Operating Instructions

Translation of original operating instructions

TRANS MOBIL TM Installation Carrier

TM-150-D-A-XL

Bitte beachten Sie, dass das Produkt ohne vorliegende Betriebsanleitung in Landessprache nicht eingesetzt / in Betrieb gesetzt werden darf. Sollten Sie mit der Lieferung des Produkts keine Betriebsanleitung in Ihrer Landessprache erhalten haben, kontaktieren Sie uns bitte. In Länder der EU / EFTA senden wir Ihnen diese kostenlos nach. Für Länder außerhalb der EU / EFTA erstellen wir Ihnen gerne ein Angebot für eine Betriebsanleitung in Landessprache, falls die Übersetzung nicht durch den Händler/Importeur organisiert werden kann.

Please note that the product may not be used / put into operation without these operating instructions in the national language. If you did not receive operating instructions in your national language with the delivery of the product, please contact us. In countries of the EU / EFTA we will send them to you free of charge. For countries outside the EU / EFTA, we will be pleased to provide you with an offer for an operating manual in the national language if the translation cannot be organised by the dealer/importer.

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2 EC-Declaration of Conformity

Description:	TRANS MOBIL TM Installation Carrier
Type:	TM-150-D-A-XL
Order-Nr.:	5222.0012

Manufacturer: Probst Greiftechnik◆Verlegesysteme GmbH
Gottlieb-Daimler-Strasse 6
D-71729 Erdmannhausen
info@probst.eu www.probst.eu

Complies with the following provisions applying to it

EC-machinery directive 2006/42/EG

Applied harmonized standards in particular

DIN EN ISO 12100

Safety of machinery - General principles for design - Risk assessment and risk reduction (ISO 12100:2010)

DIN EN ISO 13857

Safety of machinery — Safety distances to prevent hazard zones being reached by upper and lower limbs (ISO 13857:2008)

DIN EN 349 (ISO 13854)

Minimum distance to avoid squeezing any parts of the body

DIN 45635-13

Measurement of airborne noise emitted by machines (displacement-, turbo- and jet-compressors).

DIN EN 1012-1 / DIN EN 1012-2

Compressors and vacuum pumps; Safety requirements part 1 and 2.

DIN EN 60204-1 (IEC 60204-1)

Safety of machinery, electrical equipment of industrial machines. Part 1: General requirements.

2006/95/EC (Low voltage standard)

2004/108/EC (Electromagnetic compatibility)

DIN EN 55014-1 (IEC/CISPR 14-1)

Electromagnetic compatibility – Requirements for household appliances, electric tools, and similar apparatus. Part 1: Emission.

DIN EN 55014-2 (IEC/CISPR 14-2)

Electromagnetic compatibility – Requirements for household appliances, electric tools, and similar apparatus. Part 2: Immunity.

Authorized person for EC-dokumentation:

Name: J. Holderied
Address: Probst Greiftechnik◆Verlegesysteme GmbH; Gottlieb-Daimler-Str. 6; D-71729 Erdmannhausen

Signature, informations to the subscriber:

Erdmannhausen, 02.11.2016.....

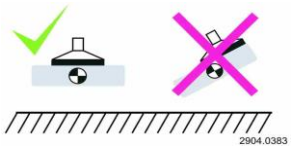
(M. Probst, Managing director)

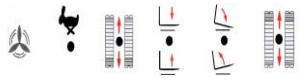
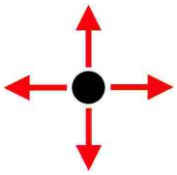
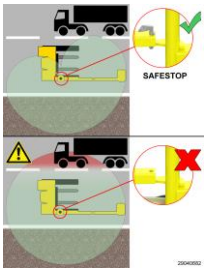
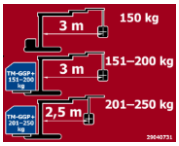
3 Safety

3.1 Safety Symbols

	***Danger to life!*** Identifies imminent hazard. If you do not avoid the hazard, death or severe injury will result.
	***Hazardous situation!*** Identifies a potentially hazardous situation. If you do not avoid the situation, injury or damage to property can result.
	***Prohibition!*** Identifies imminent a prohibition. If you do not avoid the prohibition, death and severe injury, or damage to property will result.

3.1 Safety Marking

WARNING SIGN			
Symbol	**Meaning**	**Order-No.:**	
	It is not allowed to stay under hanging loads. **Danger to life!**	2904.0210 2904.0209 2904.0204	30 mm 50 mm 80 mm
	Do not lift any components off-centre.	2904.0058	
	Fill-in only diesel – NO bio-diesel!	2904.0483	
WARNING SIGN			
Symbol	**Meaning**	**Order-No.:**	**Size:**
	Danger of squeezing the hands.	2904.0221 2904.0220 2904.0107	30 mm 50 mm 80 mm

REGULATORY SIGN			
Symbol	**Meaning**	**Order-No.:**	**Size:**
	Each operator must have read and understood the operating instructions (and all safety instructions).	2904.0665 2904.0666	30 mm 50 mm
	Use ear protection	2904.0298	50 mm
	ATTENTION! Clean filter daily with compressed air. Do not hit filter cartridge against any object!!! Exchange in case of much dirt.	2904.0687	Ø 50 mm
OPERATING HINTS			
Symbol	**Meaning**	**Order-No.:**	**Size:**
	Function levers for vacuum and driving activity	2904.0478	185x30 mm
	Joystick for adjust the mast	2904.0477	50x50xmm
	Swing range must be limited when working direct on roadways – **danger** of accidents with motorcars.	2904.0682	100x132
	Information about the working load limit on the type plate of the suction plate has priority!	2904.0730	48x125 mm
	Information about the maximum load depending on counterweight and outreach.	2904.0731	95x75 mm

3.1.1 Function Control

- Before using the device check the functions and the working condition.
- Maintenance and lubrication are only permitted when device is shut down!

- Do not use the device, until all faults which can cause safety hazards are removed.
- If there are any cracks, splits or damaged parts on any parts of the device, **immediately** stop using it.

- The operating instructions must be available at the workplace every time.
- Do not remove the data-plates of the machine.
- Unrecognisable information signs must be replaced.

3.2 Safety at work

- The use of the vacuum lifting device is only permitted in proximity to the ground. Do not swing it over peoples heads.
- The manual guiding of is only allowed for devices with handles.
- The operator is not allowed to leave the control unit as long as the vacuum lifting device loaded with load (stone slab). The load must always be in the range of vision of the operator.

- Always keep an eye on the vacuum gauge. Never lift loads when the vacuum is below the required under pressure (mbar). If the pointer of the pressure gauge moves into the red danger zone, **lower the load immediately! Danger! Load could fall down!**

- While using the vacuum lifting device is the stay of persons in the working area forbidden. Except it is indispensable. Caused of the way of using the vacuum lifting device , e.g. if the device must be leaded by hand.

- While using the vacuum lifting device be sure that there are no persons in the working area. **Danger to Life!!**
- The device must never be subjected to a force acting in a lateral direction due to diagonal pulling.
- Do not lift any components off-centre, because that could fall down. **Danger of tilting!**
- Release the load only when it is completely safely resting on the surface. **Keep fingers away from the load when you release it as they can be crushed!**
- The capacity and the nominal width the vacuum lifting device are not allowed to cross over.
- Do not use the vacuum lifting device to jerk seized set down load.
- Avoid quick or jerky movements with the vacuum lifting device. E.g. caused through driving fast over uneven grounds/site is **forbidden**. ***Because the gripping good could fall down.***

3.3 Instructions for the Company

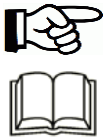
The lifting devices are manufactured according to current technical standards and are safe. However, they will present hazards

- if they are not operated by qualified or, at the least, trained staff,
- if they are used contrary to the approved applications.

Problems can arise

- for the health and life of operators and other persons,
- for the lifting device and other valuable goods.

3.4 Instructions for Installation, Maintenance and Operating Personnel



The device must be installed and maintained by qualified personnel, mechanics and electricians.

Each person in your company involved in the installation, start-up, operation, maintenance, and repair of the device must have read and understood the operating instructions and especially the chapter "Safety" therein.

Your company must ensure by internal measures

- that the operators of the lifting device are properly trained,
- that they have read and understood the operating instructions,
- that the operating instructions will be available to them at any time.

The responsibilities for the tasks carried out with the device must be clearly organized and observed. There must be no ambiguity regarding responsibilities.

3.5 Requirements for the Installation Location

- The lifting vacuum lifting device may not be used in explosion-risk rooms or areas.
- The ambient temperature may not exceed and 40 °C (if this temperature is exceeded, please consult the manufacturer before using the device).
- The vacuum lifting device must be connected to the electrical supply and the main switch of the crane from which it is suspended.
  Ensure, by means of internal instructions and regular inspections, that the area around the workplace is kept clean and tidy at all times.

3.6 Special Hazards

- The operating range has to be covered for unauthorized persons, especially children.
- The workplace has to be sufficiently illuminated.
- Take care when handling wet, dirty and not solidified components.

- **The working with the vacuum lifting device in case of atmospheric editions under 3° C (37,5° F) is forbidden! Because the goods could be fall down caused by dampness or freezing.**
- Take care in case of thunderstorm!
- Since the load is held on the suction plates of the unit by a vacuum, it will fall off as soon as this vacuum is lost (e.g. energy failure).
- This can happen if the vacuum generator fails. An integrated vacuum reservoir maintains the vacuum for a short safety period whose duration depends on the porosity of the work piece surface.
- If the vacuum generator fails, lower the load immediately if this is possible. Otherwise, leave the danger area below the load immediately.
- The unit draws in large amounts of air and hair and items of clothing can be drawn into the air inlet. **Do not** look into the air inlet when the unit is running: it is even possible for your **eyes to be drawn into the air inlet.**

3.6.1 Hydraulic excavator and other lifting equipments

- Hydraulic excavator and other lifting equipments have to be in good, safe working condition.
- Only authorized, certificated and qualified personnel is allowed to operate the excavator and other lifting equipments.
- The operator staff must have all the necessary qualifications.

- **Take care that the maximum capacity of the hydraulic excavator and other lifting equipments is not exceeded.**

3.7 Workplaces

- The workplace of the operator is in front of the operator handle.
- The operator must stand so that he can see the vacuum gauge at all times.

3.8 Behaviour in Emergencies

An emergency situation exists when:

- power suddenly fails (unit switches off),
- the vacuum drops below -0.42 bar (red area of the pressure gauge).

- In such cases, lower the load immediately if this is possible. Otherwise, leave the danger area below the load immediately. **The load will be dropped from the lifting device!**

3.8.1 Inspecting the vacuum hoses and hose clamps

- Check that all vacuum hoses and hose clamps are securely seated. Tighten any loose connections.

3.8.2 Testing the vacuum reservoir

- See the sub-section "Leak test" in the section ”Maintenance”

- Rectify any detected faults before using the lifting device. If a fault becomes apparent during, switch off the lifting device and rectify the fault.

3.9 Damages of suction plate

Avoidance of damages:

To avoid damages of the rubber seal on the suction plate (chinks, abrasion) take notice, that:

during the operation (lifting, transporting and lowering) with the device, the suction plate does not brush or pump against other products or materials.

Otherwise the rubber seal on the suction plate could be damaged (danger of pressure loss).

Product could fall down. **Danger of accidents!**

3.10 Protective equipment

The protective equipment must consist, according to the safety regulations of the following parts:

- Protective clothing
- Safety gloves
- Safety shoes
- Hearing protector

3.11 Behaviour in Emergencies

An emergency situation exists when

- power suddenly fails (device switches off),
- the vacuum pressure drops below -0.42 bar to the red section on the scale of the vacuum gauge.

Lower the load immediately if possible. If this is not possible, immediately leave the dangerous area near the load, since it will be dropped from the device.

3.12 Checking the Safety Devices

The lifting device is equipped with following safety devices:

- vacuum gauge with red danger zone
- warning device, audible (optional)

Check these devices at the beginning of each shift (when operating in shifts) or once a week (when operating continually).

Checking the Vacuum Gauge and the Warning Device

Warning device monitors the operating vacuum and power failure

⇨ Switch on the lifting device.

⇨ Place the lifting device on a stone slab or similar material and apply vacuum.

Caution: Simply apply vacuum to attach the suction pads to the stone slab. Do not lift the stone slab, since it may be dropped during the test!

⇨ When the vacuum has built up, lift the edge of a suction pad to create a leak.

⇨ **The reading on the vacuum gauge decreases. When the vacuum drops below red danger zone, the warning device must sound.**

Checking the Vacuum Hoses and Hose Clamps:

Check all vacuum hoses and clamps for proper mounting and tighten the clamps if necessary.

Checking the Vacuum Reservoir

See “Testing for Leaks"“ in chapter “Maintenance“

Correct any faults before using the device. If faults occur during operation, switch the device off and correct the faults before continuing work with the device.

3.13 Unauthorized transportations

All unauthorized transportations with the device <u>are not allowed</u>!

- Transportation of people and animals.
- Transportation of other loads and material than described in this manual.

3.14 Unauthorized alterations

All unauthorized alterations of the device and the use of any self-made additional equipment could cause danger and are therefore forbidden!!

4 General

4.1 Authorized use

The device **"*Trans Mobil*" (*TM-150-D-A-XL*)** is a mobile device for transporting of complete palettes of building material (up to a maximum **1500 kg**) as well as for lifting and installation of concrete elements, naturals stones, kerbstones, slabs etc. up to a maximum of **150 kg** with the corresponding vacuum suction plates (at the vacuum hose lifter).

These device is series equipped with the following elements:

- Vacuum lifting unit including one standard suction plate with 150 kg (330 lbs) capacity.
- Mast of the vacuum laying unit can be adjusted to allow positioning of the lifting unit light as a feather alongside the horizontal jib. Adjustment approx. +/- 10degree).
- Knuckle/ shifting jib with „SAFESTOP" to limit the swing area into a trafficked area (when install kerb stones on trailing roadway) to avoid accidents with motorcars.
- Lifting unit is equipped with 2 fork tines (working length 1,090 mm (43"), horizontally adjustable. Lifting height of the lifting unit 340 mm (131/2"), lifting capacity 1,500 kg (3,300 lbs).

The deployment of the device (*TM-150-D-A-XL*) in confined space or areas that implicate danger of explosion or fire is prohibited due to the diesel engine.

The use of this device is only permitted in proximity to the ground.
The Load must not be lifted above 1,8 m (70,8 inch)!

Only suction plates of the manufacturer **PROBST** shall be used!!!

The use of suction plates with a smaller carrying capacity than the lifting unit is *forbidden!*
Danger: Load will fall down.
(It is permissible to use suction plates with a higher carrying capacity than the lifting unit)

- Some suction plates which can be mounted to the device will reduce its carrying capacity.
  The maximum load is indicated on each suction plate.
- Use only suction plates which are ***approved*** for this device!
- ***Do not exceed*** the maximum carrying capacity of the suction plates!!!
  Danger: Load (stone slabs) **will fall down!**

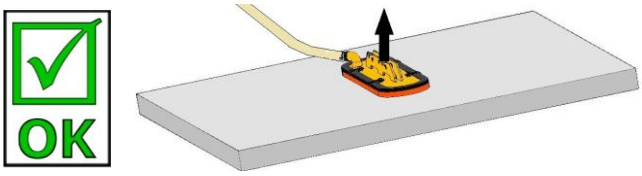
- The device is only designed for the use specified in this documentation.
- Every other use is not authorized and is forbidden!
- All relevant safety regulations, corresponding legal regulations, especially regulations of the declaration of conformity, and additional local health and safety regulations have to be observed.

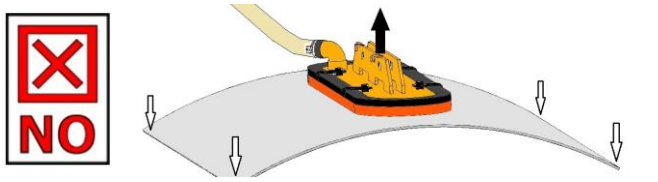
Prior to every operation the user must ensure that:

- the equipment is suited to the intended operation, the functioning and the working condition of the equipment is examined, and the loads are suitable to be handled.

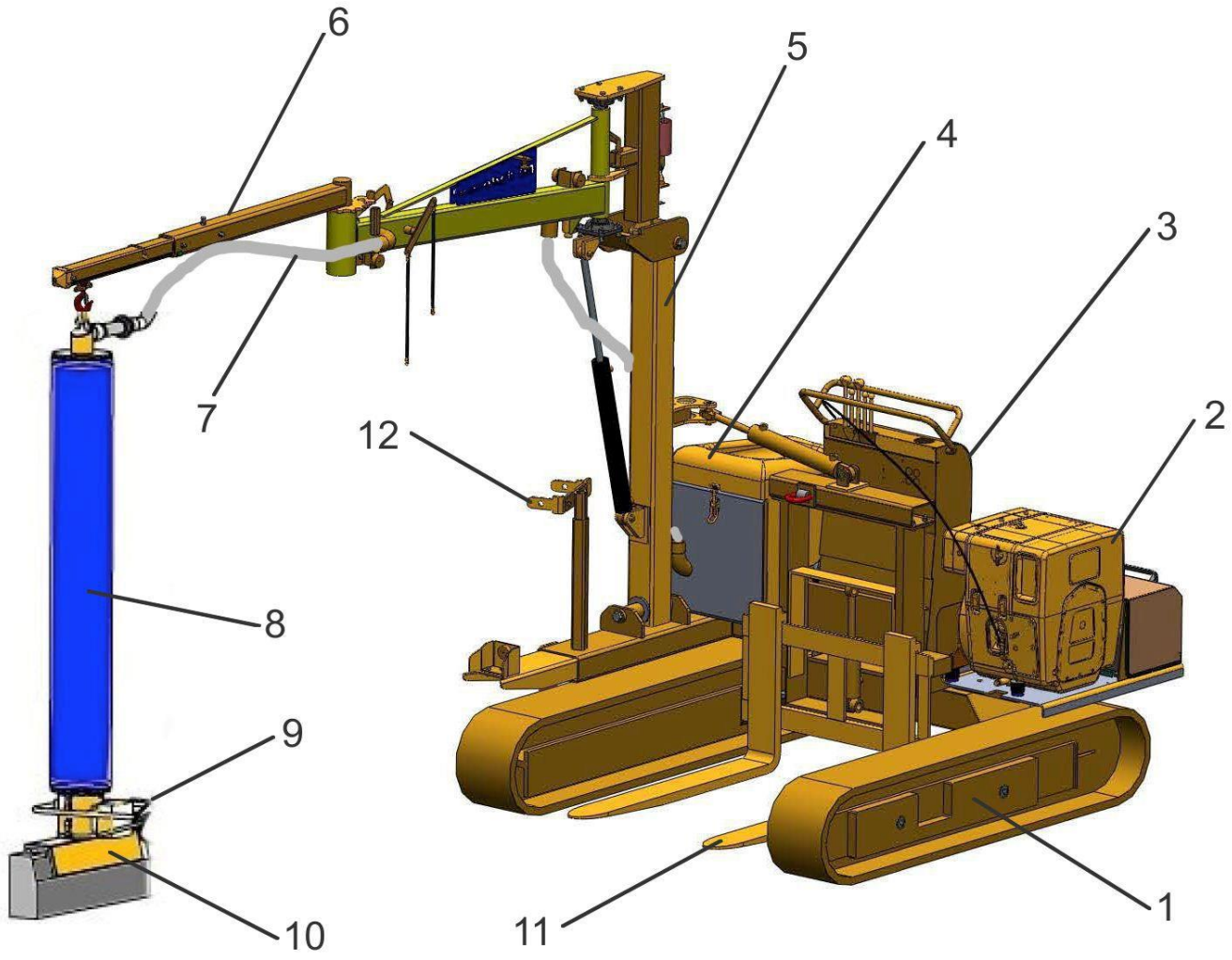
Any doubts about instructions should be raised with the manufacturer prior to use.

- The load (stone slabs) which is to be sucked and transported, must have sufficient inherent stability, otherwise there is **risk of breakage** when lifting!
- Stone slabs **must not** be bend when lifting - especially take care with thin and large-sized stone slabs!
- Generally, the load (stones slab) is only to be sucked in the **middle**, otherwise the load hangs diagonally under the device and the load could break - especially when lifting large stone slabs with a small suction plate.
- Standard suction plates are not suitable for the transport of glass plates!





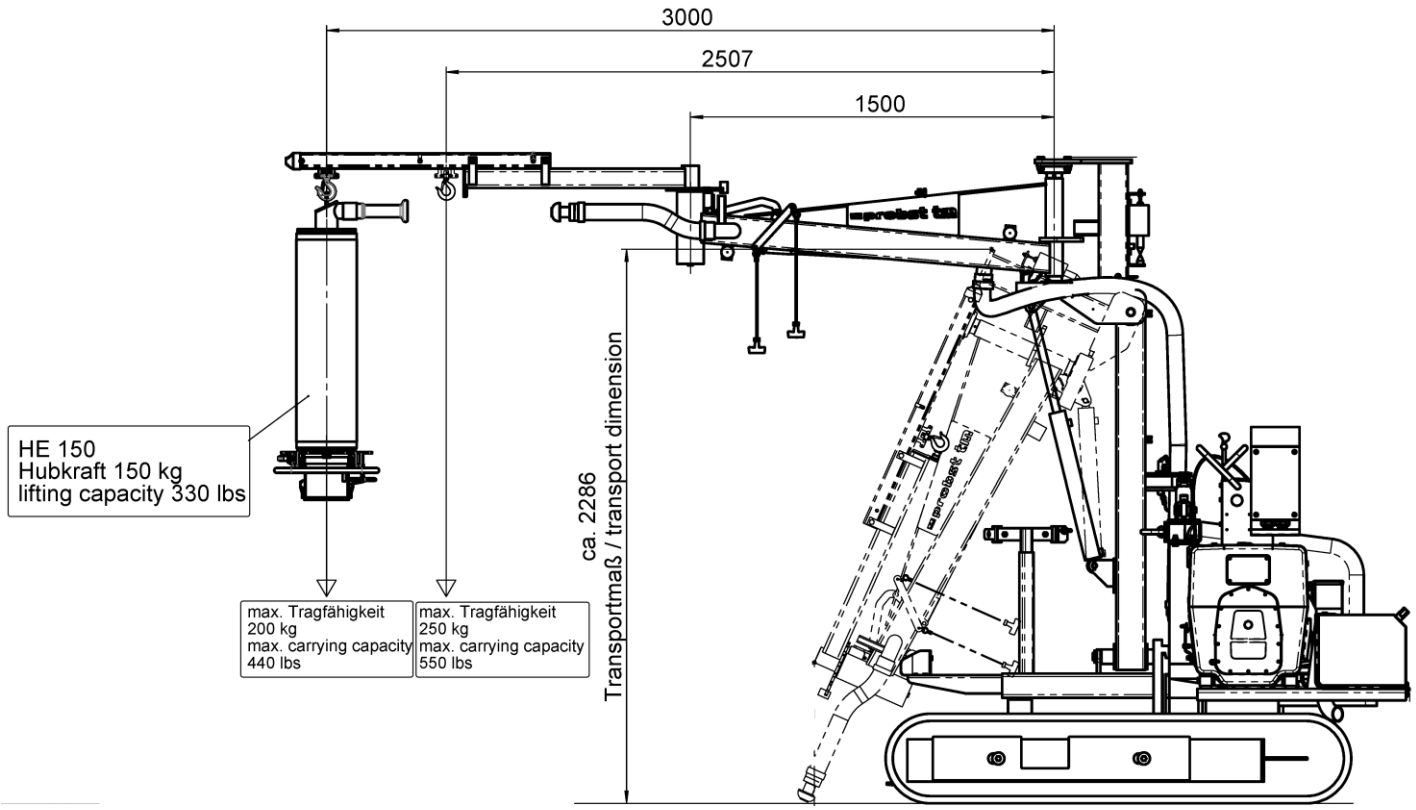
4.2 Survey and construction



1	Track set with drivers step	7	Vacuum suction hose
2	Drive (diesel engine)	8	Lifting hose unit
3	Control unit	9	Operating valve unit
4	Vacuum supply	10	Suction plate
5	Mast	11	Fork tines (paletts lifting unit)
6	Knuckle boom jib	12	Park position for operating valve unit

4.3 Technical Data

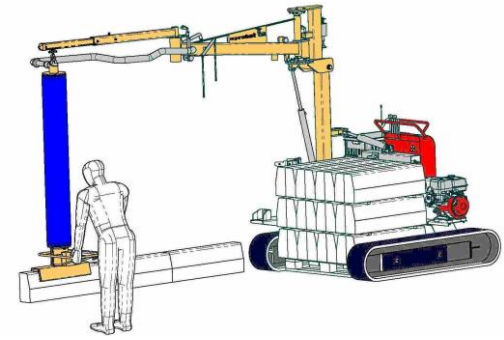
Type:	Drive	Reach	Lifting Capacityof Vacuum Laying Uni**	Payload *	Dead Weight
TM-150-D-A-XL	Diesel engine 9,6 kW	3.000 mm (118″)	150 kg (330 lbs)	1.500 kg (3,300 lbs)	ca. 1.540 kg (approx. 3,400 lbs)
	Overall width	**Total height** (in transporting position)	**Total length** (in transporting position)	**Maximum Travel speed**	
	1.910 mm (75″)	2.280 mm (90″)	2.300 mm (91″)	~ 2,2 km/h (1,36 miles/h)	



** With more powerful lifting hose unit, proper suction plate etc. and platform for counterweight TM-GGP (42220070) upgradeable to 200 kg lifting capacity when fully extended and up to 250 kg at reduced outreach of 500 mm.

* Maximum payload/working load (lifting capacity of the forks) for the transportation of one complete pallet of building material up to maximum 1500 kg (3,300 lbs)

Definition der maximalen Nutzlast

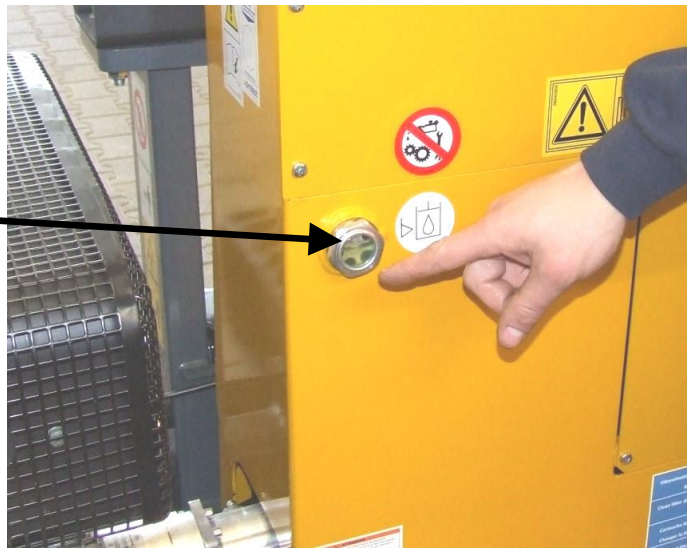
	The maximum working load (lifting capacity of the forks) is **2000 kg** (4,400 lbs) **without** the attaching of the **vacuum components.**
	Due the dead weight of the vacuum components, the maximum working load (lifting capacity of the forks) is reduced to **1500 kg** (3,300 lbs).

5 Operation

5.1.1 Starting the Diesel engine

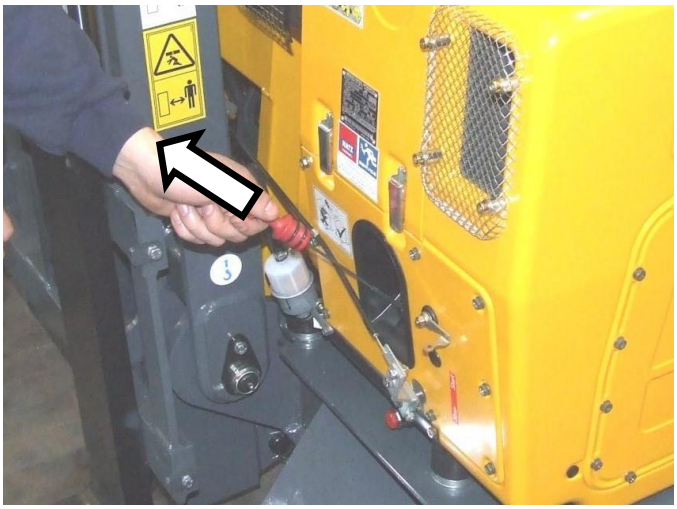
	Every emergency symbol and its corresponding explanation (icons) has to be read and understood before putting the device into operation in order to secure the user and the device.
	Read unconditional the attached operating instructions of the *diesel engine HATZ-– 1D81C* and the *tracked forklift HINOWA - TP2000* !
	Before every first start-up, check the oil level and if necessary refill oil. → Ill. A+B. (see attached operating instructions „Hinowa“). See also further maintenance instructions in the manuals of the ***diesel engine HATZ-– 1D81C.***

Ill. A



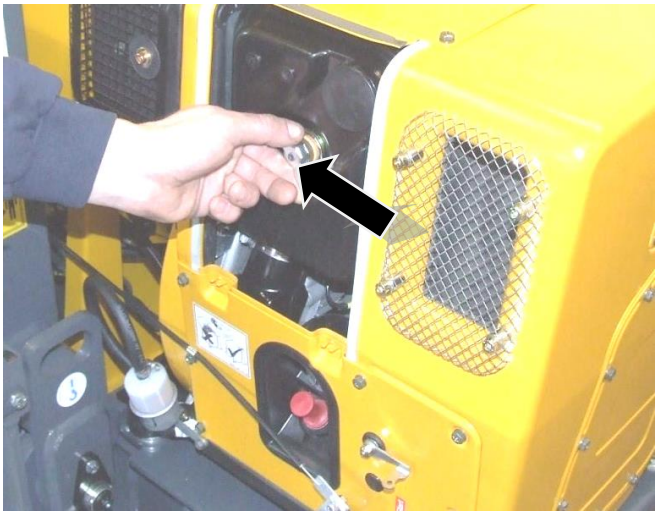
Ill. B

1.) Control daily the oil level. → Pull out oil level gauge. (→ Ill.C)



Ill. C

2.) Check daily air filter for dirt and clean if necessary (→ Ill.D)



Ill. D

1.) Open cover cap. (Ill. 1).

Ill. 1

2.). Start up the engine at the main switch (on vertical position (Ill.2)

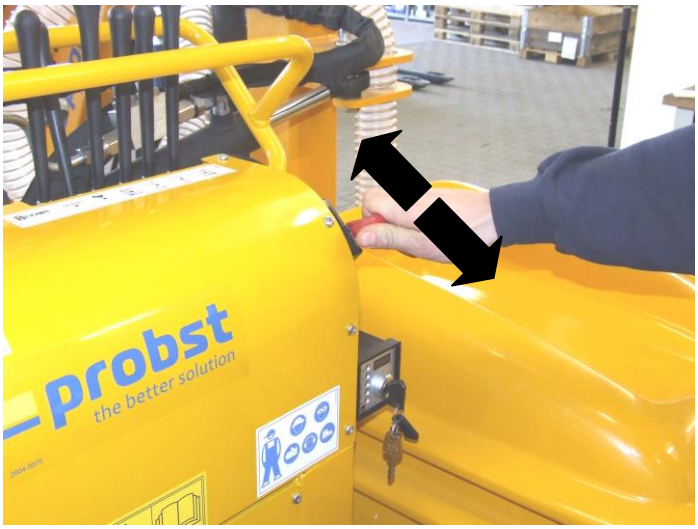
Ill. 2

Before the diesel engine can be started, move **first** the selector switch at the control unit to the position "**Hand**" (and left it in this position).

3.) Start the HATZ Diesel engine. Move switch to "ON" (↘). Insert and rotate ignition key (↙). (Ill. 3)

Ill. 3

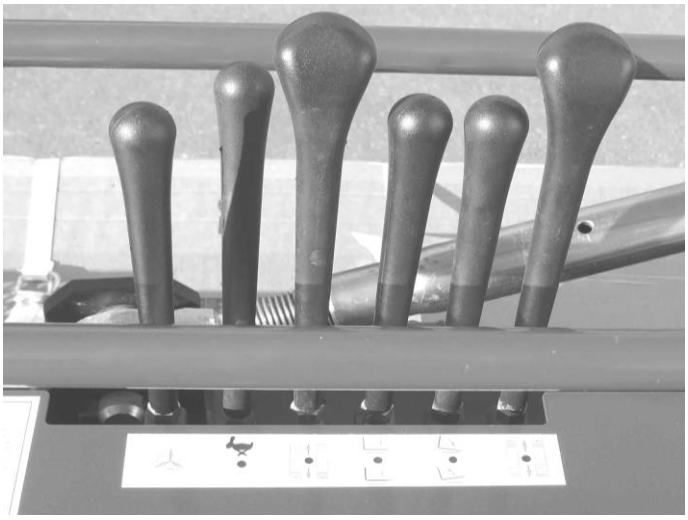
4.). Regulate the engine speed (↖ ↘). (→ Ill. 4)



Ill. 4

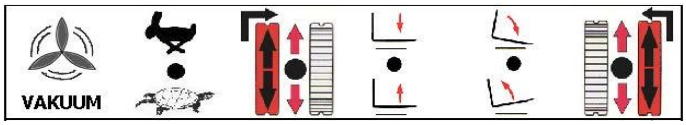
5.2 Driving of the truck set - general

5.) Familiarise yourself with the control lever on the truck set. (see the attached operating instructions "Hinowa") (→ Ill. 5)



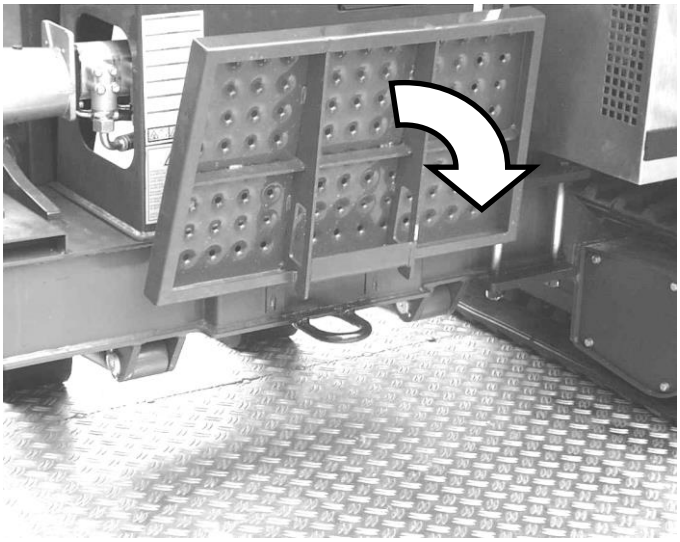
Ill. 5

6.) Activate the corresponding market function lever to drive with the device (TM) → see symbol sticker (Ill. 6)



Ill. 6

7.) Fold drivers step down. (→ Ill. 7)

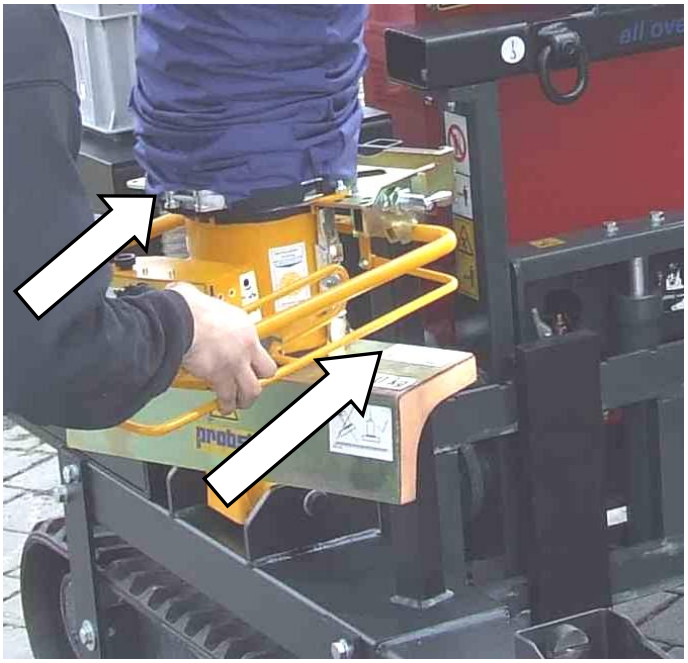


Ill. 7

8.) The driver is standing on the step while driving. (→ Ill. 8)

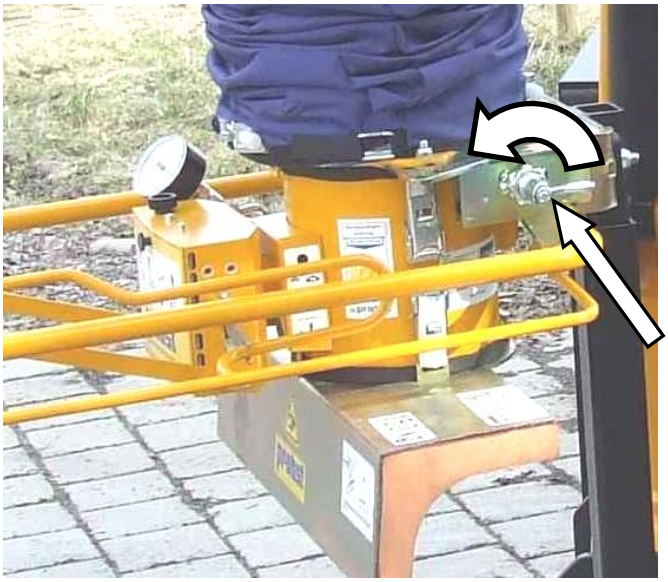
Ill. 8

9.) Secure the *vacuum hose lifter unit* against swinging around before every driving with the device (TM) (→ Ill.9 ↗↗) **Danger of injury!**



Ill. 9

10.) Engage both spring bolts, that the *vacuum hose lifter unit* can not slide out from the holder. (→ Ill.10)



Ill. 10

5.3 Installing the boom jib

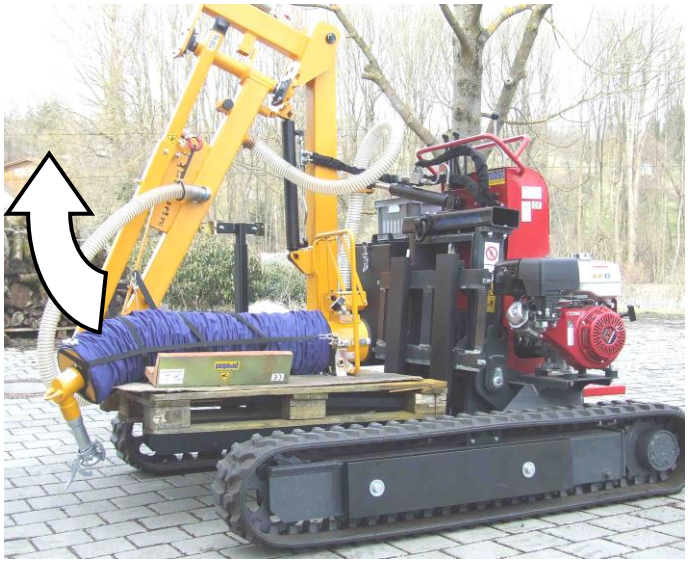
Before the diesel engine can be started, move **first** the selector switch at the control unit to the position "**Hand**" (and left it in this position).

(→ Ill. 0)

Ill. 0

1.) To install the boom jib, start the HATZ Diesel engine. (see chapter „Starting the Diesel engine“). (→ Ill. 1)

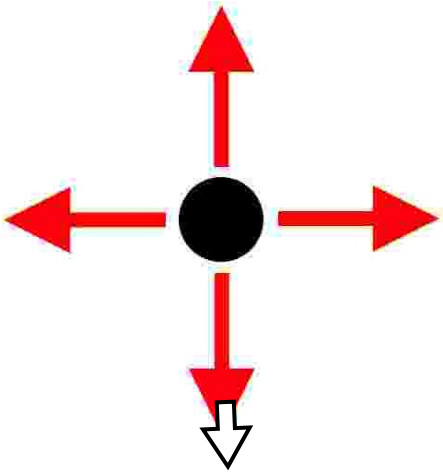
Ill. 1



Ill. 1A

2.) To install (lift up) the boom jib press the control button "backwards" (in direction to the operator).(→ Ill. 2 +2A+3)

Ill. 2



Ill. 2A

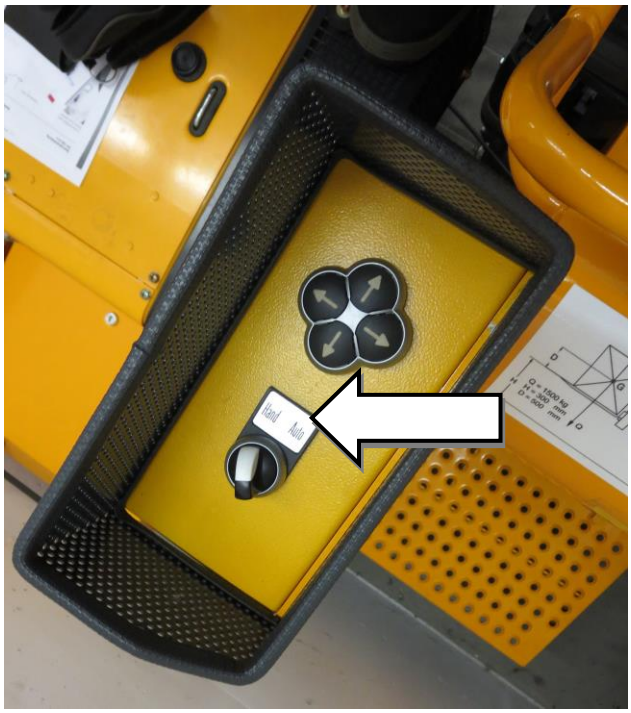
<u>Alternative: use automatic operation</u>

When the selector switch is on position "**Auto**", the boom jib moves "automatically" to the top. (see figure alongside „Ill. 2B")

While using the automatic operation is the stay of persons in the working area forbidden.

Danger of injury!

To stop the automatic operation move the selector switch at the control lever to the position "Hand"

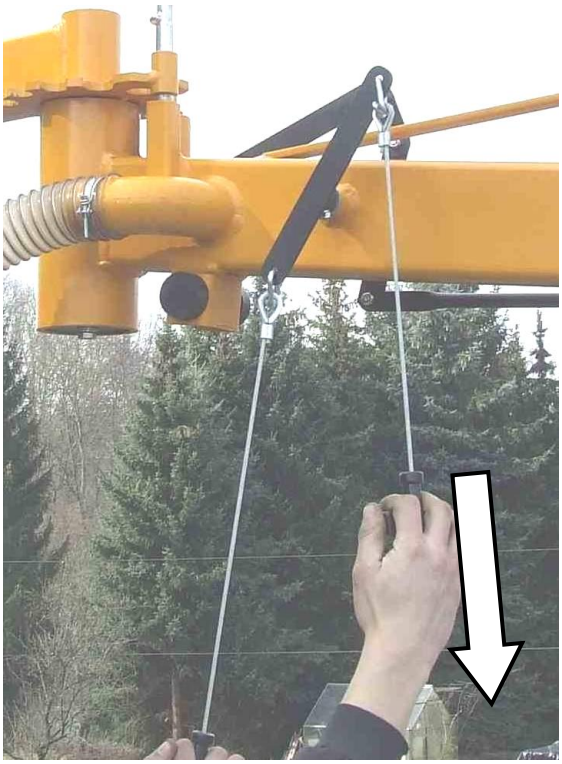


Ill. 2B

3.) Put up the boom jib about approx. 45 °. (→ Ill. 3).

Ill. 3

4.) Pull at the cord (🡻) to release the locking lever at the gear ring (on the boom jib).



Ill. 4

5.) Swing the boom jib complete out (→ Ill. 5), untill the rear and front part are in the same line.

Ill. 5

6.) Pull at the cord (🡻) to lock the locking lever at the gear ring (on the boom jib). Therefore the boom jib is stiff. (→Ill. 6 see 🡻)

Ill. 6

7.) Suction hose is fixed with a rubber band (against swivelling around) at the mobile jib hook. Remove rubber band from the suction hose and put the suction hose on the floor (→ Ill. 7).

Ill. 7

8.) Connect the lifting hose unit at the jib hook (→ Ill. 8).

Ill. 8

9.) Fit the suction hose at the coupling element (of the lifting hose unit) (→ Ill. 9).

Ill. 9

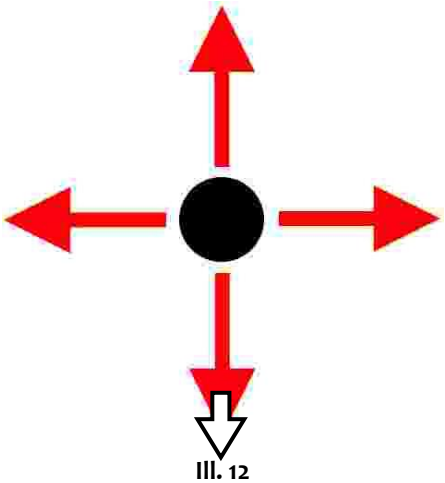
10.) Close the quick fastener at the lifting hose unit (→ Ill. 10).
ATTENTION: Danger of squeezing the hands!

Ill. 10

11.) Lift up the boom jib about. 90 °.
Move first the selector switch at the control unit to position the "**Hand**" and then press the control button “backwards” (in direction to the operator). (→ Ill. 11+12)

Ill. 11

12.) - - - - -



Ill. 12

<u>**Alternative: use automatic operation**</u>

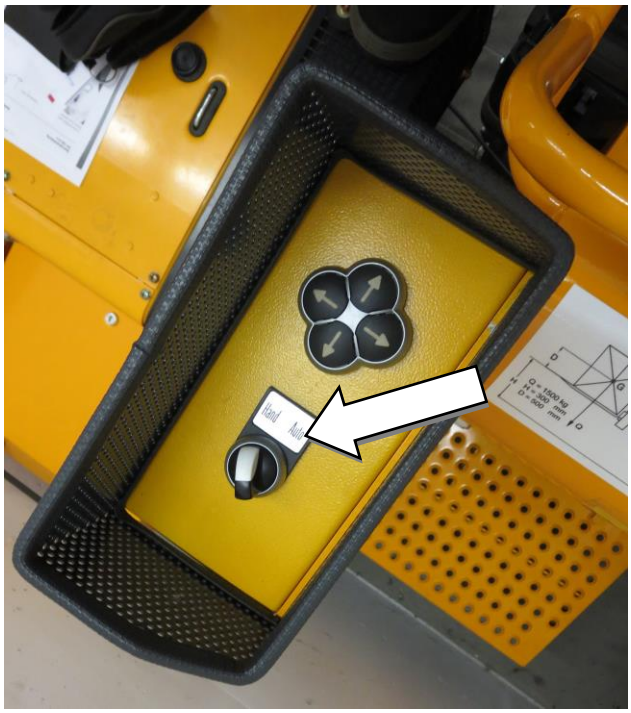
When the selector switch is on position "**Auto**", the boom jib moves "automatically" to the top. (see figure alongside „Ill. 11B“)

While using the automatic operation is the stay of persons in the working area forbidden.

Danger of injury!

To stop the automatic operation move the selector switch at the control lever to the position "Hand"

Ill. 11B



5.4 Align the Mast

13.) Before every start-up, the mast has to be adjusted (aligned) to the slope of the ground.

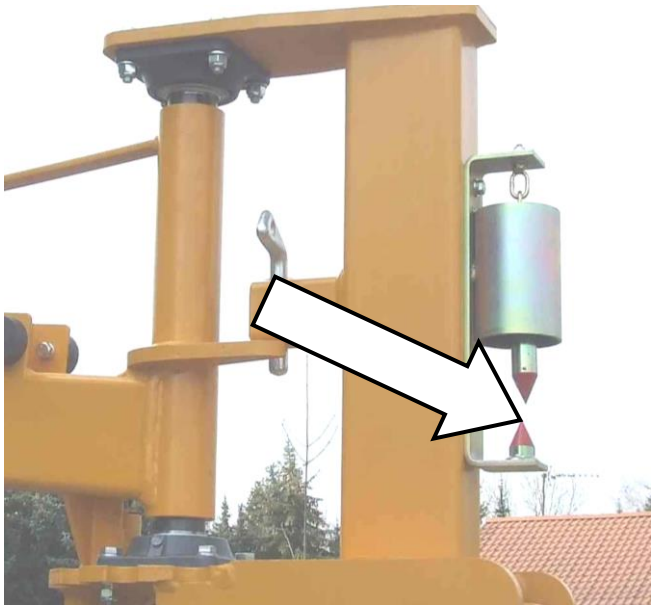
Move therefore selector switch to the position "**Hand**" and then press the control buttons “right” , “left”, “backwards” or “forwards”. (→ Ill. 13+12).

Ill. 13

Alternative: use automatic operation

If the selector switch is on the position "Auto", the mast aligns "automatically" to the slope of the ground. (see figure alongside „Ill. 14A“)

14.) Orientation of the slope (of the ground) with the help of the plumb bob (→ Ill. 14 see ↘).



Ill. 14

Ill. 14A

15.) Connect the operating valve unit with the suction plate. Fit both quick fasteners of the operating valve unit at the suspension hooks of the suction plate. → Ill. 15

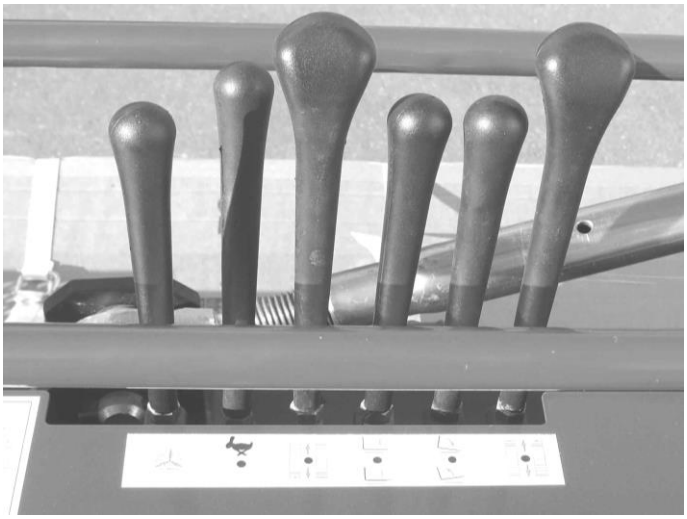
Ill. 15

16.) Close quick fasteners of the operating valve unit (click downwards) – therefore the suction plate is fixed with the operating valve unit. (→ Ill. 16)

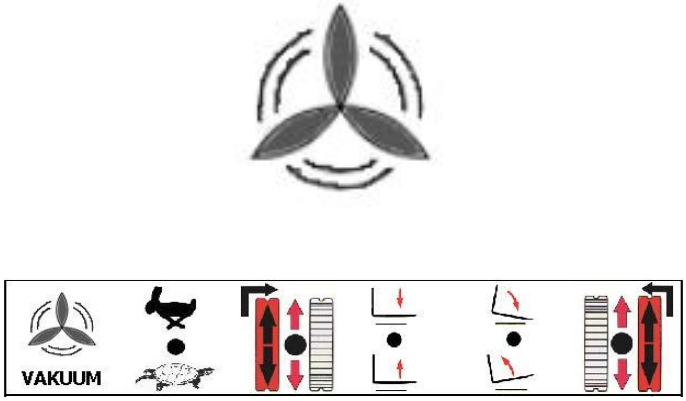
Ill. 16

5.5 Vacuum Laying

1.) Activate the corresponding market function lever to work with the *vacuum hose lifter unit* with the device (TM) → see symbol sticker. (→ Ill. 1+1A)

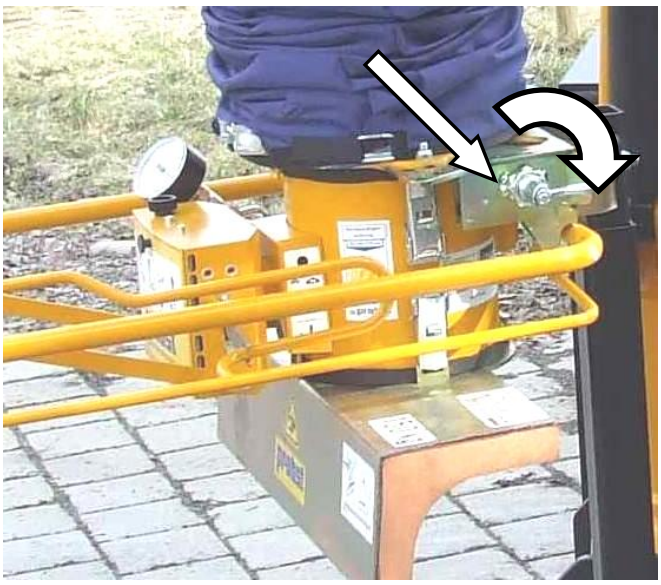


Ill. 1



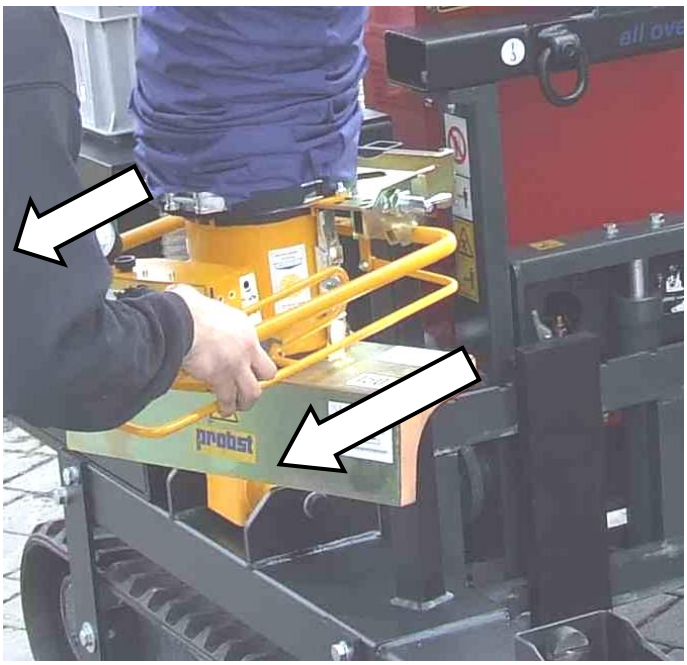
Ill. 1A

2.) Engage both spring bolts (↘) at the holder (of the vacuum listing hose unit). (Ill. 2)



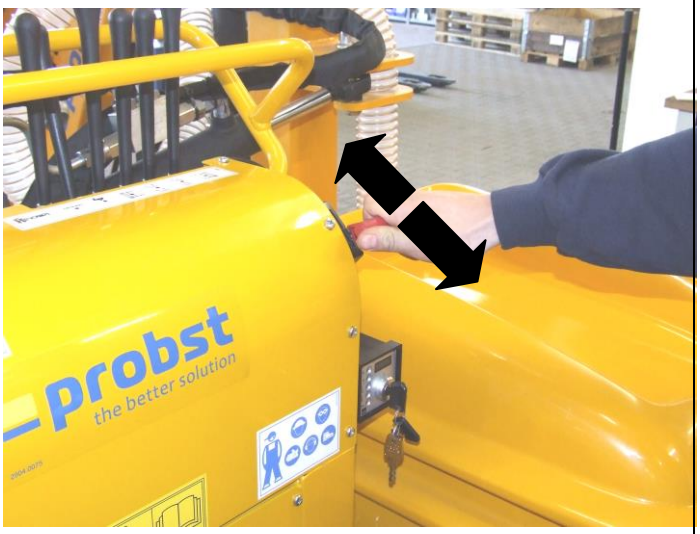
Ill. 2

3.) Remove the vacuum hose lifter unit slowly from holder. (→ Ill. 3). Danger of injuring the hands!



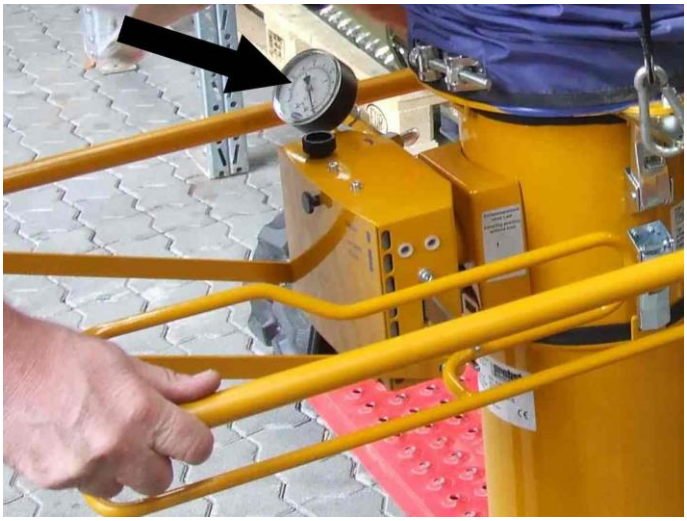
Ill. 3

4.) Regulate the engine speed. (→ Ill. 4)



Ill. 4

5.) Adjust engine speed so, that the manometer (at the vacuum control unit) shows minimum **-0,42 bar**, as soon as a load is sucked.(→ Ill. 5)



Ill. 5

6.) Open both snap hooks of the vacuum hose corset (see ↙ Ill. 6) and clip the snap hooks in the middle of the corset (see ↖ Ill. 7).

Ill. 6

7.) Vacuum hose is now released and ready for vacuum operation.

Ill. 7

5.5.1 Adjusting the hovering position

5.5.1.1 Adjusting the hovering position without load

The hovering position <u>without load</u> must be adjusted with each operation.

The hovering position of the lifting device must be adapted to the weight of the vacuum head.
A valve (2) in the tube support cylinder is used to adjust it.

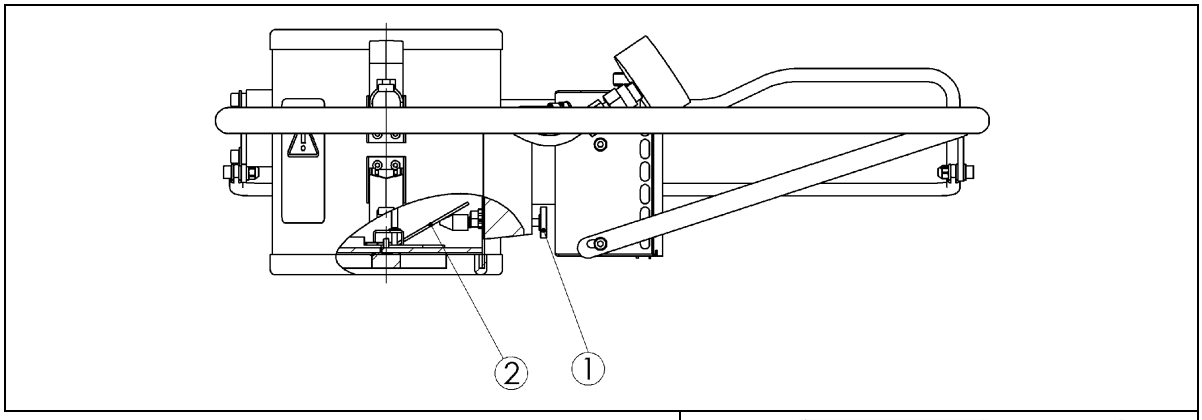
When you apply the vacuum head to the load a valve is fully opened by a plunger and the valve rod in the vacuum head. The load can be sucked and lifted.

Adjustment:

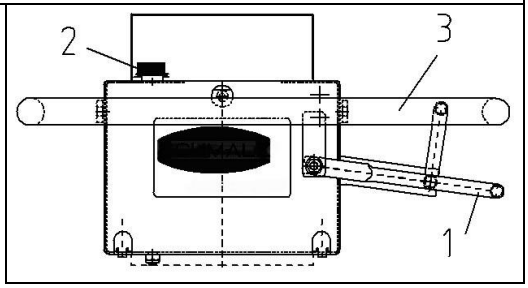
⇨ Turn the adjustment screw (1) at the operating unit (accessible from the bottom).
Turn clockwise (direction of arrow) ➔ Valve becomes opened.
Turn counter-clockwise ➔Valve becomes closed.

⇨ The farther the valve is opened the lower the device hovers.

When the valve is closed totally the device bounce up abruptly as soon the blower is switched on!



- Place the vacuum head directly above the load/kerb stone.
- Press the regulator lever (1) down. The lifting tube descends and the vacuum head lowers.
- Apply the vacuum head to the load. Distribute load evenly.
- Slowly push the regulator lever (1) upward. The device attaches to the load.

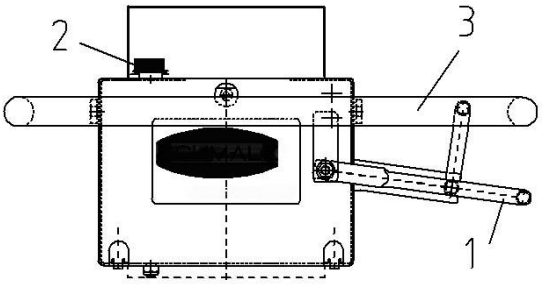


Control lever (of operating valve unit) must not be on the position “Lift”, for more than 90 seconds. Because otherwise the blower could be damaged and fail, (all guarantee claims are void) and power is wasted unnecessarily.

5.5.1.2 Adjusting the hovering position with load

Turn the adjusting screw (2) to adjust the hovering position with the load.

Caution: Do not confuse this adjustment with the hovering position without load.



⇨ Turn screw clockwise ➔ the hovering position will be lower.

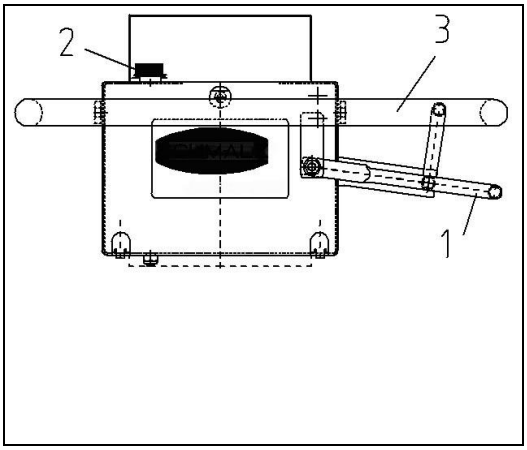
⇨ Turn screw counter-clockwise ➔ the hovering position will be higher.

Control lever (of operating valve unit) must not be on the position "Lift", for more than 90 seconds. Because otherwise the blower could be damaged and fail, (all guarantee claims are void) and power is wasted unnecessarily.

The hovering position with load should not be adjusted to the highest position of the lifting hose unit because otherwise: the blower could be damaged and fail, (all guarantee claims are void) and power is wasted unnecessarily.

- Slowly move the regulator lever (1) downward - "Lower". The lifting tube descends and the vacuum head lowers with the load.
- Do not operate the regulator lever control abruptly, while you firmly hold the handlebar (3), as this can cause the load to fall off, because the vacuum suddenly vanishes.
- Lower the load to the chosen position.
- To land the load push the regulator lever down all the way. Tip the valve control box a little and lift it off the load.

For further details see the attached operating instruction. Operating valve unit/Lifting hose unit



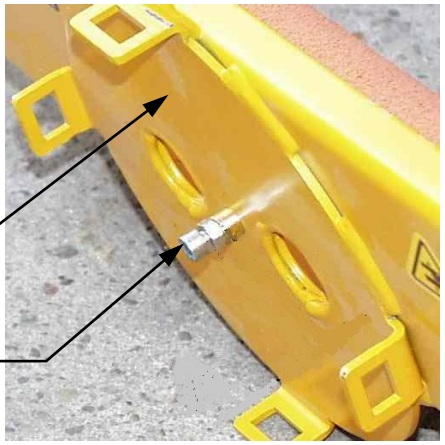
Ill. 15

Ill. 16

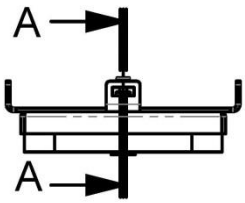
Ill. 17

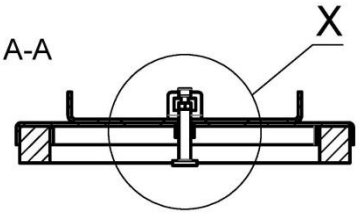
5.5.2 Valve tappet adjustment

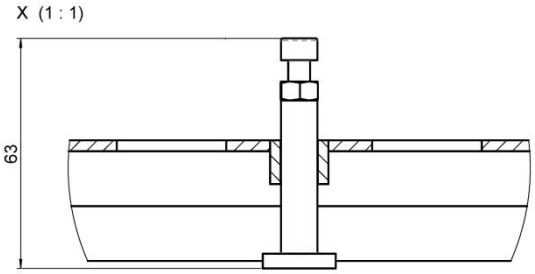
The distance of the tappet at the upper side of suction plate (mounting side operating valve unit) is adjusted to 63 mm (ex works) und secured with locknut.



Never change these distance, otherwise the load (kerb stone) could fall down. **Danger of accidence!**

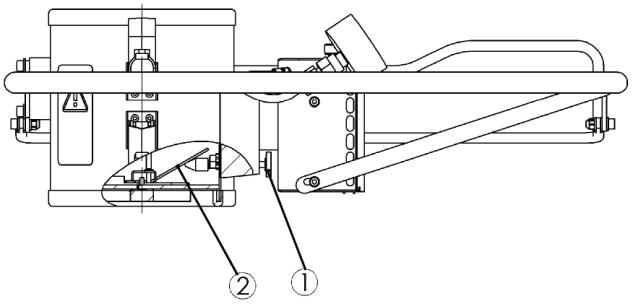






While placing the suction plate on the load/kerbstone, the installed valve tappet will completely open the flap, which is used to adjust the hoverimg position without load.

As a result the suction will be easier. In addition to that a higher level of safety is achieved, while lifting up porous materials or pick up a load beyond the center of gravity.



If it happens often that the valve tappet gets jammed, while using very dusty, dirty kerbstones/plates/etc., you can continuing work without the valve tappet.

Requirements for this are very airtight materials. But this needs to be tested by the user in each individual case. In case of doubt it is necessary to work **ALWAYS with valve tappet** and this needs to be **cleaned from time to time.**

When engine breakdown the load/kerb stones does not fall down (check valve).

Residual vacuum lowers the operating valve unit/lifting hose unit with the sucked in load/kerb stone slowly.

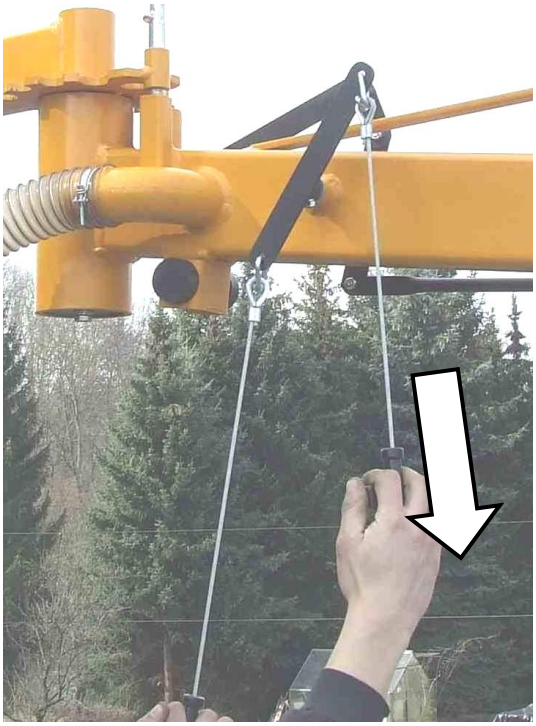
Do not use the device to jerk [sic!] seized loads/kerbstones!

No work stoppage (pause) with sucked load/kerb stone, danger of the overheating of the vacuum blower!!!

Adjust engine speed in such way that a minimum vacuum of -0.4 bar is present.

5.5.2.1 Arrange the swing range (360°)

1.) Pull at the cord (🡻) to release the locking lever at the gear ring (on the boom jib). Now the operating range of the boom jib is movable around 360°. (→ Ill. 1 +Ill. 2)



Ill. 1

2.) The locking device releases the two bolts at the turning points (rear and in the middle at the boom jib) see 🡹🡻) (→ Ill. 2)

Ill. 2

3.). Remove both socket pins at the crane boom (🡽) to swing the boom jib around 360°. (→ Ill. 3 +Ill. 4)

Ill. 3

4.). (→ Ill. 4)

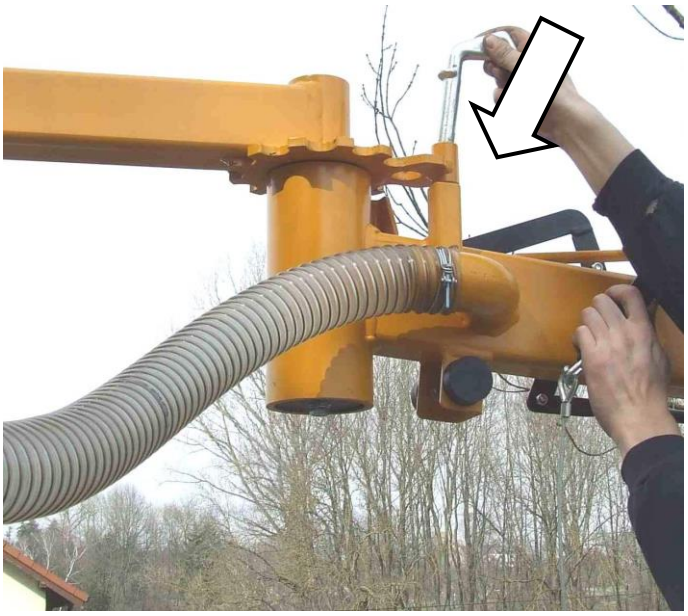
Ill. 4

5.5.2.2 Arrange the swing range (limited)

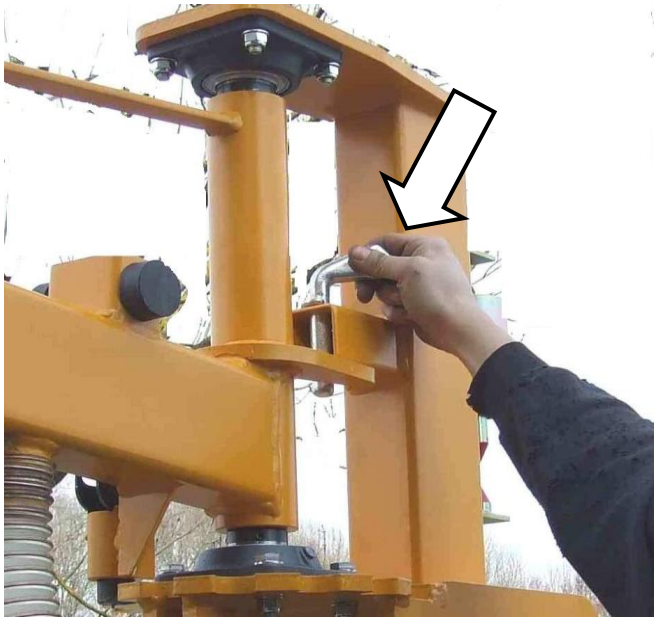
The using of the working range of the crane boom around 360° is strictly forbidden, when working direct on roadways – danger of accidents with motorcars, if vacuum lifting hose unit swings in to the roadway area!

The swing area of the vacuum lifting hose must be limited for the dangerous area (trailing roadway). Therefore limit the swing area of the crane boom with the corresponding socket pin.

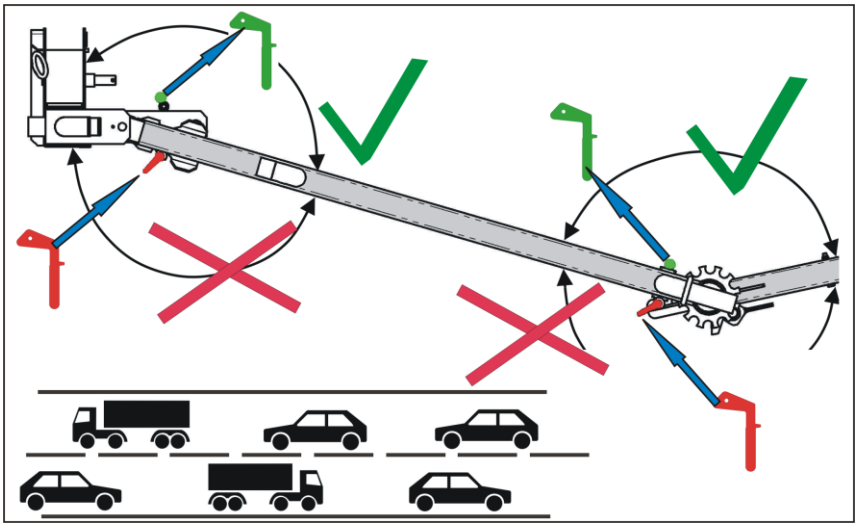
5.) Move the boom jib to the left and insert the corresponding 2 socket pins (right side in direction of travelling) at the boom jib (🡼) to delimit the working range of the crane boom to the right.→ **Ill. 5 und Ill. 5A**



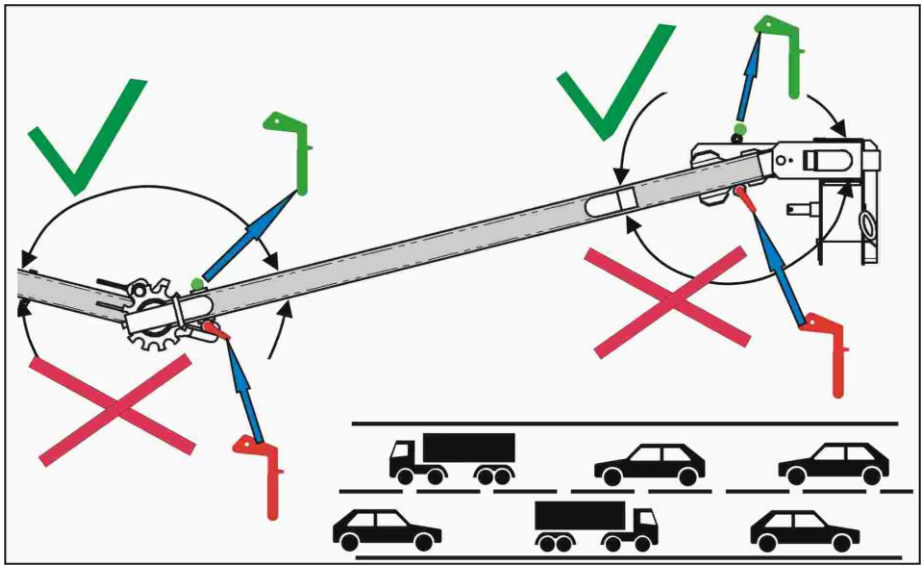
Ill. 5



Ill. 5A



6.) Move the boom jib to the right and insert the corresponding 2 socket pins (left side in direction of travelling) at the crane boom (🡼) to delimit the working range of the crane boom to the left → **Ill. 5 und Ill. 5A**



5.5.3 Handling general

1.) Suck load. (→ Ill. 1)

Ill. 1

2.) Lift the load (kerbstone) and transport it to the place of destination. (→ Ill. 2)

Ill. 2

3.) Lower and deposit the load (kerbstone) and take a new load (kerbstone) from the palette. (Ill. 3)

Ill. 3

5.6 Damages of suction plate

Avoidance of damages:

To avoid damages of the rubber seal on the suction plate (chinks, abrasion) take notice, that:

during the operation (lifting, transporting and lowering) with the device, the suction plate does not brush or pump against other products or materials.

Otherwise the rubber seal on the suction plate could be damaged (danger of pressure loss).

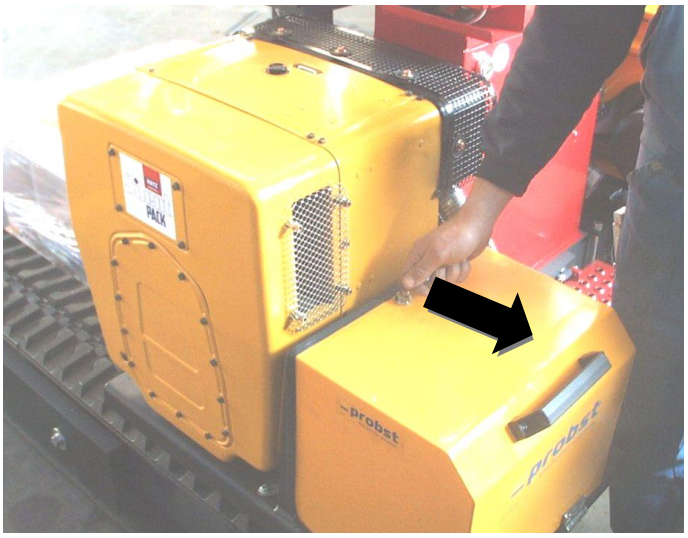
Product could fall down. **Danger of accidents!**

5.7 End of work

It is recommended to fill the diesel tank completely in the evening. Otherwise it will possibly the next day to have start-up problems (strong smoke emitting). When condensation due to possible temperature variations (at night) is formed in the Diesel tank.

After each end of work, the main switch of the battery must be switched off!:
a) so that the engine cannot be started by unauthorized persons (anti-theft device),
b) to separate the device from the power circuit.

1.) Open cover cap. (Ill. 1).



Ill. 1

9.) Switch off the main switch of the battery (on horizontal position (Ill.2)). Afterwards close the cover cap again (Ill. 2).

Ill. 2

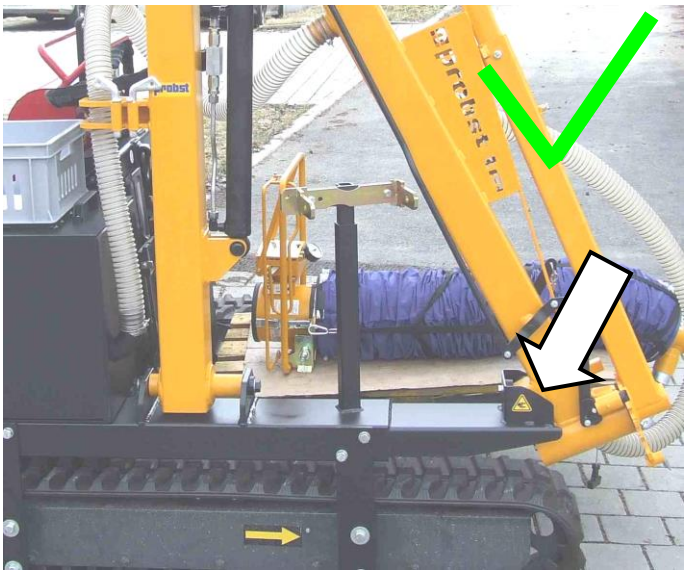
5.8 Transport

The device can be transported on a car trailer (considering the dimensions and allowable total weight).

1.) The transport of the device, when boom jib is in raised position, is strictly forbidden.
(→ Ill.1) **Danger of accidents!**

Ill. 1

2.) With every transport of the device lower the boom jib complete and arrest the boom jib in the lower holder (see ↙). (→ Ill.2)



Ill. 2

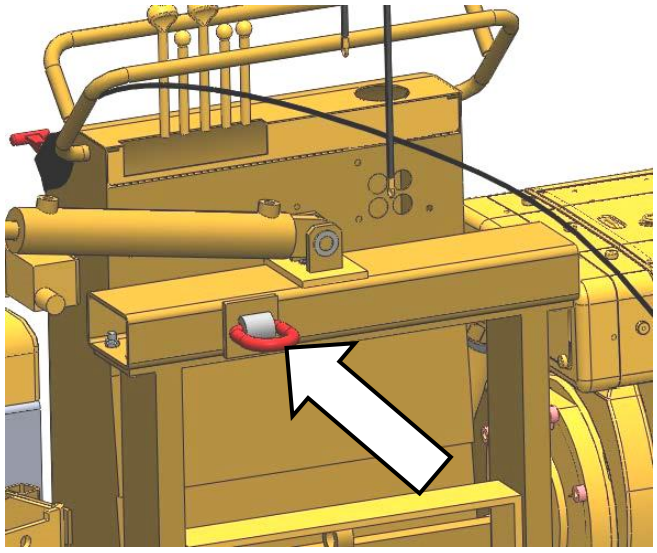
3.) While transporting, remove the vacuum hose lifter unit including the vacuum suction hose (4) from the device (TM). (→ Ill.3) **Danger of accidents!**

Ill. 3

4.). Secure the vacuum suction hose against swivelling around with the rubber band at the mobile jib hook (→ Ill. 4)

Ill. 4

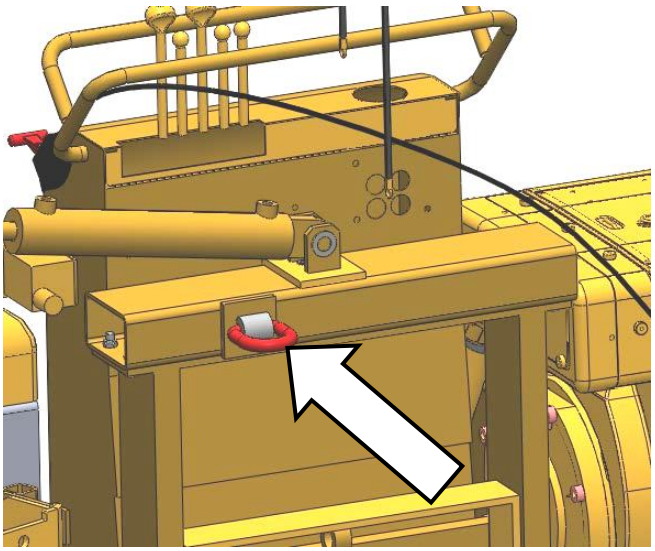
5.) To ship the device (TM) on a trailer with a corresponding support frame (e.g. excavator) use the crane eye. (→ Ill. 5)



Ill. 5

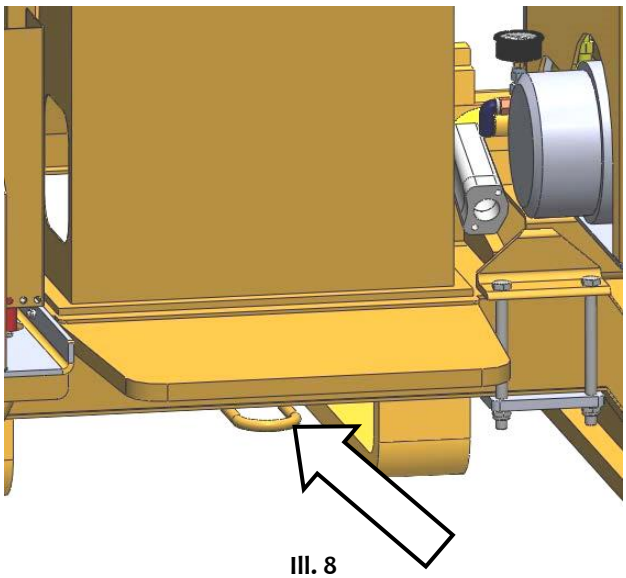
6.) - - - - - - - -

7.) The device has to be secured adequate (for the transport on a truck or trailer) with belts. Fastening eyes for belts - see ↖ (→ Ill. 7)



Ill. 7

8.) Fastening eye (↖) for belts is underneath the driver's step (at TM). (→ Ill. 8)



Ill. 8

6 Maintenance and care

6.1 Maintenance

To ensure the correct function, safety and service life of the device the following points must be executed in the maintenance interval.

Used **only original spare parts**, otherwise the warranty expires.

For all maintenance services the device must be completely shut down!!!
For all operations you have to make sure, that the device will not close unintended.
Danger of injury!!!

MECHNICAL

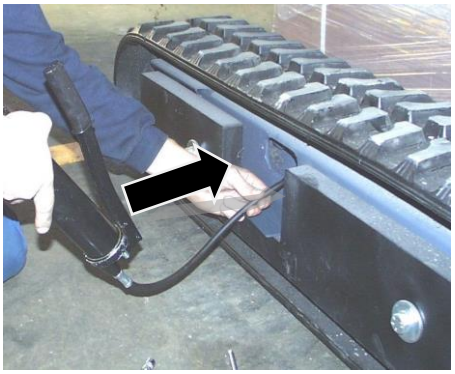
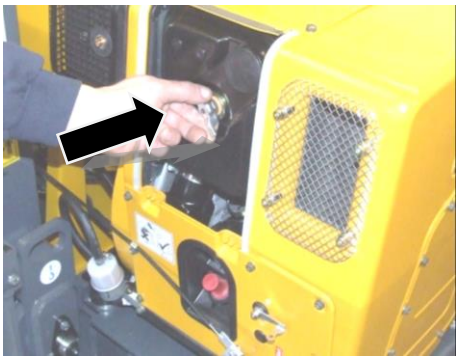
SERVICE INTERVAL	Maintenance work
First inspection after 25 operating hours	• Control and tighten all screws and connections. (The implementation is only allowed by an expert).
Daily controls	• See attached operating instructions of the *diesel engine HATZ-- 1D81C* and the *tracked forklift HINOWA - TP2000* !

• Check the oil level of the *tracked forklift* (see operating instructions from HINOWA).

• Check the oil level of the *Diesel engine* (see operating instructions from HATZ).

• Remove and clean air filter (with compressed air), replace if necessary.

• Check the rubber washer from the cover oft he air filter and replace it when damaged.

	• Remove the covering and grease with lubrication gun. 	• Check air filter for dirt 
All 50 operating hours	• Tighten all screws and connections (take care that the tightening torques according to the property class of the screws are observed). • Check all joints, bolts, guidance's and gears for correct function, if necessary adjust or replace it. • Check all Grippers (if available) for signs of wear. • Grease all slidings (if available) when the device is in opened position with a spatula.	
Minimum 1x per year (at rough conditions shorten the interval)	• Check of all the suspension parts, bolts and straps. Check for corrosion and safety by an expert.	

6.2 Troubleshooting

Error	Cause	Repair
It is not possible to connect the Jumbo BV to the to the wheel loader.	wrong connectors (bracket)	Use the right connectors
It is not possible to pick up the stacks	The position of the forks is not correct	Adjust the forks to the stack
The boom is swinging to the wrong direction	The swinging range is not correctly set.	Adjust the swinging range.
Vacuum pressure does not reach -0,42 bar	Workpiece has cracks, openings or is porous	Workpiece is not suitable for suction
	Seal is damaged	Replace the seal
	Pressure gauge is defective	Replace the pressure gauge
	Vacuum hose is defective, connectors are not tight	Check, replace vacuum hose
Engine does not run	Fuel tank is empty	Refuel the tank
Engine does not run	Fuel valve is closed	Open the fuel valve
	Engine is defective	Check the engine/call customer service
Diesel engine goes out and immediate re-starting is not possible	Gasoline supply interrupted	Check gasoline lines and fuel level in tank.
	Ignition coil is defective	Check ignition coil and if necessary exchange.
Device just wont work/ or no Vacuum available	seal	Check the seal around baseplate, if possable remove the seal and clean around the edge of the plate, and in the groove of the seal, but do not glue the seal on.
	vacuum pipe	Check the fitting that interfaces the vacuum pipe to the plate and check that it is fully tightened and has not come loose.
	air filter and the fittings	Check the air filter and the fittings such as pipe clips etc, and make sure they are tightly sealed.
	pipes to the vacuum pumps	Check all pipes to the vacuum pumps are not damaged.
	foreign bodies	Check that there is a vacuum or pressure on the pumps and that they have not been damaged by the ingression of foreign bodies.
Load cannot be sucked. Prescribed negative pressure cannot be achieved no more. Negative pressure diminishes itself too fast, when switching the device off.	Leakage at vacuum plate by deposited dirt between rubber seal and suction plate. Rubber seal wore or porously (aging after effect of UV radiation)	Remove rubber seal from suction plate. Clean suction plate and slot in rubber seal. Draw up and fasten rubber seal on suction plate again. If necessary exchange rubber seal.

For repair/trouble shooting at the lifting hose unit, the operating valve unit, Diesel engine (HATZ) or Tracked Forklift (Hinowa) see the references in the respective operating instructions.

6.3 Repairs

- Only persons with the appropriate knowledge and ability are allowed to repair the device.
- Before the device is used again, it has to be checked by an expert.

6.4 Safety procedures

- It is the contructors responsibility to ensure that the device is checked by an expert in periods of max. 1 year and all recognized errors are removed (→ see BGR 500).
- The corresponding legal regulations and the regulations of the declaration of conformity have to be observed!
- We recommend, that after checking the device the badge „Safety checked“ is put on the device. (Order-No.: 2904.0056+inspection sticker with date).
- You can receive these badges from us.

The check by an expert must be proved!

Device	Year	Date	Expert	Company

6.5 Hints to the identification plate

Type, serial-number and production year are very important for the identification of your device. If you need information to spare-parts, warranty or other specific details please refer to this information.

The maximum carrying capacity is the maximum load which can be handled with the device. Do not exceed this carrying capacity.

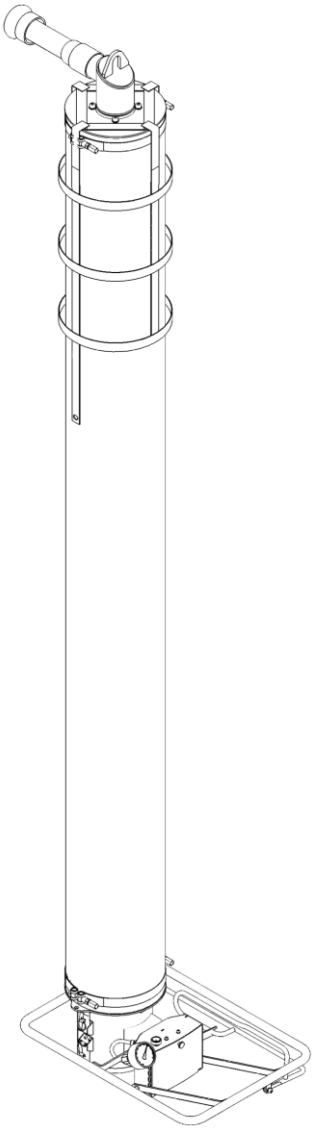
If you use the device in combination with other lifting equipment (Crane, chain hoist, forklift truck, excavator) consider the deadweight of the device.

Example:

6.6 Hints to the renting/leasing of PROBST devices

With every renting/leasing of PROBST devices the original operating instructions must be included unconditionally (in deviation of the users country's language, the respective translations of the original operating instructions must be delivered additionally)!

Vacuum Hose Lifter Components
Lifting hose unit with Operating Valve Unit



CE

Keep these Operating Instructions for future use !

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Special Features

The unit is equipped with the following special feature(s):

(See the Appendix for special operating instructions and spare parts.)

If the special features require a separate list of spare parts or parts subject of consumption, the corresponding list in section "Spare parts" is invalid.

1 Safety

1.1 Instructions for the Company

The *Vacuum Hose Lifter* has been manufactured according to current technological standards and is safe. Still, it will present hazards

- ⇨ if the device is not operated by qualified or, at least trained staff,
- ⇨ if the device is used contrary to the approved applications (see 1.5).

Problems can arise:

- ⇨ for the health and life of operators and other persons,
- ⇨ for the lifting device and other valuable goods.

1.2 Instructions for the Installation, Maintenance and Operating Personnel

The *Vacuum Hose Lifter* must be installed and maintained by qualified personnel, mechanics and electricians. Any work on the electrical equipment may be carried out only by a qualified electrician.
Each person in your company involved in the installation, start-up, operation, maintenance, and repair of the device must have read and understood the operating instructions and especially the chapters "Safety" and ”Operating” therein.
Your company must ensure by internal measures

- ⇨ that the operators of the lifting device are properly trained,
- ⇨ that they have read and understood the operating instructions,
- ⇨ that the operating instructions will be available to them at any time.

The responsibilities for the tasks carried out with the device must be clearly organized and observed. Ambiguity regarding responsibilities must not exist.
We recommend that you protect the lifting device from unauthorized use, e. g. by a key-switch.

1.3 Hazard Alert Symbols in this Manual

The hazard alert messages in this manual are labelled as follows:

Danger

Identifies imminent hazard. If you do not avoid it, death or servere injury will result.

Caution

Identifies a potentially hazardous situation. If you do not avoid it, minor or moderate injury can result.

1.4 Installation Site Requirements

The lifting device must not be operated in rooms with explosive atmosphere. If desired, the *Vacuum Hose Lifter* can be supplied in explosion-protected version.
The ambient temperature must be between +0°C and 40 °C
(if this temperature may be exceeded, consult the manufacturer).
Ensure by internal instructions and checks that the installation site is always clean and well organized.

1.5 Intended Use

Danger

The *Vacuum Hose Lifter* is designed to lift and transport items of all kinds.
The maximum lifting capacity must not be exceeded, however. Observe the name plate!
The loads must be stable enough that they cannot be destroyed during raising!
Transport of persons and animals with the load or the lifting device itself is forbidden!
Unauthorized alteration of the lifting device is forbidden for safety reasons!

Only suction plates of the manufacturer **PROBST** shall be used!!!

Danger

Some suction plates which can be mounted to the device will reduce its carrying capacity.
The maximum load is **indicated** on each suction plate.
Use only suction plates which are approved for this device!
Do not exceed the maximum carrying capacity of the suction plates!!!
Danger: Load (stone slabs) will fall down!

Prohibition

The use of suction plates with a smaller **carrying capacity** than the lifting unit is **forbidden**! **Danger**: Load will fall down.
(It is permissible to use suction plates with a higher carrying capacity than the lifting unit).

The use of this device is only permitted in proximity to the ground.
The Load **must not** be lifted above **1,8 m** (70,8 inch)!

1.6 Emissions

The equivalent continuous sound pressure level amount in operation (workpiece sucked on) is for the *Vacuum Hose Lifter* below 70 dB (A).

1.7 Special Hazards

The load is held at the suction head by underpressure. If there is a sudden interruption of the vacuum generator, the underpressure at the suction head decreases. As a result the lifting tube of the device descends and the load lowers.
This happens in a sudden power failure. A non-return valve in the rotary suction fitting ensures that the vacuum can escape only slowly. However, this will work only when the regulator lever is moved to "Lift".
When power fails, immediately put the load down if possible. If this is not possible, immediately leave the dangerous area near the load.
The device generates a very strong suction which can draw in hair and clothing. Do not look into the suction opening or place small objects close to suction openings when the device is switched on.

1.8 Workplace

Danger

The workplace of the operator is in front of the control unit.
Make sure, that there will be no unauthorized operating of the main switch from the lifting device (for example with a padlock at the main switch).
Never stand below the load.

1.9 Instructions for the Operator

As an operator of the lifting device you must be trained before start-up. You must have read and understood the operating instructions and especially the chapters "Safety" and ”Operating”.
Be sure, that only authorized persons use the device. You are responsible for others in the operating range of the equipment.
Local safety requirements are fully applicable. Safety instructions in this document are complementary to the rules in force and do not supersede the latter.

1.10 Equipment for Personal Protection

Wear safety shoes when operating the device.
Before transporting dangerous goods the appropriate safety clothes have to be put on.

1.11 Behaviour in Emergencies

As an example sudden power failure is an emergency (the device switches off invariably!).
Turn the control handle fully to position "Lift". The operating unit lowers itself slowly with the load.

1.12 Checking the Guards

A non-return valve is mounted inside the rotary suction fitting. It prevents the load from dropping off the vacuum head if there is a sudden power failure.
Check the function of this non-return valve at the beginning of each shift (when operating in shifts) or once a week (when operating continually).
During the check stay outside the dangerous area.
When power fails, immediately put the load down if possible. If this is not possible, immediately leave the dangerous area near the load.
Checking:

- ⇨ Switch on the lifting device.
- ⇨ Lift a load and turn the control handle fully to position "Lift".
- ⇨ Switch off the lifting device. The device must lower itself slowly with the load. The load must not drop off at once.

Correct faults before operating the device. If faults occur during operation, switch the device off and correct the faults before continuing work with the device.

2 Technical Data

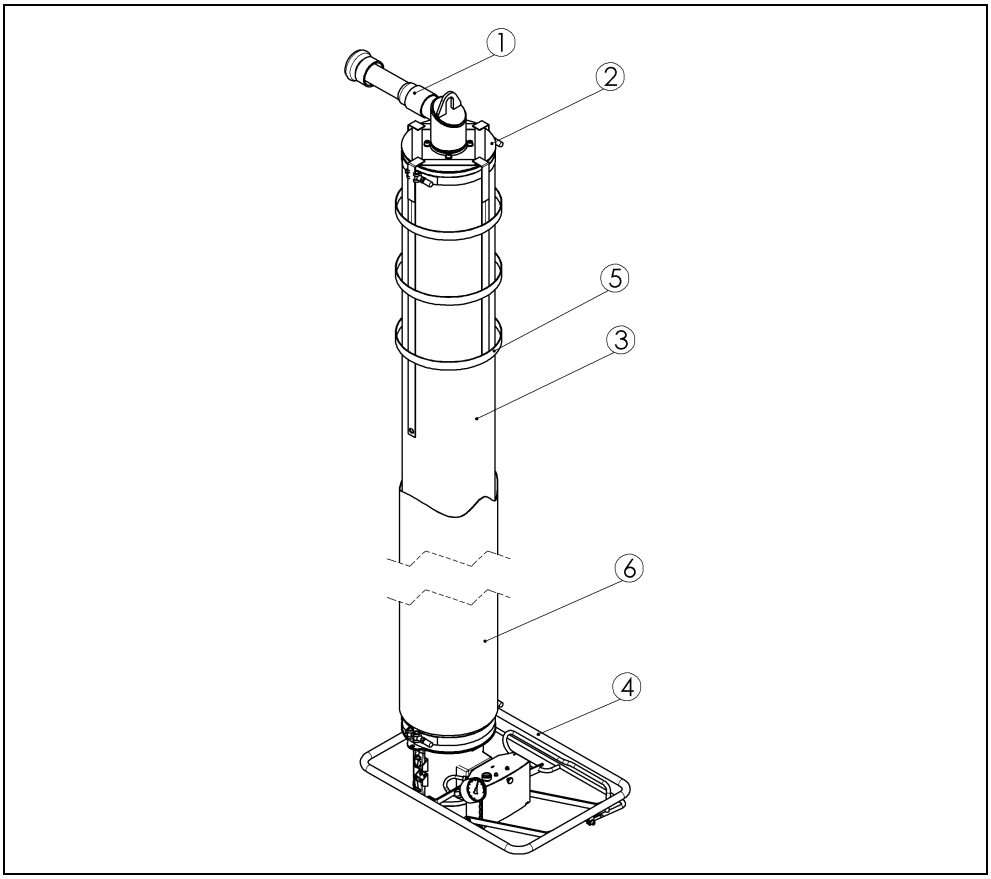
Ambient temperature	0 - 40 °C
Max. lifting stroke	approx. 1550 mm

3 Description

3.1 Components of the *JUMBO*

The *Vacuum Hose Lifter* consists essentially out of:

Pos.	Description	Remarks
1	Coupling	customer connection
2	Rotary suction fitting	customer connection
3	Lifting tube	customer connection
4	Operating unit	with regulator handle
5	Securing net	-
6	Covering for lifting tube	-



3.2 Rotary Suction Fitting

The rotary suction fitting is connected to the suction hose of the blower and the lifting tube (3).
The lifting device is suspended on the rotary suction fitting.
The lifting device can be rotated endlessly.

3.3 Lifting Tube

The lifting tube transmits the vacuum to the vacuum head(s) and realize the lifting movement of the lifting device.

3.4 Control Unit

With the control unit the lifting and lowering of loads is controlled by changing the vacuum in the lifting device. It regulates the flow of outside air to the lifting unit.

The flow of outside air and therefore the vacuum is controlled by an orifice disc. It is operated by a regulator lever (Pos. 4.2). The load is lifted when the control opening is fully closed by the slider. The farther the control opening is open, the more outside air will be drawn in. The load will lower.

3.5 Accessories

Dust Filter
The installation of a dust filter is urgently recommended to protect the fan from all kinds of dirt (dust from surroundings, dirty loads etc.)
Observe the enclosed installation instructions for dust filter.
Note: If no dust filter is used, foreign objects must be excluded from the guarantee as a possible cause of failure.

Motor Overload switch
With this device, the blower can be switched on and off. An integrated overcurrent switch prevents the blower motor form being damaged by high current.

Tube cylinder Extension
The tube cylinder extension is designed for handle parts in high-sided boxes, crates, wire-mesh boxes, etc. The tube cylinder extension has to be mounted between the vacuum head and the control unit.

Vacuum gauge
The vacuum gauge indicates the underpressure at the vacuum head and thereby the status of operation of the lifting device. It is mounted at the control unit.

Protection Tube
The protection tube is a protective covering for the lifting tube.

Retaining net
The retaining net is for space-saving storage of the lifting device. The length of the lifting tube is reduced to a minimum.

4 Installation

4.1 Installation Procedure

The *Vacuum Hose Lifter* must be installed and maintained by qualified personnel, mechanics and electricians. Any work on the electrical equipment may be carried out only by a qualified electrician.

Blower Installation
⇨ Install the vacuum blower as described in the separate operating instructions.

Checking the Rotation Direction
Before commissioning, check that the blower rotation direction corresponds with that in the separate manual.

Caution

When mounting the suction hose, observe that the hose is hanged up spirally turned (∅ at least 800 mm). Its length has to be the 1.3 to 1.5 times the jib length. The suction hose must hang down freely. It must not lie flat, rub or catch on anything.

Danger

⇨ Mount the rotary suction fitting (7) to the transport trailer (5) of the crane. Fasten it safely! Insert the transport trailer into the crane jib (2).

⇨ Mount the end stop (6) at the end of the crane jib. Never work without an end stop on the crane jib, otherwise the lifting device can fall off.

⇨ Connect the suction hose to the rotary suction fitting (4) and secure it with a hose clamp.

If you install the suction hose, note that the hose contracts under the pressure of vacuum by approximately 10 to 15 %.
Therefore, a loose installation with length compensation should be provided. Longer, linear distances can also be bridged with a plastic pipe. The overall length should not exceed 50 m. Long suction hoses reduce the capacity and the dynamics of the tube lifter.

4.2 Adjusting the Hovering Position (without load)

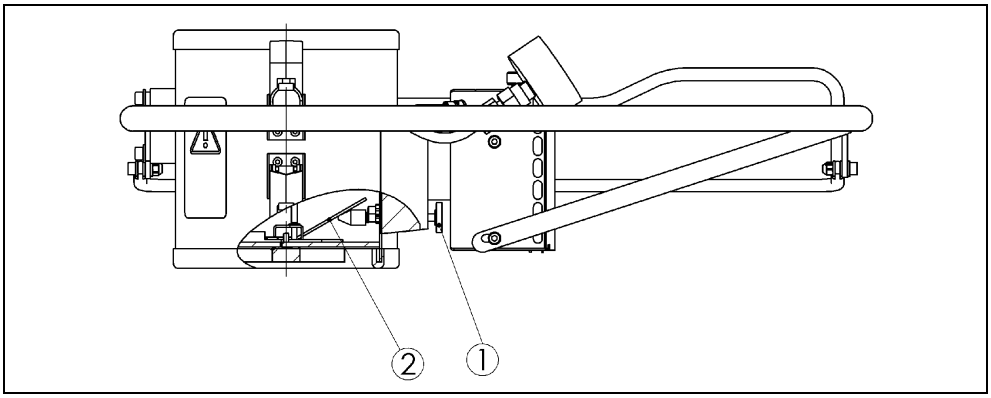
The hovering position of the lifting device must be adapted to the weight of the vacuum head. A valve (2) in the tube support cylinder is used to adjust it.
When you apply the vacuum head to the load a valve is fully opened by a plunger and the valve rod in the vacuum head. The load can be sucked and lifted.
Adjustment:

⇨ Turn the adjustment screw (1) at the operating unit (accessible from the bottom).
Turn clockwise (direction of arrow) ➔ Valve becomes opened.
Turn counter-clockwise ➔Valve becomes closed.

Danger

⇨ The farther the valve is opened the lower the device hovers.

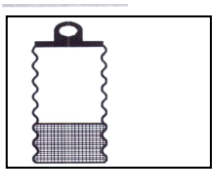
When the valve is closed totally the device bounce up abruptly as soon the blower is switched on!



4.3 Replacing the lifting tube

The lifting tube can be replaced on-site.

The lifting tube must always be installed with the reinforced section at the bottom!



Caution

Procedure:

- ⇨ Clamp the rotary inlet in a vice, holding it by the screws of the tube holder (Fig. 1).
- ⇨ Remove the protective caps from the ends of the threads of the hose clamps.
- ⇨ Use a spanner to remove the hose clamps from the tube cylinder (Fig. 2) and the rotary inlet (Fig. 3).
- ⇨ Remove the adhesive tape from the old lifting tube.
- ⇨ Unscrew the old lifting tube from the tube mounting of the tube cylinder (Fig. 4).
- ⇨ Unscrew the lifting tube from the tube mounting of the rotary inlet (Fig. 5).
- ⇨ Lightly grease the threads of the tube mountings (Fig. 6).
- ⇨ Mount the new lifting tube with the reinforced section at the bottom!
- ⇨ Fully screw the new lifting tube onto the threads of the rotary inlet (Fig.7).
- ⇨ Fully screw the new lifting tube onto the threads of the tube cylinder (Fig. 8).
- ⇨ Wind tow full turns of adhesive tape (Coroplast) around the ends of the lifting tube to seal it to the tube cylinder (Fig. 9) and the rotary inlet (Figs. 10, 11).
- ⇨ Place the hose clamps on the ends of the lifting tube and tighten them with a torque of 10 Nm, using a torque wrench (Fig. 12).
- ⇨ Fit the protective caps on the ends of the threads of the hose clamps.


Fig. 1


Fig. 2


Fig. 3


Fig. 4

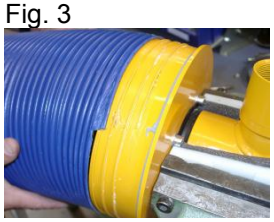


Fig. 5

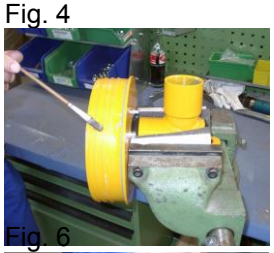


Fig. 6


Fig. 7


Fig. 8


Fig. 9


Fig. 10


Fig. 11


Fig. 12

Serial number →

Lifting tube dimension →

← Article number lifting tube

5 Operating

5.1 Safety Instructions

Local safety requirements are fully applicable. The following safety instructions are complimentary to the rules in force and do not supersede the latter:

- ⇨ Wear safety shoes.
- ⇨ Before transporting dangerous goods the corresponding safety clothes have to be put on.
- ⇨ Never exceed the maximum lifting capacity of the lifting device. Observe the name plate on the handle.
- ⇨ Do not stand below the load. Always keep clear of the load.
- ⇨ Never carry people or animals with the load or the lifting device itself !
- ⇨ Operate only when you can view the entire working area. Look out for other persons in the working area.
- ⇨ Never manoeuvre loads above people.
- ⇨ Never lean about lifted loads.
- ⇨ Do not let go of the handle whilst lifting a load.
- ⇨ Do not pull loads to the side or drag them along with the lifting device.
- ⇨ Do not rip loose loads that have become jammed.
- ⇨ If there is a power failure immediately turn the handle (***JUMBOERGO***) resp. push upwards the regulator lever (***JUMBOSPRINT***) fully to "Lift" to prevent the load from dropping off. The reserve vacuum will let the lifting device lower slowly with the load.
- ⇨ Apply suction and lift only to appropriate loads (check for stability and porosity).
- ⇨ The lifting device is mounted into the crane rails with rail end stops. While moving against the rail end stops, strong horizontal forces can occur. These forces can result in releasing the load.

Danger

If the lifting unit (lifting tube) is not able to lift the vacuum-gripped load, never try to support the lifting of the load, it is possible that the gripper's holding force is inadequate.
The load could fall ➔ risk of injury.

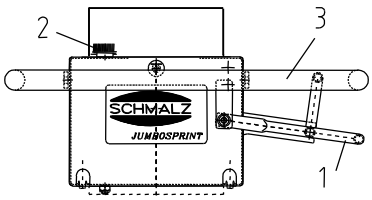
5.2 Lifting, Lowering and Landing Loads

The following operating steps must be checked by a qualified mechanic prior to use of the device by the operating personnel. Correct faults before start-up.

The hovering position (without load) must be adjusted prior to start up, see 4.2.

Danger

Lifting



- ⇨ Place the vacuum head directly above the load.
- ⇨ Press the regulator lever (1) down. The lifting tube descends and the vacuum head lowers.
- ⇨ Apply the vacuum head to the load. Distribute load evenly.
- ⇨ Slowly push the regulator lever (1) upward. The device attaches to the load.

Attention: the regulator lever must not be on the position "Lift" for more than 90 seconds because otherwise:

- ⇨ the blower could be damaged and fail, all guarantee claims are void!
- ⇨ power is wasted unnecessarily.

Attention

Adjusting the hovering position with load

Turn the adjusting screw (2) to adjust the hovering position with the load.
Caution: Do not confuse this adjustment with the hovering position without load.

- ⇨ Turn screw clockwise ➔ the hovering position will be lower.
- ⇨ Turn screw counter-clockwise ➔ the hovering position will be higher.


Attention

Attention: the hovering position with load should not be adjusted to the highest position of the control unit because otherwise:

- ⇨ the blower could be damaged and fail,
  all guarantee claims are void!
- ⇨ power is wasted unnecessarily.

Lowering, Placing


Danger

- ⇨ Slowly move the regulator lever (1) downward - "Lower". The lifting tube descends and the vacuum head lowers with the load.
  Do not operate the regulator lever control abruptly, while you firmly hold the handlebar (3), as this can cause the load to fall off, because the vacuum suddenly vanishes.
- ⇨ Lower the load to the chosen position.
- ⇨ To land the load push the regulator lever down all the way. Tip the valve control box a little and lift it off the load.

6 Trouble Shooting

The device must be installed and maintained by qualified personnel, mechanics and electricians. Any work on the electrical equipment may be carried out only by a qualified electrician.
After each repair or maintenance job check the guards as described in the Operating Manual ”Safety”.

If a load cannot be lifted, check through the following list to find the problem and correct it.

Error	Remedy
Opposite direction of rotation	⇨ Transpose the phases of the blower connection.
The required vacuum is not reached	⇨ Check the suction hose and tube lifter for airtightness. ⇨ Check the mounting of the suction heads ⇨ Clean resp. replace the dust filter cartridge
The load is too heavy	Split the load, use other lifting device.
The load is too porous or of low bending strength	Load cannot be lifted, try using a different vacuum head.
Suction hose is damaged	Replace hose or cut out damaged piece and connect remaining hose with a tube and hose clamps
Vacuum lifting tube is damaged	Replace the vacuum lifting tube
Connection of the vacuum head is damaged	Check seal on the tube cylinder, replace it.
Vacuum head is damaged	Check seal on the vacuum head, replace it.
The load drop off when you lower it	Please contact the manufacturer
The vacuum is reached but the lifting device can not lift porous loads	Please contact the manufacturer
The control unit of the tube lifter hangs in the upper block position (with running blower) even without load and is not coming down by turning the handle or regulator lever	⇨ Turn the adjustment screw at the control unit clockwise ⇨ Clean or replace the dust filter of the control unit

7 Maintenance

7.1 General Notes

The *Vacuum Hose Lifter* may be installed and maintained only by qualified personnel such as mechanics and electricians.
After any repair or maintenance work, check the safety devices as described in the section "Safety".

7.2 Cleaning

The maintenance proceedings and intervals are described in the service-table.
Use cleaning detergent to clean the device (do not use petrol (gasoline) or aggressive or corrosive fluids to clean the device. The vacuum lifting tube and the suction hose will otherwise become leaky or be destroyed).
Remove items and contaminations such as adhesives, glue, saw dust, dust etc. sticking to the vacuum heads at least once a week. Use glycerine to clean the seals. Immediately replace damaged vacuum heads (tears, holes, waves).

7.3 Accident prevention rules

Accident prevention rules require a yearly inspection of lifting device and crane by a qualified person.

7.4 Service-Table

	Interval				
	daily	weekly	monthly	1/2-yearly	yearly
Tube Lifter					
Is the lifting tube in good condition (not porous, no scrubbing spots, no holes and with that tight)?			X		X
Is the fastening of the lifting tube correct (wire clips at the correct place, tightening)?					X
Can the rotary suction fitting be rotated easily itself?			X		X
Does the rotary handle resp. the control handle operates smooth?			X		X
Are all junctions fixed, hose band clips etc.?					X
Are the type- and the lifting- capacity label still on the machine?					X
Is the operating instruction still present and does the worker know of it?					X
Is the handle firm?					X
Is the filtermat still at the operator unit and is it cleaned?			X		X
Check supporting parts (such as the suspension of the device) on deformation, wear, rust or other damages.				X	
Function					
Can the device be lifted and lowered without weight easily ? (Adjusting the valve in the operating unit)			X		X
JUMBOSPRINT: Can the hovering position of the device with weight be adjusted easily ? (Adjusting the adjusting screw at the operating unit)					X
Does the non return valve work by power failure?			X		X
Check the general condition of the machine.					X

8 Notes on the Name Plate

On the nameplate the main data for the lifting device is indicated.
The nameplate is firmly connected to the device.
The nameplate contains the following information:

Caution

Type and number are vital for identification of the unit. Indicate these when ordering spares or filing claims and other inquiries.

The max. lifting capacity indicates for which maximum load the device can be used. The max. load must not be exceeded.

9 Storage

If you are not using the Jumbo Sprint vacuum hose lifter, you should store it correctly to best preserve the product quality. This entails the following:

- ⇨ Clean the product (see 7.2) and let it dry if wet
- ⇨ Store the product in a room that protects it from moisture and frost (recommendation: in the manufacturer's storage case)
- ⇨ Storage temperature: +0 – 40 °C

To start up the system again, refer to chapter 4, "Installation"

10 Guarantee, spare and consumable parts

This equipment is guaranteed in accordance with our General Conditions of Business. This also applies to spare parts where these are original parts supplied by us.

We will assume no liability for damage caused by the use of non-original spare parts and accessories.

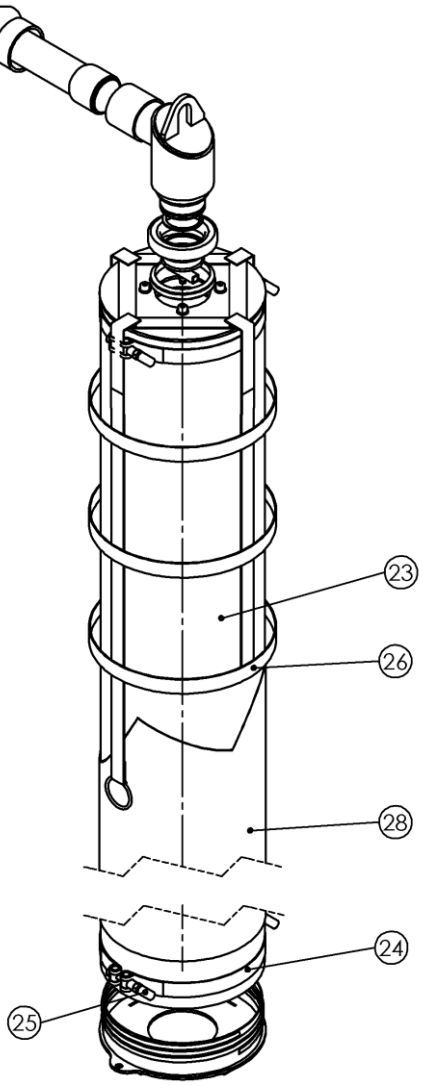
Wear and consumable parts are not covered by the guarantee.

The most important spare and consumable parts are shown in the following list.

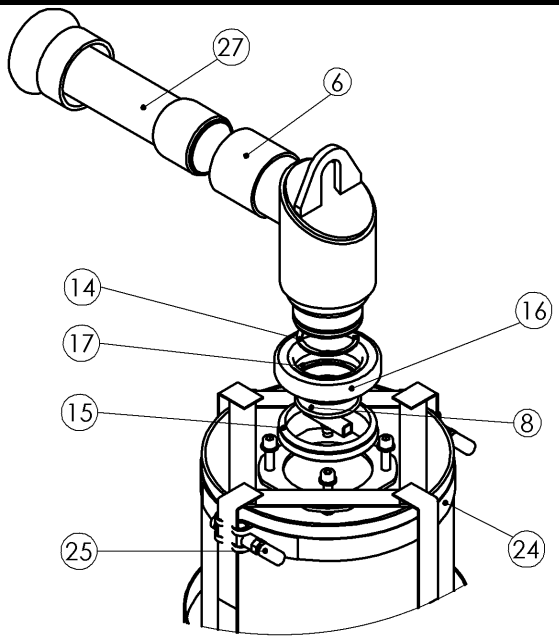
Abbreviations:	- Spare part	**= E**
	- Consumable part	**= V**
	- Consumable-part assembly, contains consumable parts	**= VB**

Hubeinheit mit Bedieneinheit
Ersatzteile/ /Spare Parts

Hubeinheit / Lifting Hose Assy



Dreheinheit / Rotation Unit



Hubeinheit mit Bedieneinheit
Ersatzteile/ /Spare Parts

probst handling equipment

Hubeinheit / Lifting Hose Assy						
Pos.	*Menge / Amount*	*Bezeichnung*	*Description*	*Abmessung / Dimension*	*Art. No.*	*Legende*
6	1	G 2“ - L 56 - D 66,3	G 2“ - L 56 - D 66,3		2700.0007	E
8	1	Flachsauggreifer_PFG	Flat suction pad_PFG		4210.0610	V
14	1	DIN 472 - 54 x 2,0	DIN 472 - 54 x 2,0		2048.0025	E
15	1	V-Ring	V-ring		4210.0611	V
16	1	Kugellager	Bearing		2135.0022	E
17	1	DIN 471 - 65 x 2,5	DIN 471 - 65 x 2,5		2048.0026	E
23	1	Hubschlauch	Lifting hose	PVC	2527.0010	V
24	2	Schlauchschelle	Hose clamp	SSB	2105.0068	E
25	4	Kappe für SSB	Cap for SSB		2202.0042	E
26	1	Haltenetz	Securing net		2527.0005	V
27	1	Kupplung	Coupling		4200.0042	E
28	1	Schutzhülle	Covering for lifting tube		2529.0007	E

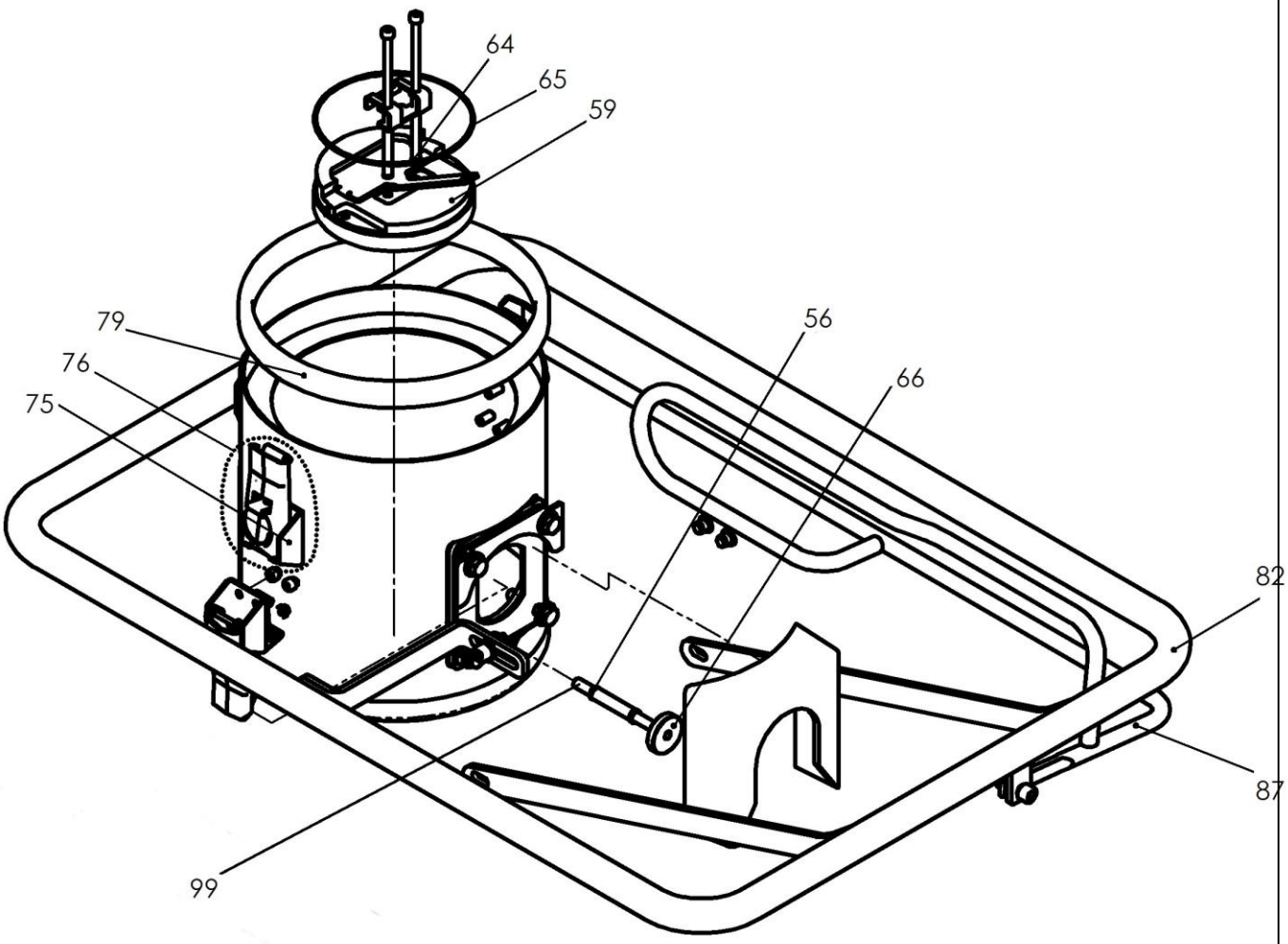
E= **E**rsatzteil, **V**= **V**erschleißteil, **VB**= **V**erschleißteil**b**augruppe, enthält Verschleißteile
E= Spare part, **V**= Consumable part, **VB**= Consumable-part assembly, contains consumable parts

Hubeinheit / Lifting Hose Assy						
Pos.	*HE 35-E/S-BP*	*HE 50-E/S-BP*	*HE 80-E/S-BP*	*HE 150-E/S-BP*	*HE 200-E/S-BP*	*HE 300-E/S-BP*
23	11.04.01.10007	11.04.01.10028	11.04.01.10066	11.04.01.10178	11.04.01.10070	11.04.01.10129
24	10.07.10.00048	10.07.10.00049	10.07.10.00039	10.07.10.00046	10.07.10.00040	10.07.10.00065
26	11.01.12.10141	11.01.14.10058	11.01.05.10248	11.01.23.10043	11.01.25.10039	11.01.25.10084
28	11.04.01.10023	11.04.01.10018	11.04.01.10017	11.04.01.10132	11.04.01.10073	11.04.01.10127

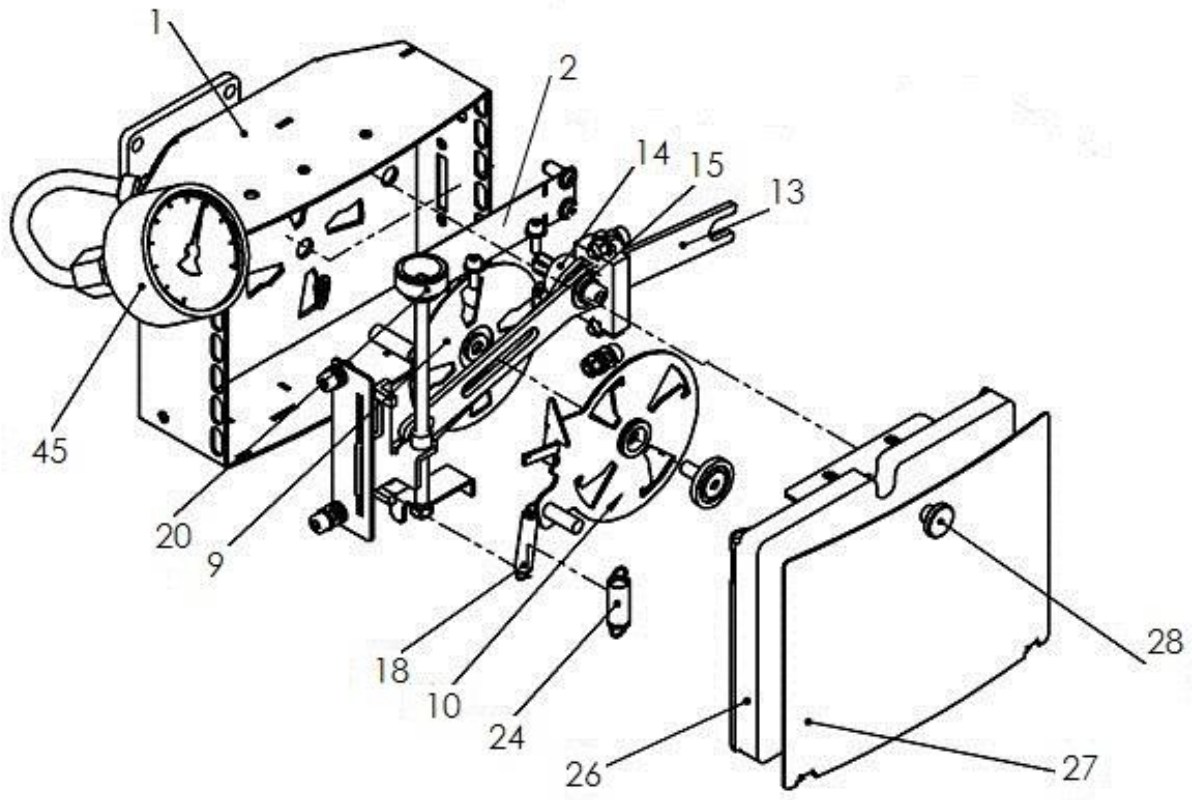
E= **E**rsatzteil, **V**= **V**erschleißteil, **VB**= **V**erschleißteil**b**augruppe, enthält Verschleißteile
E= Spare part, **V**= Consumable part, **VB**= Consumable-part assembly, contains consumable parts

Hubeinheit mit Bedieneinheit
Ersatzteile/ /Spare Parts

Ventileinheit, Bedieneinheit / Valve Unit, Operating handle



Ventileinheit / Valve Unit

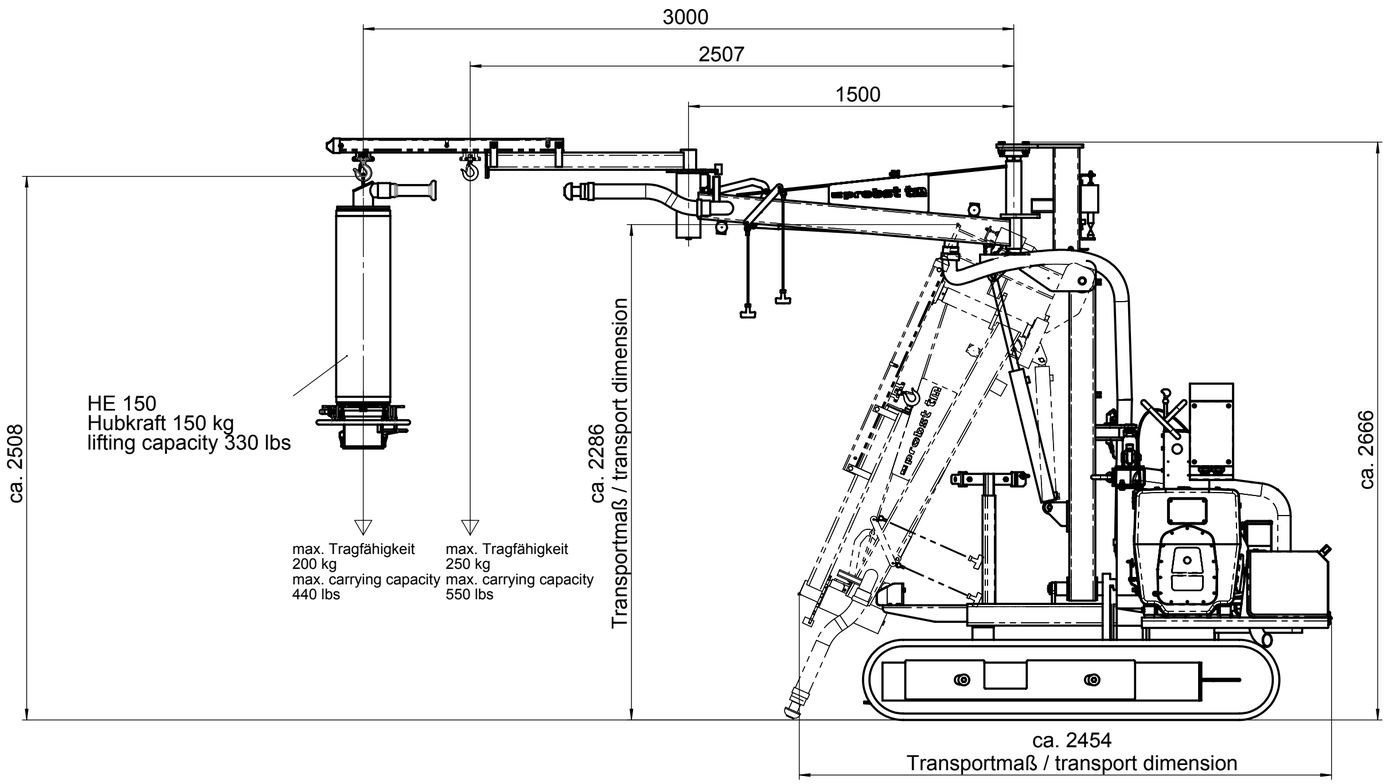


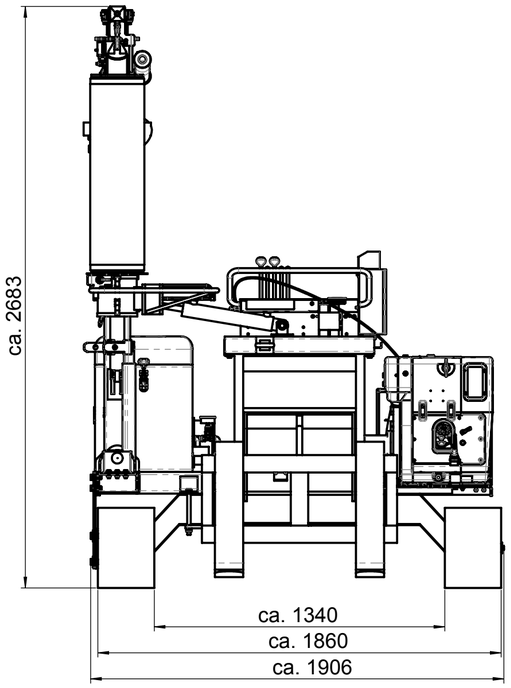
Hubeinheit mit Bedieneinheit
Ersatzteile/ /Spare Parts

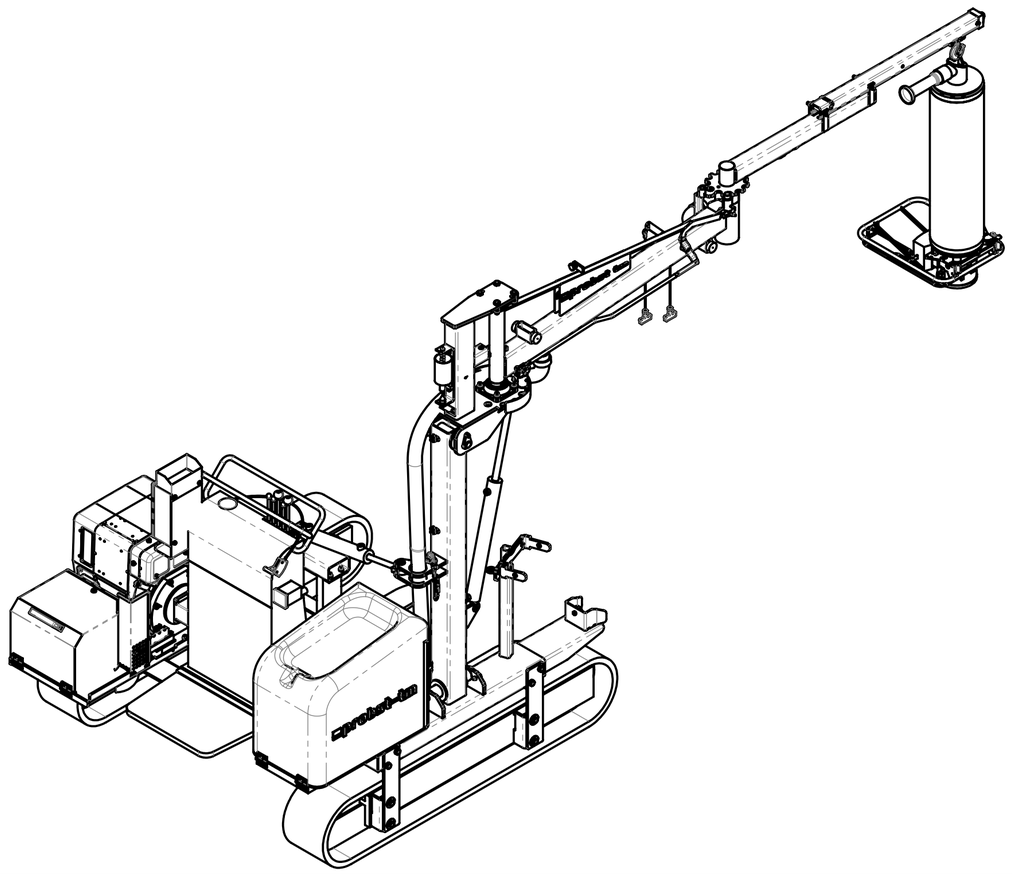
probst handling equipment

Ventileinheit, Bedieneinheit / Valve Unit, Operating handle						
Pos.	*Menge / Amount*	*Bezeichnung*	*Description*	*Abmessung / Dimension*	*Art. No.*	*Legende*
1	1	Ventilgehäuse kpl.	Valve casing compl.		4210.0612	E
2	1	Federklappe	Spring flap		4210.0608	E
9	1	Reibbelag	Friction lining		4210.0613	E
10	1	Scheibe	Disk		4210.0614	E
13	1	Schieber	Slide		4210.0401	E
14	1	Hülse	Socket for slide		4210.0535	E
15	1	Gleitlager	Bearing bush		4210.0536	E
18	1	Zugfeder	Tension spring	Z 066 OI	2171.0008	E
20	1	Stellschraube	Adjusting screw		4210.0403	E
24	1	Zugfeder	Tension spring	Z 081 HI	2171.0009	E
26	1	Filtermatte	Filter mat		2505.0010	V
27	1	Abdeckung f. Ventilklappe	Cover for valve unit		4210.0615	E
28	1	Rändelschraube	Knurled screw		2009.0038	E
45	1	Manometer VAM	Manometer VAM		2213.0007	E
56	1	Druckfeder	Spring (pressure)		2170.0044	E
59	1	Ventilklappe	Valve flap		4210.0558	E
64	2	Druckfeder	Spring (pressure)		2170.0045	E
65	1	O-Ring	O-ring seal		2155.0087	V
66	1	Rändelmutter	Knurled nut		2019.0021	E
75	4	Spannhaken für Spannverschluss	Tension hook		2106.0011	E
76	2	Spannverschluss	Tension lock		2106.0004	
79	2	Schlitzgummiring	Ruber seal		4210.0091	V
82	1	Haltebügel	Supporting strap		4210.0405	E
87	1	Reguliergriff	Control handle		4210.0406	E
99	1	Rundstab	Rod		4210.1051	E

E= **E**rsatzteil, **V**= **V**erschleißteil, **VB**= **V**erschleißteil**b**augruppe, enthält Verschleißteile
E= Spare part, **V**= Consumable part, **VB**= Consumable-part assembly, contains consumable parts







Installation carrier TRANSMOBIL TM-150-D-A-XL

Tragkraft 200 / 250 kg
Lifting capacity 440 / 550 lbs

probst
the better solution

Bei Änderungen Rücksprache TB !

Gewicht: 1510,5 kg

		Datum	Name
	Erst.	22.1.2013	Ralf.Northe
	Gepr.		

Benennung
TRANSMOBIL TM-150-D-A-XL
Ausführung Diesel Automatik
mobiles Transport- und Verlegegerät für Bordsteine und Platten, mit Knickausleger

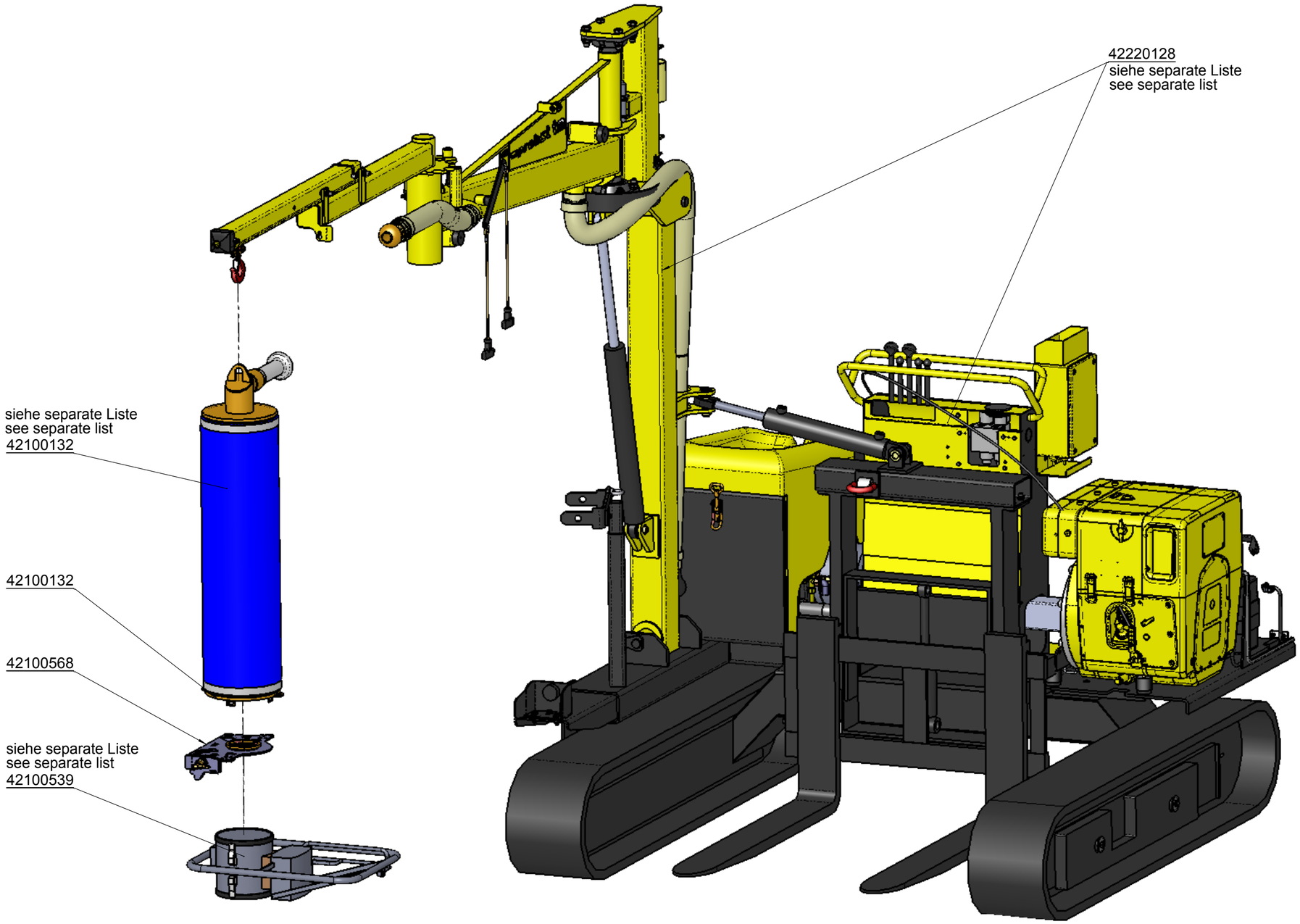
WA:

Kunde:

Artikelnummer/Zeichnungsnummer
D52220012

Blatt 1 von 1

Zust. | Urspr. | Ers. f. | Ers. d.



probst
the better solution

Bei Änderungen Rücksprache TB !

Gewicht: 1511,1 kg

		Datum	Name
	Erst.	22.1.2013	Ralf.Northe
	Gepr.		

Benennung
Trans Mobil TM150-D-A-XL,
Mob.Transp.- u. Verlegegerät
f. Bordsteine u. Platten m. Knick-Ausleger, verbreitert

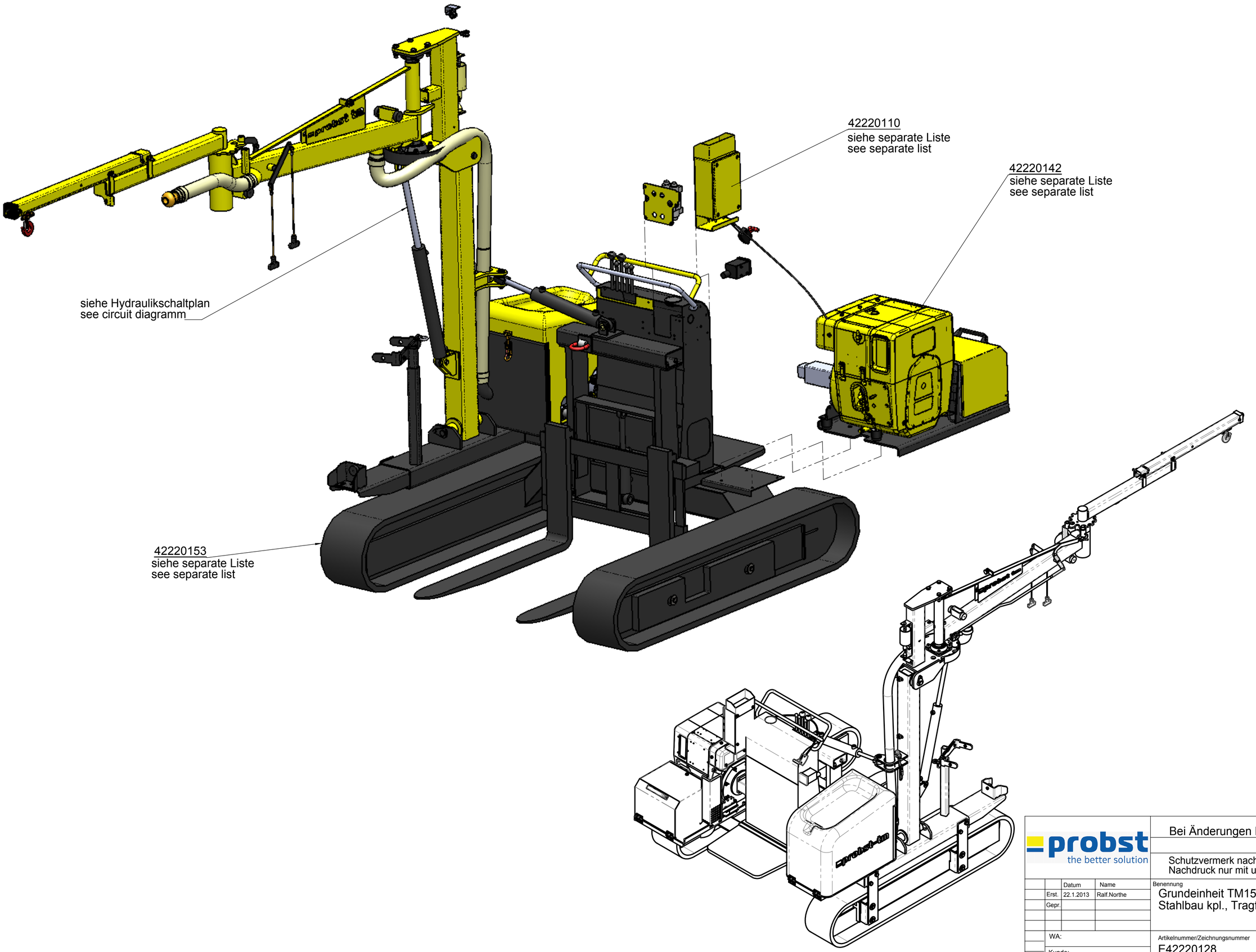
WA:

Kunde:

Artikelnummer/Zeichnungsnummer
E52220012

Blatt 1
von 1

Zust.	Urspr.	Ers. f.	Ers. d.



probst
the better solution

Bei Änderungen Rücksprache TB !

Gewicht: 1481,5 kg

		Datum	Name
	Erst.	22.1.2013	Ralf.Northe
	Gepr.		

WA:

Kunde:

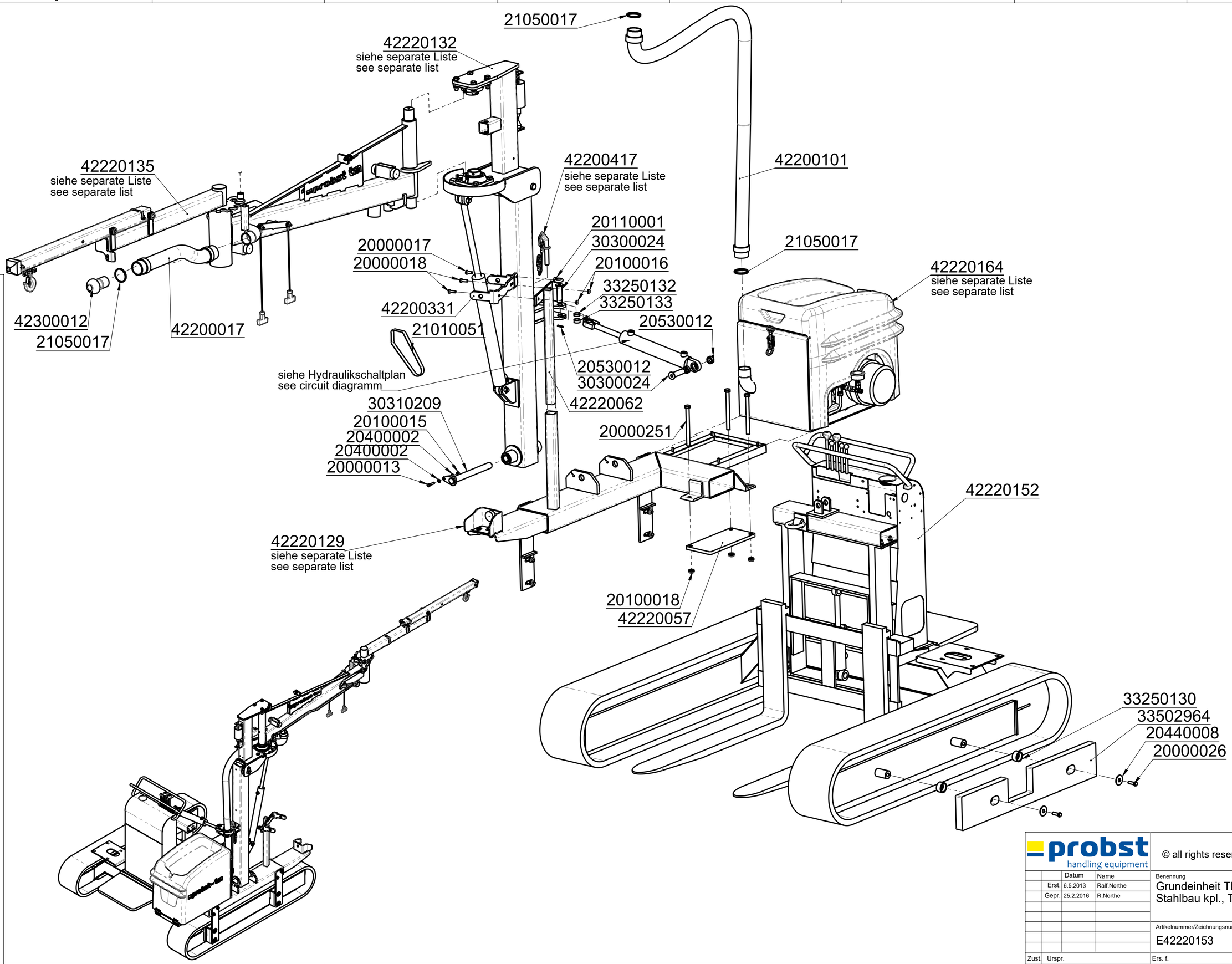
Zust. | Urspr.

Benennung
Grundeinheit TM150-D-A-XL breit
Stahlbau kpl., Tragf. 200/250 kg

Artikelnummer/Zeichnungsnummer
E42220128

Blatt 1 von 1

Ers. f. | Ers. d.



probst handling equipment

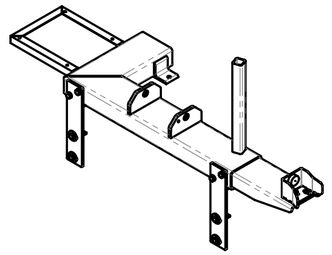
		Datum	Name
	Erst.	6.5.2013	Ralf.Northe
	Gepr.	25.2.2016	R.Northe

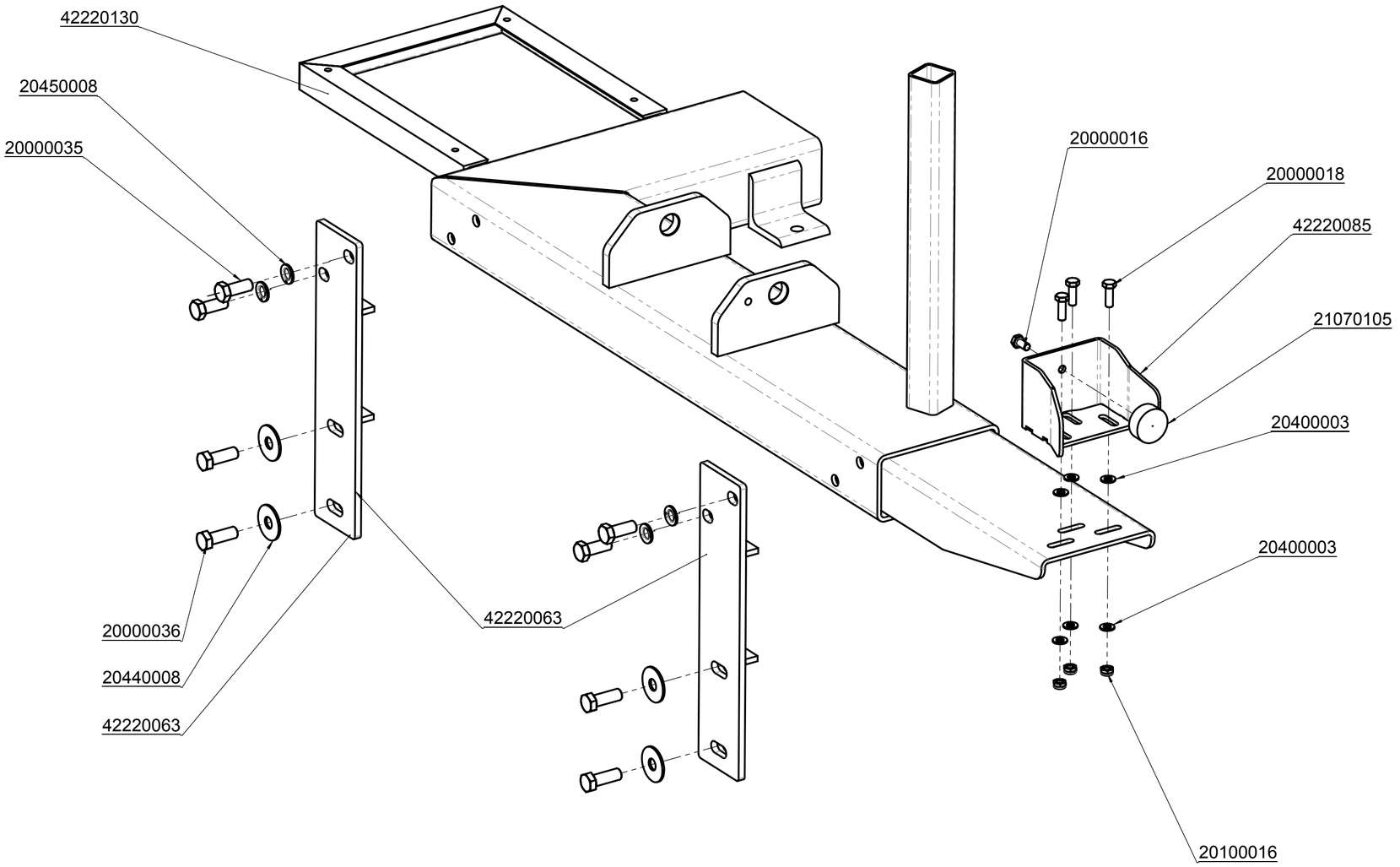
Benennung
Grundeinheit TM150-D-A-XL breit
Stahlbau kpl., Tragf. 200/250 kg

Artikelnummer/Zeichnungsnummer
E42220153

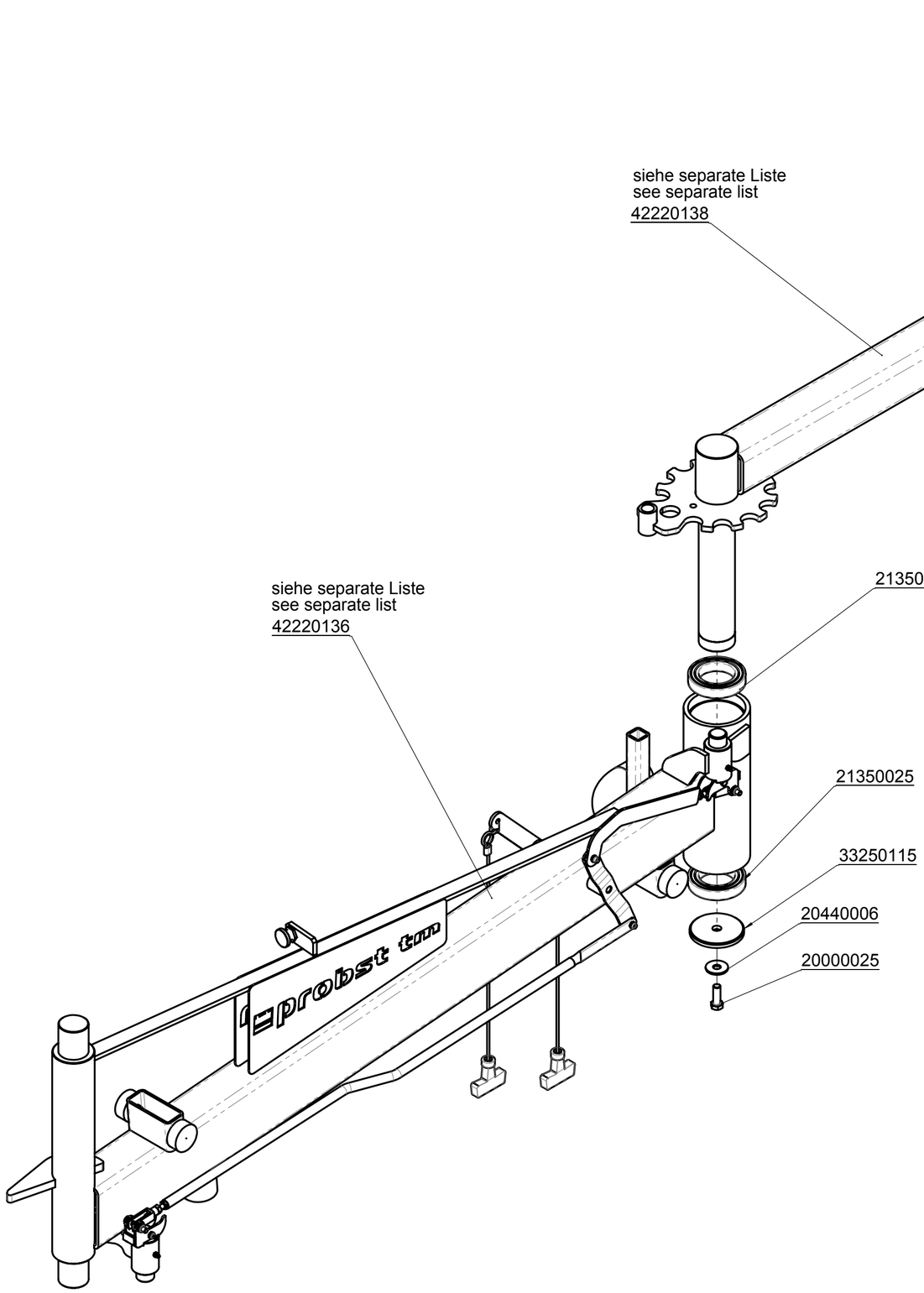
Blatt 1
von 1

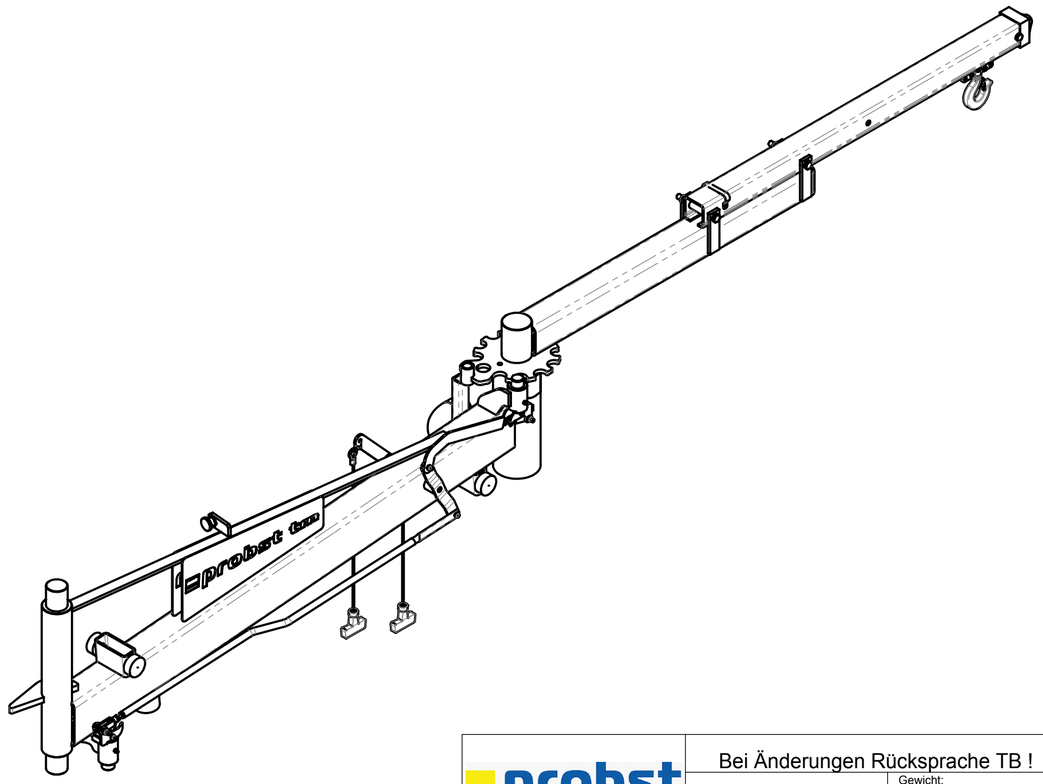
Zust. | Urspr. | Ers. f. | Ers. d.





probst the better solution				Bei Änderungen Rücksprache TB !	
				Gewicht: 67,5 kg	
				Schutzvermerk nach DIN 34 beachten! Nachdruck nur mit unserer Genehmigung!	
		Datum	Name	Benennung	
	Erst.	4.2.2013	Ralf.Northe	Konsole kompl. für TM150-XL	
	Gepr.				
	WA:			Artikelnummer/Zeichnungsnummer	Blatt 1
	Kunde:			E42220129	von 1
Zust.	Urspr.			Ers. f.	Ers. d.





probst
the better solution

Bei Änderungen Rücksprache TB !

Gewicht: 92,3 kg

		Datum	Name
	Erst.	14.1.2013	Ralf.Northe
	Gepr.		

Benennung
Ausleger kompl. TM150-XL

WA:

Kunde:

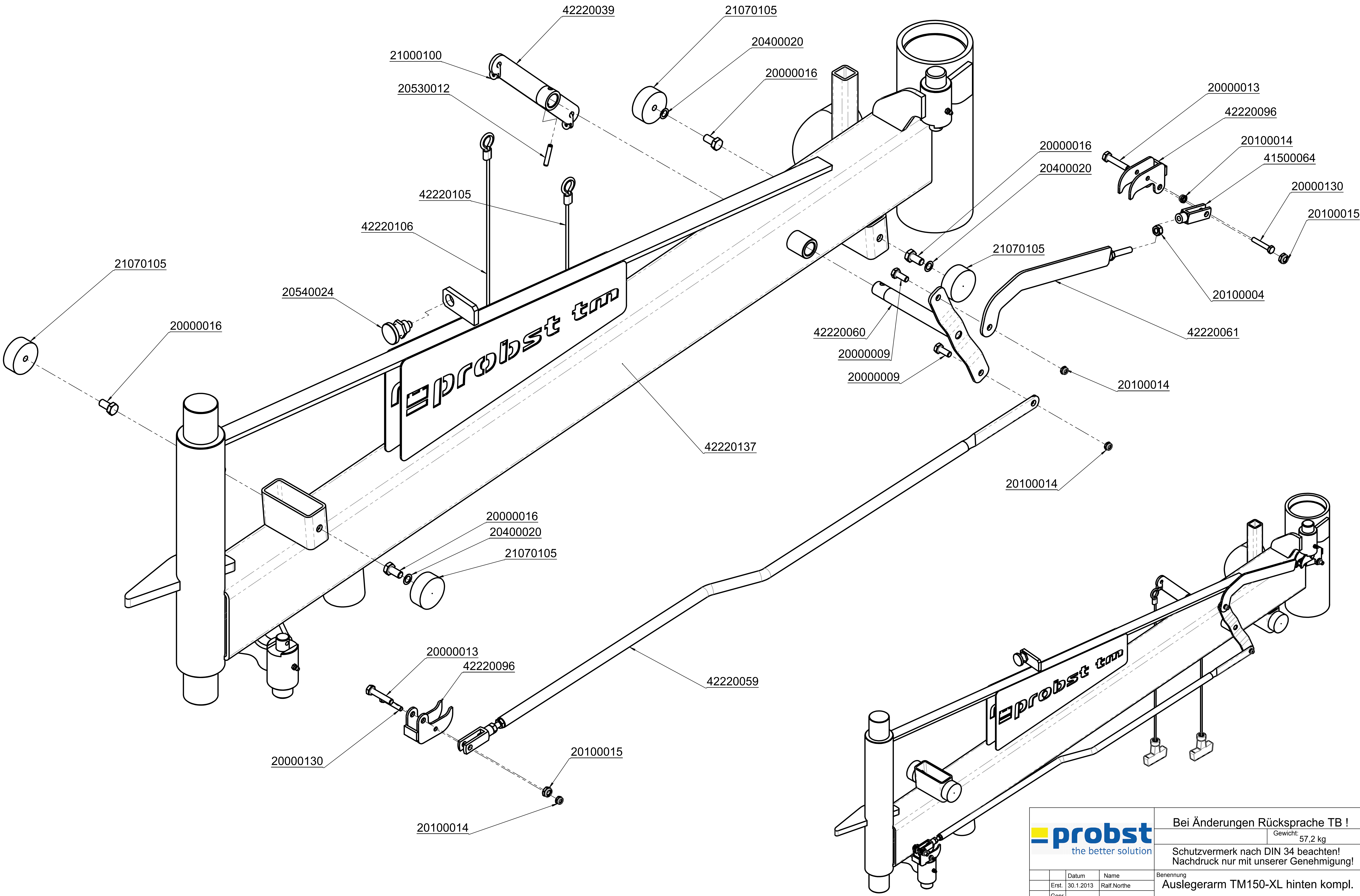
Zust. Ursprung

Artikelnummer/Zeichnungsnummer
E42220135

Blatt 1 von 1

Ers. f.

Ers. d.



probst
the better solution

Bei Änderungen Rücksprache TB !

Gewicht: 57,2 kg

Schutzvermerk nach DIN 34 beachten!
Nachdruck nur mit unserer Genehmigung!

	Datum	Name
Erst.	30.1.2013	Ralf.Northe
Gepr.		

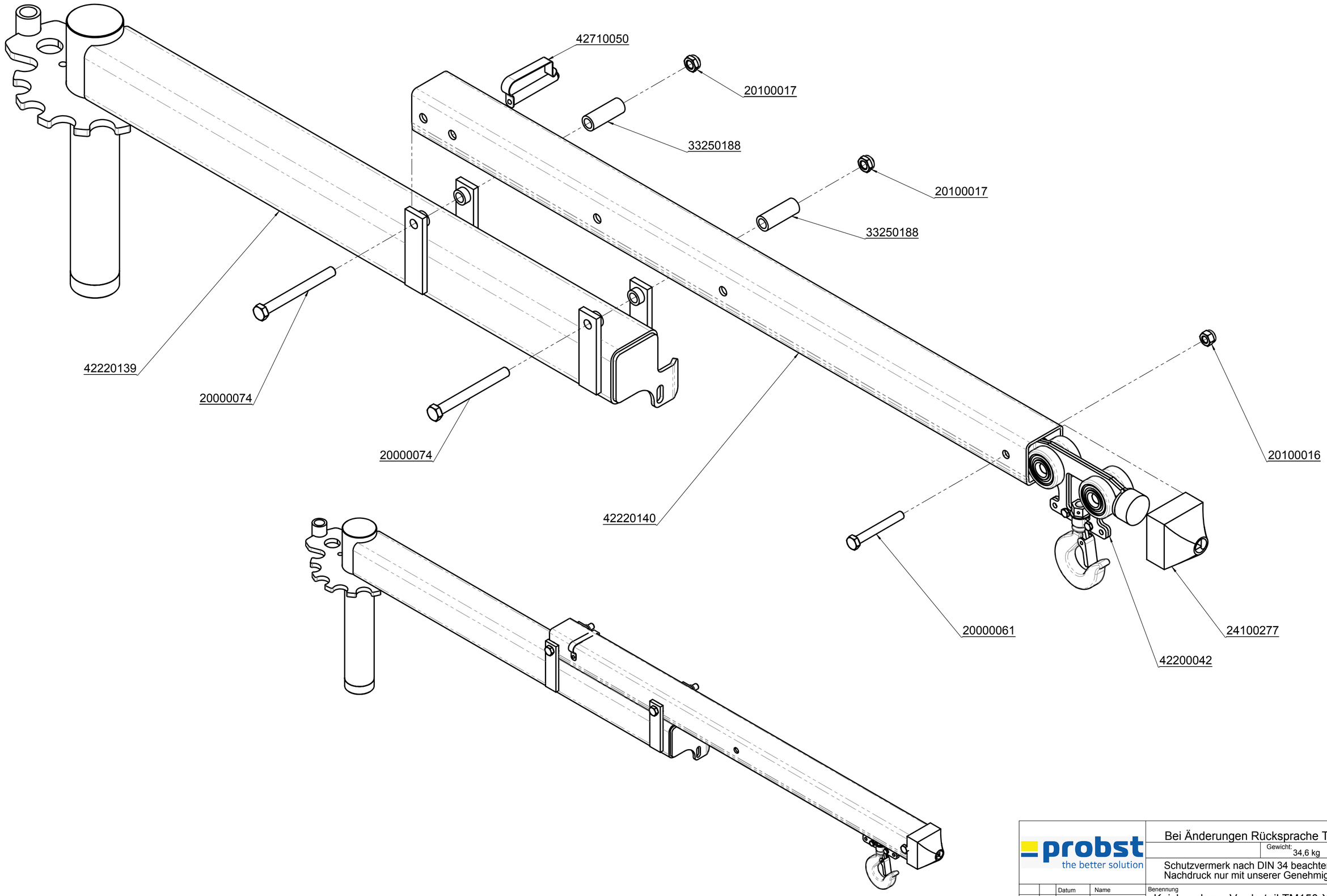
Benennung
Auslegerarm TM150-XL hinten kompl.

WA:
Kunde:

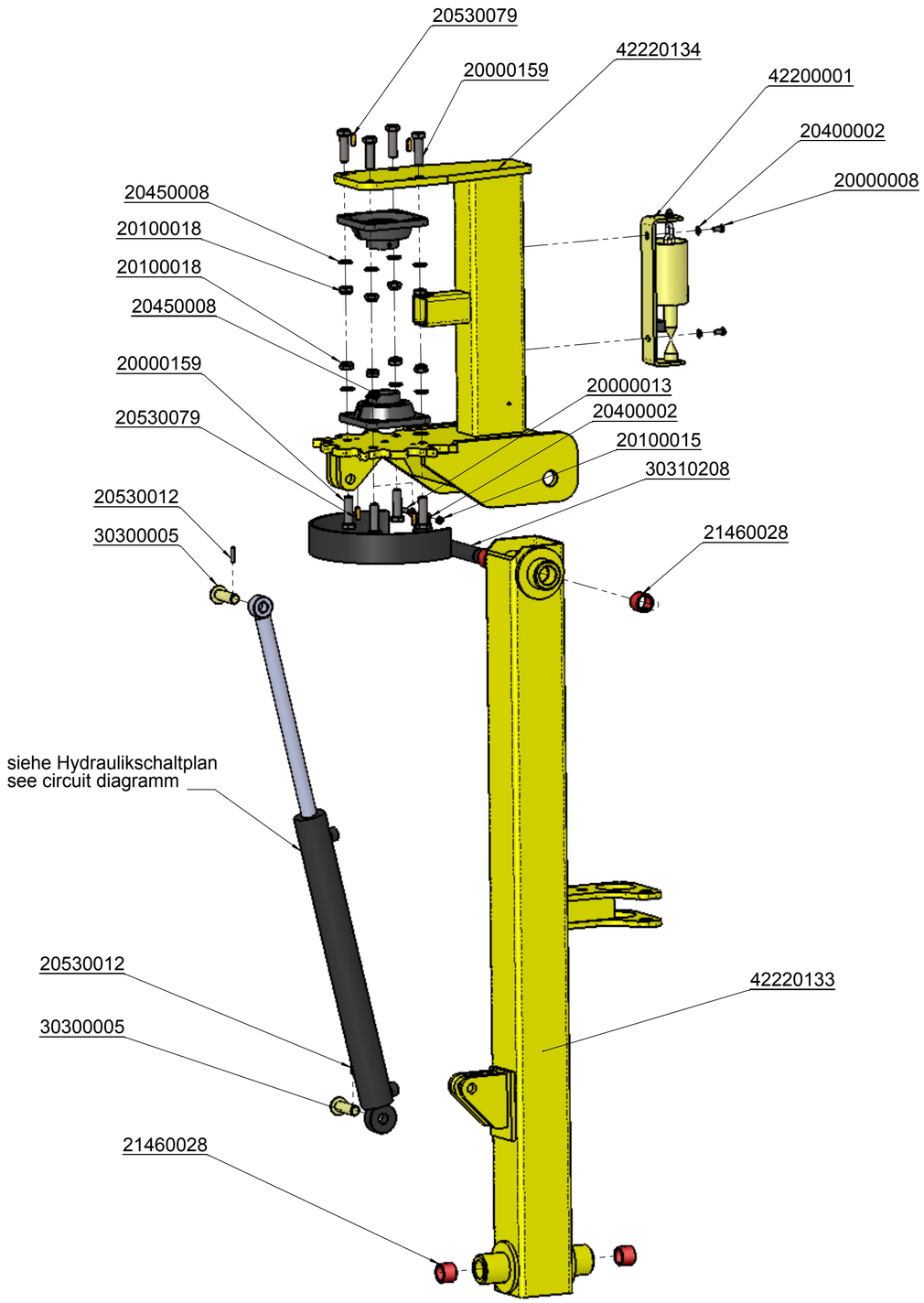
Artikelnummer/Zeichnungsnummer
E42220136

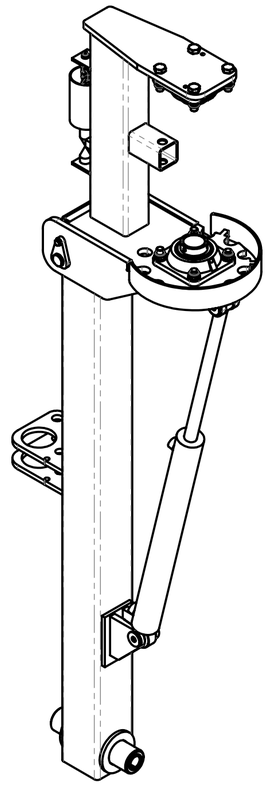
Blatt 1 von 1

Zust. | Urspr. | Ers. f. | Ers. d.

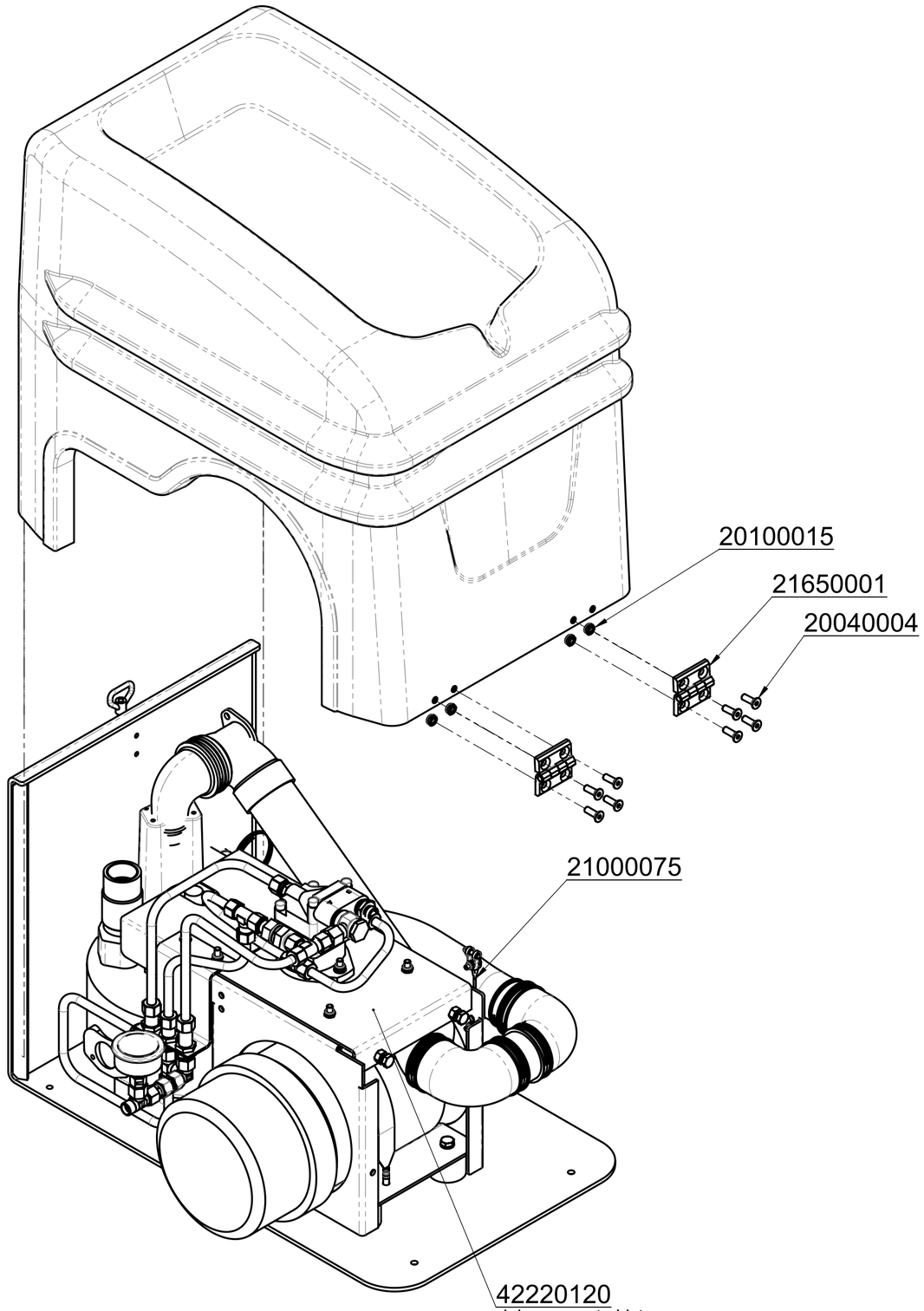


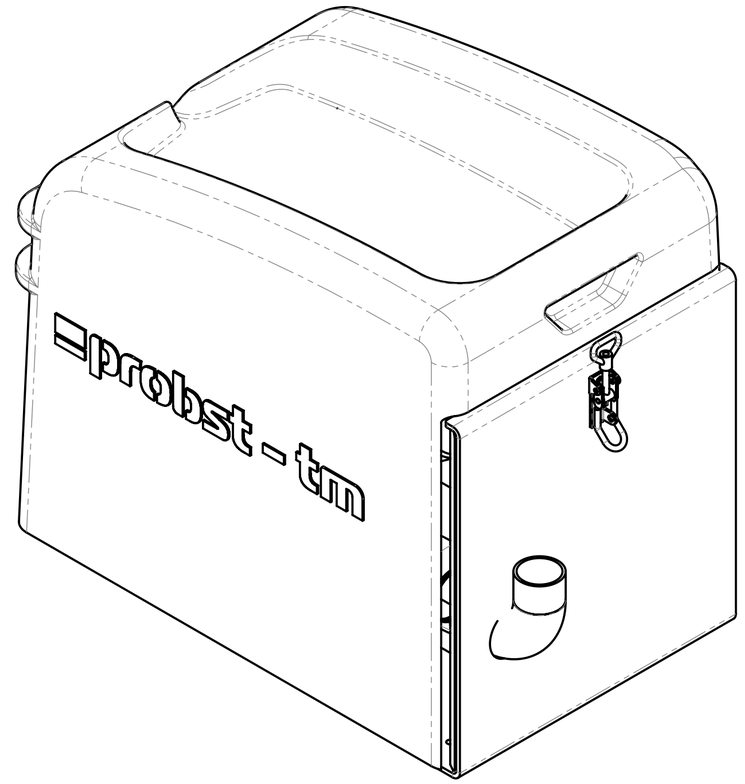
probst the better solution			Bei Änderungen Rücksprache TB !	
			Gewicht: 34,6 kg	
			Schutzvermerk nach DIN 34 beachten! Nachdruck nur mit unserer Genehmigung!	
		Datum	Name	Benennung: Knickausleger Vorderteil TM150-XL kpl.
	Erst.	14.1.2013	Ralf.Northe	
	Gepr.			
	WA:			Artikelnummer/Zeichnungsnummer: E42220138
	Kunde:			Blatt 1 von 1
Zust.	Urspr.			Ers. f. / Ers. d.





probst the better solution				Bei Änderungen Rücksprache TB !	
				Gewicht: 108,6 kg	
				Schutzvermerk nach DIN 34 beachten! Nachdruck nur mit unserer Genehmigung!	
		Datum	Name	Benennung	
	Erst.	24.1.2013	Ralf.Northe	Mast kompl. TM150-XL	
	Gepr.				
WA:				Artikelnummer/Zeichnungsnummer	Blatt 1
Kunde:				E42220132	von 1
Zust.	Urspr.			Ers. f.	Ers. d.





probst handling equipment

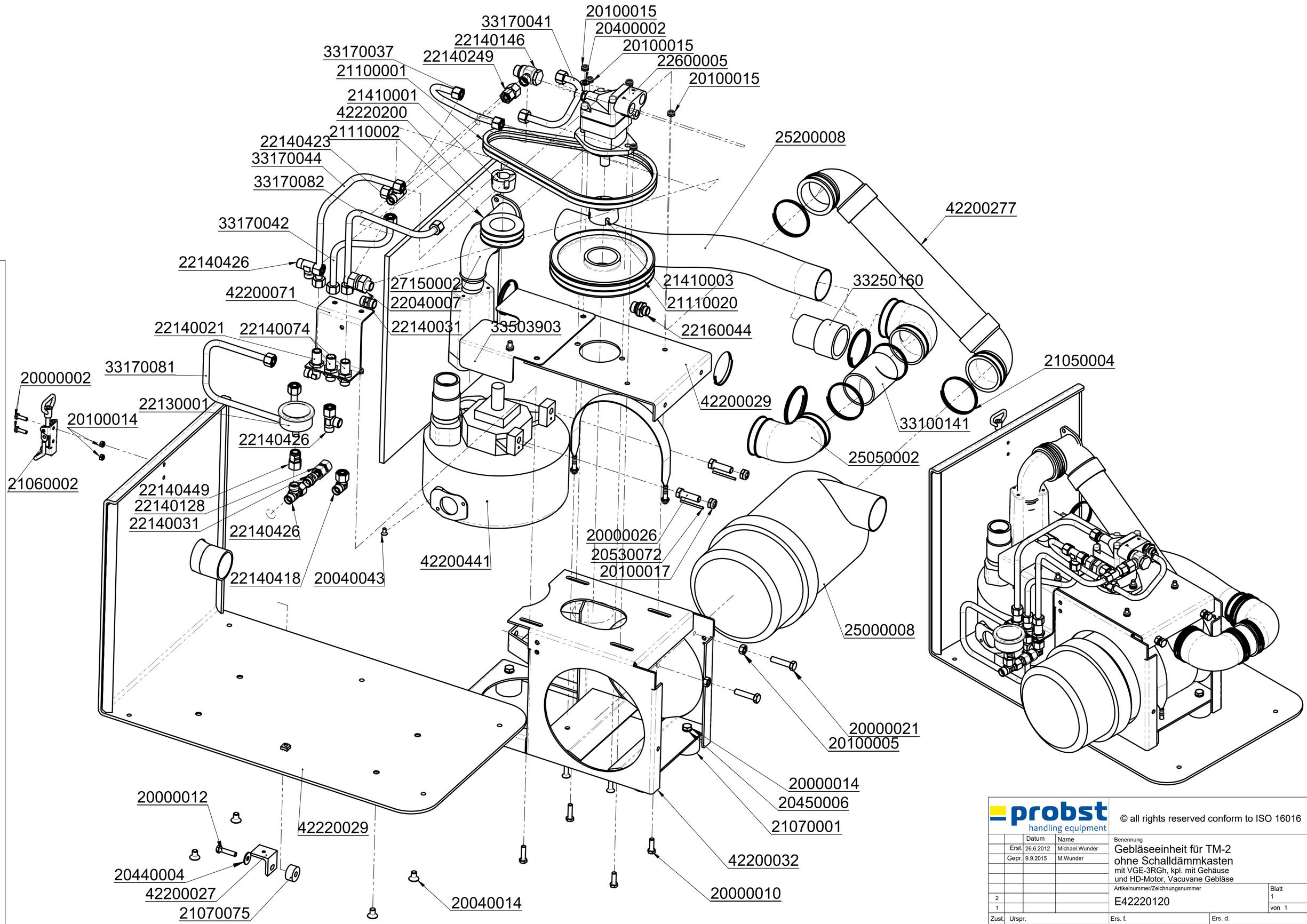
		Datum	Name
	Erst.	20.11.2013	Ralf.Northe
	Gepr.	9.3.2015	M.Wunder
1			

Zust. | Ursprung | Ers. f. | Ers. d.

Benennung
Vakuum-Gebläseeinheit
für Trans Mobile TM-150-XL
mit VGE-3RGh, kpl. mit Gehäuse und HD-Motor

Artikelnummer/Zeichnungsnummer
E42220164

Blatt 1 von 1



probst handling equipment

		Datum	Name
	Erst.	26.6.2012	Michael.Wunder
	Gepr.	9.9.2015	M.Wunder

Benennung

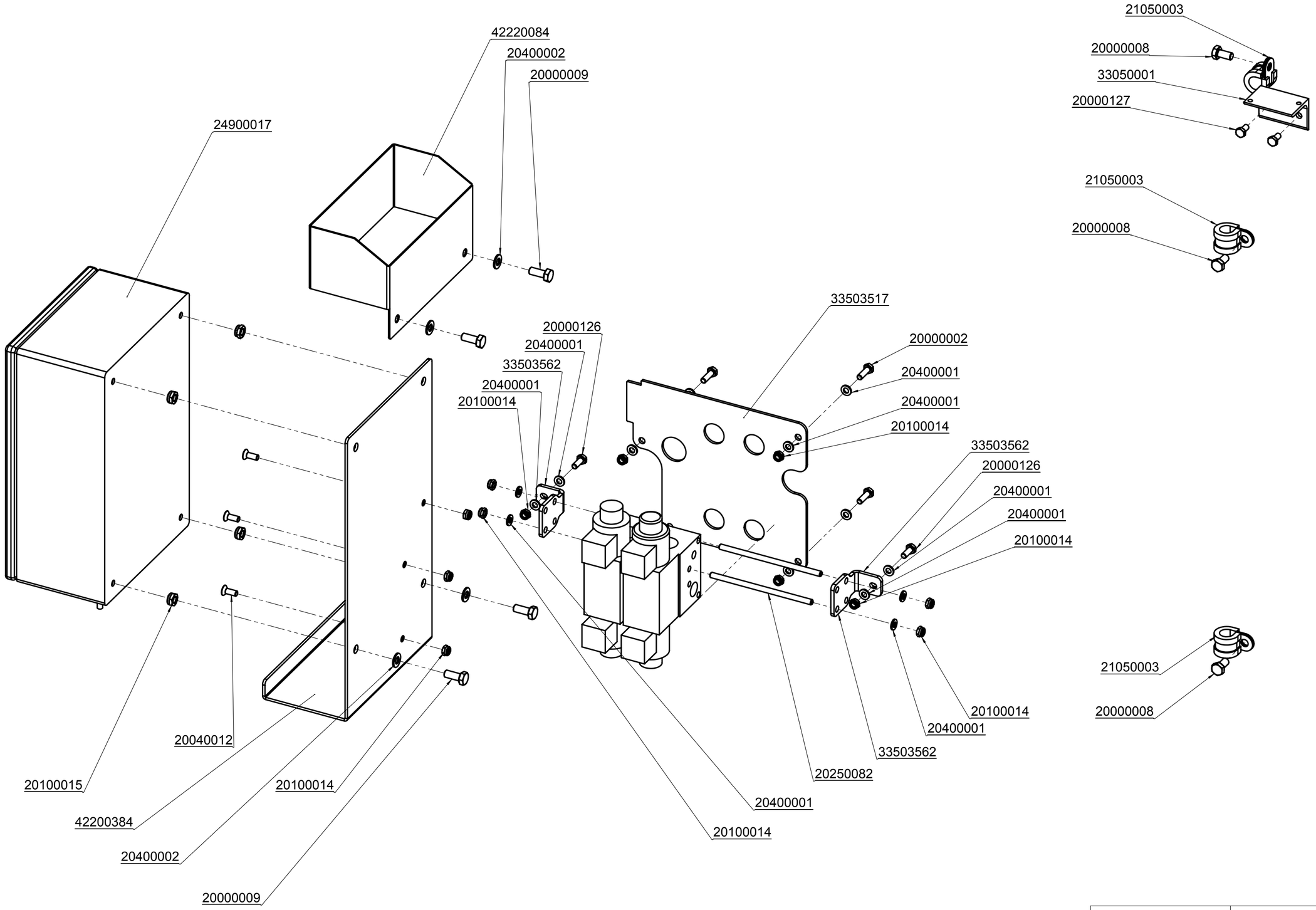
Gebläseeinheit für TM-2
ohne Schalldämmkasten
mit VGE-3RGh, kpl. mit Gehäuse
und HD-Motor, Vacuvane Gebläse

Artikelnummer/Zeichnungsnummer

E42220120

Blatt 1 von 1

Zust. | Ursprr. | Ers. f. | Ers. d.



probst
the better solution

Bei Änderungen Rücksprache TB !

Gewicht: 16,3 kg

	Datum	Name
Erst.	25.4.2013	Ralf.Northe
Gepr.		

Benennung
Umbauteile auf TM-D-A-XL

Steuersäule, Steuerung

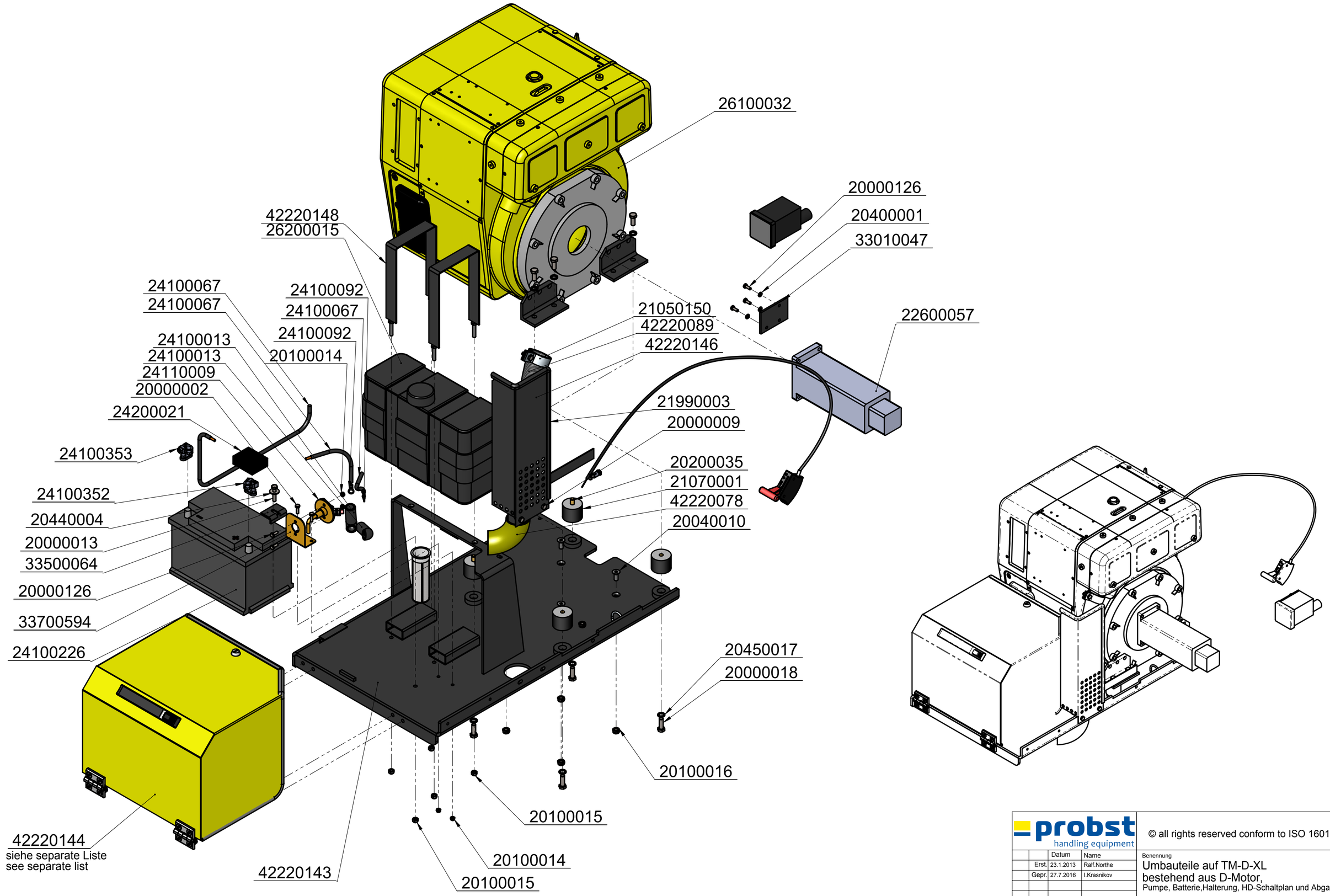
WA:

Kunde:

Artikelnummer/Zeichnungsnummer
E42220110

Blatt 1 von 1

Zust. | Urspr. | Ers. f. | Ers. d.



probst handling equipment

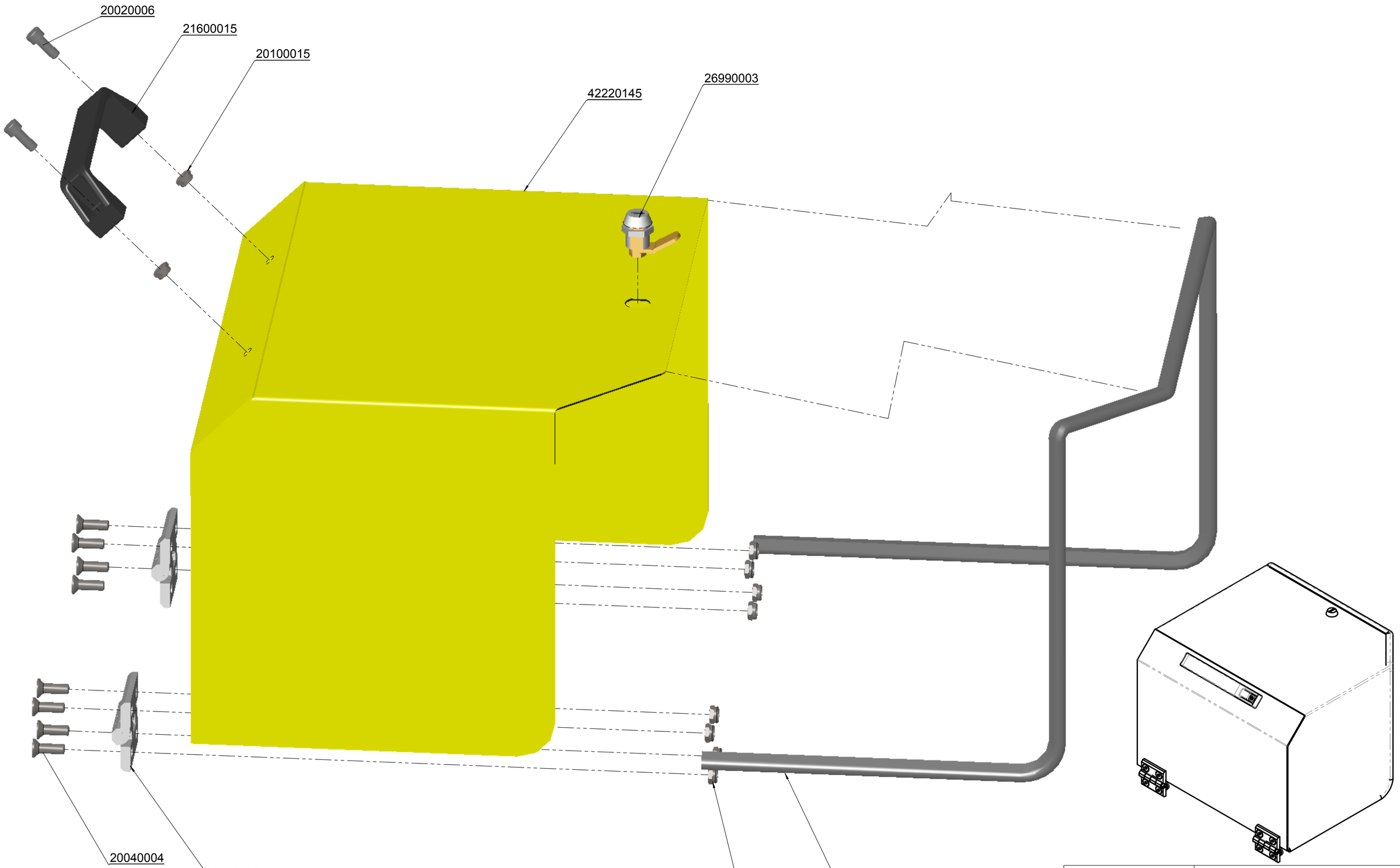
		Datum	Name
	Erst.	23.1.2013	Ralf.Northe
	Gepr.	27.7.2016	I.Krasnikov
1			

Benennung
Umbauteile auf TM-D-XL
bestehend aus D-Motor,
Pumpe, Batterie,Halterung, HD-Schaltplan und Abgasrohr

Artikelnummer/Zeichnungsnummer
E42220142

Blatt 1
von 1

Zust. | Urspr. | Ers. f. | Ers. d.



probst
the better solution

Bei Änderungen Rücksprache TB !

Gewicht: 6,9 kg

		Datum	Name
	Erst.	4.2.2013	Ralf.Northe
	Gepr.		

Benennung
Haube TM 150-D-XL komplett

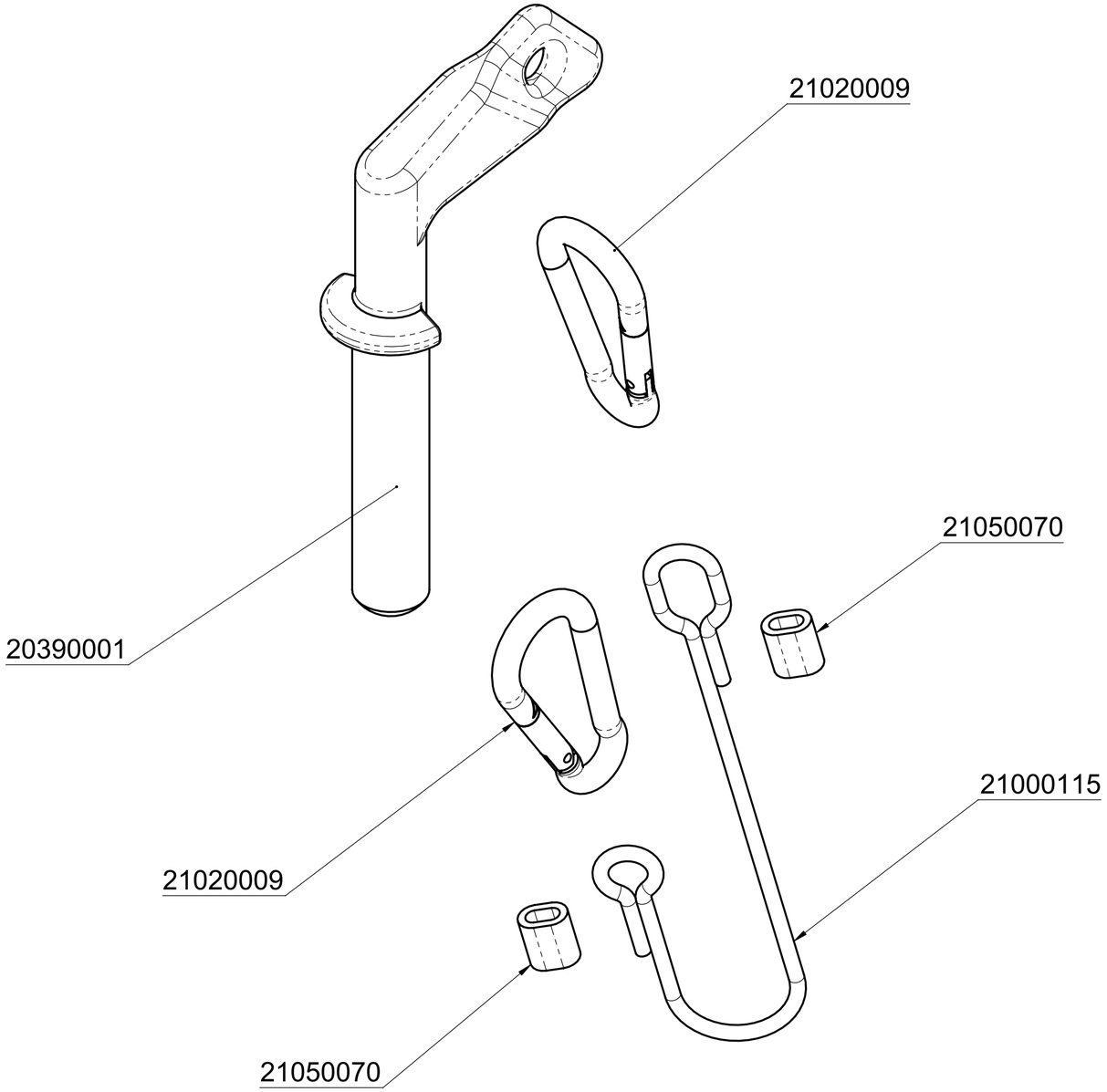
WA:

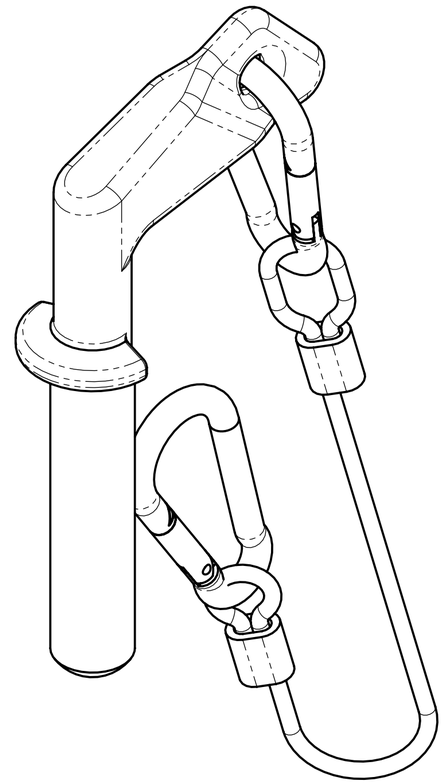
Kunde:

Artikelnummer/Zeichnungsnummer
E42220144

Blatt 1 von 1

Zust. | Urspr. | Ers. f. | Ers. d.





probst handling equipment

		Datum	Name
	Erst.	13.7.2018	R.Seidel
	Gepr.	13.7.2018	R.Seidel

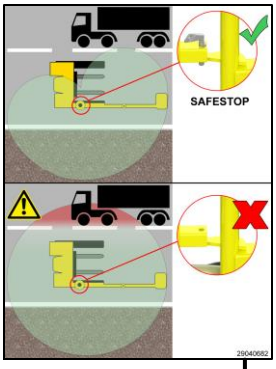
Benennung
Bolzen mit Handgriff mit Seilsicherung und Karabiner

Artikelnummer/Zeichnungsnummer
E42200417

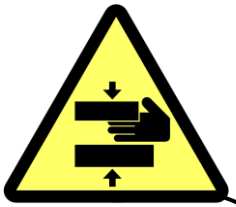
Blatt 1 von 1

Zust. | Ursprr. | Ers. f. | Ers. d.

A52220010 TM-150-B-XL
A52220011 TM-150-D-XL
A52220012 TM-150-D-A-XL
A52220014 TM-150-D-A-SILENT-XL



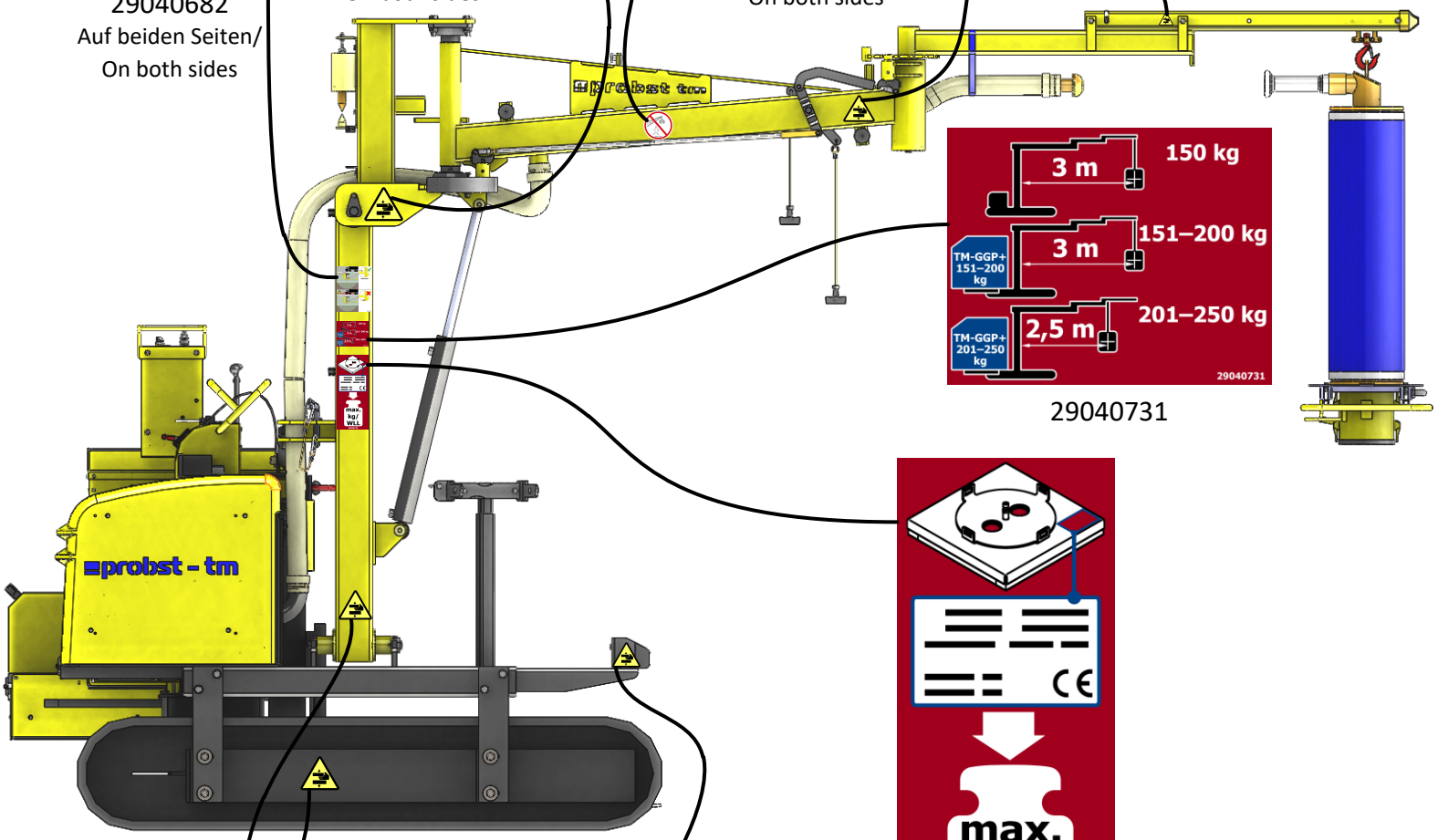
29040682
Auf beiden Seiten/
On both sides



29040107
Auf beiden Seiten/
On both sides

29040204
Auf beiden Seiten/
On both sides

29040220
Auf beiden Seiten/
On both sides



29040731

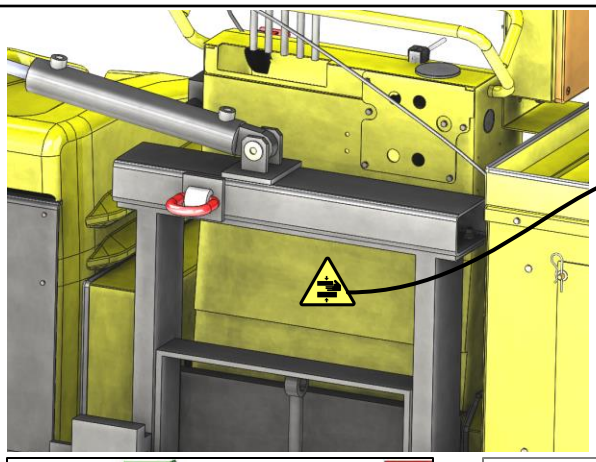
29040730

29040107
Auf beiden Seiten/
On both sides

29040220
Auf beiden Seiten/
On both sides

Einige der Abbildungen sind möglicherweise optionales Zubehör des Gerätes/Some of pictures may be optional equipment of the device.

A52220010 TM-150-B-XL
A52220011 TM-150-D-XL
A52220012 TM-150-D-A-XL
A52220014 TM-150-D-A-SILENT-XL



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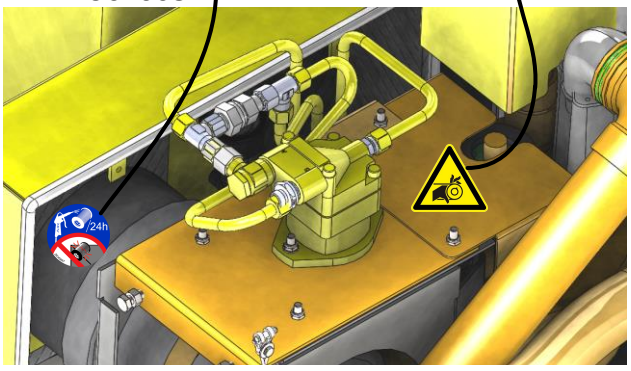

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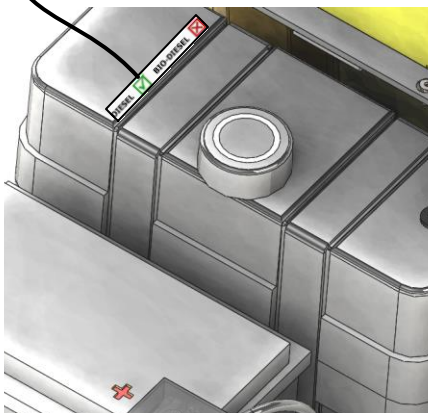

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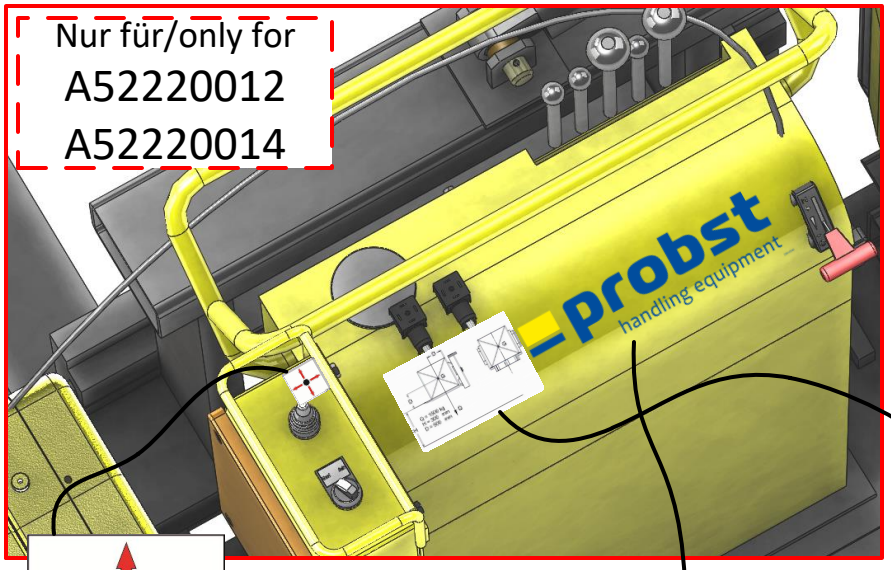

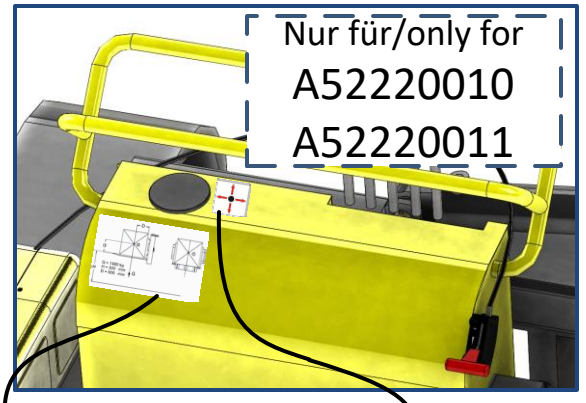

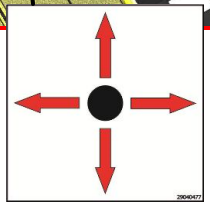

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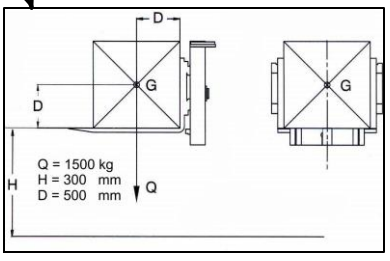

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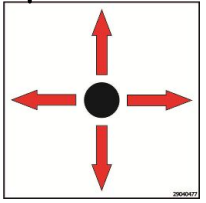

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Einige der Abbildungen sind möglicherweise optionales Zubehör des Gerätes/Some of pictures may be optional equipment of the device.

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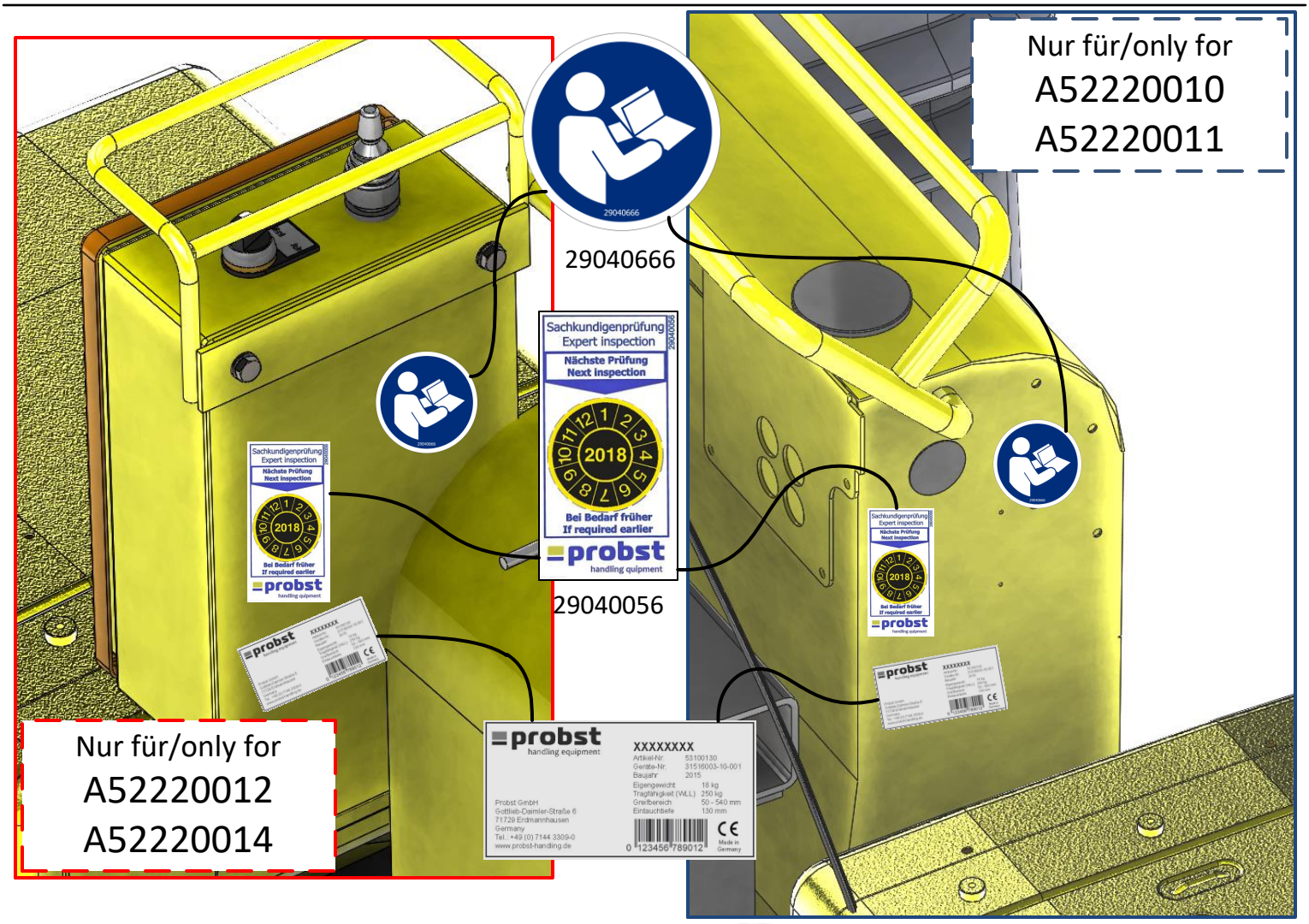
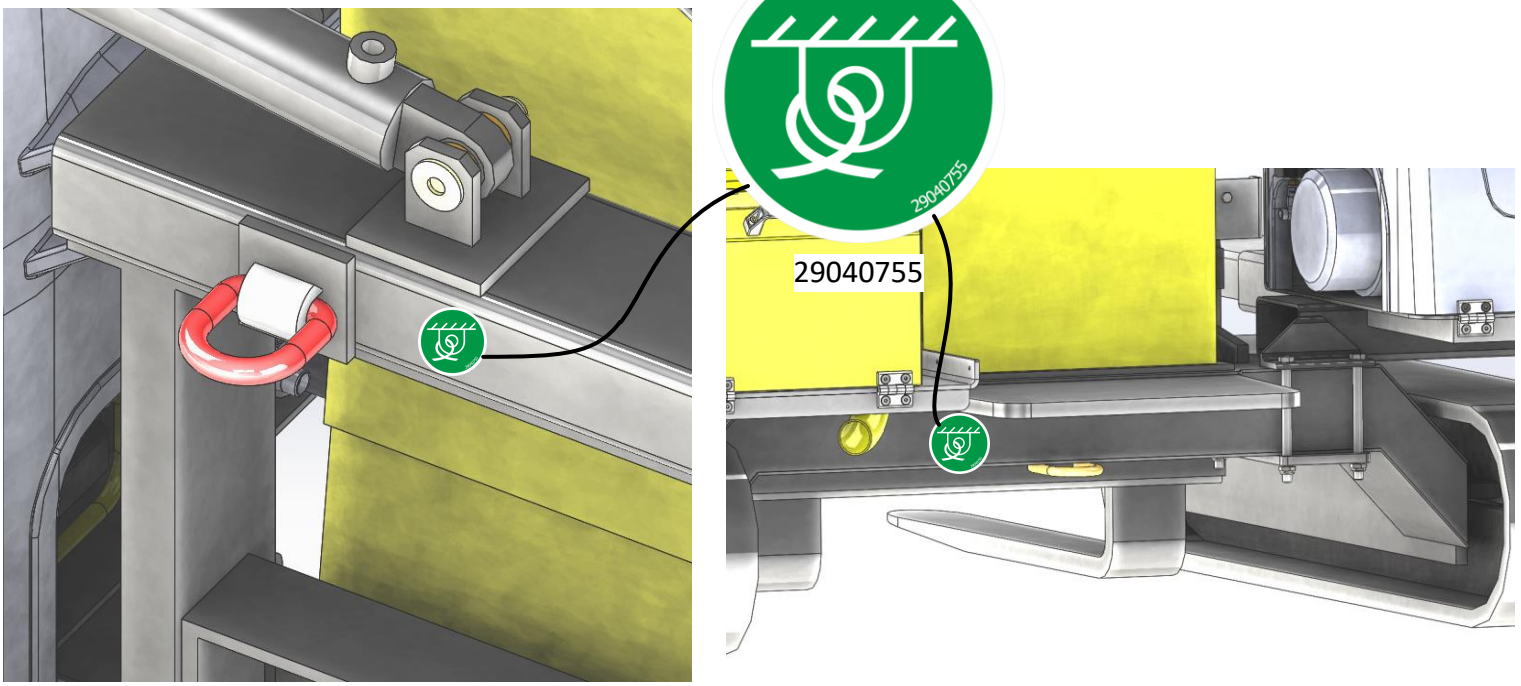
A52220012 TM-150-D-A-XL
A52220014 TM-150-D-A-SILENT-XL



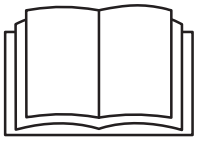


Einige der Abbildungen sind möglicherweise optionales Zubehör des Gerätes/Some of pictures may be optional equipment of the device.

Operation, Safety, Maintenance and service Manual

Original Instructions - Keep this manual with the machine at all times.

TRACKED FORKLIFT
PT20GL/TP2000/169835
TP2000/17189300CA



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EC DECLARATION OF CONFORMITY TP2000

MINIESCAVATORI - MINIDUMPERS - CARRI CINGOLATI - PIATTAFORME AEREE - PALE COMPATTE

Nogara, __.__.__

DICHIARAZIONE DI CONFORMITA' CE
EG CONFORMITY DECLARATION

LA SOCIETA' **HINOWA S.p.A.** con sede in VIA FONTANA-37054 NOGARA (VR) ITALIA
THE COMPANY HINOWA S.p.A. main office in VIA FONTANA-37054 NOGARA (VR) ITALY

DICHIARA
DECLARES

SOTTO LA PROPRIA ESCLUSIVA RESPONSABILITÁ CHE IL PRODOTTO DENOMINATO
ON ITS OWN EXCLUSIVE RESPONSIBILITY THAT THE PRODUCT CALLED

" SOLLEVATORE "
"LIFT"

" **DESTINATO AD UTILIZZO MOVIMENTO TERRA**/ DESTINED FOR GROUND MOVING PURPOSES "

MODELLO MODEL	**TP2000**
MATRICOLA SERIAL NUMBER	**___TP**
ANNO DI COSTRUZ. CONSTRUCTION YEAR	**2008**

AL QUALE QUESTA DICHIARAZIONE SI RIFERISCE, E' CONFORME AI REQUISITI ESSENZIALI DI SICUREZZA PREVISTI DALLE DIRETTIVE 98/37, 89/336, E SUCCESSIVE MODIFICHE.
TO WHICH THIS DECLARATION REFERS,COMPLIES WITH THE ESSENTIAL SAFETY REQUIREMENTS PROVIDED FOR BY DIRECTIVES 98/37 CE, 89/336 AND SUBSEQUENT MODIFICATIONS.

Il Legale Rappresentante

HINOWA s.p.a. - Via Fontana - 37054 NOGARA (Verona) - ITALIA - Tel. +39 (0)442 539100 - Telefax +39 (0)442 539075 - E-mail: hinowa@hinowa.it
web site: www.hinowa.com - Reg. Impr. C.C.I.A.A. 01996640239 - R.E.A. 210602 - Cod. Fisc. e Part. Iva IT 01996640239 - Cap. Soc. € 1.500.000,00 i.v.

INTRODUCTION

- This manual is made to permit customers to properly employ Hinowa hydraulic units on the machines they have designed.

- Read this manual with care before making mechanical and hydraulic connections between the Hinowa hydraulic unit and your machine.

- Continuous improvements in Hinowa products may lead to have illustrations in the manual that do not match exactly with the parts that are used.

- No matter where you live or work do not hesitate to contact our engineering department which is at your full disposal for all useful information and, in case, to furnish you with any genuine spare parts you may require: these are the only spare parts that guarantee quality and perfect interchangeability.

- To submit a correct request for the spare parts needed, it is necessary to quote the undercarriage serial no. on every order.

DECLARATION OF INCORPORATION

Preliminary remark: The product hydraulic unit is a partly completed machinery which cannot in itself perform a specific and autonomous application, as it is without any tools, utensils or other parts for a specific application. Therefore, in conformity with the provisions of the Machinery Directive, Chapter 1, Article 1, this product does not fall within the scope of this directive and is not subject to the provisions in Chapter 1, Article 5 and Chapter 2, Article 8. As per Annex II, point B (see Chapter 1, Article 4, point 2) this product is only intended to be incorporated into or assembled
with other machinery, thereby forming machinery to which the Machinery Directive applies.

Given this,

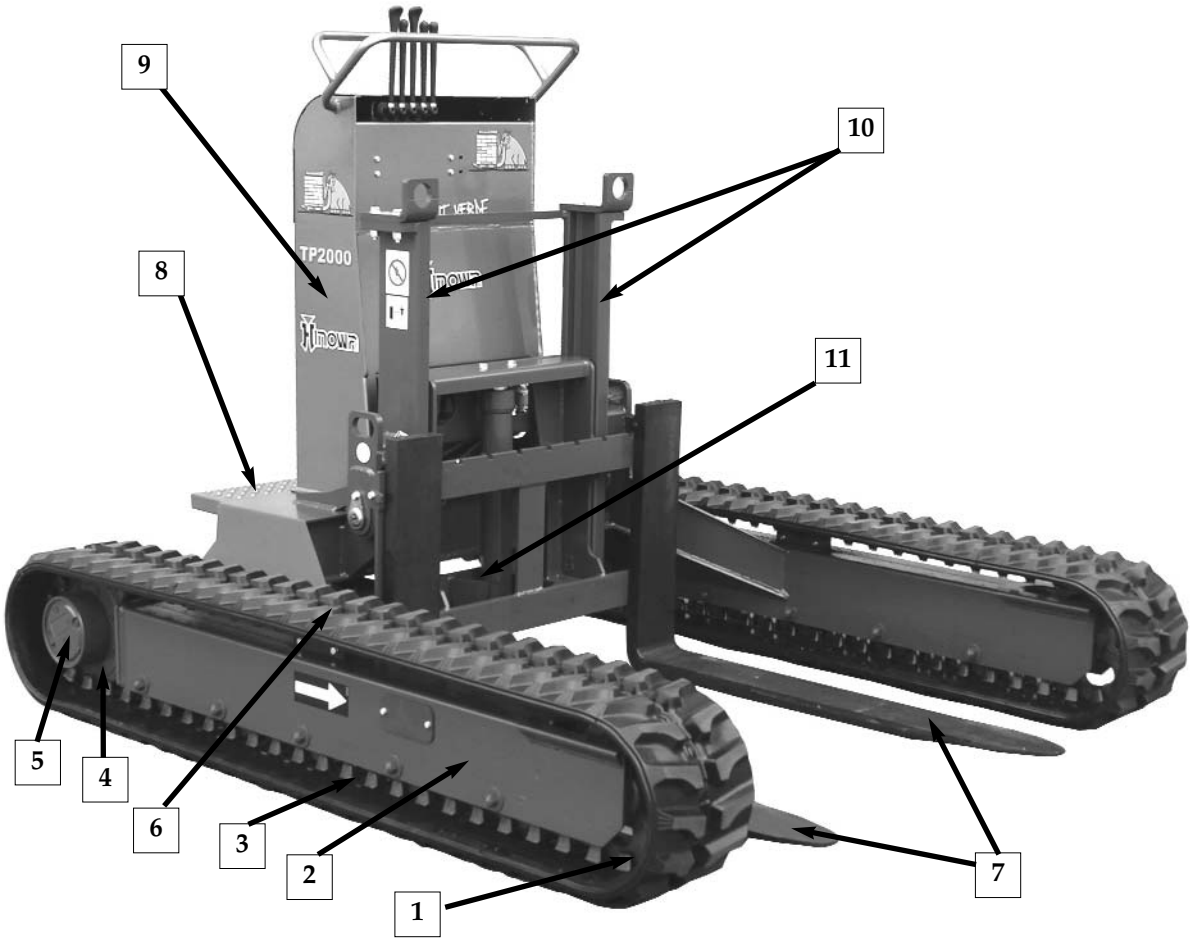
The **HINOWA S.p.A**. Company
Via Fontana - 37054 NOGARA (VR) - ITALY
Tel. +39 0442 539100 - Fax +39 0442 539075

STATES

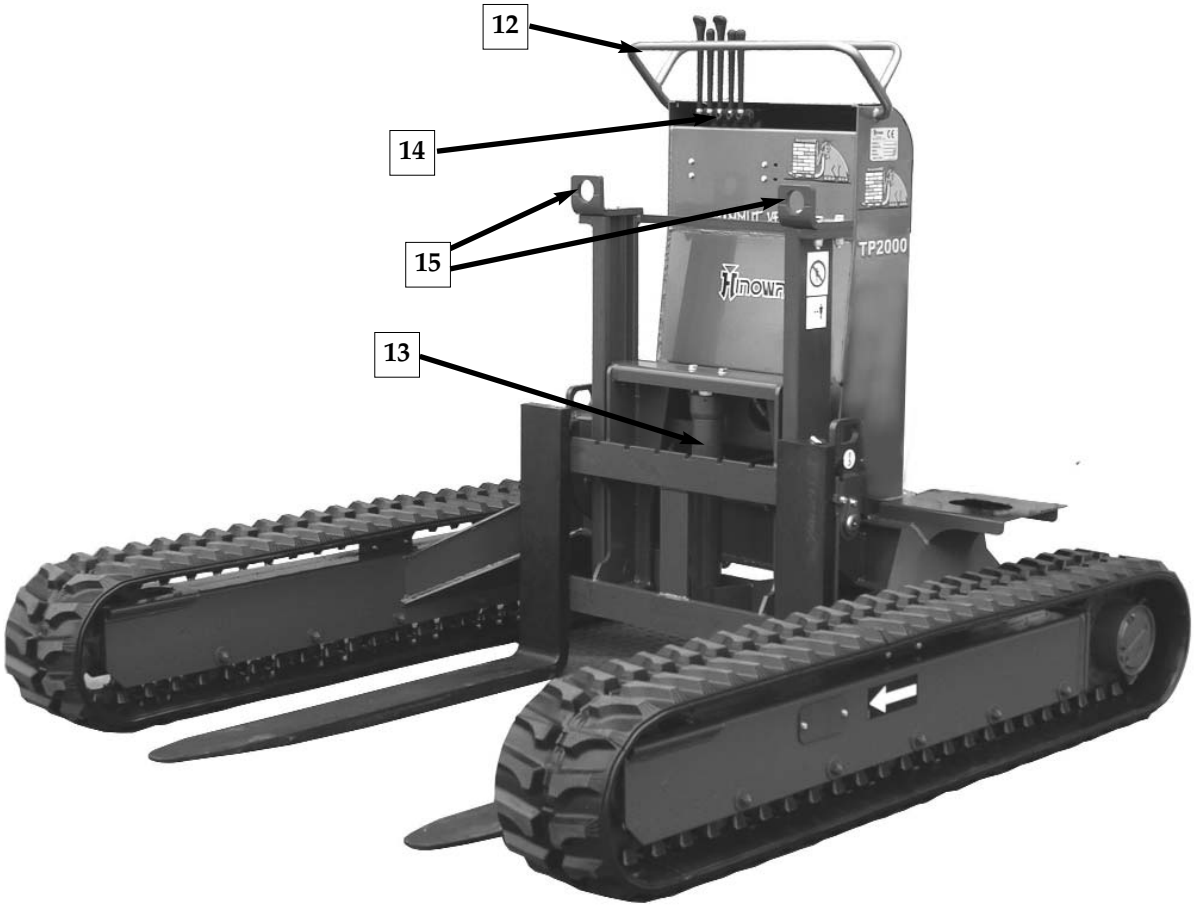
That it is forbidden to put HINOWA hydraulic units series TS in service before the machine in which they have been incorporated has been stated to comply with the provisions of Machinery Directive (EEC directive 2006/42) and subsequent modifications.

NOMENCLATURE

To make the safety warnings and the operation and maintenance instructions easier to understand, the names of the various parts of the tracked forklift are listed here below:



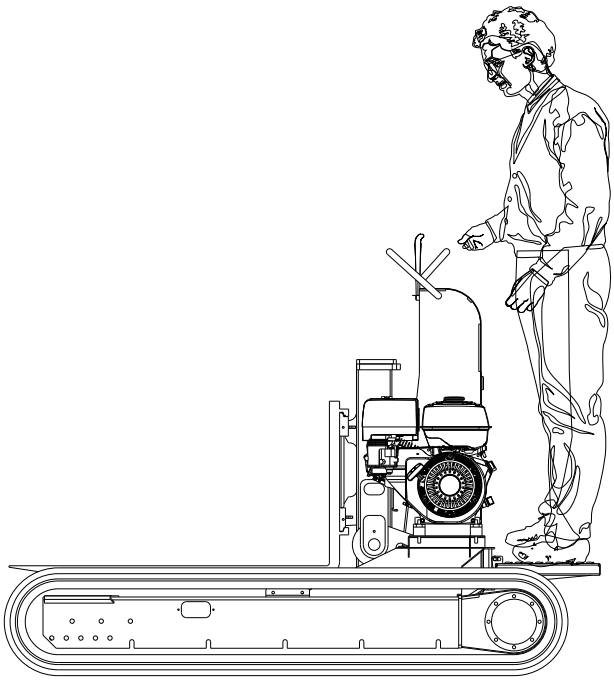
1 Idler roller assembly
2 Tracked undercarriage chassis
3 Roller
4 Traction wheel
5 Travel reductin gear oil
6 Track
7 Forks
8 Platform
9 Hydraulic oil tank
10 Lifting guides
11 Swing cylinders



12 Control lever guard
13 Lifting cylinder
14 Hydraulic distributor
15 Lifting points

CONTROL STATION

The control station is the position at the rear of the machine where the operator stands (on the platform), securely anchored to the control levers.



WARNING

The operator must control the machine from the control station. The maximum possible protection has been provided, taking in consideration that the machine can also be used off-road; nonetheless if the operator does not stand in the specified position his/her lower limbs may be crushed by the tracks.

INFORMATION ON SAFETY

To avoid accidents, before starting work and before performing any maintenance operations, all the precautions and warnings contained in this manual must be read, understood and observed.

This is the safety warning symbol.
When this symbol is identified on the machine or in this manual, care must be taken to avoid the risk of potential personal injuries.
Observe the suggested precautions and the instructions.

The words **DANGER** and **WARNING** are used together with the safety warning symbol.

The word **DANGER** indicates potential situations of danger that may be the likely cause of serious injuries or death. In addition, serious damage may also be caused to the machine.

DANGER

The word **WARNING** indicates potential situations of danger, which if not avoided may cause minor damage or personal injuries.

WARNING

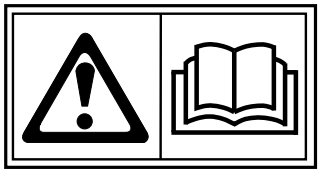
This wording may also be used when there is only the risk of damaging the machine.
This message is used in situations where, unless the due precautions are taken, the life of the machine may be affected.

IMPORTANT

Hinowa has carefully analysed the risks deriving from the normal use and maintenance of the machine. Nonetheless, improper use and maintenance performed using unsuitable equipment by persons who are not appropriately trained may bring about situations of serious danger to the operator.

PICTOGRAMS ON THE TP2000

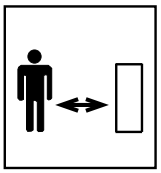
1) READ THE MANUAL (POS. 8 - TABLE 01)



Carefully read the contents of this manual before commissioning, use, maintenance, refuelling or other operations on the machine.

Label position: in front of the operator on the distributor support.

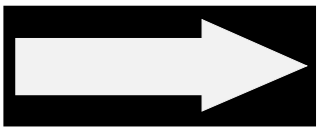
2) MACHINE WORKING (POS. 13 - TABLE 01)



Keep outside of the operating range of the moving machine.

Label position: right- and left-hand side of the lifting guides.

3) TRAVELLING DIRECTION (POS. 5 - TABLE 01)

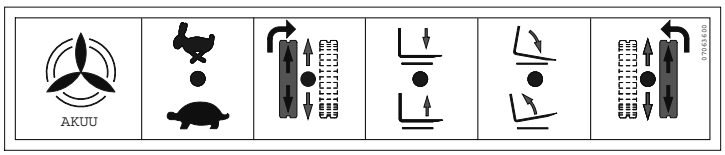


This label indicates the recommended travelling direction, so that impact with any obstacles to be driven over can be dampened by the shock absorbers connected to the idler roller.

Label position: tracked undercarriage chassis.

4) DISTRIBUTOR CONTROLS, TP2000, FIXED UNDERCARRIAGE, PETROL ENGINE (POS. 1 - TABLE 01)

Label position: distributor guard.

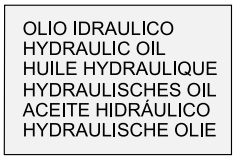


5) SAFETY DISTANCE (POS. 21 - TABLE 01)

This label warns anyone in the vicinity to be careful and keep a safe distance from the working machine as the lifted loads may cause serious harm or damage to people.

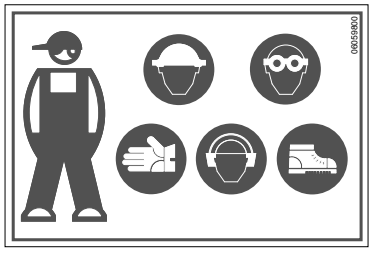
Label position: on the lifting guides.

6) HYDRAULIC OIL (POS. 16 - TABLE 01)



Label position: on the hydraulic oil tank.

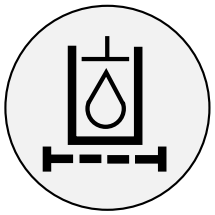
7) CLOTHING AND PROTECTIVE EQUIPMENT (POS. 4 - TABLE 01)



When using the machine or performing maintenance, wear a hard hat, glasses, safety footwear, gloves and acoustic earmuffs.

Label position: in front of the operator on the distributor guard.

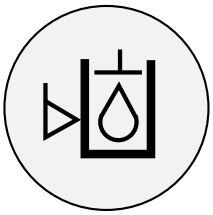
9) HYDRAULIC OIL FILTER (POS. 12 - TABLE 01)



Indicates the position of the hydraulic oil filter.

Label position: in front of the operator on the hydraulic oil tank, under the distributor guard.

10) HYDRAULIC OIL LEVEL INDICATOR (POS. 7 - TABLE 01)



Indicates the position of the hydraulic oil level indicator.

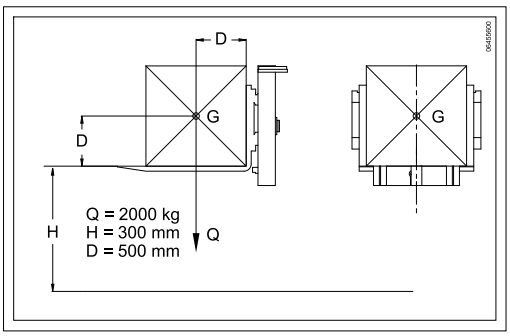
Label position: in front of the operator on the hydraulic oil tank.

12) LIFTING POINTS (POS. 6 - TABLE 01)

Indicates the points to be used for lifting the machine.

Label position: near the anchorage eyelets on the forklift guide.

15) MAX. LOAD PERMITTED (POS. 22 - TABLE 01)



Indicates the maximum load permitted and the maximum vertical and horizontal distance from the forks.
It is forbidden to exceed the capacity limit and the indicated distance of the load's centre of gravity from the forks.

Label position: on the distributor support.

16) AVOID LIFTING PEOPLE (POS. 14 - TABLE 01)

Indicates that it is forbidden to get on the lifting forks and to use the forklift as a lifting platform.

Label position: at the level of the lifting guides.

17) NO MAINTENANCE WITH MOVING PARTS (POS. 18 - TABLE 01)

Indicates that no maintenance operations may be performed when there are moving parts.

Label position: in front of the operator on the hydraulic oil tank.

18) DANGER OF CUTTING THE UPPER LIMBS (POS. 15 - TABLE 01)

Indicates that the operator must pay the utmost attention to the moving parts during work.

Label position: at the level of the lifting guides / in front of the operator on the distributor guard.

19) HOT SURFACE - RISK OF BURNING (POS. 10 - TABLE 01)

Indicates that the operator must pay the utmost attention to the hot surfaces of the machine.

Label position: near the exhaust silencer.

20) CRUSHING HAZARD FEET (POS. 23 - TABLE 01)

Indicates areas where there is a danger of crushing lower limbs for the operator.

Label position: tracked undercarriage chassis.

REPLACE THE LABELS AND THE PLATES IF THEY ARE DAMAGED.

FAILURE TO HEED ANY WARNINGS, DUE TO THE DAMAGE, LOSS OR NON-OBSERVANCE OF A SAFETY LABEL, MAY CAUSE SERIOUS ACCIDENTS.

POSITION OF PICTOGRAMS ON THE TP2000

SAFETY AND ACCIDENT PREVENTION

1 GENERAL PRECAUTIONS

DANGER

1.1 CAREFULLY READ THE INSTRUCTIONS

Before performing any operation on the machine, implement all the safety standards, precautions and instructions described in the manual.

1.2 FOLLOW THE SAFETY INSTRUCTIONS

Read all the safety messages in this manual and the safety signs on the machine. Check that the safety signs are in good condition, replacing any missing or damaged signs.
Make sure that when replacing any components or fitting new equipment, the safety signs are correct.
Learn the correct way to operate the machine and use the controls.
Do not allow any unauthorised or not specifically trained persons to operate and/or perform maintenance on the machine.

1.3 CLOTHING AND PROTECTIVE EQUIPMENT

Avoid wearing loose clothing, rings, watches or anything else that may get caught in moving parts. Also avoid wearing oil- or fuel-stained garments, as these are readily flammable.
When using the machine or performing maintenance, wear a hard hat, glasses and safety footwear, a mask, gloves and acoustic earmuffs.
When working for a period of 8 hours with a noise level over 85 dBA, always wear suitable ear protection.

1.4 UNAUTHORISED MODIFICATIONS

It is strictly prohibited to make any modifications to the machine that may compromise its operation and safety. **Hinowa** is not liable for any injuries or damage caused by unauthorised modifications.

1.5 SAFETY VALVES

It is strictly prohibited to modify and/or tamper with the safety and control valves on the hydraulic system. **Hinowa** is not liable for any damage to people, things and to the machine when the standard adjustments of the hydraulic valves are changed.

PRECAUTIONS FOR USE

2 THE PRECAUTIONS TO BE TAKEN BEFORE STARTING WORK

2.1 SAFETY IN THE WORKPLACE

DANGER

Before starting the engine, carefully check the conditions of the ground where the machine will be working to look for any irregularities that may make the work dangerous or the machine unstable.

Always look out for people who enter the machine's working area.
Use suitable signs to warn people before moving the machine, and prevent anyone from approaching the working zone when the machine is operating.

WARNING

The machine is NOT fitted with a protective structure against overturning or the falling of objects from above.
Before starting work, make sure there is no risk of overturning or falling objects that may directly or indirectly hit the operator.

3 PRECAUTIONS TO BE ADOPTED WHEN WORKING

DANGER

3.1 PRECAUTIONS WHEN STARTING THE ENGINE

Check your machine carefully by walking around it before starting the engine.
Warn any people nearby that you are about to start the machine. Do not allow anybody to climb onto the machine.

3.2 PRECAUTIONS WHEN DRIVING

To avoid the possibility of accidents or loss of control, do not climb onto the forklift; stand on the platform behind it and hold the grips tightly.
Keep children and animals away from the working area to avoid injuries due to contact with the machine.

Use the tracked forklift at night only if the working area is suitably lit.

3.3 PRECAUTIONS WHEN TRANSPORTING THE LOAD

To avoid accidents or overturning, observe the load limits specified in this manual.
Make sure that the load is still and that it does not protrude from the outline of the forklift or impede the operator's view. Keep the load away from the exhaust silencer.
To avoid overturning, do not change the direction of travel when operating on slopes.
Do not travel uphill or downhill on inclines with a gradient exceeding 20°. Before transporting the load on slopes, make sure that there is no risk of overturning.
Take care when using the machine in reverse, as in this situation the risk of falling or sliding increases.
On steep declines, always travel at minimum speed. Never travel downhill in reverse, and pay special attention when the gradient changes.

3.4 TRANSPORTING THE MACHINE

Strictly heed the local regulations when transporting the machine on public roads.
Use a truck or trailer suitable for transporting the machine.
Always unload and load the machine on a solid and flat surface.
Remember to use a ramp or a loading platform to load/unload the machine.
Never select the quick speed control during these operations.
Avoid steering when driving up or down a ramp, as this is extremely dangerous. If steering is unavoidable, first return to the ground or the loading platform, then change direction and start driving again.
Never operate any levers other than the gear levers when driving up or down a ramp to avoid the risk of the machine losing balance.
At the top end of the ramp when reaching the bed of the vehicle there is a change in slope.
Take care when driving over this section.
Secure the chains or cables to the chassis of the machine.
Read the chapter on transport.

3.5 PARKING THE MACHINE SAFELY

Park the machine on a wide and level area, where the ground is firm, with the forks completely lowered.
If this is not possible and you need to park on a slope, place chocks under the tracks.

3.6 EMERGENCIES

React promptly if a fire breaks out.
Before starting work, find out where the first aid kit and the extinguishers are kept in the working area, so as to be able to react promptly in the event of fire or accidents.
Keep the emergency telephone numbers for doctors, ambulance, hospital and fire brigade near your telephone.

3.7 PROTECTIVE GARMENTS

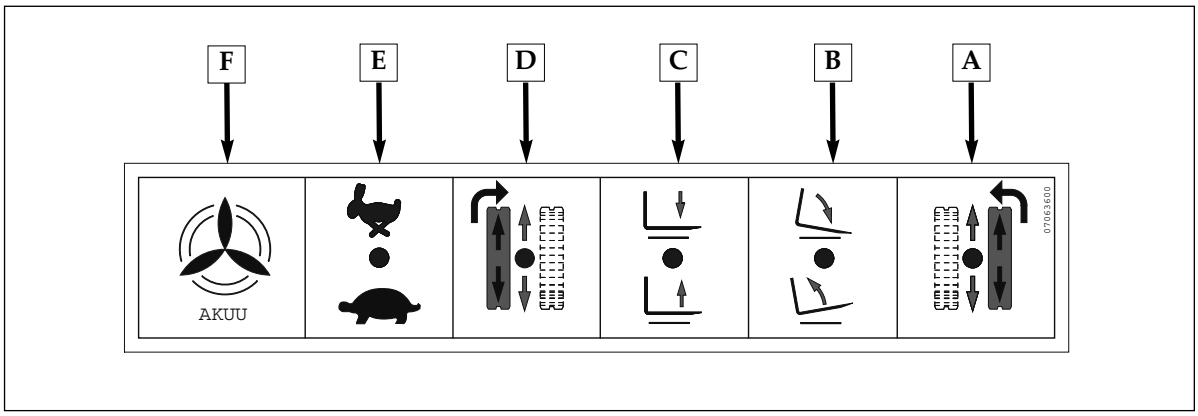
Wear tight-fitting clothes and use safety equipment suitable for the job at hand.

3.8 PROTECTION AGAINST NOISE

Extended exposure to noise may cause injuries or loss of hearing.
Use suitable equipment, such as earplugs or earmuffs, to protect yourself against unbearable or deafening noise.

4 OPERATING INSTRUCTIONS

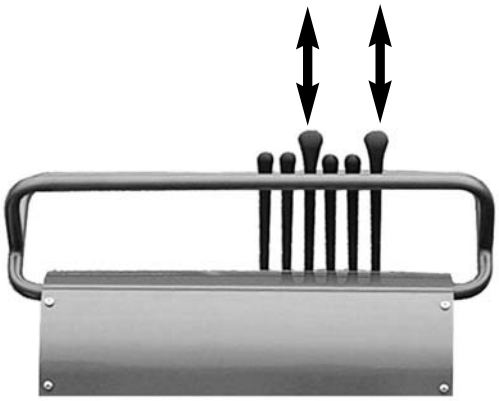
4.1 OPERATING POSITION AND CONTROLS

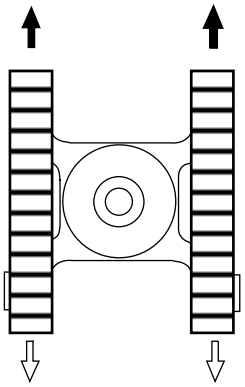


A - Carriage R travel control lever
B - Fork swing control lever
C - Fork lifting control lever
D - Carriage L travel control lever
E - 2nd travel speed lever
F - Vakuum

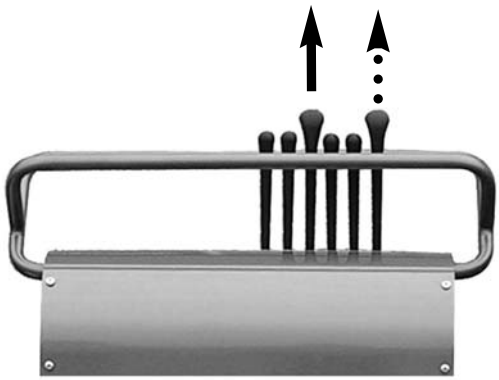
4.2 MOVING THE MACHINE TP2000

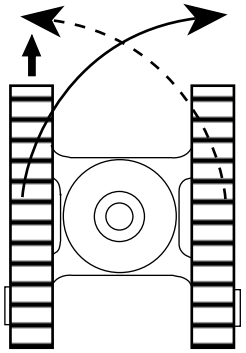
4.2.1 UNDERCARRIAGE OPERATION



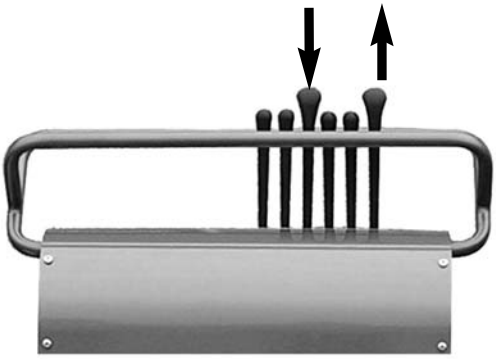


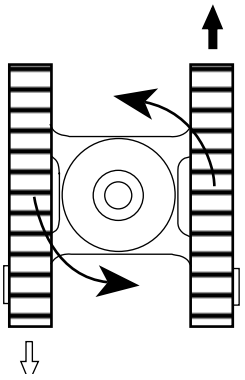
- *Travelling in a straight line*
  Move both levers forwards to travel in a straight line.
  Pull both levers backwards to travel in reverse.





- *Steering to the right or left*
  To turn right, move the left lever forwards.
  To turn left, move the right lever forwards.

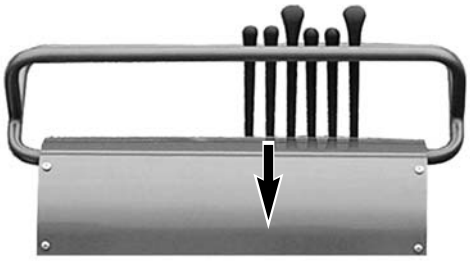




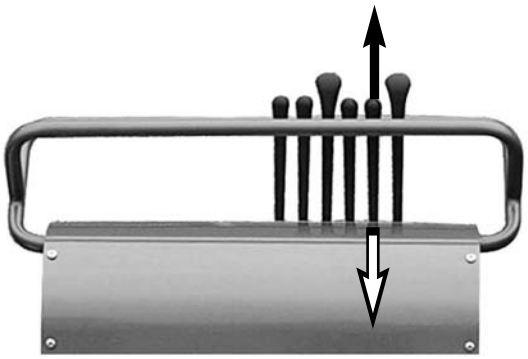
- *Turning on the spot*
  Move one lever forwards and the other lever backwards.

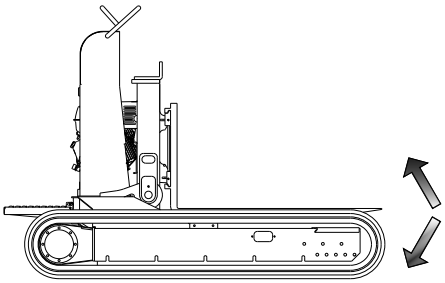
4.2.1.1 2ND TRAVEL SPEED

To engage the 2nd travel speed, shift the lever to the position shown. Use this control only when travelling on level and compact ground.



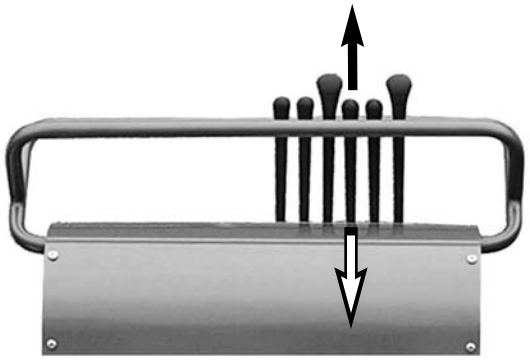
4.2.1.2 SWING FUNCTION

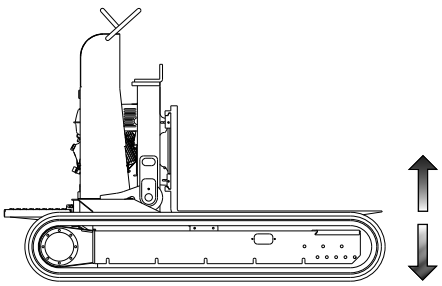




- To swing the load forwards, push the lever forwards.
- To swing the load backwards, pull the lever backwards.

4.2.1.3 LIFTING FUNCTION





- To lift the forks, pull the lever backwards.
- To lower the forks, push the lever forwards.

4.2.2 PRECAUTIONS FOR USE

WARNING

This forklift is not provided with a light unit, therefore it is forbidden to use it when visibility is scarce.

WARNING

Before starting the engine, make sure that all the distributor levers are in neutral position.

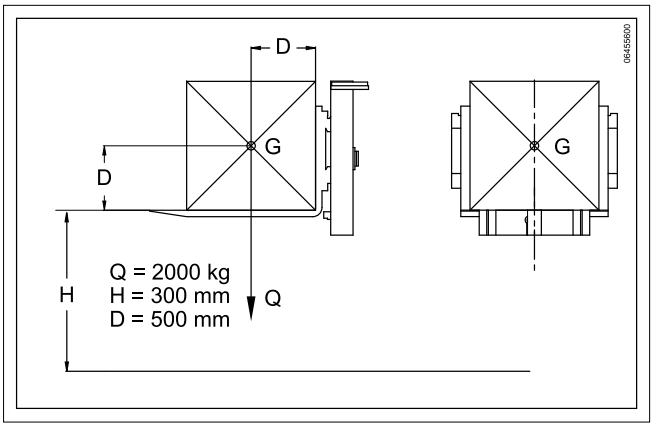
DANGER

Do not allow anyone in the area where the machine works and moves.

Operate the FORKLIFT TP2000 ONLY FROM THE CONTROL POSITION.

The FORKLIFT Hinowa TP2000 has been designed for handling palletized goods or boxes. The handled material must not weigh more than 2000Kg with a maximum distance of 500 mm between the centre of gravity of the load and the horizontal and vertical plane of the forks. The loads handled must be firm and compact, correctly positioned on standard pallets measuring 1000x1200mm or 800x1200mm, the maximum height of the load to be transported cannot exceed 1800mm (make sure that the centre of gravity of the load to be transported is at a maximum distance of 500mm from the horizontal and vertical plane of the forks).

The operator must always look in the direction of travel, in such a way as to check the route and avoid accidents. If transporting goods that hinder visibility, proceed in reverse; if this is not possible a second operator must walk before the forklift, keeping a safety distance, and the driver must proceed very slowly and stop the machine if he/she cannot see his/her colleague.
Make sure that the ground is firm enough to support the machine.
Take care to prevent the machine from overturning when you work on frozen ground. Increases in temperature soften the ground, making it unstable.
Before use, check that the carriage sliding and supporting area on the machine is free of debris or other material that may hinder its movement.



THE LOAD TO BE LIFTED CANNOT WEIGH MORE THAN 2000 KG AND THERE MUST BE A MAXIMUM DISTANCE OF 500 MM BETWEEN THE CENTRE OF GRAVITY OF THE LOAD AND THE HORIZONTAL AND VERTICAL PLANE OF THE FORKS.
IT IS FORBIDDEN TO EXCEED THE CAPACITY LIMIT AND THE INDICATED DISTANCE OF THE LOAD'S CENTRE OF GRAVITY FROM THE FORKS.

WARNING

AVOID OPERATING THE LOAD HANDLING LEVERS WHILE TRAVELLING.

4.2.2.1 DO NOT WORK IN DANGEROUS AREAS

DANGER

Due to specific manufacturing difficulties, the FORKLIFT TP2000 cannot be fitted with guards against the risk of material falling from above and the risk of overturning.
Make sure that in the working area there is no risk of overturning or of material falling from above.

4.2.2.2 HANDLING THE LOAD

Only pallets in perfect conditions and not exceeding the indicated dimensions can be loaded; the load must be compact and homogeneous and its weight and the distance of its centre of gravity from the forks must be as indicated.

Approach the load to be handled and brake smoothly in such a way as to stop the carriage near the load. Swing the forks forwards so that the mast is in vertical position.

WARNING

The forks must be swung forwards very slowly, to prevent the carriage from overturning and the load from sliding off the forks.

Move slowly forwards, taking care to avoid damaging the load and stop as soon as the end of the fork comes into contact with the load.
Check that the centre of gravity of the load is in the middle of the two fork tines.
Lift the load.
At this point swing the forks backwards, so that the load is as near the operator as possible.
Make sure that the way is free and proceed with the transport operation. Now drive carefully, accelerating and decelaring slowly and reducing speed in bends.

Note: **When travelling on slopes, the load must lead (be on the uphill side); it is absolutely forbidden to travel horizontally and to turn while the machine is moving uphill or downhill.**
Avoid parking or stopping the machine on slopes.

WARNING

When transporting particularly bulky loads, whose height exceeds the height of the control levers, pay the utmost attention to the position of your hands on the controls.
Any abrupt movement of the load may cause your upper limbs to be crushed between the distributor support and the load itself.

4.2.2.3 OPERATIONS ON SOFT GROUND

Avoid driving on very soft ground that is not hard enough to support the machine safely.
ALWAYS MAKE SURE THERE IS NO RISK OF OVERTURNING.
The machine is not fitted with a protective structure against overturning.

4.2.2.4 AVOID OPERATING ON SLOPES

Warning: manoeuvring on slopes is dangerous. Reduce travelling speed to avoid tilting or sliding.

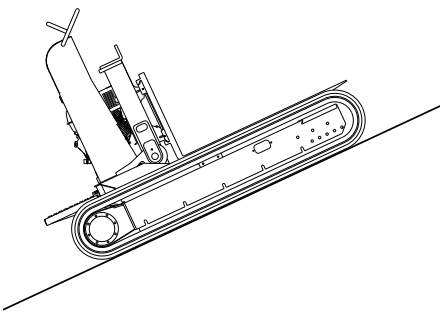
Where possible, avoid turning on slopes. If it is necessary to turn on a slope, try to do this in an area with firm and reasonably level ground.
Avoid crossing inclines to prevent the danger of overturning.
Pay special attention when the gradient changes, travelling at the minimum possible speed.

4.2.2.5 PARKING AND STOPPING ON SLOPES

Warning: parking and stopping on slopes is very dangerous. If parking or stopping on a slope is unavoidable, take the following precautions:

1. **Always check that the ground is firm enough to ensure the stability of the machine.**

2. When stopping on a slope, even for a short period of time, place chocks underneath the tracks on the downhill side.



3. Before attempting to travel up an incline, make sure the gradient is not over 20° and that the engine and the hydraulic oil have warmed up sufficiently. Otherwise, the slow movement of the machine on a steep hill may cause problems.

4.3.2.6 TOWING THE MACHINE

IMPORTANT

The machine must not be towed.
Any attempt to tow the forklift may damage the transmission.

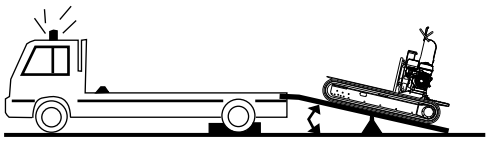
4.2.2.7 TRANSPORTING THE MACHINE

LOADING THE MACHINE ON A TRUCK WITH LOW BED.

Always load and unload the machine on a firm and level surface.

Warning: remember to use a ramp or a loading platform to load/unload the machine.

1. The ramps must be strong enough to support the weight of the machine. Make sure that the gradient of the ramp is less than 20°.
2. The ramps must be wide and strong enough and must have a suitable slope for the machine to drive on.
3. Before loading the machine, fully clean the ramp and the platform. Ramps or platforms that are dirty with oil, mud or ice are slippery and dangerous.



GRADIENT BELOW 20°

WARNING: during colder periods let the machine warm up before loading/unloading it.

ATTENTION:

1. **Avoid steering when driving up or down a ramp, as this is extremely dangerous. If steering is unavoidable, first return to the ground or the low loading platform, then change direction and start driving again.**
2. **Do not operate any lever other than the gear levers when driving up or down a ramp to prevent the machine from losing balance.**
3. **At the top end of the ramp, when the forklift reaches the bed of the truck, the gradient changes. Take care when driving over this section.**
4. Drive the machine slowly on the ramp.

5. The centre line of the machine must coincide with the centre line of the trailer.

IMPORTANT

Secure the chains or cables to the chassis of the machine. Never place the chains or cables over or against the hydraulic hoses.

6. Place chocks in front of and behind the tracks.

7. Secure all corners of the machine to the trailer with a chain or cable, using a suitable load securing device.

During transport, turn the fuel valve to position OFF and make sure that the engine remains level so as to avoid fuel leaks. Petrol fumes or leaks may catch fire.

PRECAUTIONS FOR TRANSPORTING THE MACHINE WITH RUBBER TRACKS

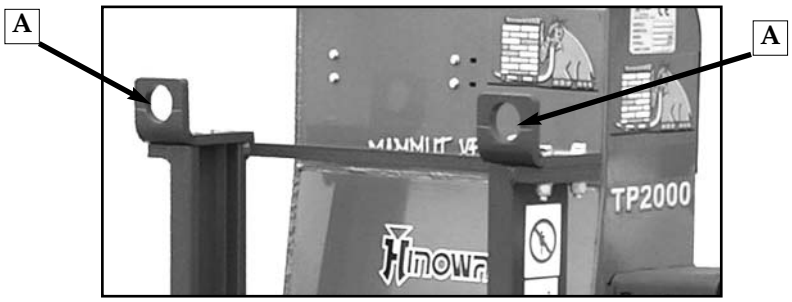
When transporting a machine with rubber tracks, remember to fasten the chassis of the right and left tracks securely to the floor of the truck, using metal cables and soft protectors.
Do not allow the metal cables to come into direct contact with the rubber tracks.

4.2.2.8 LIFTING THE MACHINE

To lift the machine correctly, observe the following safety precautions:
- The machine must not be carrying any load.
- Position the machine on a level surface.
- The operator must abandon the driving position when the machine is going to be lifted.
- Check that the work area is clear.
- Use sufficiently strong cables to support the weight of the machine as indicated on the CE plate.

LIFTING POINTS

There are two lifting points on the trucklift. Both are positioned on the upper part of the lifting guides.



4.2.2.9 USING THE RUBBER TRACKS

Avoid the following situations when working with an undercarriage with rubber tracks:

1. Do not manoeuvre the machine on hard, rocky and uneven surfaces, such as river stones, gravel, etc..
2. Do not leave the rubber tracks directly exposed to the sun for more than 3 months.
3. Where possible avoid improper steering operations on asphalt and concrete, as this will cause the tracks to wear out. In addition, avoid manoeuvring on bitumen roads when the surface temperature exceeds 60° C, as this causes wear on the tracks as well as damage to the road surface.
4. Manoeuvring with a loose track on an uneven surface may cause the detachment of and/or damage to the rubber track.
5. The rubber tracks are only for use on soft ground, and not on hard and abrasive surfaces such as sand, stones, minerals, etc. Using the rubber tracks on these surfaces may cause deformation and premature wear.
6. Prevent the rubber track from coming into contact with sharp concrete edges etc..
7. Rubber tracks must never come into contact with fuels or synthetic oils. If this does occur, however, immediately clean the track.
8. The rubber tracks should not be used near the sea, as the salty air or saline environments in general affect the adhesion between the rubber and the metal core.

5 MAINTENANCE

5.1 CORRECT INSPECTION AND MAINTENANCE PROCEDURES

- Learn how to perform correct maintenance on the trucklift and follow the inspection procedures as illustrated in this manual.
- Carry out the maintenance operations on solid and level ground.
- Never lubricate or grease nor carry out maintenance on the machine while it is on.
- Securely support the undercarriage if this needs to be lifted for maintenance work.
- Pay attention when carrying out maintenance on the hydraulic system, as the oil is very hot after work.
- There is high pressure in the circuits not only during but also after work.
- Keep all the components in good conditions and make sure they are correctly installed.
- Repair any damage immediately and replace any worn or broken parts.
- Remove any deposits of fat, oil or debris.
- Check that there are no oil leaks and/or damaged hydraulic pipes or hoses.
- Use the recommended lubricants. Do not mix together lubricants made by different manufacturers.
- Only use original **Hinowa** spare parts.
- Keep the grease nipples of the track tensioners and the pins of the hydraulic cylinders clean.
- The routine maintenance intervals refer to normal working conditions. If working in heavy-duty conditions, maintenance must be carried out more frequently.
- Dispose of the lubricants ecologically. Careless disposal of lubricants may harm the environment. Before disposing of the lubricants, refer to the local waste disposal legislation in force.
- Use suitable reservoirs when draining the lubricants. Do not use food or drink containers that someone may drink from by mistake.
  Do not pour the lubricants onto the ground, into the sewers or into puddles, canals or other water courses. Observe the laws in force on environmental protection when disposing of the lubricants.

5.2 HYDRAULIC SYSTEM

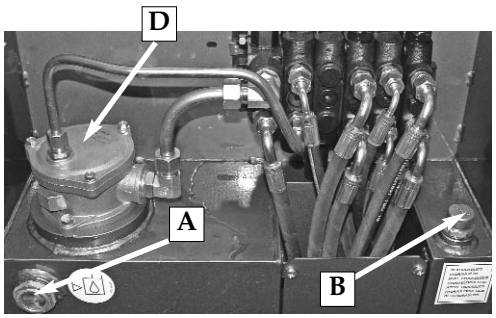
NO.			Qty.	INTERVAL			
				1 DAY	1 MONTH	3 MONTHS	1 YEAR
1	HYDRAULIC OIL	Check level		●			
		Change	l 35		*●		●
2	HYDRAULIC OIL FILTER	Change	1		*●	●	
3	TRAVEL AND ROTATION REDUCTION GEAR OIL	Check level				●	
		Change	l.0.5 EA.		*●		●

*** FIRST CHANGE**

5.2.1 HYDRAULIC OIL

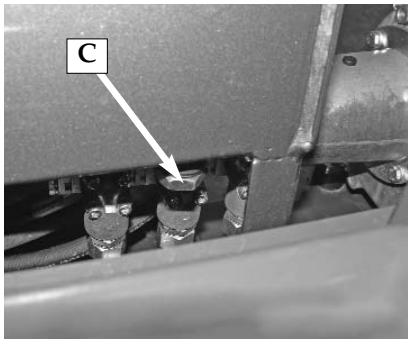
Check

To check the hydraulic oil level, place the machine on a level surface and check that the oil level is around half way up the gauge **A**. If not, top up through the filler cap **B** positioned under the distributor guard.



Change

To change the hydraulic oil, proceed as follows:
- open the filler cap B positioned under the distributor guard;
- unscrew the drain plug C on the bottom of the tank;
- completely drain the oil contained in the tank. Carefully clean the tank before filling with new oil. Screw on the drain plug C and fill the tank through the filler cap B; do not mix oils made by different manufacturers.



To ensure unaltered performance of your forklift, only use HINOWA HYDRAULIC EP EXTRA oil.
The recommended filtering gauge is ß10 (>2).

5.2.2 HYDRAULIC OIL FILTER

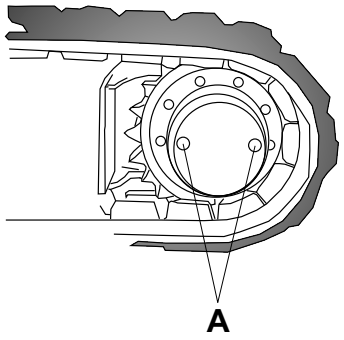
Change

The hydraulic oil filter **D** is located at the top of the hydraulic oil tank, behind the distributor guard. Before opening the filter cover, remove the filler cap **B** (*see photograph Par. 5.3.1*) to avoid overpressurizing the tank.
To access this, after removing the distributor guard, remove the screws on the filter cover and replace the cartridge.

5.2.3 TRAVEL REDUCTION GEAR OIL

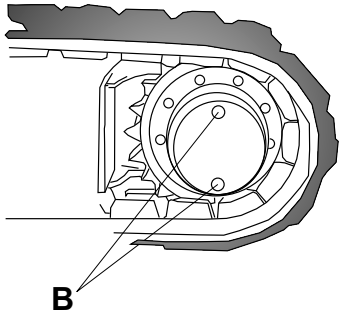
Checking the reduction gear oil level

The reduction gear oil level should be checked every 100 hours. Stop the reduction gear with the plugs aligned on the horizontal axis. Remove the plugs as shown in Fig. A and check that the oil level reaches the same height. If not, top up through one of the openings, using the other as level reference.



Changing the reduction gear oil

The oil should be changed for the first time after 100 hours of operation, and the following times every 1000 hours of operation. To change the oil, proceed as follows:
- stop the reduction gear with the plugs aligned vertically to the ground, as illustrated in Fig. B;
- remove both plugs and drain the oil completely;
- then position the reduction gear with the plugs aligned on the horizontal axis (Fig. A) and fill through one of the openings, using the other as level reference.



IMPORTANT

Avoid using different oils in terms of characteristics and brand.

Choosing the reduction gear oil

For the reduction gears, gear oils are recommended with EP additives, and viscosity grade ISO VG150 or SAE 80W/90.
In the event of significant variations in temperature, synthetic lubricants are recommended, with EP properties, minimum viscosity index 165 and viscosity grade VG150 and VG220.

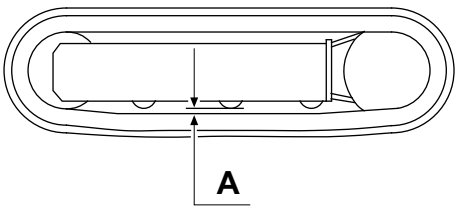
	VG100	VG150	VG320	VG150-200
ISO 3448	-20°C +5°C IV 95min	+5°C +40°C IV 95min	+30°C +50°C IV 95min	-30°C +65°C IV 165min

In any case, the oils chosen should not be subject to rapid ageing at the corresponding operating temperatures. The continuous operating temperature must not exceed 90°C.

5.3 MAINTENANCE ON THE RUBBER TRACKS

5.3.1 CHECKING THE TRACK TENSION

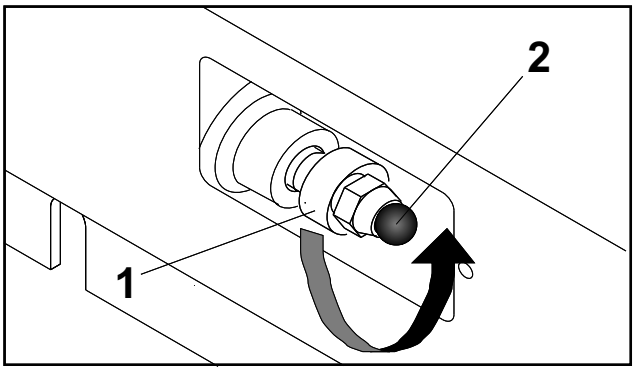
Stop the machine on firm and level ground. Lift the machine and support it securely and safely by placing stable supports under the chassis of the undercarriage. At the centre roller on the undercarriage, measure the distance A of the bottom of the roller from the rigid inner part of the rubber tracks. The tension of the track is normal if A is between 10 and 15 mm.
If the tension of the track is not within the values specified above, too loose or too tight, follow the procedure illustrated in the paragraph below.



5.3.2 OPERATIONS FOR LOOSENING/TIGHTENING THE TRACK

The grease contained in the hydraulic track is under pressure. For this reason, do not loosen the grease valve 1 more than one turn; if the valve is too loose, the grease may be released due to pressure, placing the operator at risk. Never loosen the grease nipple 2.
When gravel or mud gets stuck between the cogwheel and the links of the track, remove it before loosening the track.

1. To loosen the track, slowly unscrew valve 1 anticlockwise, no more than one turn. One turn of valve 1 is sufficient to loosen the track.
2. If the grease does not start to be drained, rotate the track slowly.
3. When the right track tension has been found, turn valve 1 clockwise and tighten it. Remove all traces of grease.
4. To tighten the track, connect a grease gun to the grease nipple 2 and add grease until the tension of the track is within the specified values.



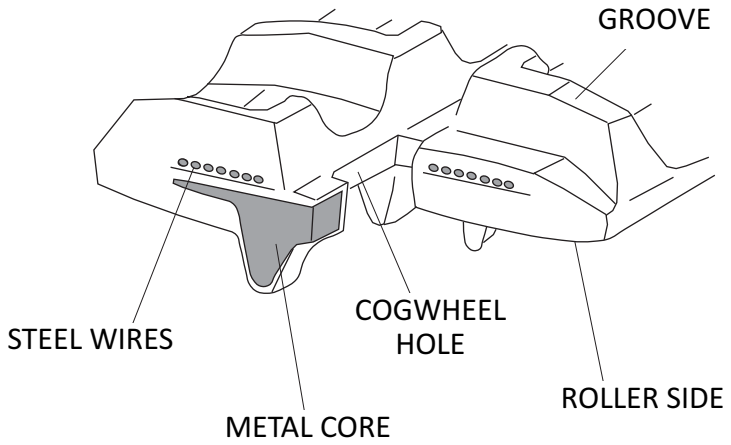
DANGER

It is not normal for the track to remain tight after valve 1 has been turned anti-clockwise, or for the track to be still loose after grease has been added through the grease nipple 2.In any case, never attempt to remove the tracks or disassemble the tensioner cylinder, as the pressure of the grease inside the track is very dangerous.

5.3.3 CHECKING THE RUBBER TRACKS

The structure of the rubber track is shown in Fig. A. The steel wires and the metal core are embedded in the rubber. The track grooves are designed to ensure stability when travelling on soft ground. These are located on the bottom part in contact with the ground, while the wheel guides inside the track prevent it from coming off the guide rollers.

Fig. A



Cause of damage

A) *Breakage of the steel wires*

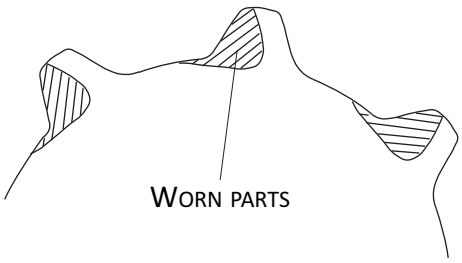
Excessive tension will cause the steel wires to break under the following conditions:
- when stones or foreign matter accumulate between the track and the chassis of the undercarriage;

- when the track comes off its guide;
- in the event of considerable friction, such as rapid changes in direction.

B) *Wear and breakage of the metal cores*

As for the breakage of the steel wires described above, excessive tension may cause the metal cores to bend or break, together with one of the following causes:
- improper contact between the cogwheel and the track;
- rotation of the inside rollers;
- operation on sandy ground.

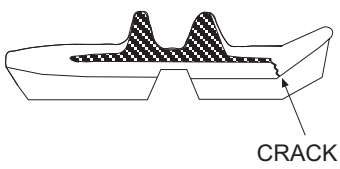
C) *Separation of the metal cores*
The metal core acts as the 'adhesive' for the rubber between the core itself and the steel wires.



Separation may be caused by excessive tension, as for the breakage of the wires, for the following reasons:
- the metal cores have been rolled up by the worn cogwheel as shown in the figure. When such wear and abrasions are found, the cogwheel must be replaced as soon as possible.
In the case of breakage as described in paragraphs A-B-C, the track must be replaced, as this damage causes a complete loss of operability.

D) *Abrasion and cracks due to fatigue*

1. Cracks at the base of the track patterns occur due to fatigue, since the rubber is bent by the cogwheel and the idler roller, as shown in photo 4 (see the appendix).



2. Cracks and bends on the edge of the rubber are due to the fact that the track is operated on curbs and sharp concrete edges.

3. Cracks and abrasion on the rubber along the line of the guide rollers are due to fatigue from the compression of the rubber by the weight of the wheel, together with operation on sandy ground, or repeated and sudden changes in direction, as shown in photos 6-8-9 (see the appendix).

4. Abrasion of the track patterns may be caused by rotation on concrete, gravel or

hard surfaces (see photo 7 in the appendix).

The damage described in paragraph D points 1, 2, 3 is not considered fatal for the track, and the track can continue to be used, even if with gradual and progressive damage.
The progression of the damage indicated in point 3 leads to the exposure of the metal cores, and if such exposure covers more than half of the circumference of the track, then the track should be replaced. It can in any case still be used.

E) *Cracks due to external factors*

Cracks on the outside surface of the track (the part in contact with the ground) are very often due to contact with gravel, sharp stones, sharp materials such as metal sheet, nails and glass, which cause cuts as shown in photo 10 (see the appendix). Considering the properties of rubber, this is unavoidable, even if it depends on the operating conditions.
Cracks on the inside surface of the circumference and on the edge of the rubber are due to the contact of the track with the structure of the undercarriage or with sharp concrete edges, as shown in photos 12 and 13 (see the appendix).
The increase in the extent of the cracks is relatively small.
Even if it seems in bad conditions, the track can still be used for heavy-duty applications.

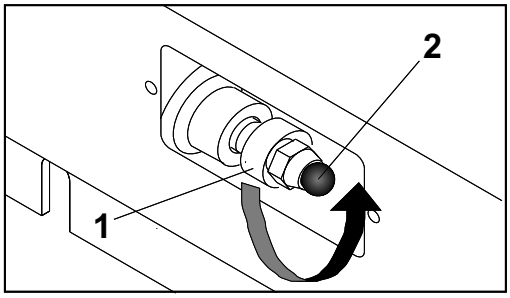
5.3.4 REPLACING THE RUBBER TRACKS

DANGER

The grease contained in the hydraulic track is under pressure.
For this reason, do not loosen the grease valve 1 more than one turn; if the valve is too loose, the grease may be released due to pressure, placing the operator at risk.
Never loosen the grease nipple 2.
When gravel or mud gets stuck between the cogwheel and the links of the track, remove it before loosening the track.

Removing the rubber track

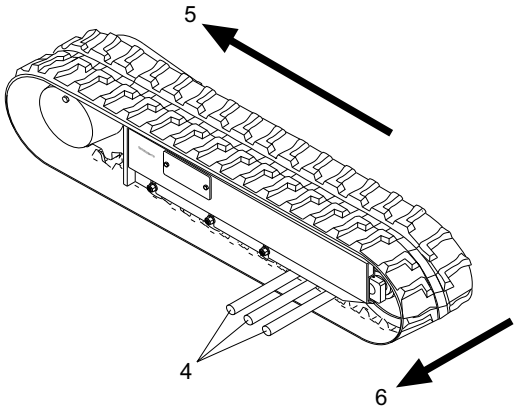
1. Stop the machine on firm and level ground, lift it and support it securely and safely.



2. To loosen the track, slowly unscrew valve 1 anticlockwise, giving it no more than one turn. One turn of valve 1 is sufficient to loosen the track.

3. If the grease does not start to be drained, slowly rotate the track.

4. Insert 3 steel tubes (4) into the track, in the space between the rollers. Turn the sprocket in reverse (5) so that the steel tubes move with the track and are caught in the idler roller.
Exert lateral force (6) to slide the track and lift it up from the idler roller.



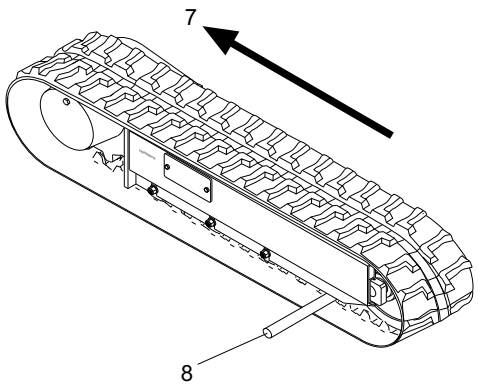
DANGER

Installing the rubber track

1. Before assembling the tracks, make sure that the lifted machine does not represent a danger and that the working conditions are safe.

2. Make sure that the grease contained in the hydraulic cylinder has been released.

3. Mesh the links of the track with the cogwheel and position the other end of the track on the idler roller.



4. Turn the sprocket (7) in reverse, pushing the bottom of the track inside the chassis (8).
5. Using a steel tube, position the track and turn the sprocket again.
6. Make sure that the links of the track are correctly meshed on the cogwheel and the idler roller.
7. Adjust the tension of the track (see paragraph 5.4.2 - *Operations for loosening/tightening the track*).
8. Rest the tracked undercarriage on the ground.

5.4 CHECKING THE TIGHTNESS OF NUTS AND BOLTS

The parts and the nuts and bolts that may become loose must be checked based on the use of the forklift.

Pay special care to the components of the chassis, such as the idler rollers, travel reduction gears, sprockets and guide rollers. Check tightness as per the following table.

Thread diameter mm	Distance between idler roller and sprocket mm	kgm
6	1	1,3 ± 0,15
8	1,25	3,2 ± 0,3
10	1,5	6,5 ± 0,6
12	1,75	11 ± 1
14	2	17,5 ± 2
16	2	27 ± 3
18	2,5	37 ± 4
20	2,5	53 ± 6
22	2,5	73 ± 8
24	3	92 ± 10
27	3	135 ± 15
30	3,5	184 ± 20

5.5 STORING THE MACHINE

1. Inspect the machine. Repair any worn or damaged parts. Install new parts where necessary.
2. Clean the filtering elements of the air filter.
3. Lubricate all the greasing points.
4. Place the tracks on stable blocks. Lubricate the pins of the track links with oil (except for rubber tracks).
5. Wash the machine.
6. To prevent rust, paint the parts where required.
7. Store the machine in a dry and protected place. If stored outdoors, cover with a tarpaulin.

Using the machine after storage

WARNING: only start the engine in a well-ventilated place.

1. Fill the fuel tank. Check all the fluid levels.
2. Start the engine and run at medium revs for a few minutes before starting work.
3. Operate all the hydraulic parts various times.
4. Carefully check the entire system before operating the machine with a full load.

6 TECHNICAL SPECIFICATIONS

6.1 TECHNICAL CHARACTERISTICS

UNDERCARRIAGE
Track width .....250 mm
Support rollers per side 5
Travel speed.....1,5 - 2,2 km/h

OPERATING WEIGHT
Operating weight excluding operator (fixed undercarriage).....845 kg

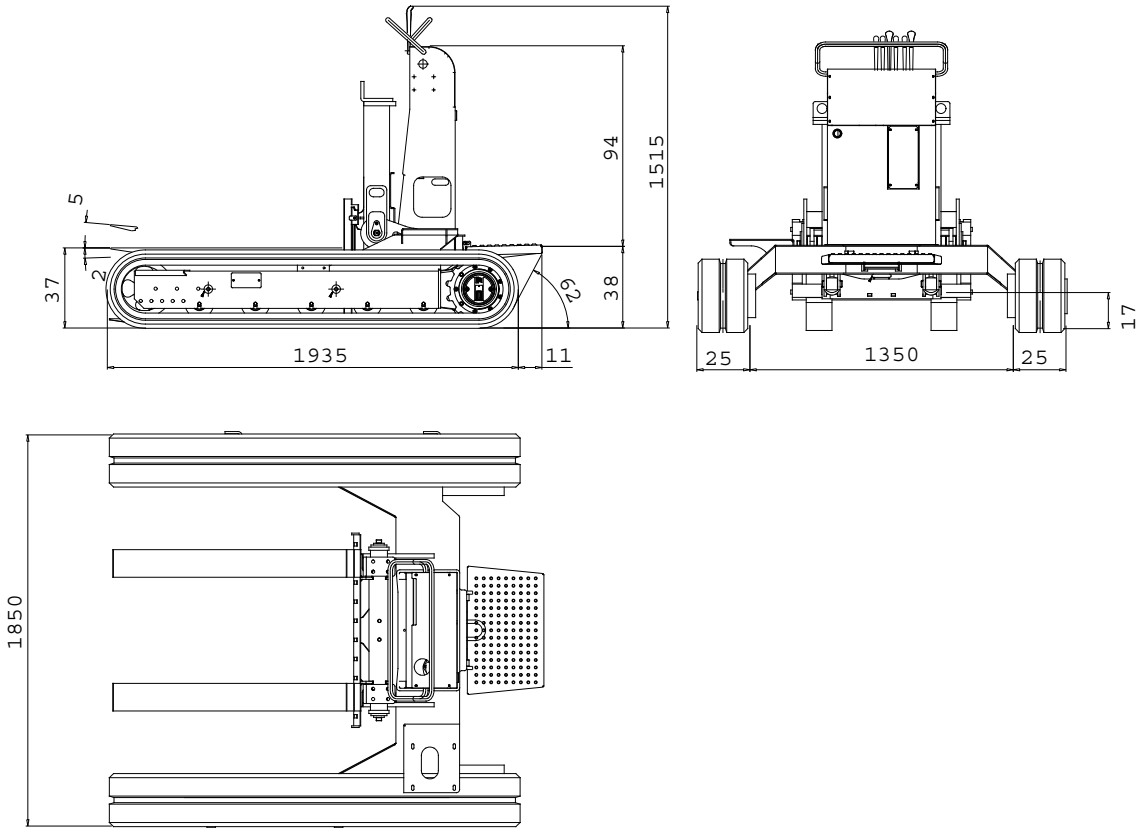
PERFORMANCE
Gradeability .....20° (36,4%)
Capacity .....2000 kg
Max distance from the centre of gravity allowed .....500 mm
Max lifting height..... .....300 mm

Sound power level at operator's ear .....86 dB (A)
Measured sound power level .....102 dB (A)

Vibrations transmitted to the operator's hand/arm system during
normal off-road use of the machine (HAV) .....Aw 1,75 m/s^2
Vibrations transmitted to the operator's body as a whole during
normal off-road use of the machine (WBV).....Aw 1,13 m/s^2

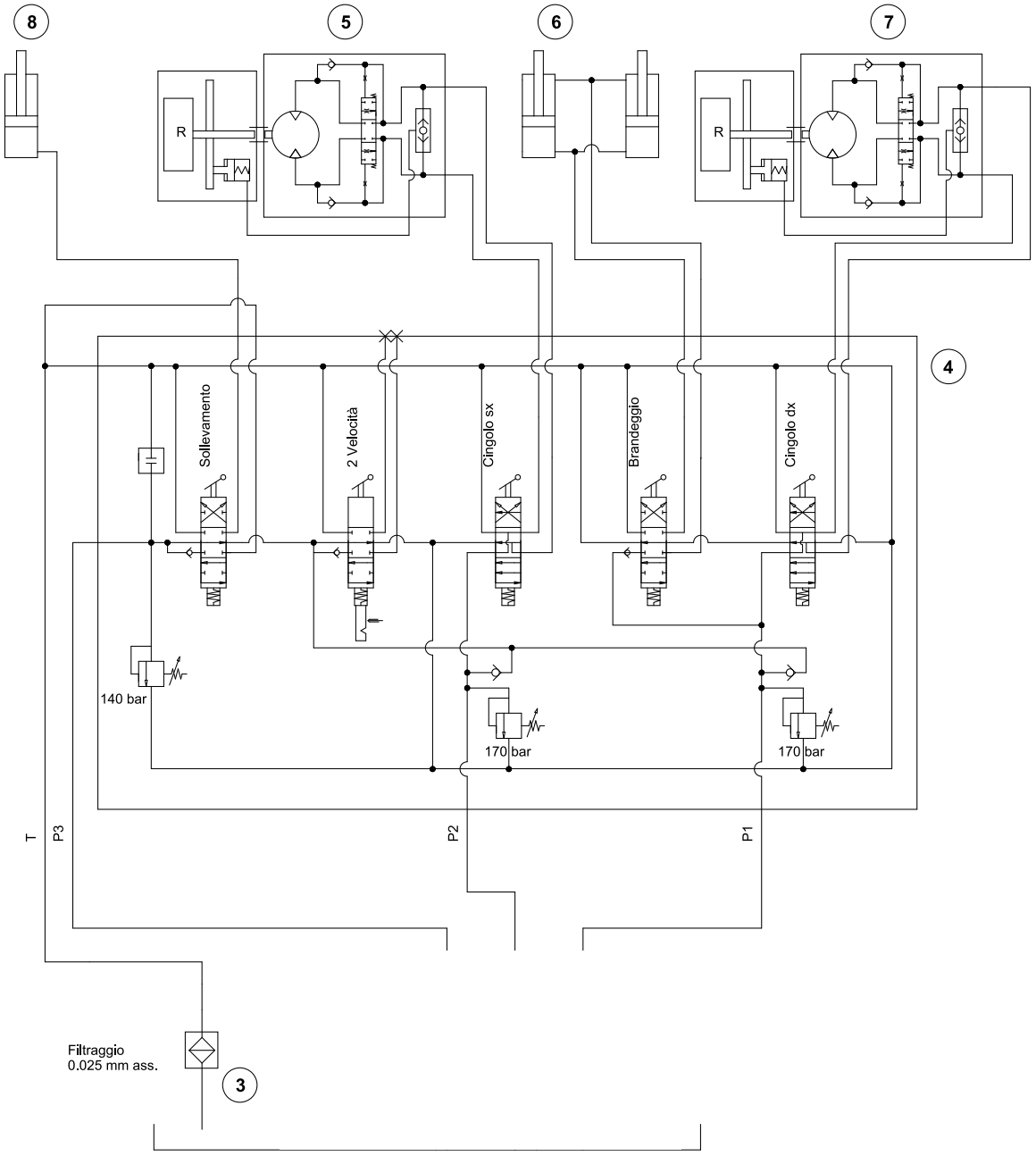
STANDARD FEATURES
- Second travel speed
- Non-slip platform

FORKLIFT TP2000



6.2 HYDRAULIC SYSTEM DIAGRAM

6.2.1 KEY TO THE HYDRAULIC SYSTEM DIAGRAM



1 -
2 -
3 - Drain filter
4 - Distributor HC-D9/5
5 - Reduction gear, L track
6 - Swing cylinders
7 - Reduction gear, R track
8 - Lifting cylinder

APPENDIX

PHOTO NO. 1

CUT STEEL WIRES

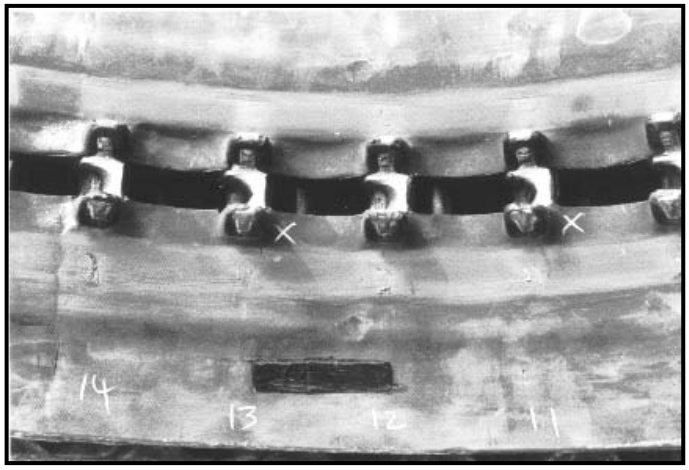


PHOTO NO. 2

ABRASION AND BREAKAGE OF THE STEEL CORES

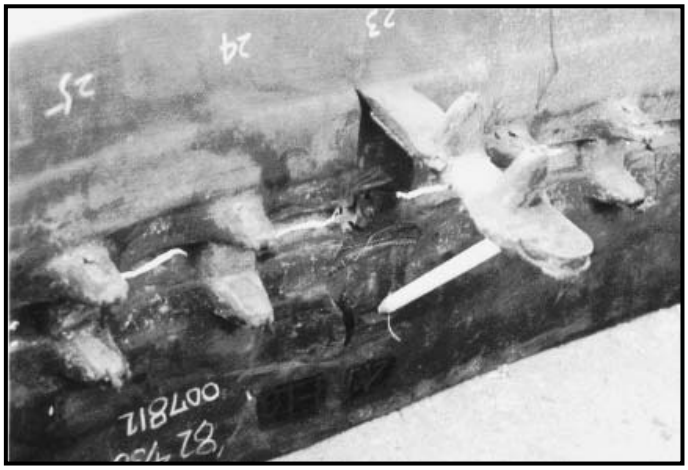


PHOTO NO. 3

SEPARATION OF THE STEEL CORE

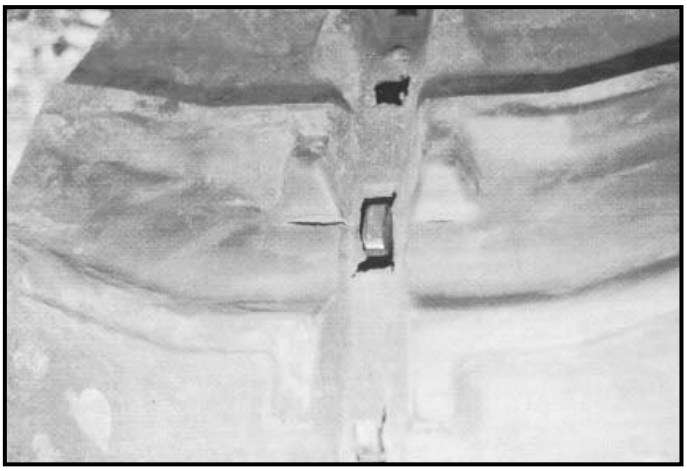


PHOTO NO. 4

BREAKAGE OF THE TRACK PATTERN CAUSED BY BENDING STRESS (CURVING) ON THE RUBBER

PHOTO NO. 5

BREAKAGE ON THE OUTSIDE PART OF THE RUBBER UNDER THE EDGE OF THE STEEL CORE

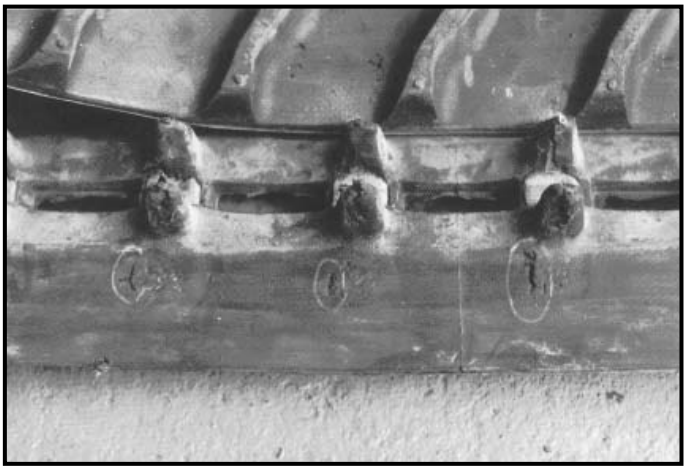


PHOTO NO. 6

BREAKAGE ON THE INSIDE PART OF THE RUBBER ON THE SIDE OF THE STEEL CORE

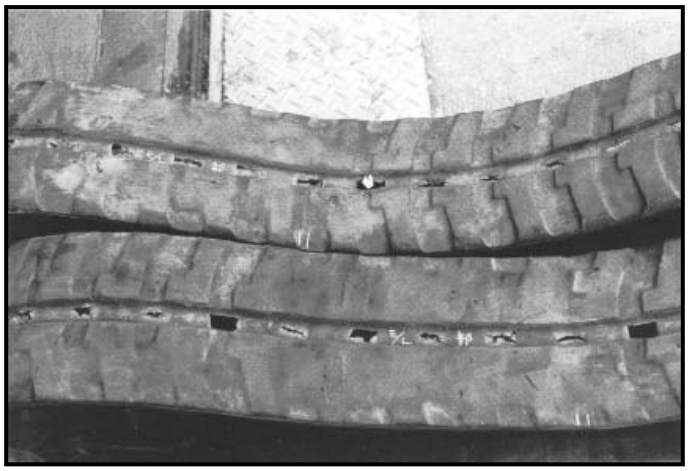


PHOTO NO. 7

ABRASION OF THE TRACK PATTERN

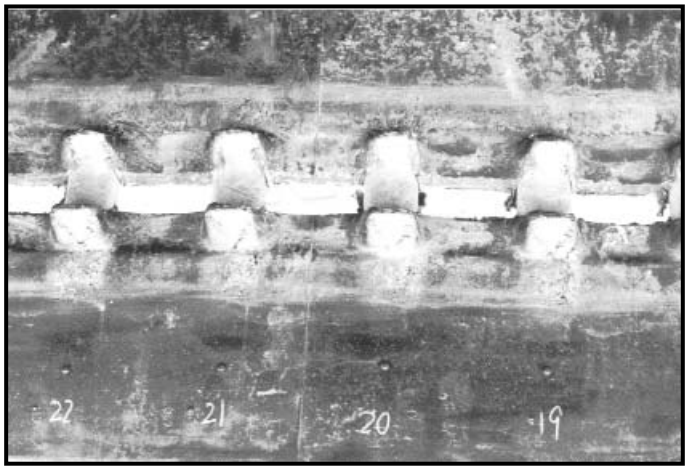


PHOTO NO. 8

ABRASION OF THE RUBBER DUE TO THE GUIDE WHEELS (INITIAL STAGE)

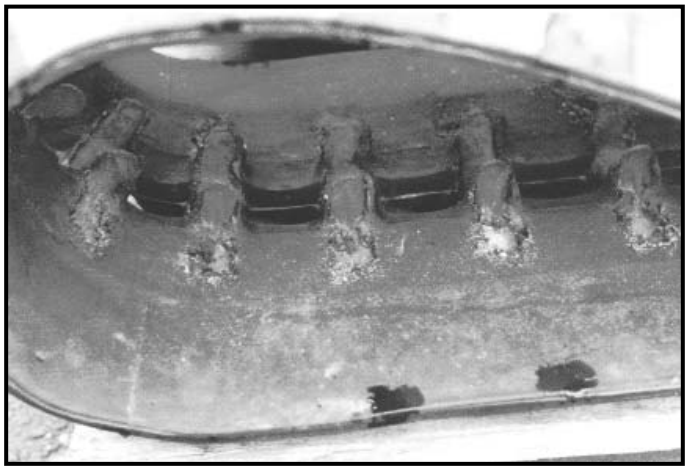


PHOTO NO. 9

ABRASION OF THE RUBBER DUE TO THE GUIDE WHEELS (FINAL STAGE)

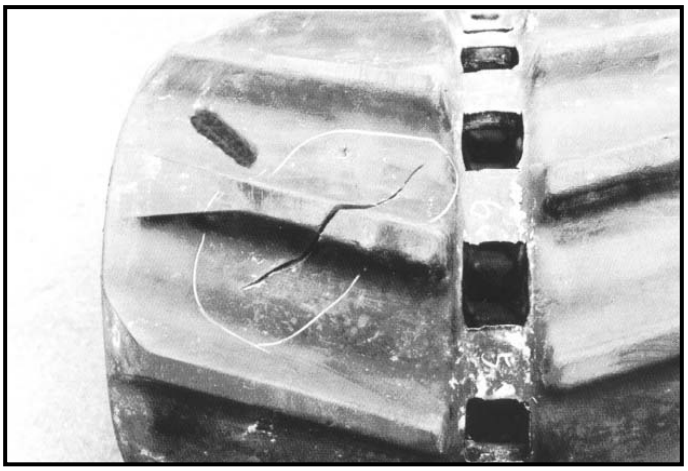


PHOTO NO. 10

CUTS DUE TO SHARP MATERIAL ON THE OUTSIDE PART OF THE RUBBER

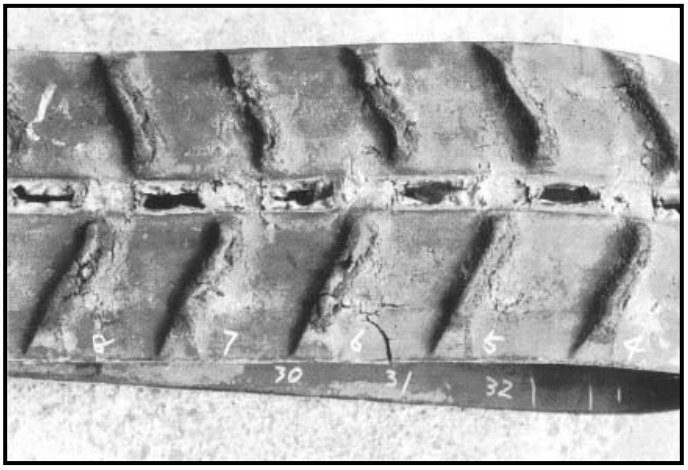


PHOTO NO. 11

BREAKAGE AND ABRASION ON THE OUTSIDE PART OF THE RUBBER CAUSED BY HARD GROUND

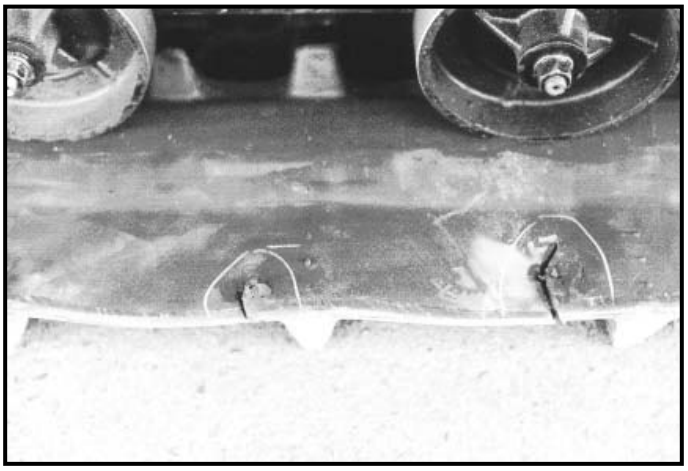


PHOTO NO. 12

CUT ON THE INSIDE EDGE OF THE RUBBER DUE TO SHARP MATERIALS OR HARD, SHARP EDGES

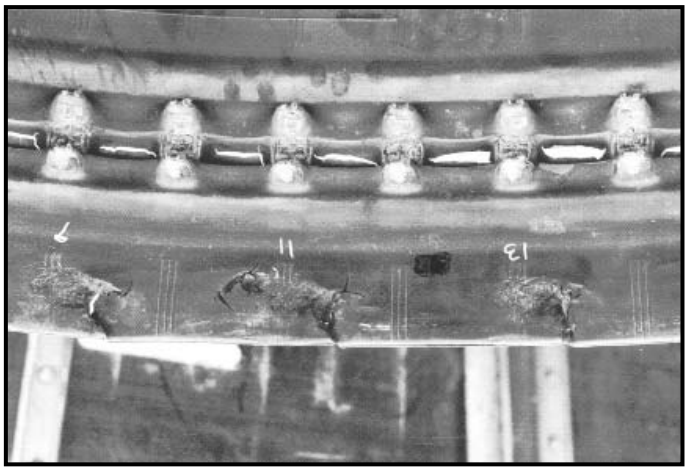


PHOTO NO. 13

BREAKAGE OF THE INSIDE PART OF THE RUBBER CAUSED BY CONTACT WITH THE UNDERCARRIAGE CHASSIS

PT20GL/TP2000
16983500

- Catalogo ricambi
- Spare parts catalogue
- Catalogue pièces détachées
- Ersatzteilkatalog
- Catálogo repuestos
- Reserveonderdelen Catalogue

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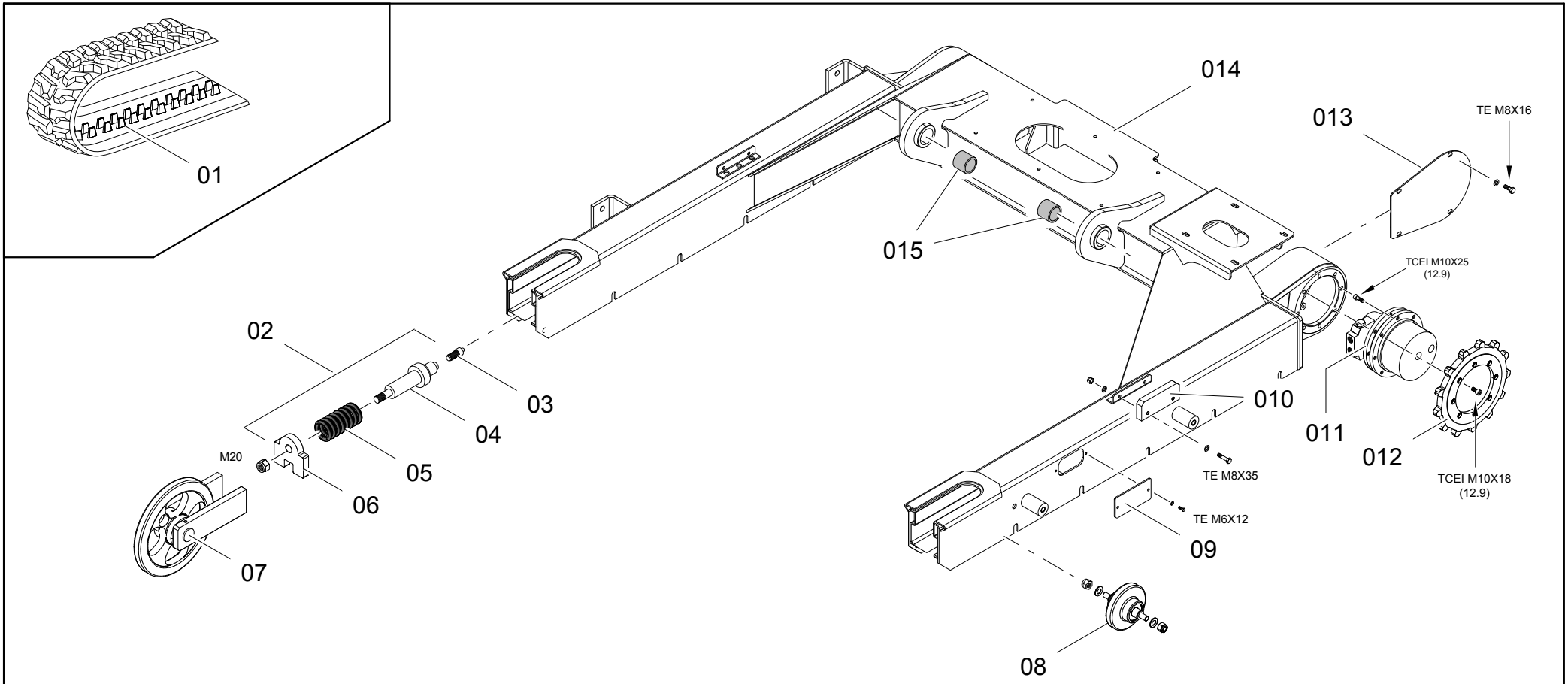
Tav. 01.01.00	Carro con cingolo in gomma	Carriage with rubber track	Train de roulement chenille en caoutchouc
Tav. 02.01.00	Torretta	Upper structure	Tourelle
Tav. 03.01.00	Impianto idraulico aspirazione - scarico	Intake-draining system	Installation aspiration - évacuation
Tav. 04.01.00	Impianto idraulico	Hydraulic system	Installation hydraulique

Inhalt	Índice	Inhoud
Tav. 01.01.00 Wagen mit Gummiraupe	Carro con oruga de goma	Onderstel met rubberen rupsband
Tav..02.01.00 Oberwagen	Torreta	Toren
Tav. 03.01.00 Hydraulik - Vor- und Rücklauf	Instalación de aspiración-descarga de aceite	Hydraulische installatie afzuiging-afvoer
Tav. 04.01.00 Hydraulikanlage	Instalación hidráulica	Hydraulische installatie



Hinowa	CARRO CON CINGOLO IN GOMMA	WAGEN MIT GUMMIRAUPE	**PT20GL/TP2000/ 16983500**
	CARRIAGE WITH RUBBER TRACK	CARRO CON ORUGA DE GOMA	
	TRAIN DE ROULEMENT CHENILLE EN CAOUTCHOUC	ONDERSTEL MET RUBBEREN RUPSBAND	**01.01.00** / **Ed.07.2017**

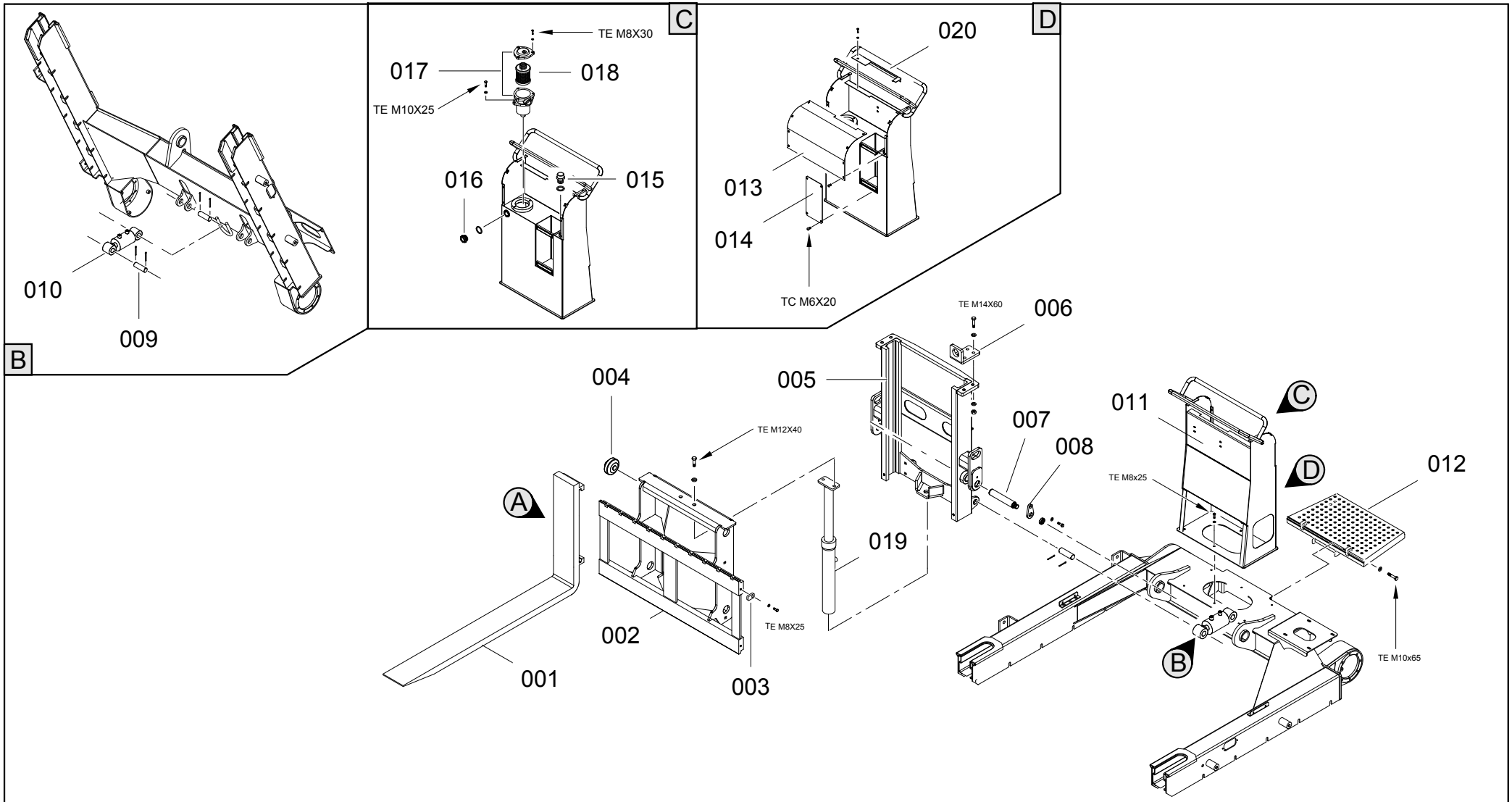
Tav. **01.01.00**

Carro con cingolo in gomma | **Wagen mit Gummiraupe**

Carriage with rubber track | **Carro con oruga de goma Te**

Train de roulement chenille en caoutchouc | **verbreOnderstel met rubberen rupsband**

Pos.	Cod.	Q.tà	Descrizione	Description	Designation	Benennung	Descripción	Beschrijving
01	04445700	02	Cingolo in gomma	Rubber track	Chenille en caoutchoue	Gummiketten	Oruga de goma	Rubberen rupsband
02	147306Y1	02	Supporto tendicingolo completo	Complete idler support	Support tendeur de chenille complet	Halterung der Raupens pannvorr - komplett	Soporte tensor oruga completo	Complete steun rupsbandspanner
03	03149200	01	Valvola ingrassaggio	Greasing valve	Soupape graissage	Schmierungsventil	Valvula de engrase	Smeringsventiel
04	10681670	01	Cilindro tendicingolo	Idler cylinder	Cylindre tendeur de chenille	Raupenspann-zylinder	Cilindro tensor oruga	Cilinder rupsband - spanner
05	03024801	01	Molla	Spring	Ressort	Feder	Muelle	Veer
06	04635800	01	Piastra	Plate	Platine	Platte	Placa	Plaat
07	147307H2	02	Ruota tendicingolo completa	Complete idler wheel	Roue tendeur de chenille complète	Raupensparad komplett	Rueda tensor oruga completo	Compleet wiel rups-bandspanner
08	167934H2	10	Rullo inferiore completo	Carrier roller complete	Rouleau inférieur	Tragrolle komplett	Rodillo inferior	Compleet onderste rol
09	030253H2	02	Coperchio ispezione tendicingolo	Track tensioner inspection cover	Couvercle inspection rue de traction	Deckel für Spannket-teaufsicht	Tapa registro tensor cadena	Hubarbeitsbühne
10	04463500	02	Guida cingolo	Track's guide	Guidage chenille	Bahn für die Kette	Guia oruga	Onderstel begeleiding
11	14895700	02	Motoriduttore	Gear motor	Motoréducteur	Getriebemotor	Motorreductor orugas	Vertrangingsdrifwerk onderkankant
12	043042H2	02	Ruota trazione	Sprocket wheel	Roue de traction	Antriebsrad	Rueda de arrastre	Drijfwiel
13	03174501	02	Coperchio motoriduttore	Cover gear motor	Couvercle motoréduc - teur	Deckel Getriebemotor	Tapa Motorreductor	Deksel
14	37029800	01	Telaio carro	Undercarriage frame	Châssis chenillard	Rahmen des Fahrwerks	Bastidor carro	Onderstel frame
15	04535300	02	Boccola	Bush	Douille	Buchse	Casquillo	Bus

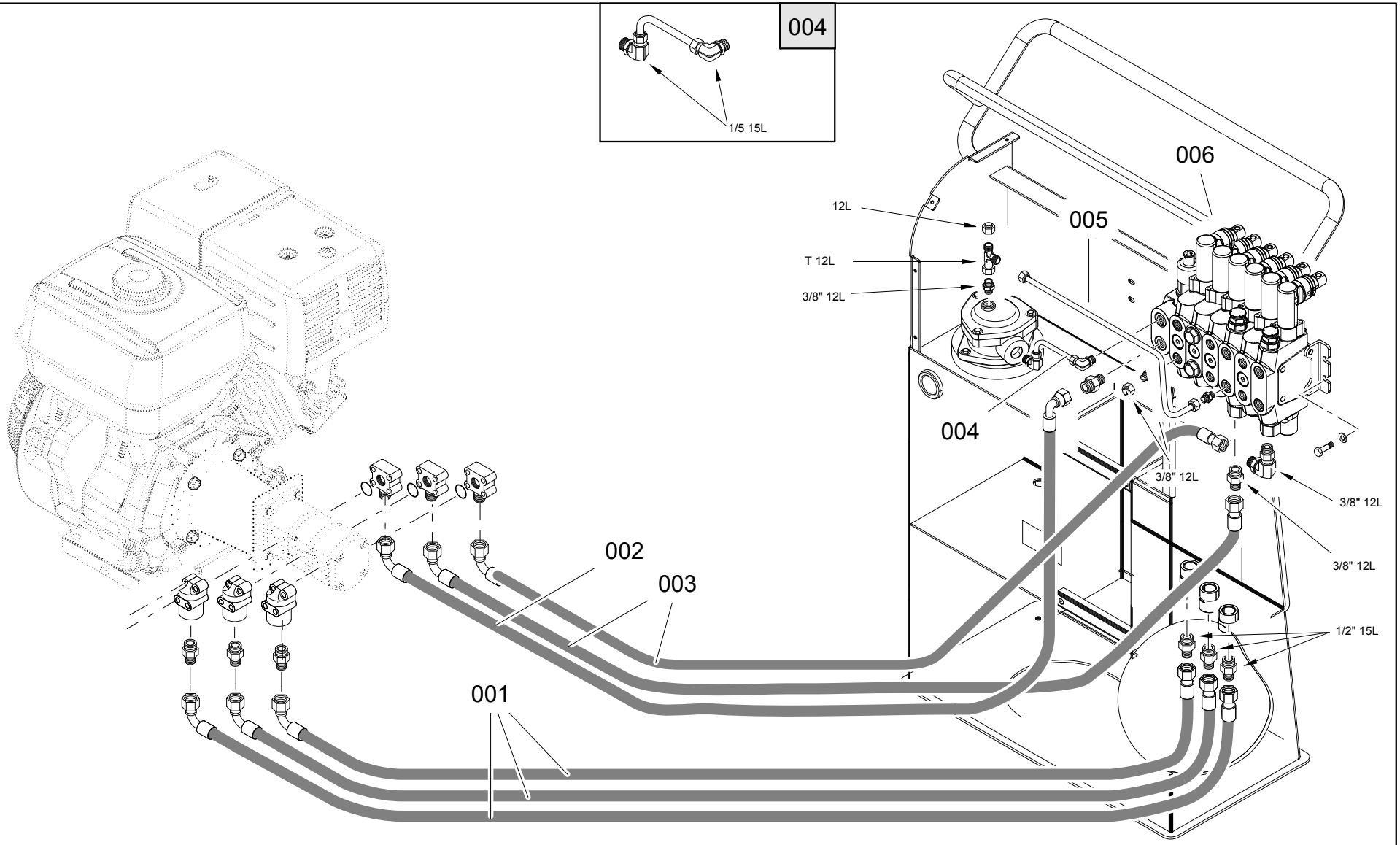


Hinowa	TORRETTA	OBERWAGEN	**PT20GL/TP2000/ 16983500**
	UPPER STRUCTURE	TORRETA	
	TOURELLE	TOREN	**02.01.00** / **Ed.07.2017**

Tav. **02.01.00**

Torretta | **Upper structure** | **Tourelle** | **Oberwagen** | **Torreta** | **Toren**

Pos.	Cod.	Q.tà	Descrizione	Description	Designation	Benennung	Descripción	Beschrijving
01	06437100	02	Dente forche pallets	Pallet fork tooth	Dent de fourches de palettes	Palettengabelzahn	Diente horquillas paletas	Tand vorken
02	364404H2	01	Supporto forche pallets	Pallet fork support	Support fourches de palettes	Halterung	Soporte horquillas paletas	Halterung vorken pallets
03	05607200	04	Fermo forche	Retainer	Arrêt	Halterung	Sujetador	Blokkering
04	05653600	04	Cuscinetto	Bearing	Roulement	Lager	Cojinete	Lager
05	36440500	01	Guide forche	Pallet fork guides	Guidage fourches de palettes	Kastenaufbau - Führung	Guías horquillas paletas	Geleider
06	06441200	02	Tappo ferma guide	Cap	Bouchon	Verschluss	Tapón	Dop
07	06097800	02	Spina supporto guide	Pin	Cheville	Stift	Clavija	Stekker
08	068142Y1	02	Goccia spina	Pin drop	Baisse cheville	Tropfen Stift	Caída clavija	Drop stekker
09	06097700	04	Spina clindro brandeggio	Swivelling cylinder's pin	Tige du cylindre de la rotation de la flèche	Zylinderstift der Seitenschwenkung	Clavija cilindro movimiento lateral brazo	Pen cilinder zwenken
10	260880H2	02	Cilindro brandeggio	Cylinder	Cylinder	Zylinder	Cilindro	Cilinder
11	36928300	01	Supporto distributore	Distributor support	Support distributeur	Halt.des Steuergeräts	Suporte distribuidor	Steun distributeur
12	361750B1	01	Pedana	Footboard	Repose-piedes	Fussbrett	Tarima	Treeplank
13	06928600	01	Coperchio distributore	Distributor cover	Couvercle distributeur	Untersetzungsgetriebesdeckel	Tapa distribuidor	Hydraulische verdeler deksel
14	06437800	01	Coperchio tubi	Cover	Couvercle	Deckel	Tapa	Deksel
15	05611800	01	Tappo olio	Oil plug	Bouchon d'huile	Ölstopfen	Tapón aceite	Oliedop
16	05061800	01	Livello olio	Oil level	Niveau huile	Ölniveau	Nivel aceite	Oliepei
17	26120000	01	Filtro olio idraulico completo	Complete filter Oil	Filtre a d'huile complete	Ölfilter komplett	Filtro aceite completo	Kompletet Oliefilter
18	04130500	01	Cartuccia filtro olio idraulico	Hydr. oil cartridge	Cartouche huile hydr.	Filtereinsatz	Cartucho aceite hidr.	Patroon hydr. olie
19	264372H2	01	Cilindro sollevamento	Lift cylinder	Cylindre de levage	Hubzylinder	Cilindro de elevación	Hefcilinder
20	06928700	01	Lamiera piegata	Folded plate	Tôle pliée	Blech gebogen	Chapa doblada	Plaatijzer gebogen

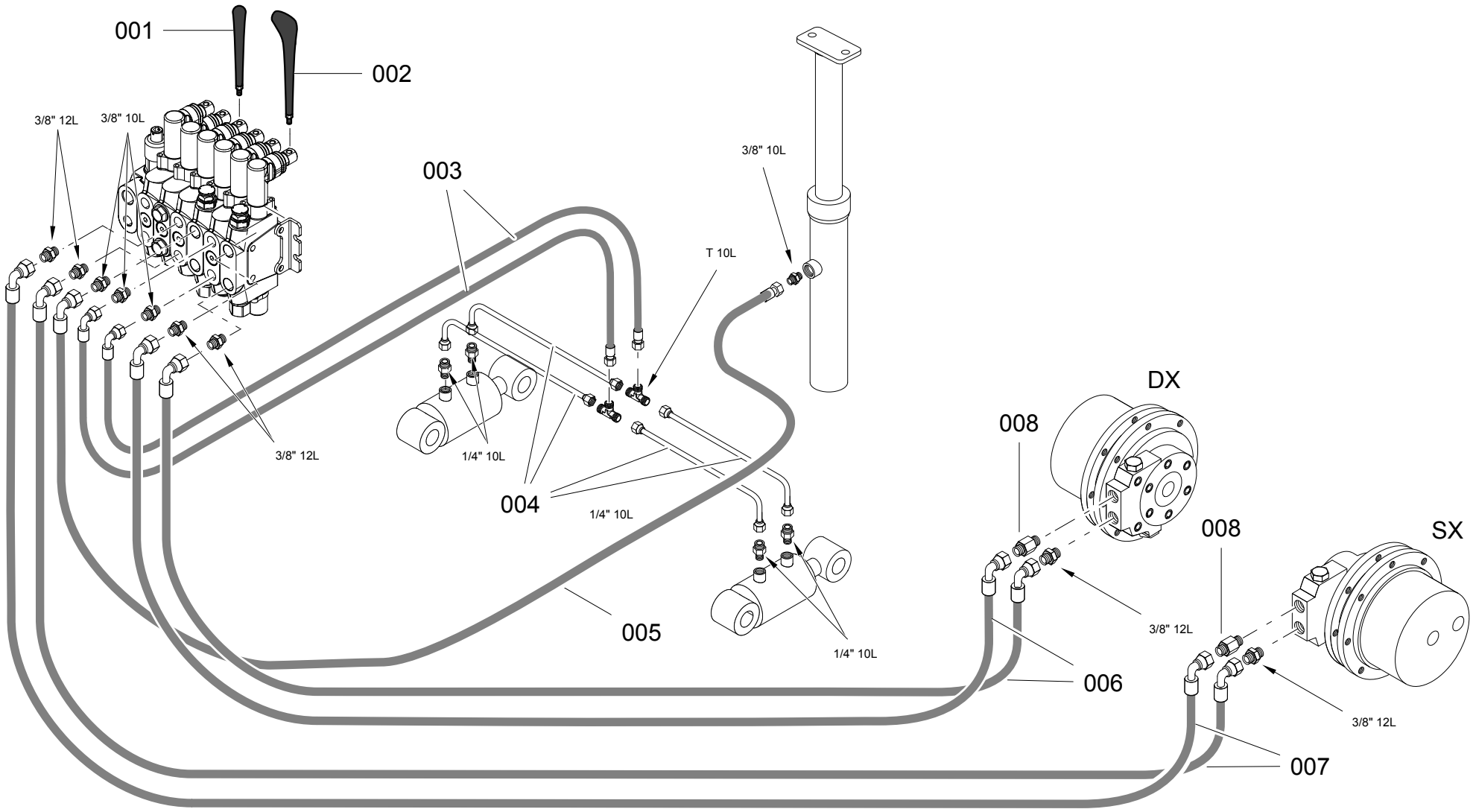


Hinowa	IMPIANTO ASPIRAZIONE E SCARICO	VOR- UND RÜCKLAUFANLAGE	**PT20GL/TP2000/ 16983500**	
	SUCTION - DRAINING SYSTEM	INSTALACIÓN DE ASPIRACIÓN Y DESCARGA		
	INSTALLATION ASPIRATION ET DÉCHARGE	INSTALLATIE AFZUIGING EN AFVOER	**03.01.00**	**Ed.07.2017**

Tav. **03.01.00**

Impianto aspirazione - scarico
Intake-draining system
Installation aspiration-évacuation
Hydraulik — Vor- und Rücklauf
Instalación de aspiración-descarga de aceite
Hydraulische installatie afzuiging-afvoer

Pos.	Cod.	Q.tà	Descrizione	Description	Designation	Benennung	Descripción	Beschrijving
01	**07149200**	**03**	Tubo flessibile	Flexible pipe	Tuyau souple	Schlauch	Tubo flexible	Slang
02	**06453600**	**01**	Tubo flessibile	Flexible pipe	Tuyau souple	Schlauch	Tubo flexible	Slang
03	**06453700**	**02**	Tubo flessibile	Flexible pipe	Tuyau souple	Schlauch	Tubo flexible	Slang
04	**06453100**	**01**	Tubo rigido	Pipe	Tube rigide	Rohr	Tubo rígido	Stijve leiding
05	**07149400**	**01**	Tubo rigido	Pipe	Tube rigide	Rohr	Tubo rígido	Stijve leiding
06	**26942100**	**01**	Distributore idraulico	Aerial part hydraulic	Distributeur hydraulique	Hydraulischer Verteil	Distribuidor hidraulico	Heffend hydraulische



Hinowa	IMPIANTO IDRAULICO TRAZIONE	HYDRAULIKANLAGE ANTRIEB	**PT20GL/TP2000/ 16983500**	
	HYDRAULIC SYSTEM FOR TRACTION	INSTALACIÓN HIDRÁULICA TRACCIÓN		
	SYSTÈME HYDRAULIQUE DE TRACTION	HYDRAULISCHE AANDRIJFINSTALLATIE	**04.01.00**	**Ed.07.2017**

Tav. **04.01.00**

Impianto idraulico trazione | **Hydraulikanlage Antrieb**

Hydraulic system for traction | **Instalación hidráulica tracción**

Syst ème hydraulique de traction | **Hydraulische aandrijfinstallatie**

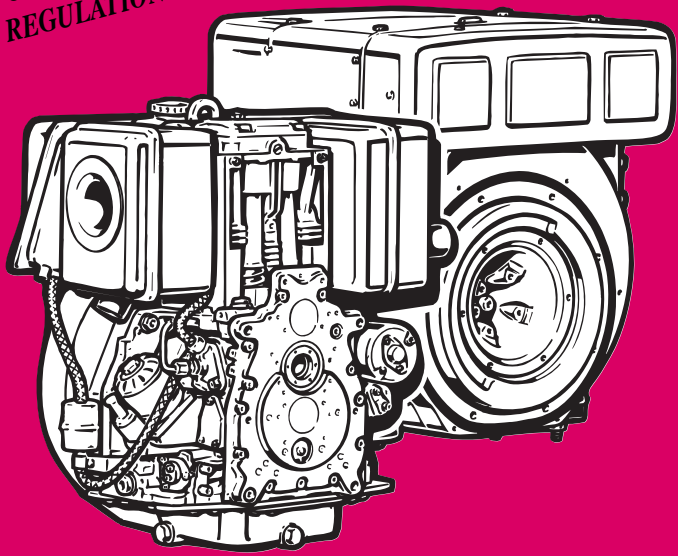
Pos.	Cod.	Q.tà	Descrizione	Description	Designation	Benennung	Descripción	Beschrijving
01	06154300	04	Leva tipo tondo	Lever	Levier	Hebel	Palanca	Hendel
02	06154200	02	Leva ergonomica	Lever	Levier	Hebel	Palanca	Hendel
03	06453900	02	Tubo flessibile	Flexible pipe	Tuyau souple	Schlauch	Tubo flexible	Slang
04	06453000	04	Tubo rigido	Pipe rigid	Pipe rigid	Rohr	Tubo rígido	Stijve leiding
05	06454000	01	Tubo flessibile	Flexible pipe	Tuyau souple	Schlauch	Tubo flexible	Slang
06	06453500	02	Tubo flessibile	Flexible pipe	Tuyau souple	Schlauch	Tubo flexible	Slang
07	06453400	02	Tubo flessibile	Flexible pipe	Tuyau souple	Schlauch	Tubo flexible	Slang
08	05004400	02	Raccordo 3/8 12L H=20	Fitting 3/8 12L H=20	Raccord 3/8 12L H=20	Anschluss 3/8 12L H=20	Conexión3/8 12L H=20	Verbinding 3/8 12L H=20

INSTRUCTION BOOK

HATZ DIESEL

INCLUDES SUPPLEMENTAL INFORMATION TO THE OWNER'S MANUAL FOR 2008 AND LATER EPA CERTIFIED NONROAD COMPRESSION-IGNITION ENGINES

INCLUDES SUPPLEMENTAL INFORMATION TO THE OWNER'S MANUAL FOR 2008 AND LATER CALIFORNIA REGULATIONS FOR HEAVY-DUTY OFF-ROAD ENGINES



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A new HATZ diesel engine is ready to work for you

This engine is intended only for the purpose determined and tested by the manufacturer of the equipment in which it is installed. Using it in any other manner contravenes the intended purpose. For danger and damage due to this, Motorenfabrik HATZ assumes no liability. The risk is with the user only. Use of this engine in the intended manner presupposes compliance with the maintenance and repair instructions laid down for it. Noncompliance leads to engine breakdown.

Please study this Instruction Book before you start the engine for the first time: it will help you to avoid accidents, to operate the engine correctly, to perform maintenance work and to keep the engine operating at full efficiency for a very long time.

Please follow all maintenance references carefully including the schedule for 2008 and later EPA certified nonroad compression-ignition engines and for 2008 and later CARB certified Heavy-Duty off-road engines to prevent our environment.

Please pass this Instruction Manual on to the next user or to the following engine owner.

HATZ DIESEL SERVICE

Throughout the world, a network of HATZ service stations is at your disposal for advice, spare parts supply and maintenance or repair work.
Please refer to the enclosed list for the address of your nearest HATZ service point.

HATZ DIESEL

Original-Ersatzteile
Original-spare parts
Pièces de rechange d'origine
Repuestos originales

Please use only genuine HATZ spare parts. Only these parts guarantee a perfect dimensional stability and quality. Their order numbers are shown in the enclosed Parts List. Please note the complete spare part kits in Table M00 of the list.

In the interests of technical progress we reserve the right to introduce modifications.

MOTORENFABRIK HATZ GMBH & CO KG

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This symbol draws attention to important safety precautions.
Please comply with them most carefully in order to avoid any risk of injury to persons or damage to materials.
General legal requirements or safety regulations issued by the competent authorities or industrial accident insurers are also applicable.

1. Important notes on safe operation of the engine

HATZ diesel engines are economical, strongly built and long-lasting. They are therefore frequently chosen for commercially and industrially operated equipment and machinery.
Since the engine forms part of the finished equipment or machine, its manufacturer will take all the applicable safety regulations into account.
Nevertheless, we give below certain additional comments on operating safety, and would recommend you to note them carefully.
Depending on the manner in which the engine is installed and its intended application, the equipment manufacturer or operator may have to attach additional safety devices and prohibit potentially hazardous aspects of operation, for example:

– Parts of the exhaust system as well as the surface of the engine are of course hot during operation of the engine, but also when it is still cooling down after use, and must not be touched.

– Faulty wiring or incorrect operation of electrical equipment may lead to sparks forming, and must be avoided as a potential fire hazard.

– Rotating parts must be shielded against accidental contact when the engine is installed in other equipment or machinery.
Guards are available from HATZ to protect belt drives, cooling fans and generators.

– Before attempting to start the engine it is essential to have studied the starting information in the Instruction Book; this is particularly important on engines started with a starting handle.

– Mechanical starting devices must not be used by children or persons of insufficient physical strength.

– In order to benefit from the advantages of the starting handle with kick-back damping, it must be used precisely as recommended in this Instruction Book.

– Before starting the engine, ensure that all the specified protective guards are in place.

– The engine must only be operated, serviced or repaired by persons who have received the appropriate training.

– Keep the starting handle and the key out of reach of unauthorized persons.

– Never run the engine in closed or badly ventilated rooms.
Do not breath in emissions - danger of poisoning!

– Also fuel and lubricants could contain poisonous components. Please follow the instructions of the mineral oil producer.

Important notes on safe operation of the engine

– Stop the engine before performing any maintenance, cleaning- and repair work.

– Stop the engine before refuelling.
Never add fuel near a naked flame or a source of sparks.
Don't smoke. Don't spill fuel.

– Keep explosive materials as well as flammable materials away from the engine because the exhaust gets very hot during operation.

– Wear close-fitting clothing when working on a running engine.
Please don't wear necklaces, bracelets or any other things which you could get caught with.

– Please pay attention to all advice- and warning stickers placed on the engine and keep them in legible condition. Contact your next **HATZ service station**, if a sticker comes off or is illegible and ask for a new one.

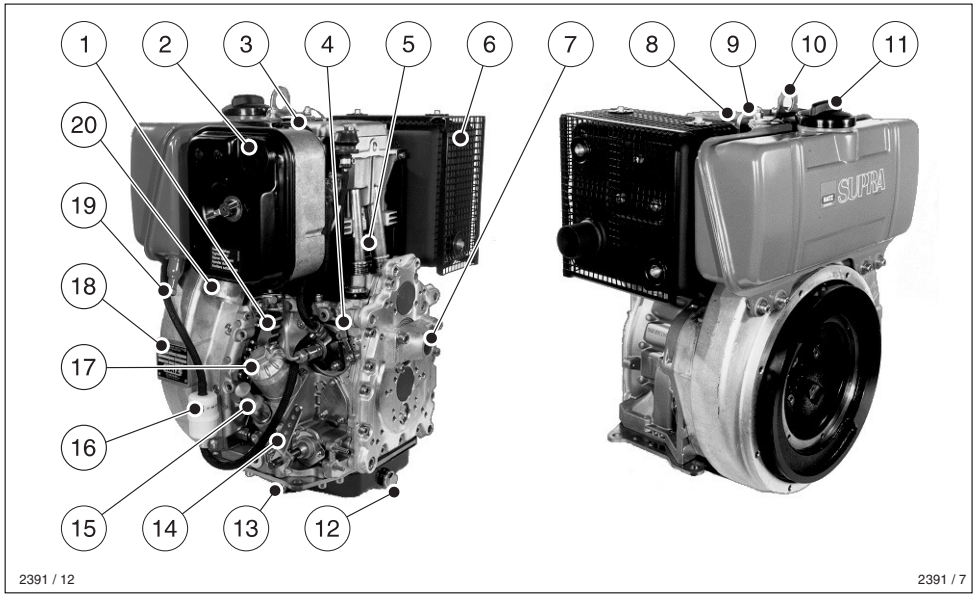
– Note that any unauthorized modification to the engine absolves its manufacturer from liability for the consequences.

Regular servicing in accordance with the details provided in this Instruction Book is essential to keep the operating reliably and to ensure the exhaust quality of the engine.

In case of doubt, always consult your nearest **HATZ service station** before starting the engine.

2. Description of engine

1D41 • 1D50 • 1D81 • 1D90 S / Z engines

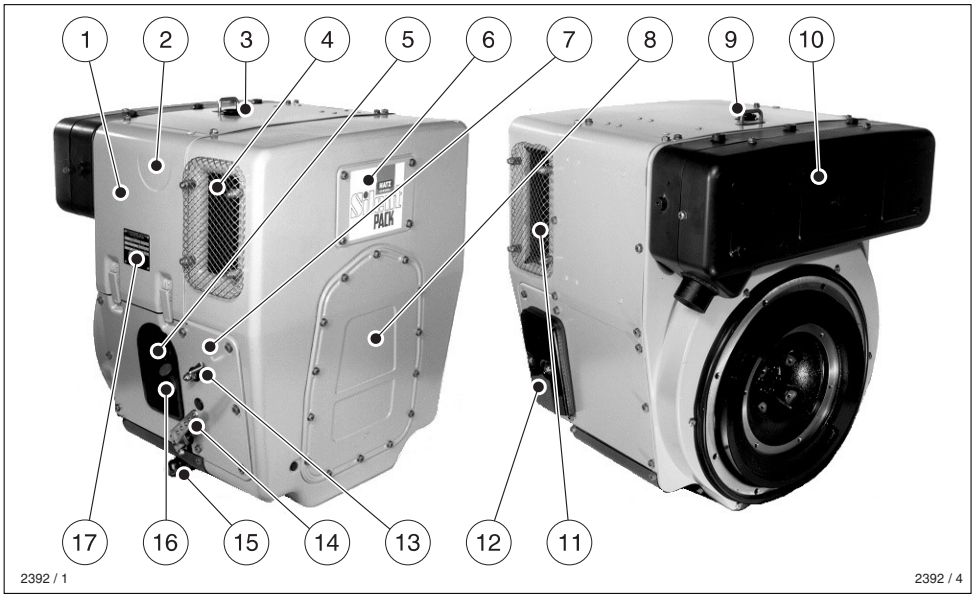


1

1 Cooling air inlet
2 Dry-type air cleaner
3 Decompression lever
4 Stop lever
5 Cooling air outlet
6 Silencer (muffler)
7 Guide sleeve for starting handle
8 Cylinder head cover
9 Cold-start oil metering device
10 Suspension lug
11 Tank filler cap
12 Oil drain plug, governor housing
13 Oil drain plug, governor side
14 Speed control lever
15 Oil filler pipe and dipstick
16 Fuel filter
17 Oil filter
18 Type plate
19 Tank drain plug
20 Combustion air intake

Description of engine

Fully-encapsulated version
1D41C • 1D81C engines



2

1 Capsule
2 Decompression lever
3 Cold-start oil metering device
4 Combustion and cooling air intake
5 Oil filter
6 Cleaning hatch
7 Side panels
8 Hold for starting handle
9 Suspension lug
10 Silencer (muffler), encapsul.
11 Cooling air outlet
12 Battery connection and central plug for electrical system
13 Stop lever
14 Speed control lever
15 Oil drain plug
16 Oil filler and dipstick
17 Type plate

3. General information

3.1. Technical data

Type		**1D41.**	**1D50.**	**1D81.**	**1D90.**
Engine models		S, Z, C	S, Z	S, Z, C	S, Z
Mode of operation		air-cooled four-stroke diesel engine			
Combustion method		Direct-fuel injection			
Number of cylinders		1	1	1	1
Bore / stroke	mm	90/65	97/70	100/85	104/85
Displacement	cm^3	413	517	667	722
Engine oil content without filter with filter	approx. L approx. L	1.1 [1)] 1.2 [1)]	1.4 [1)] 1.5 [1)]	1.8 [1)] 1.9 [1)]	1.8 [1)] 1.9 [1)]
Volume of oil between „max“ and „min“ marks	approx. L	0.4 [1)]	0.5 [1)]	0.9 [1)]	0.9 [1)]
Consumption of lubrication oil after running-in period		approx. 1 % of fuel consumption at full load			
Engine oil pressure Oil termperature 100 ± 20 °C		min. 0.6 bar at 850 r.p.m.			
Direction of rotation looking at the flywheel		counterclockwise			
Valve clearance at 10 - 30 °C Inlet Exhaust	 mm mm	 0.20 0.20	 0.10 0.20	 0.10 0.20	 0.30 0.30
Max. angle from vertical in any direction (continuous operation)	max.	30° [2)]	30° [2)]	30° [2)]	30° [2)]
Weight (incl. fuel tank, air-cleaner, exhaust silencer and electric starter) Engine model S Engine model Z Engine model C	 approx. kg approx. kg approx. kg	 75 77 96.5	 76 78 –	 89 91 121	 90 92

Model **S:** non-encapsulated, normal system of balancing
Z: non-encapsulated, add. system of balancing
C: SILENT PACK, add. system of balancing

1) These data are approx.-values. The **max.** mark on oil dipstick counts.

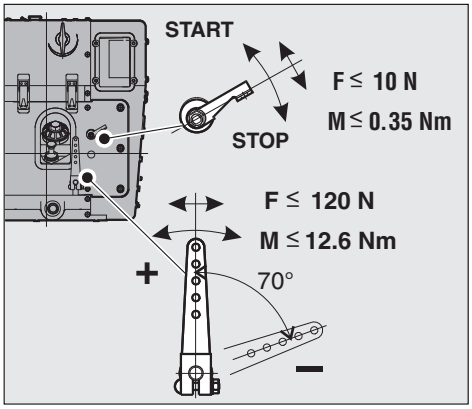
2) Exceeding these limits causes engine breakdown.

3.2. Transport

A lug is provided on top of the engine as standard equipment, so that the engine and its auxiliaries can be lifted safely. It is not suitable for lifting complete machines or similar with the engine attached, and this is strictly prohibited. (See Chapter 2.)

3.3. Instructions for installation

The „Manual for Selection and Installation of Engines“ contains all the information you need if your engine has not yet been installed on or in the equipment it is intended to drive, or set up in its correct operating position. You can obtain a copy of this manual from your nearest HATZ service station.



3

The permitted loads and elements on the speed adjusting lever and the stop lever should be observed as an exess can lead to damage to the contacts and inner governor parts.

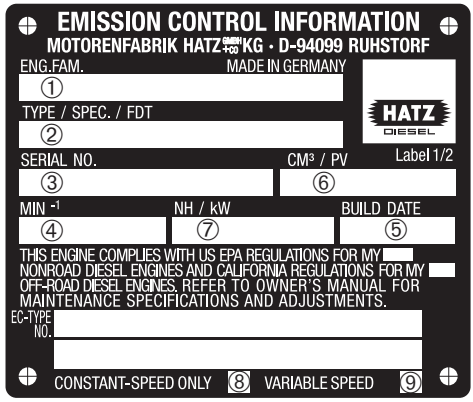
3.4. Load on engine

See supplemental information for EPA certified engines, Page 35; resp. supplemental information for California regulations for off road engines, Page 51.

3.5. EPA/CARB-type plates and fuel label

There are two EPA/CARB- type plates applied for the identification of the engine. The type plates are placed on the crankcase resp. on the capsule (chapt. 2).
They include the following emission control information (Figure 4a):

Label 1/2



4a

① EPA/CARB-Engine Family Number
② engine type/spec. (only for special equipment) /Fuel Delivery Timing
③ engine number
④ max. engine rated speed
⑤ build date
⑥ displacement
⑦ rated power
⑧ “constant speed only” (if requested)
⑨ “variable speed” (if requested)

Every engine is equipped with an additional loose engine type plate. If the original type plate on the engine is not readily visible after the engine is installed in the equipment then the second loose type plate must be attached on the equipment in such a manner that it is readily visible to an average person.

The layout is identical for constant-speed and variable speed application.

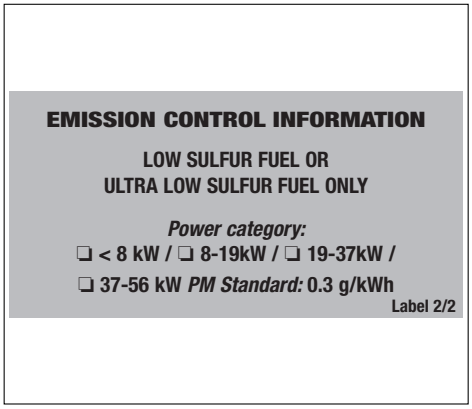
For any offer as well as spare parts orders it is necessary to mention the following data (also see spare parts list, page 1):

② engine type/spec.
(only for special equipment)
③ engine number
④ max. engine rated speed

Attention:
If the engine was certified for constant-speed application and shall be used so, the field "constant-speed only" is marked with “X”.
If the engine was certified for variable speed application and shall be used so, the field "variable speed" is marked with “X”.

Always install the engine for its intended application in order to comply with EPA and CARB emission regulation requirements.

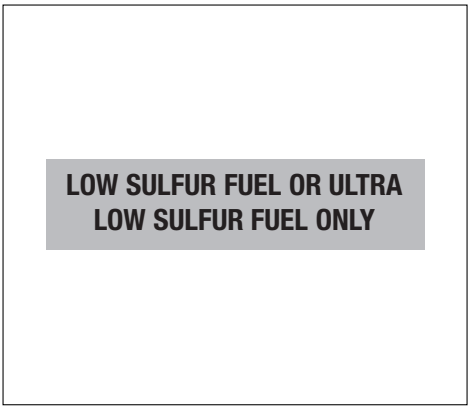
Label 2/2



4b

The engine must be operated with “LOW SULFUR FUEL OR ULTRA LOW SULFUR FUEL ONLY”.
The label also states the applicable emission-related power category of the engine.

Fuel label



4c

The fuel label is placed nearby the fuel inlet.
If there was no fuel tank mounted to the engine, the label has to be permanently attached to the equipment near the fuel inlet.

3.6. EMISSION-RELATED INSTALLATION INSTRUCTIONS

See supplemental information for EPA certified engines, Page 35; resp. supplemental information for California regulations for off road engines, Page 51.

4. Operation

4.1. Before initial start-up

Engines are normally delivered without fuel and oil.

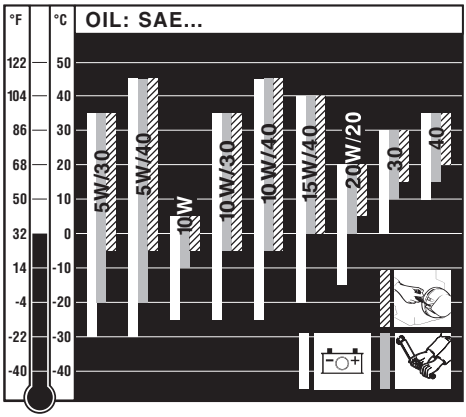
4.1.1. Engine oil

Qualified are all trademark oils which fulfil at least one of the following specifications:

ACEA – B2 / E2 or more significant
API – CD / CE / CF / CF-4 / CG-4 or more significant.

If engine oil of a poorer quality is used, reduce oil change intervals to 150 hours of operation.

Oil viscosity



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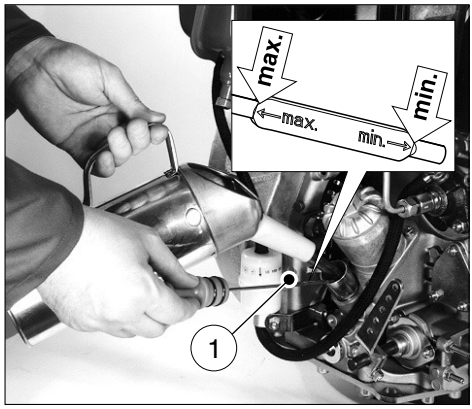
Choose a viscosity according to the ambient temperatures where the engine is to be started from cold.

The engine must be in a horizontal position before adding oil or checking the oil level.



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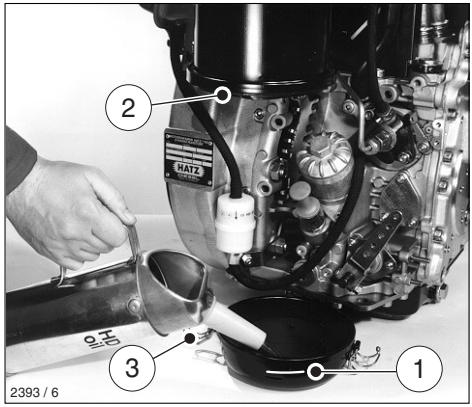
– Pull out dipstick „1“ and add engine oil of the correct specification and viscosity up to the **„max“ mark** on the dipstick; (Chapter 3.1.).

4.1.2. Oilbath air cleaner



7

– Take off the oil reservoir and fill it up to the mark „1“ using engine oil.

– Attach the oil reservoir, making sure that sealing ring „2“ is correctly seated and catches „3“ are tight.

4.1.3. Fuel

⚠ Only refuel when engine is stopped. Never refuel close to open flames or flammable sparks, don't smoke. Use only pure fuel and clean replenishing cups. Don't spill the fuel.

All diesel fuels sold as fuel and complying with the following minimum specification can be used:

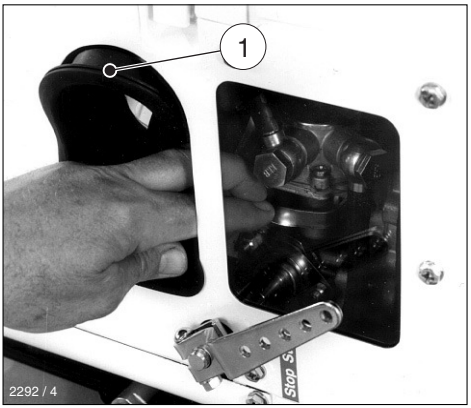
EN 590 or
BS 2869 A1 / A2 or
ASTM D 975 - 1D / 2D

8

– Before the first start or if the fuel tank has been run dry, completely fill the fuel tank with diesel.
The fuel system is bled automatically if the fuel tank is attached to the engine or located higher than the injection pump.

9

– If the fuel tank is not mounted on top of the engine, or is at a lower level, operate the lever on the fuel feed pump until fuel is heard to flow back to the tank through the return line.



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– On fully encapsulated engines, move sleeve „1“ to one side to gain access to the feed pump.
After operating the feed pump, make sure that the sleeve is replaced correctly and makes a good seal.

At temperatures below 0 °C, winter-grade fuel should be used or parafin added to the fuel well in advance.

Lowest ambient temperature when starting, in °C	Paraffin content for:	
	Summer fuel	Winter fuel
0 up to –10	20 %	–
–10 up to –15	30 %	–
–15 up to –20	50 %	20 %
–20 up to –30	–	50 %

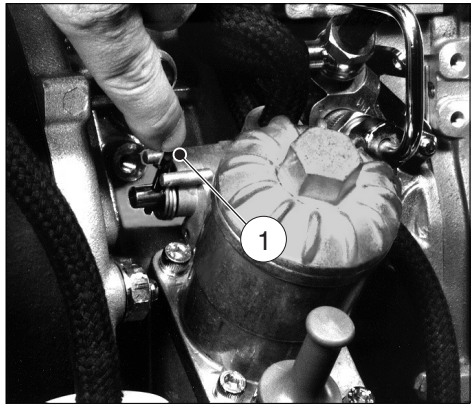
4.1.4. Mechanical oil pressure monitor (optional extra)

The mechanical oil pressure monitor should be activated:

- when first filling, or after running the fuel tank dry.
- if engine shut down automatically because lubricating oil supply was inadequate.
- after freeing it by turning at low temperatures (Chapter 4.2.4.)
- after replacing the fuel filter, Chapter 5.4.1.

– Add fuel, chap. 4.1.3.

– Check engine oil level, chap. 5.2.1.



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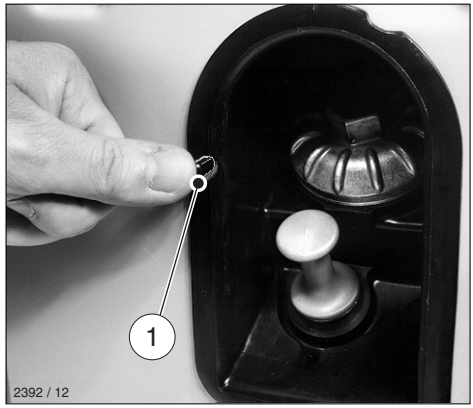
– To activate the monitor, press lever „1“ for approx. 15 seconds.



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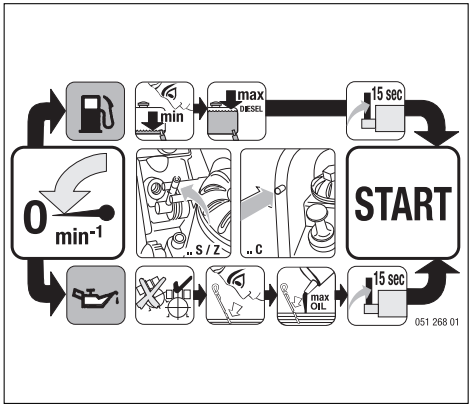
– If the engine has a full capsule, press pin „1“ for app. 15 seconds.

– If the engine has a fuel feed pump, operate its lever for several strokes at the same time (Figs. 9 and 10).

– Re-assemble all parts repositioned or removed. Check that capsule elements make a good seal.



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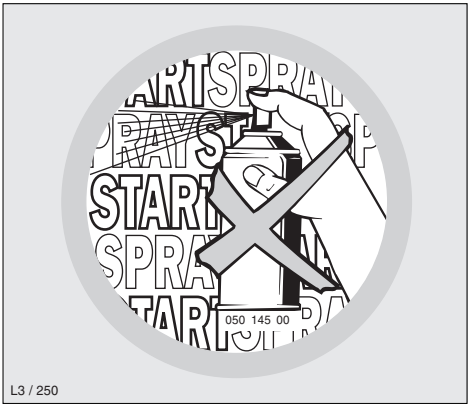

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Instructions to activate the mechanical oil pressure control are mentioned on the sticker placed on the engine.

IMPORTANT !
Even with mechanical oil pressure monitoring the oil level must be checked every 8 – 15 operating hours (Chapter 5.2.1.).

4.2. Starting the engine

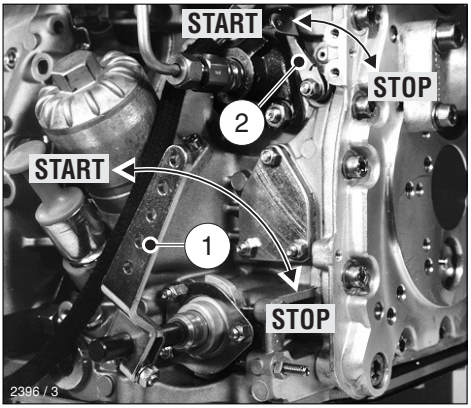
Do not run the engine in closed or badly ventilated rooms – danger of poisoning ! Before the engine is started, always make sure that nobody is in the danger area (moving parts on engine or machinery) and that all safety guards are in place.

Check that the starting handle is in good condition: renew tubular grip if broken, worn drive pin etc.
Lightly grease the sliding-contact area between the starting handle and the guide sleeve.

Never use any spray starting aids.

4.2.1. Preparations for starting

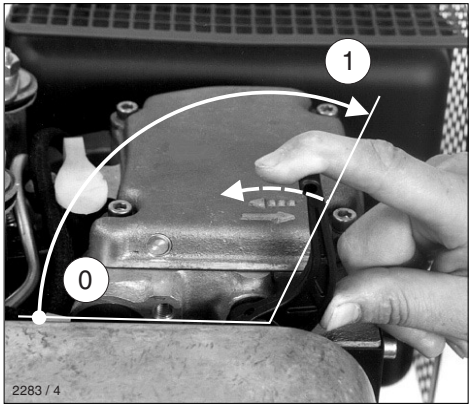
– If possible, disengage the engine from any driven equipment. The auxiliary equipment should always be placed in neutral.



15

– Set speed control lever „1“ to a position between 1/2 START and max. START, according to requirements. Selecting a lower engine speed will reduce smoke when starting.

– Make sure that stop lever „2“ - if fitted - is in the operating „START“ position.



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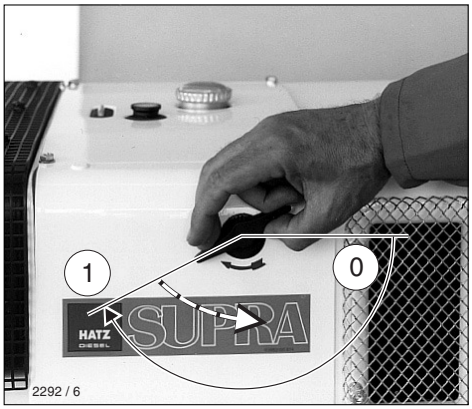

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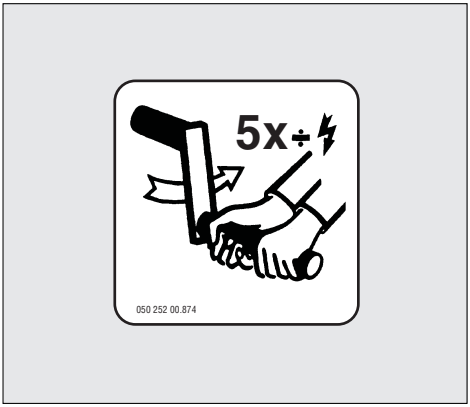
– Turn the decompression lever until stop „1“ is reached. In this position the automatic decompression system is heard to engage and the engine can then be started; Figs. 16 and 17.

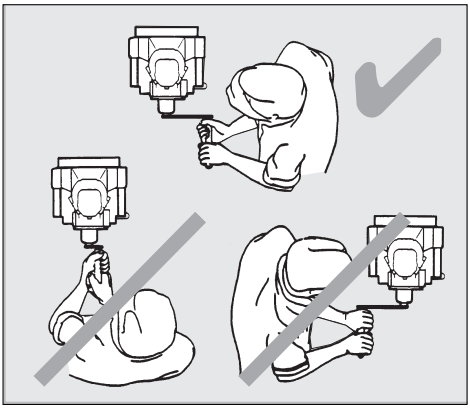


18

After the automatic decompression device has engaged at its limit stop, five turns of the crank handle are needed for the engine to build up compression and fire again.

4.2.2. Starting with the handle

For preparations to start the engine, see Chapter 4.2.1.



19

For correct position to adopt when starting the engine, see Fig. 19.

– Take hold of the starting handle with both hands and turn it at increasing speed. The maximum speed of rotation must have been reached by the time the decompression lever has returned to the „0“ position (compression). As soon as the engine has started, pull the starting handle out of the guide sleeve.

– If the engine backfires because the crank handle was not turned firmly enough (the engine may even start to run backwards), release the crank handle immediately and stop the engine (Chapter 4.3.).

There is a risk of injury from the rotating crank handle.

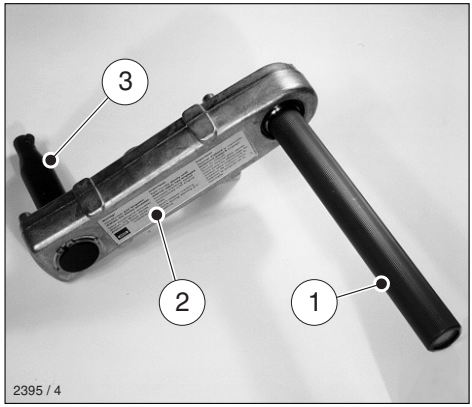
– To restart the engine, wait until it has come to a standstill, then repeat the starting preparations.

Safety precaution
For greater protection against accidental injury when starting with the handle, a handle with kick-back damping can be used.

4.2.3. Starting with the handle with kick-back damping (retrofit)

For preparations to start the engine, see Chapter 4.2.1.

– For correct position to adopt when starting the engine, see Fig. 19.



20

– Always hold tubular grip „1“ with both hands.

– Turn the handle slowly until the pawl engages in the ratchet, then increase turning force to build up speed. The highest speed must have been reached when the decompression lever returns to the „0“ position (compression). As soon as the engine has started, pull the starting handle out of the guide sleeve.

You must hold the tubular grip firmly to maintain contact all the time between the starting handle and the engine. Maintain turning force during the entire hand starting operation.

If backfiring occurs when starting the engine because the crank handle was not turned firmly enough, the brief reverse rotation at the handle tube separates the link between crank lug „2“ and driving dog „3“ (Fig. 20).

– If the engine begins to run backwards after backfiring (smoke emerges from air cleaner), release the crank handle immediately and stop the engine (Chapter 4.3.).

– To restart the engine, wait until it has come to a standstill, then repeat the starting preparations.

4.2.4. Starting in cold weather

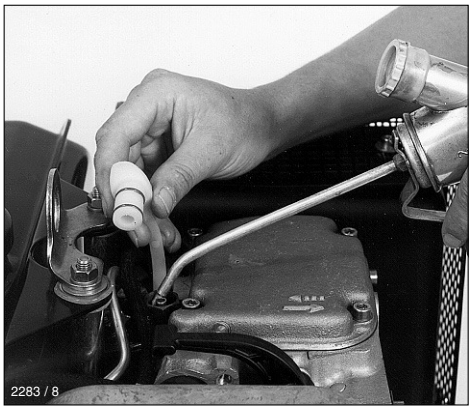
At temperatures below app. –5 °C, always turn the engine over to ensure that it rotates freely.

– Move the speed control lever to the START position; Fig. 15.

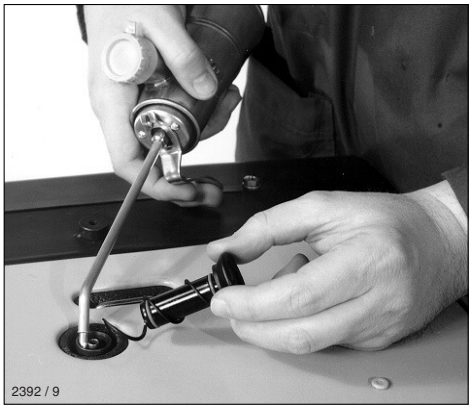
– Move the decompression lever to a position not as far round as starting position „1“ (Figures 16 and 17).

– Turn the engine over with the starting handle until it is felt to rotate more freely (10 – 20 turns of the starting handle).

– If mechanical oil pressure monitoring is fitted, press lever „1“ or pin „1“ in for about 15 seconds (Figs. 11 and 12).



21



22

– Remove dirt from the cover of the metering device and the surrounding area. Pull off the cover; Figs. 21 and 22.

– Add a free-flowing lubricating oil to the housing until the level reaches the upper rim. Replace the cover and press it in firmly. Two filling operations in succession are needed.

– Turn the decompression lever until limit stop „1“ (fig. 16 and 17).

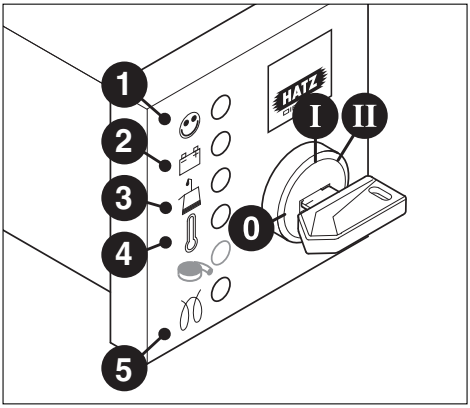
– After this, start the engine immediately. Chap. 4.2.1. / 4.2.2. / 4.2.3.

4.2.5. Electric starter

For preparations to start, see Chapter 4.2.1.

– The decompression lever remains in pos. „0“.

Starting procedure



23

– Insert the key **to its stop** and turn it to **position I**.

– Battery charge telltale „2“ and oil pressure warning „3“ must light up.

– Turn start key to **position II** (fig. 23).

– As soon as the engine runs, release the start key. It must return to **position I** by itself and remain in this position during operation. The battery charge telltale and oil pressure warning must go out immediately after starting. Indicator light „1“ is on when the engine is in operation.

– If anything seems to be incorrect, stop the engine immediately and trace and rectify the fault (chapt. 6).

– The engine temperature display „4“ (additional equipment) lights up if the temperature at the cylinder head becomes too high. **Switch off the engine and trace and eliminate the cause of the problem,** chap. 6.

– Always turn the start key back to **position 0** before re-starting the engine. The repeat lock in the ignition lock prevents the starter motor from engaging and possibly being damaged while the engine is still running.

Never operate the electric starter when the engine is running or coasting to a standstill. There is a risk of broken starter pinion or ring gear teeth.

Important:
If a start protection module is installed, the start key has to be returned to **position 0** for at least 8 seconds if the engine has failed to start before a further attempt to start the engine can be made.

Preheating device with automatic heating timer (additional equipment)

The preheating light „5“ lights up additionally at temperatures below 0° Celsius (Fig. 23).

– After the light has gone out, start the engine without delay.

Automatic electrical shutdown system

(additional equipment)

This is characterized by a brief flashing of all pilot lamps once the starter key has been turned to **position I** (Fig. 23).

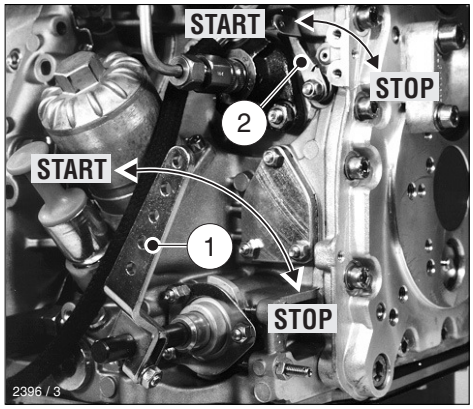
Important!
If the engine cuts out immediately after starting or switches off by itself during operation, a monitoring element in the automatic shutdown system has tripped. The corresponding indicator light (Fig. 23, positions 2 - 4) will come on.
After the engine has stopped, the display continues to glow for about 12 seconds.
The electrical device then switches itself off automatically.
The display lights up again after the start key has been turned back to **position 0** and then to **position I** again.
Trace and eliminate the cause of the operating fault before trying to restart the engine (see chapter 6).

The display light goes out when the engine is next started.

Even with automatic shutdown monitoring the oil level must be checked every 8 – 15 operating hours (Chapter 5.2.1.).

4.3. Stopping the engine

⚠ Never stop the engine by moving the decompression lever. During breaks in work or at the conclusion of the working period, keep the starting handle and starting key in a safe place, out of reach of unauthorized persons.



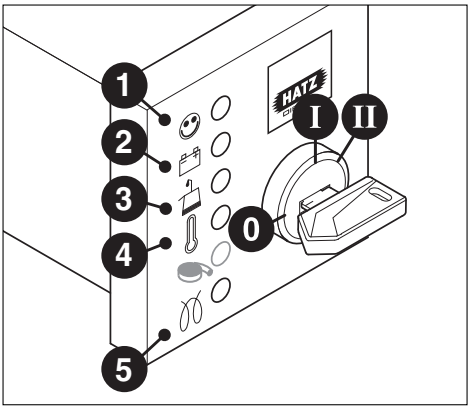
24

– Move speed control lever „1“ back to the STOP position.

– On engines with the lower engine speeds not accessible, move speed control lever „1“ back, then move stop lever „2“ in the STOP direction. Hold it there until the engine has stopped.

– Release the stop lever „2“ when the engine has stopped, making sure that the lever returns to its normal operating position.

Electrical system



25

The charge „2“ and oil pressure telltales „3“ come on.

– Turn the key to the **0 position** and pull it out. The telltale lights must then go out.

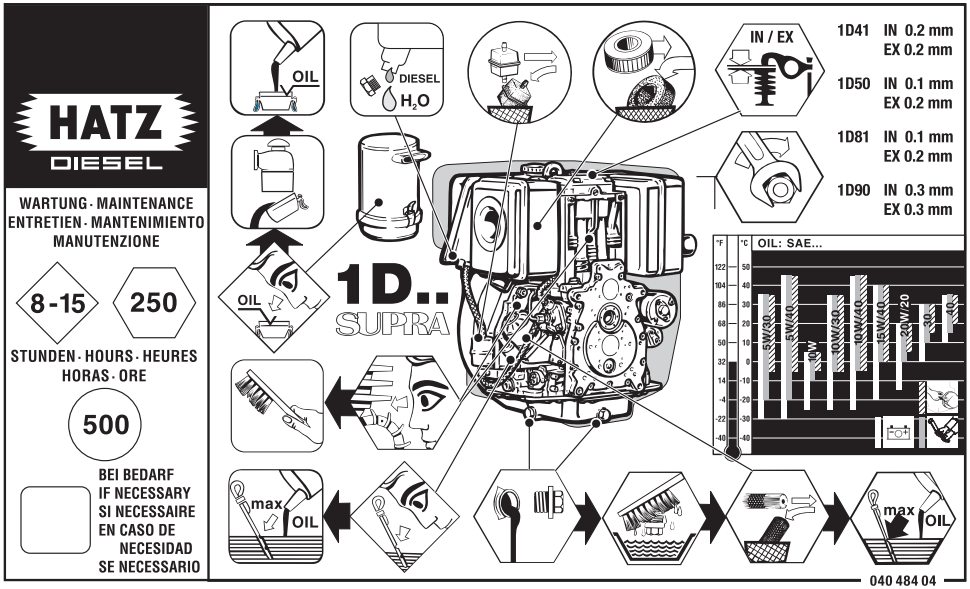
Note:
Engines with an automatic electrical shutdown system (Chapter. 4.2.5.) can also be switched off by turning the start key back to **position 0.**

5. Maintenance

The engine must be stopped before any maintenance work is attempted.
Comply with legal requirements when handling and disposing of old oil, filters and cleaning materials.
Keep the engine's starting key and starting handle out of reach of unauthorized persons.
To immobilize engines with an electric starter, disconnect the negative battery terminal.
At the end of the maintenance work, check that all tools have been removed from the engine and all safety guards, covers etc. replaced in their correct positions.
Before starting the engine, make sure that nobody is in the danger area (engine or driven machinery).

5.1. Maintenance summary

	Maintenace intervals	Maintenance work required	Chap.
8-15	Every 8 – 15 operating hours or before daily starting.	Check oil level.	5.2.1.
		Check area round combustion air input.	5.2.2.
		Check the air cleaner maintenance indicator.	5.2.3.
		Check the cooling air zone.	5.2.4.
		Check the water trap.	5.2.5.
		Check the lower part of the oilbath air cleaner for correct oil level and freedom from dirt; renew oil if sludge has formed.	4.1.2. 5.3.1.
250	Every 250 operating hours	Maintenance of oil bath air filter.	5.3.1.
		Replace engine oil and oil filter.	5.3.2.
		Check and adjust tappet clearance.	5.3.3.
		Clean cooling air system.	5.3.4.
		Examine screw connections.	5.3.5.
		Cleaning mesh insert in exhaust silencer	5.3.6.
500	Every 500 operating-hours	Replace fuel filter.	5.4.1.
		Maintenance of dry-air filter.	5.4.2



26

The above maintenance chart is supplied with every engine. This label should be affixed to the engine or equipment in an easily visible position. The maintenance chart governs the maintenance intervals.

For **new** or **reconditioned** engines, the following must always be carried out after **first 25 operating hours:**

– Replace engine oil and oil filter, chap. 5.3.2.

– Check tappet clearance, and adjust if necessary, chap. 5.3.3.

– Examine screw connections, chap. 5.3.5.
Do not tighten the cylinder head fastening.

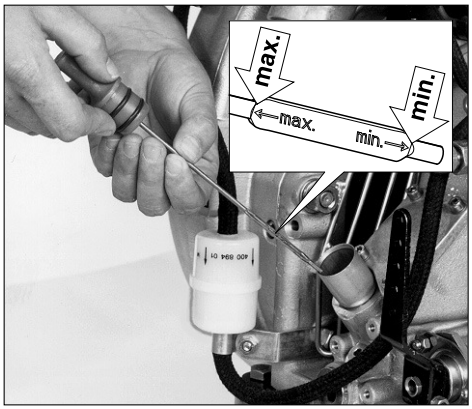
For short operating periods: replace engine oil and oil filter **after 12 months at the latest,** regardless of the number of operating hours.

5.2. Maintenance every 8 – 15 hours of operation

5.2.1. Check engine oil level

When checking the oil level, the engine should be standing level, and must not be running.

– Remove any dirt in the dipstick area.



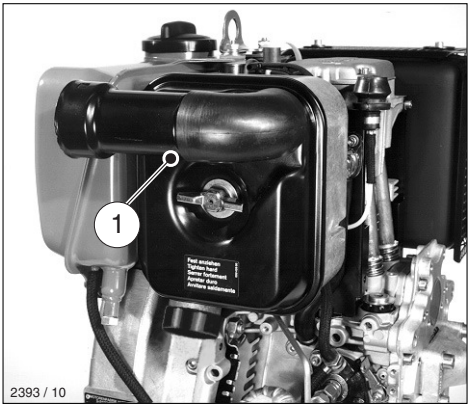
27

– Check oil level at the dipstick; top up if necessary as far as the „max“ mark (see Chapter 4.1.1.).

5.2.2. Check air intake point

Severe contamination is a sign that there are large amounts of dust in the atmosphere and the air cleaner maintenance intervals should be reduced.

– Depending on the air intake pattern, check for severe blockage; clean if necessary (see Chapter 2).



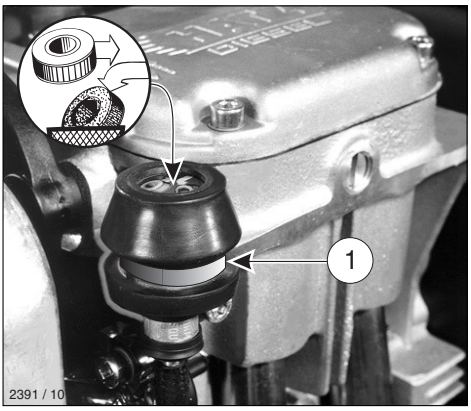
28

– Check that dust outlet „1“ on the centrifugal dust trap (depending on version) is not blocked, and clean if necessary.

5.2.3. Air cleaner blockage indicator

(optional extra)

– Run the engine at full speed shortly.



29

If the rubber bellows is pulled in and obscures the green zone „1“, maintenance work is due on the air cleaner; Chapt. 5.4.2. In dusty operating conditions, check the rubber bellows several times a day.

5.2.4. Checking cooling air zone

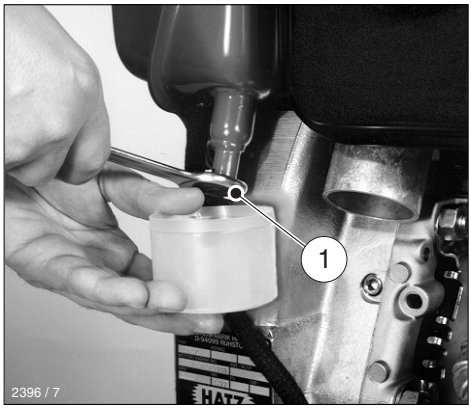
Severe contamination is a sign that there are large amounts of dust in the atmosphere and that maintenance intervals should be reduced.

– Check the air inlet and outlet zones for blockage by coarse material such as leaves, large amounts of dust etc., and clean if necessary (see chapters 2 and 5.3.4.).

– If a temperature warning light „4“ is provided, it will come on if the engine overheats, fig. 25. **In this case, stop the engine immediately** (Chapter 4.3. and 5.3.4.).

5.2.5. Checking the water trap

The intervals at which you should check the water trap depend entirely on the amount of water in the fuel and the care taken when refuelling. The normal interval is once a week.



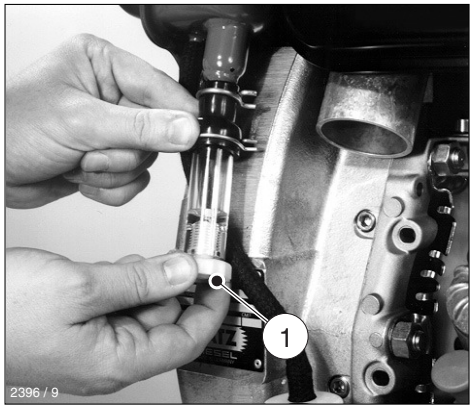
30

– Loosen hexagon screw „1“ with approx. 2-3 rotations.

– Trap the drops which emerge in a transparent vessel. Since water has a greater specific gravity than diesel fuel, the water emerges before the diesel fuel. The two substances separate at a clearly visible line.

– As soon as diesel only emerges at screw „1“, this can be tightened again.

If an external water trap is attached, check its water content every day, when the engine oil level is checked. The water which has collected is separated at a clearly visible line from the diesel fuel above it.



31

– Open drain plug „1“ and drain the water out into a suitable vessel.

– If the drain plug is difficult to reach, an extension hose can be attached to it.

5.3. Maintenance every 250 hours of operation

5.3.1. Oilbath air cleaner maintenance

32

Catch waste oil and dispase acc. to environmental regulations.

– Take off the oil reservoir „1“ and clean it.

– Remove contaminated oil and sludge from the oil tank, and clean it out.

– Take off rain cap „2“ and clean it.

– Clean the entire length of intake pipe „3“.

– Check the inserted seal and renew if in poor condition.

– Fill the oil reservoir up to the mark with engine oil and re-assemble the oilbath air cleaner, Chap. 4.1.2.

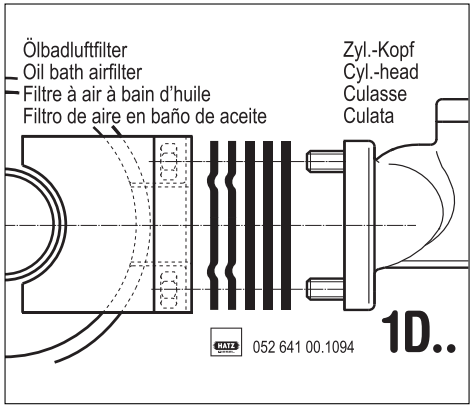
– If the filter pack is very dirty, also clean the upper part of the air cleaner as follows: Remove the upper part of the air cleaner from the engine and rinse it in diesel oil.

– Before re-assembling the air cleaner, allow the diesel fuel to drip off thoroughly, or wipe it off.

– Never attempt any repairs (welding, brazing etc.) to the oilbath air cleaner, or it may be rendered useless and the engine may also be damaged.

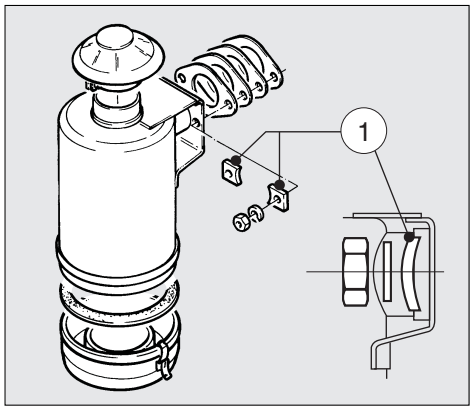
– If the sealing face is uneven, the air cleaner body cracked and/or the filter wool content is incomplete, install a new air cleaner.

– Attach the upper part of the air cleaner with a new flange gasket.



33

– Sealing package acc. picture 33 is mounted at engines 1D41 and 1D50.



34

– Shim washers „1“ should be installed with the convex side (outward curve) towards the nut.

– Re-assemble the complete air cleaner and fill it with oil to make it ready for further operation.

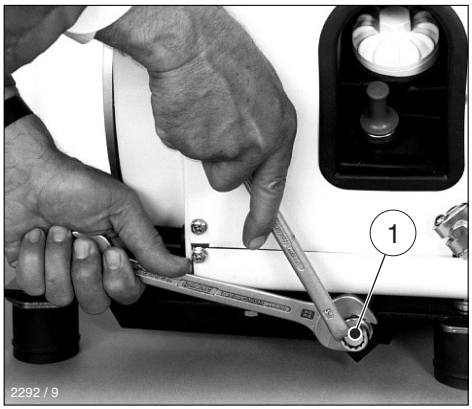
5.3.2. Changing engine oil, renewing oil filter

The engine must be stopped, and should stand on a flat, level surface.
Drain the engine oil only when it is warm.
For oil drain plug, see Chapter 2.

Risk of scalding from hot oil.
Catch waste oil and dispase acc. to environmental regulations.

– Unscrew the oil drain plug and allow all the oil to drain out.

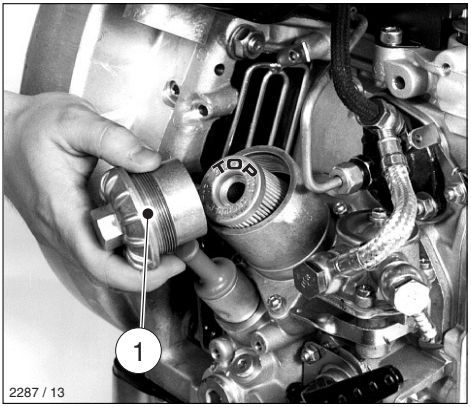
Fully encapsulated engines:



35

When unscrewing oil drain plug „1“, make sure that the drain tube is not loosened. Prevent it from turning if necessary with an open-ended wrench of the correct size.

– Clean the oil drain plug and attach a new seal. Insert and tighten the plug.



36

– Renew the replaceable lubricating oil filter element.

37

– Clean sieve bottom carefully in order not to bend the netting.
Wipe out cap screw or blow it out with compressed air.

Persons handling compressed air must wear protective goggles.

Important !
Note the „TOP“ mark on the oil filter. Fig. 36

– Check condition of O-ring „1“ and renew it if necessary (Fig. 36).

– Wet the thread and the O-ring of the screw plug with lubricant „K“ (see spare parts list).

– Add engine oil up to the „MAX“ mark on the dipstick (see Chapter 4.1.1.)

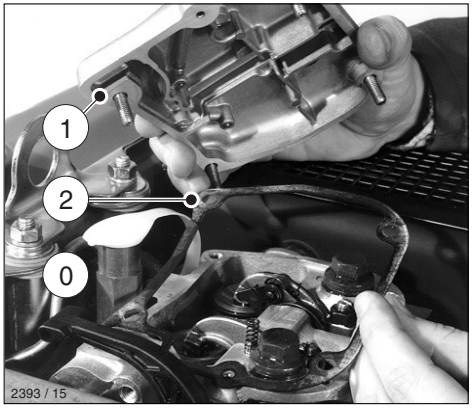
– Run the engine for a short period, then check the oil level again and top up if necessary.

– Check that there is no leakage past screw plug on the oil filter housing.

5.3.3. Checking and adjusting valve clearances

– Move the decompression lever to **position „0“**; Fig. 16 and 17.

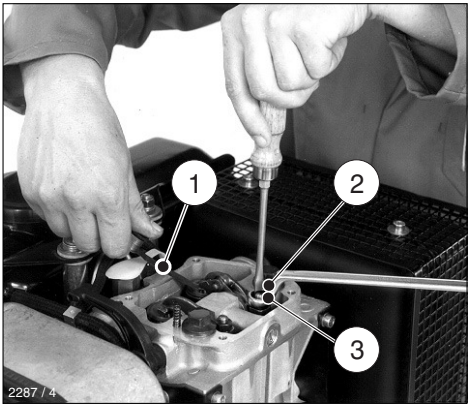
1D41 C, 1D81 C and 1D90 C engines
Take off the enclosure cover (see Chap. 2). On engines with manual starting only, the decompression lever is also taken off when the cover is removed.



38

– Unscrew cover „1“ and take off together with gasket „2“. Never re-use this gasket.

– Turn the engine over in the normal direction of rotation until compression is felt.



39

– Check valve clearances between rocker and valve stem, using feeler gauge „1“; Fig. 39 (see Chapter 3.1.).

– If valve clearance is incorrect, slacken off hex. nut „2“.

– Turn adjusting screw „3“ with a screwdriver until feeler gauge „1” can just be pulled through between the rocker and the valve stem with slight resistance to its movement after nut „2“ has been retightened.

– Attach the cover at the cylinder head again and tighten down uniformly.

– Depending on version mount parts of air duct.

– Run the engine briefly and check that the cover is not leaking.

5.3.4. Clean the cooling air system

Before cleaning, the engine must be stopped and allowed to cool down.

Remove parts of air duct.

Dry contamination

– Clean all air guide elements and the complete cooling air zones on the cylinder head, cylinder and flywheel blades without making them wet. Blow them dry with compressed air.

Persons handling compressed air must wear protective goggles.

Moist or oily contamination

– Disconnect the battery. Clean the complete area with a solvent, cold cleaner etc. according to its manufacturer's instructions, then spray down with a powerful water jet.
Do not splash electrical device with water jet or pressure jet during engine cleaning.

– Trace the cause of any contamination with oil and have the leak eliminated by a HATZ service station.

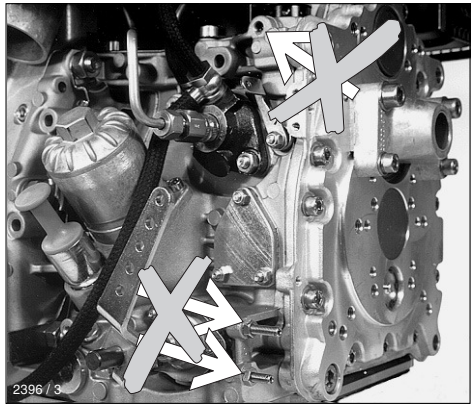
– Install the air guide elements previously removed.

The engine must never be run without the air guide elements in position.

– Immediately after re-assembly, run the engine until warm to prevent residual moisture from causing rust.

5.3.5. Checking threaded connections

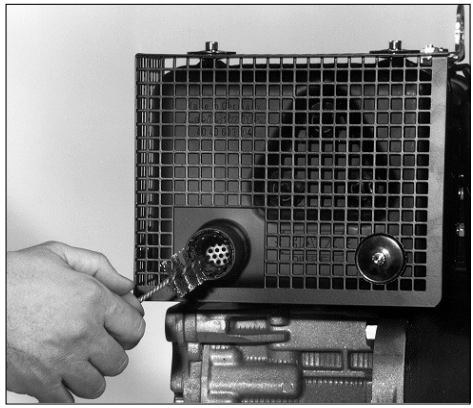
Check the condition and tightness of all threaded connections, wiring, hose clips and other components attached to the engine and its mountings, provided that these can be reached during maintenance work.
Do not tighten the cylinder head bolts.



40

Adjustment screws on speed governor and injection system are painted with safty lacquer. Do not tighten or adjust them.

5.3.6. Cleaning mesh insert in exhaust silencer (additional equipment)



41

– Remove deposits from the mesh insert with a suitable wire brush.

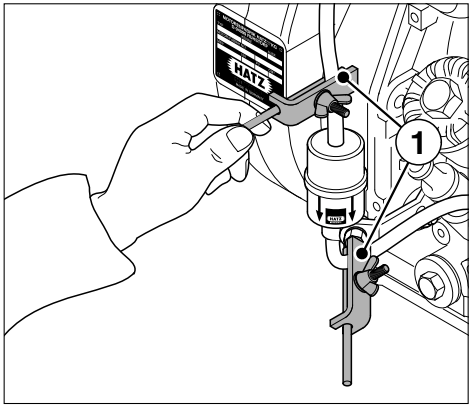
5.4. Maintenance every 500 hours of operation

5.4.1. Renewing fuel filter

Fuel filter maintenance intervals depend on the purity of the fuel used; reduce them to 250 hours of operation if necessary.

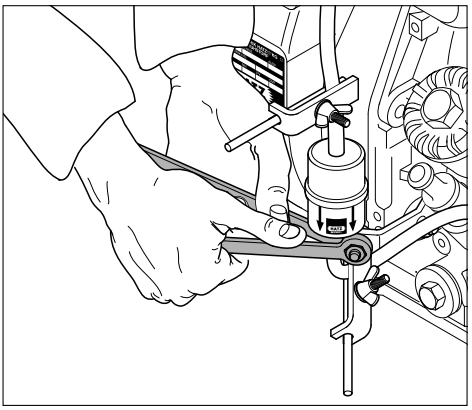
Do not smoke or bring a naked flame near the fuel system when working on it.

Important!
Keep the entire area clean so that no dirt reaches the fuel. Fuel particles may damage the injection system.



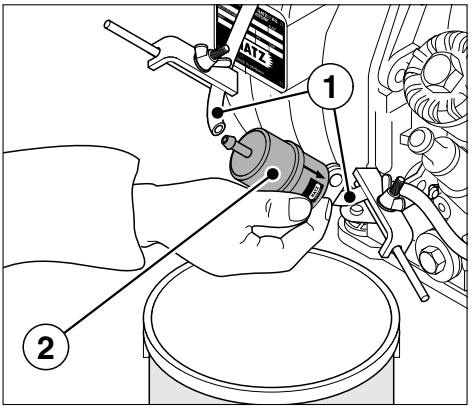
42

– Shut off the fuel supply line **upstream and downstream of the fuel filter** according to item 1.



43

– Unscrew the fuel filter from its mount.



44

– Place a suitable vessel under the filter to trap escaping fuel.

– Pull off fuel supply line „1“ at both ends of fuel filter „2“ and insert the new filter.

– Always renew the fuel filter. Note the arrows indicating the correct direction of fuel flow.

– Secure the filter to its mount.

– Open the fuel supply line or prime the pump until the fuel flows (see Chapter 4.1.3.).

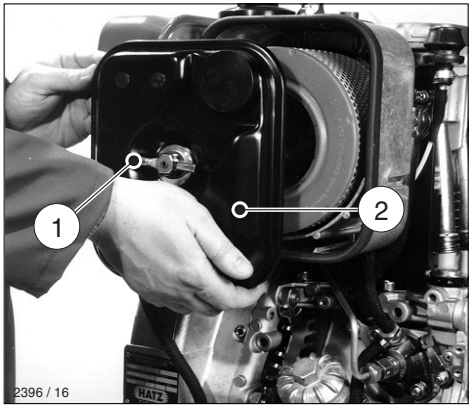
– Activate mechanical oil pressure monitor (optional extra), chap. 4.1.4.

– Run the engine briefly to check the fuel filter and lines for leaks.

5.4.2. Dry-type air cleaner maintenance

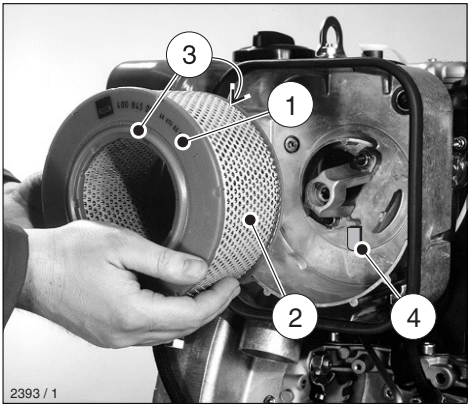
It is best to clean the filter cartridge only when the maintenance indicator displays the appropriate signal.
Apart from this, the cartridge should be renewed after 500 hours of operation.

– On fully encapsulated engines, take off the top cover (see Chapter 2).
On engines with manual starting only, the decompression lever is also taken off when the cover is removed.



45

– Slacken off wing bolt „1“ and remove it with cover „2“.

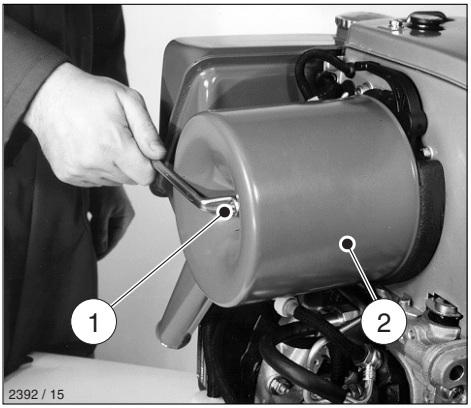


46

– Carefully pull out filter cartridge „1“.

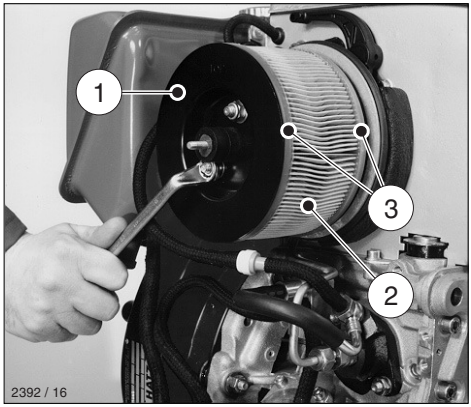
– On the version with air cleaner maintenance indicator, check that valve plate „4“ is clean and in good condition.

Noise reduced model



47

– Unscrew hex. nut „1“ and take off filter housing „2“.



48

– Unscrew the hex. nuts and remove them with filter cover „1“.

– Carefully pull out filter cartridge.

– Clean all parts except for the filtercartridge.

Do not spray into the engine’s air intake when cleaning.

Cleaning the filter cartridge

Dry contamination

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– Blow through the filter cartridge from the inside, moving the jet of dry compressed air up and down until no further dust is expelled.
Warning: air pressure must not exceed 5 bar.

Persons handling compressed air must wear protective goggles.

– Tilt the filter element and hold it against the light (or shine a light through it) to trace any cracks or other damage.

Important:
If there is even the slightest damage to paper filter element „2“ or sealing lips „3“, the filter element should not be re-used.
(Figs. 46 and 48)

Wet or oily contamination

– Renew the filter cartridge.

– Re-assemble in the reverse order of work.

6. Malfunctions – Causes – Remedies

Malfunction	Possible causes	Remedial action	Chap.
Engine will not start or start is delayed, although it can be turned over with the starter.	Speed control lever is in stop or idle position.		
	Stop lever in stop position.	Set lever to „START“-position	4.2.
	No fuel reaching injection pump.	Add. fuel.	4.1.3. 4.1.4.
		Check entire fuel supply system carefully. If no fault is found: - supply line to engine - fuel filter - Function of delivery pump must be checked.	5.4.1. 4.1.3.
	Compression too low: - Valve clearances incorrect	Check valve clearances, adjust if necessary.	5.3.3.
	- Cylinder bore and/or piston ring wear	See workshop manual.	
	Injector not operating correctly.	See workshop manual.	
Also applicable for engines with mechanical oil pressure monitoring.	Oil pressure lost.	Check engine oil level.	5.2.1.
		Activate mechanical oil pressure monitor.	4.1.4
At low temperatures.	Lower starting temperature limit exceeded.	Comply with cold starting instructions.	4.2.4.
		Operate preheat system (optional extra).	4.2.5.
	Machinery not uncoupled.	Disengage engine from machinery or equipment if possible.	
	Defective preheat system (optional extra).	See workshop manual.	

Malfunction	Possible causes	Remedial action	Chap.
At low temperatures.	Fuel separates has inadequate resistance to low temperatures.	Check whether clear (not turbid) fuel emerges at the fuel line detached from the injection pump. If turbid or separated - either warm up the engine or drain the complete fuel supply system. Refuel with winter-grade fuel to which paraffin has been added.	4.1.3.
	Starting speed too low: - Engine oil is too thick	Refill with a different grade of engine oil.	5.3.2.
	- Battery charge is insufficient.	Check the battery; consult a specialist workshop if necessary.	7.
Starter does not run or engine is not turned over.	Fault in electrical system: - Battery and/or other wiring is wrongly connected. - Wiring connections loose and/or corroded. - Battery defective and/or flat. - Defective starter motor - Defective relays, monitoring elements etc.	Check electrical system incl. indiv. components or contact a HATZ-service station.	7.
Engine fires but stops again as soon as starter is switched off.	Drive still engaged.	Uncouple engine from driven machinery if possible.	
	Fuel filter blocked.	Renew the fuel filter.	5.4.1.
	Fuel supply interrupted.	Check through the entire fuel supply systematically.	
	Stop signal from monitoring element for automatic shutdown system (optional extra): - oil pressure lost	Check oil level.	5.2.1.
	- cylinder head temperature too high.	Clean cooling air system.	5.3.4.
	- alternator has failed	See workshop manual.	

Malfunction	Possible causes	Remedial action	Chap.
Engine stops by itself during regular operation.	Fuel supply is interrupted:		
	- Tank run dry	Add fuel.	4.1.3. 4.1.4.
	- Fuel filter blocked	Renew fuel filter.	5.4.1.
	- Defective feed pump.	Check through entire fuel supply system.	
	- Air in the fuel system.	Check fuel system for penetration of air. Check air vent valve.	
	Mechanical oil pressure monitor stops the engine due to low oil pressure.	Check engine oil level. Activate mechanical oil pressure monitor.	5.2.1. 4.1.4.
	Mechanical defects.	Contact a HATZ-service station.	
In addition, if automatic engine shutdown is installed.	Stop signal from monitoring element because of:	Check engine for:	
	- oil pressure too low.	Engine oil level.	
	- cylinder head temperature too high.	Cooling air passages blocked or cooling system otherwise affected.	
	- alternator has failed	See workshop manual.	
Low engine power, output and speed.	Fuel supply is obstructed:		
	- Tank run dry.	Add fuel.	4.1.3. 4.1.4.
	- Fuel filter blocked.	Renew fuel filter.	5.4.1.
	- Tank venting is inadequate	Ensure that tank is adequately vented.	
	- Leaks at pipe unions.	Check threaded pipe unions for leaks.	
	- Air in the fuel system.	Check fuel system for penetration of air. Check air vent valve.	
	- Speed control lever does not remain in selected position.	Prevent speed control from moving.	

Malfunction	Possible causes	Remedial action	Chap.
Low engine power, output and speed, black exhaust smoke.	Air cleaner blocked.	Remove dirt from air cleaner.	5.3.1. 5.4.2.
	Incorrect valve clearances.	Adjust valve clearances.	5.3.3.
	Malfunction at injector.	See workshop manual.	
Engine runs very hot. Cylinder head overheat, telltale lamp (optional extra) comes on.	Too much oil in engine.	Drain off engine oil down to upper mark on dipstick.	5.3.2.
	Inadequate cooling:		
	- Entire cooling air system contaminated.	Clean cooling air system.	5.3.4.
	- Inadequate sealing at air guide plates or capsule elements.	Check that air guide plates and enclosure elements are all present and make a tight seal.	

7. Work on the electrical system

Batteries generate explosive gases. Keep them away from naked flame and sparks which could cause them to ignite. Do not smoke. Protect the eyes, skin and clothing against battery acid. Pour clear water over acid splashes immediately. In case of emergency call doctor.
Do not place any tools on top of the battery.

Always disconnect the negative (–) pole of the battery before working on the electric device.

– The **positive (+)** and **negative (–**) battery terminals must not be accidentally interchanged.

– When **installing the battery**, connect the **positive lead** first, followed by the **negative lead**. Negative pole to earth (ground) on engine block.

– When **removing the battery**, disconnect the **negative lead** first, followed by the **positive lead.**

– In all circumstances, **avoid short circuits** and shorts to earth (ground) at live cables.

– If electrical faults occur, first **check** for good contact at the **cable connections**.

– Replace a **failed indicator light** without delay.

– Do not take the key out while the engine is running.

– Never **disconnect the battery** while the engine is running. Electric voltage peaks can cause damage to electrical components.

– In case of an **emergency start in manual mode**, leave the battery (which might be discharged) connected to the engine.

– For **emergency operation without battery**, make sure that the plug-and-socket connector to the instrument box is disconnected additionally before the engine is started.

– Do not splash electrical device with water jet or pressure jet during engine cleaning.

– When carrying out **welding work** on the engine or attached equipment, attach the earth (ground) clip as near as possible to the welding point, and disconnect the battery.
If an alternator is fitted, separate the plug connector leading to the voltage regulator.

The relevant circuit diagrams are supplied with engines which have an electrical system. Additional copies of circuit diagrams can be obtained on request.

HATZ assumes no liability for electrical systems which was not carried out acc. HATZ circuit diagrams.

8. Protective treatment

A new engine can normally be stored for up to 12 months in a dry place.
If atmospheric humidity is high (or if exposed to sea air), protection is sufficient for about 6 months' storage.
If the engine is to be stored for a longer period, or laid up out of use, please consult the nearest **HATZ service point**.

SUPPLEMENTAL INFORMATION TO THE OWNER'S MANUAL FOR 2008 AND LATER EPA CERTIFIED NONROAD COMPRESSION IGNITION ENGINES.

EPA EMISSION CONTROL SUPPLEMENTAL WARRANTY STATEMENT AND EMISSION-RELATED INSTALLATION INSTRUCTIONS.

MAINTENANCE AND WARRANTY.

SUPPLEMENTAL INFORMATION TO THE OWNERS MANUAL FOR 2008 AND LATER EPA CERTIFIED NONROAD COMPRESSION IGNITION ENGINES.

The following supplemental information is furnished for EPA Nonroad Compression Ignition Engines which are certified according to 40 CFR Part 89 and Part 1039.

This information contains the following specific items:

- EPA-related engine parts and engine operating conditions
- Maintenance instructions for EPA-related engine parts
- Emission control system and adjustments
- Warranty statement
- Emission-related installation instructions

ENGINE PARTS AND / OR EQUIPMENT RELATED TO EPA EXHAUST EMISSION REGULATIONS.

Parts which are mandatory for engine operation.

The following parts as manufactured according to HATZ specifications are mandatory for engine operation which meets EPA exhaust emission regulations.

- Fuel injection pump
- Injection nozzle
- Extra fuel device
- Crankcase breather valve assembly
- Air cleaner housing

- Intake manifold
- Exhaust manifold
- Oil filler cap
- Intake and exhaust gaskets at head interfaces
- Emission Control Information Labels

Only parts manufactured by Hatz and which have passed the Hatz Quality Assurance Program are assured of meeting EPA exhaust emission regulations.

UNUSUAL OPERATING CONDITIONS.

The engine must not be operated at a load factor less than 25 % for an extended period as such operation will cause the fuel injector to foul. If such a condition occurs, you should contact the nearest HATZ authorized Service Center for necessary repairs.

The engine is designed and adjusted to operate most efficiently at the following conditions:

- Air temperature of 25° C (77° F)
- Atmospheric pressure of 100 kPa (14.5 psi)
- Relative humidity of 30 %

Operation of the engine at conditions other than above will affect performance and exhaust emissions. Normally the equipment manufacturer takes this into account during the design of the machine and your equipment will perform within specifications over a wide range of climatic conditions. However if you must operate your equipment under very unusual climatic conditions, please contact your nearest Hatz distributor for advice.

MAINTENANCE SCHEDULE-EPA-RELATED PARTS

The following minimum intervals are being adopted for adjustment, cleaning, repair, or replacement of following components:

At 1,500 hours, and 1,500-hours intervals thereafter:
- Fuel injector tips (cleaning only)

At 3,000 hours, and 3,000-hours intervals thereafter:
- Fuel injector

The exhaust quality of the engines can be influenced by the execution (the quality of execution) of above described maintenance work.

Therefore, the maintenance work has to be carried out by a qualified workshop.
Hatz authorised workshops, for example, are qualified workshops.

Hatz Diesel of America will give you respective addresses, if required.

EMISSION CONTROL SYSTEM AND ADJUSTMENTS.

The emission control system for this engine is EM (Engine Modification).
No adjustments are needed or possible.

EPA EMISSION CONTROL WARRANTY STATEMENT

YOUR WARRANTY RIGHTS AND OBLIGATIONS.

Motorenfabrik Hatz GmbH & Co. KG warrants the emission control system on your engine for the periods of time listed below provided there has been no abuse, neglect or improper maintenance of your engine.

Your emission control system includes:

- Fuel injection pump
- Injection nozzle
- Extra fuel device
- Crankcase breather valve assembly
- Air cleaner housing
- Intake manifold
- Exhaust manifold
- Oil filler cap
- Intake and exhaust gaskets at head interfaces
- Emission Control Information Labels

Where a warrantable condition exists, Motorenfabrik Hatz will repair your engine at no cost to you including diagnosis, parts and labor.

MANUFACTURERS WARRANTY COVERAGE:

The 2008 and later EPA certified nonroad compression ignition engines are warranted for 1500 hours of operation or two years of use, whichever first occurs.

If any emission related part on your engine is defective, the part will be repaired or replaced by Motorenfabrik Hatz.

OWNERS WARRANTY RESPONSIBILITIES:

- As the engine owner, you are responsible for the performance of the required maintenance listed in your owner's manual. Motorenfabrik Hatz recommends that you retain all receipts covering maintenance on your engine, but Motorenfabrik Hatz cannot deny warranty solely for the lack of receipts or for your failure to ensure the performance of all scheduled maintenance.

- As the engine owner, you should be aware, however, that Motorenfabrik Hatz may deny you warranty coverage if your engine or a part has failed due to abuse, neglect, improper maintenance or unapproved modifications.

- You are responsible for presenting your engine to a Motorenfabrik Hatz authorized service center as soon as a problem exists. The warranty repairs should be completed in a reasonable amount of time, not to exceed 30 days.

If you have any questions regarding your warranty rights and responsibilities, you should contact HATZ DIESEL OF AMERICA, Inc. at (262)-544-0254.

HATZ DIESEL SUPPLEMENTAL WARRANTY FOR 2008 AND LATER EPA CERTIFIED ENGINES.

PARTS WITH SUPPLEMENTAL LIMITED WARRANTY.

The following limited warranty is supplemental to the standard HATZ DIESEL LIMITED ENGINE WARRANTY and covers 2008 and later EPA certified engines and applies to the following exhaust emission-related components:

- Fuel injection pump
- Injection nozzle
- Extra fuel device
- Crankcase breather valve assembly
- Air cleaner housing
- Intake manifold
- Exhaust manifold
- Oil filler cap
- Intake and exhaust gaskets at head interfaces
- Emission Control Information Labels

SUPPLEMENTAL LIMITED WARRANTY.

Hatz Diesel of America, Inc. hereinafter referred to as “HATZ” warrants each of the above-listed parts when installed in a new engine sold by Hatz to be free from defects in material and workmanship under normal use and service, only under the named warranty coverage conditions, after the date of delivery to the original retail purchaser and Hatz will at their option, repair or replace at Hatz's sales headquarters, or at a point designated by Hatz, any part or parts which shall appear to the satisfaction of Hatz upon inspection at such point, to have been defective in material or workmanship.

- Any warranted part which is scheduled for replacement as required maintenance is warranted for the period of time up to the first scheduled replacement point for that part.

- Any replacement part which is equivalent in performance and durability may be used in non-warranty maintenance or repairs and will not reduce the overall engine warrranty obligations of Hatz. However, Hatz is not responsible for failure of such replacement parts or failure of any other parts directly caused by failure of such replacement parts.

- This warranty does not obligate Hatz to bear any transportation charges in connection with the repair or replacement of defective parts. This warranty is transferrable to subsequent owners, only under the named warranty coverage conditions.

- In order to obtain service under this warranty, the retail purchaser should contact Hatz Diesel of America, Inc. at (262)-544-0254 for information and the nearest service center. The retail purchaser will not be charged for diagnostic labor which leads to the determination that a warranted part is defective, nor for the repair or replacement of warranted parts if the work is performed at an authorized Hatz service center. If other engine components are damaged due to a failure of the above-listed warranted parts still under warranty, these other engine components will also be repaired or replaced at no charge.

- This warranty shall not apply to any engine which shall have been installed or operated in a manner not recommended by Hatz, nor to any engine which shall have been repaired, altered, neglected, or used in any way which, in the opinion of Hatz, adversely affects its performance, nor to any engine in which parts not authorized by Hatz have been used, which parts or the use of which have damaged or caused defects in or otherwise adversely affected the engine or its performance, nor to normal maintenance service or replacement of normal service items.

Hatz reserves the right to modify, alter, and improve any engine or parts without incurring any obligation to replace any engine or parts previously sold with such modified, altered, or improved engine or parts.

EMISSION-RELATED INSTALLATION INSTRUCTIONS

“Failing to follow these instructions when installing a certified engine in a piece of nonroad equipment violates federal law (40CFR1068.105(b)), subject to fines or other penalties as described in the Clean Air Act.”

“If you install the engine in a way that makes the engine's emission control information labels hard to read during normal engine maintenance, you must place duplicate labels on the equipment.”

EQUIPMENT-LABELLING REQUIREMENTS: FUEL LABEL (Chapter 3.5)

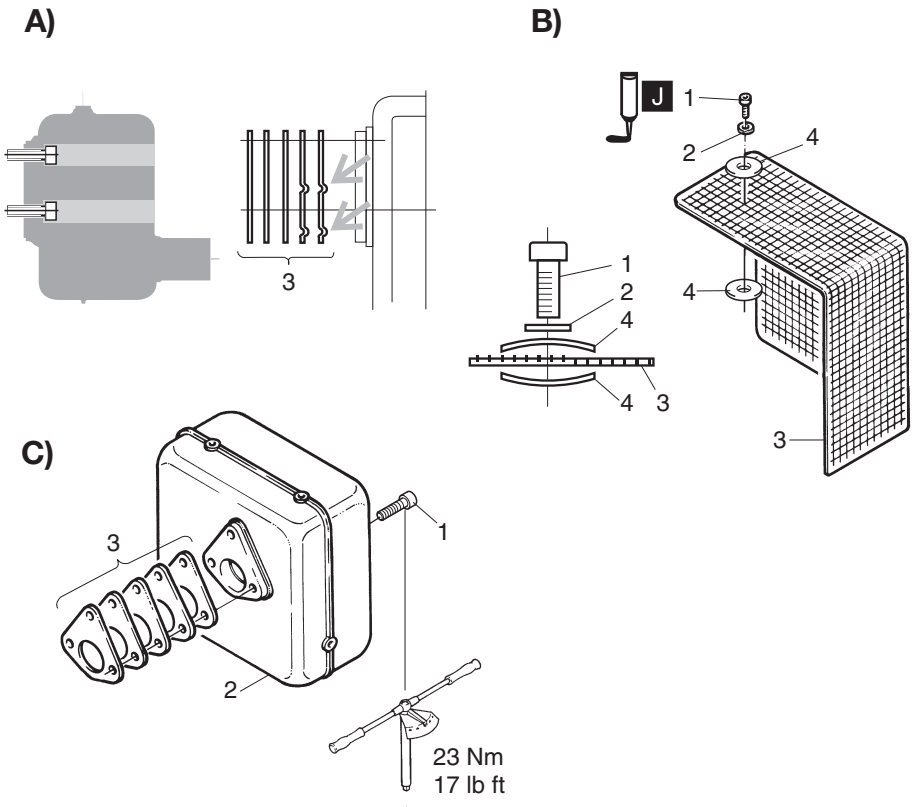
The fuel label has to be permanently attached to the equipment.
In case of an engine mounted fuel tank, every engine is equipped with an additional fuel label.
Otherwise, there are two loose fuel labels available with the engine.

If the original fuel label is not readily visible after the engine is installed in the equipment then the second loose fuel label must be attached on the equipment in such a manner that it is readily visible to an average person.

INSTRUCTIONS ON THE INSTALLATION OF THE EXHAUST SYSTEM

Following are the instructions to properly install the exhaust system and related components consistent with the EPA emission regulation requirements.

1D41 · 1D50 · 1D81 · 1D90 S / Z



Exhaust-silencers and protection guard

The exhaust silencer is fitted in connection with studs, flat washers and hex.-nuts. Fixation is done by Allen screws.

Preparations:

- Remove protection guard in numerical sequence **1...4 (B)** if so fitted. It is mounted to the exhaust silencer with three screws.

Dismantling:

- Remove in numerical sequence **1...3 (C)**.

- For opening screws **1** a special tool is required (HATZ-Ident Nr. 630 815 00).

Assembly:

- Assemble in reverse sequence.

- Apply lubricant as specified by HATZ.

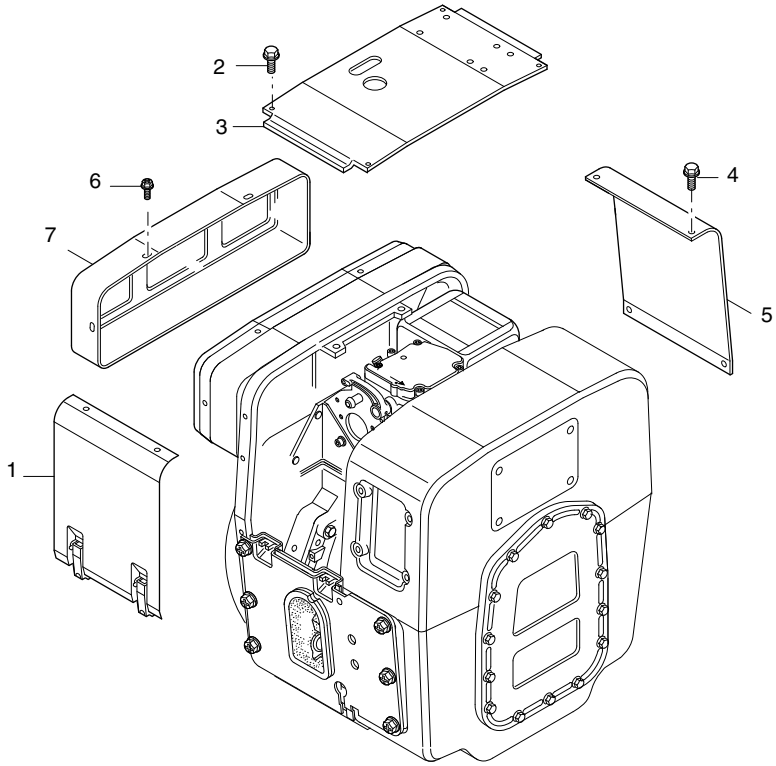
- Torque to specification!

- Ensure gasket-kit is fitted in correct sequence i.e. the creased gaskets **3** face towards exhaust silencer **(A)**.

- Assemble protection guard if so fitted in reverse sequence **4...1 (B)**.

- Use anti-seize compound **J** as specified by HATZ.

- Ensure the concave side of the curved washers **4** face towards guard **3 (B)**.



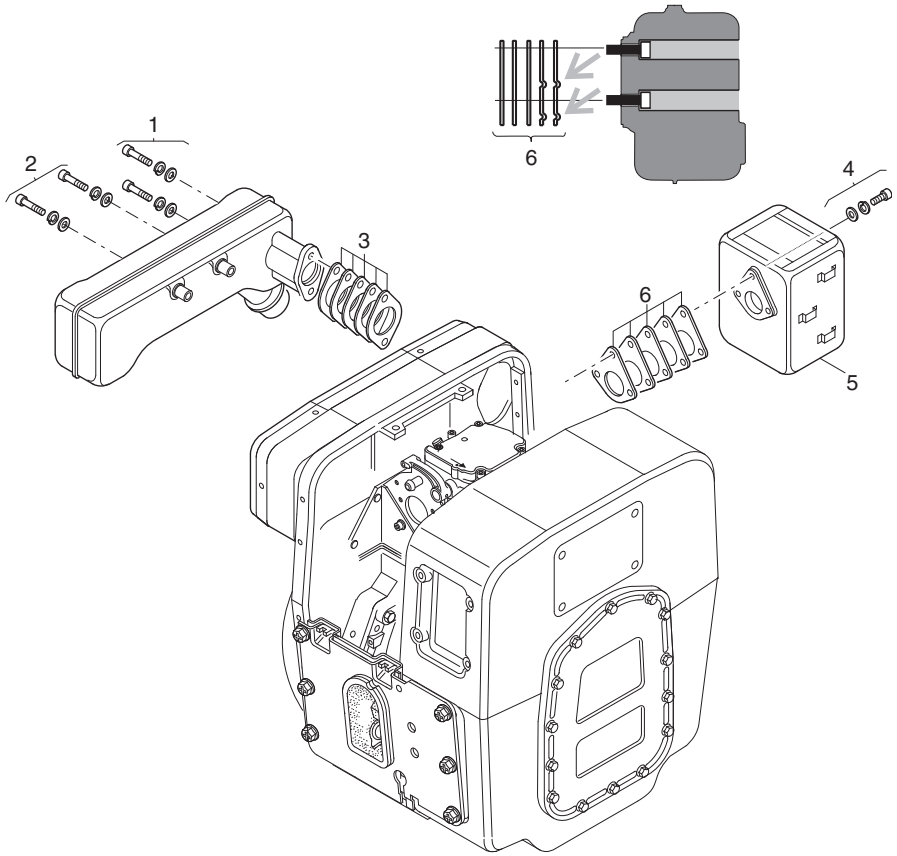
Encapsulated engine

Before dismantling the exhaust system the capsule has to be dismounted:

- Remove the four screws (2) of the top cover (3).
- Remove the side cover (1) by opening the two clips.
- Open the four screws (4) of the side cover (5).
- Remove the top cover (3) and the side cover (5)
- Dismantle the exhaust silencer cover (7) by opening the six screws (6).

Assembly:

- Assemble in reverse sequence.
- Apply lubricant as specified by HATZ.
- Torque to specification!
- Before tightening the capsule all screws have to be turned in and the different covers have to be correctly adjusted.



Sequence of dismantling the exhaust system:

- Open screws (1) and (2) and remove with shims.
- Remove big silencer with attached sealing gaskets (3).
- Open screws (4) and remove with shims.
- Remove silencer (5) with attached sealing gaskets (6).

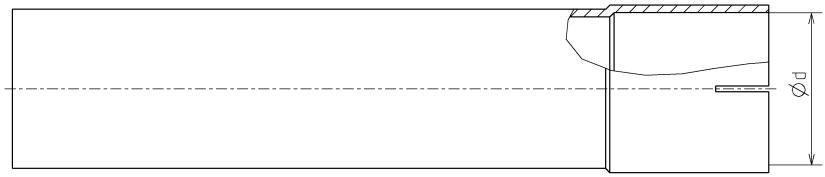
Assembly:

- Assemble in reverse sequence.
- Apply lubricant as specified by HATZ.
- Torque to specification !
- Ensure gasket-kit is fitted in correct sequence i.e. the creased gaskets (6) face towards exhaust silencer.
- Make sure that all parts are correctly placed and tightened.

SAMPLING OF EXHAUST EMISSIONS

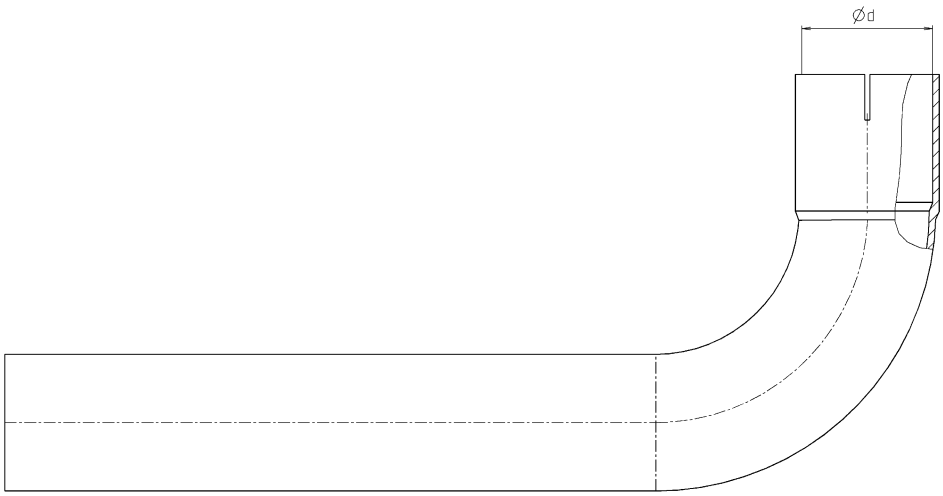
After the engine is installed in the equipment and placed in service, the sampling of exhaust emissions can be performed in a way that prevents diluting the exhaust sample with ambient air as follows:

Version 1



Specification 1: Adding a 20-centimeter linear extension to the exhaust pipe

Version 2



Specification 2: Adding a 20-centimeter bended extension to the exhaust pipe

Engine type	Ø d (mm)	Version 1 HATZ-Ident. Nr.	Version 2 HATZ-Ident. Nr.	Clamp HATZ-Ident. Nr.
1D41 S / Z	25	039 973 01	830 860 00	503 880 00
	38	830 857 00	830 858 00	037 409 00
1D50 S / Z	25	039 973 01	830 860 00	503 880 00
	38	830 857 00	830 858 00	037 409 00
1D81 S / Z	32	–	830 879 00	503 881 00
	48	–	038 775 00	504 103 01
1D90 S / Z	32	–	830 879 00	503 881 00
	48	–	038 775 00	504 103 01
1D41 C	33	–	–	–
1D81 C	48	–	038 775 00	504 103 01

SUPPLEMENTAL INFORMATION TO THE OWNER´S MANUAL FOR 2008 AND LATER CALIFORNIA REGULATIONS FOR HEAVY-DUTY OFF-ROAD ENGINES.

CALIFORNIA EMISSION CONTROL WARRANTY STATEMENT AND EMISSION-RELATED INSTALLATION INSTRUCTIONS.

MAINTENANCE AND WARRANTY.

SUPPLEMENTAL INFORMATION TO THE OWNER´S MANUAL FOR 2008 AND LATER CALIFORNIA REGULATIONS FOR HEAVY-DUTY OFF-ROAD ENGINES.

The following supplemental information is furnished for California Heavy-Duty Off-Road Engines.

This information contains the following specific items:

- CARB-related engine parts and engine operating conditions
- Maintenance instructions for CARB-related engine parts
- Emission control system and adjustments
- Warranty statement
- Emission-related installation instructions

ENGINE PARTS AND / OR EQUIPMENT RELATED TO CARB EXHAUST EMISSION REGULATIONS.

Parts which are mandatory for engine operation.

The following parts as manufactured according to HATZ specifications are mandatory for engine operation which meets CARB exhaust emission regulations.

- Fuel injector
- Fuel injection pump
- Cold start device
- Intake manifold
- Exhaust manifold
- Crankcase breather valve

- Oil filler Cap
- Intake and exhaust gaskets at head interfaces
- Emission Control Information Labels

Only parts manufactured by Hatz and which have passed the Hatz Quality Assurance Program are assured of meeting CARB exhaust emission regulations.

UNUSUAL OPERATING CONDITIONS.

The engine must not be operated at a load factor less than 25 % for an extended period as such operation will cause the fuel injector to foul. If such a condition occurs, you should contact the nearest HATZ authorized Service Center for necessary repairs.

The engine is designed and adjusted to operate most efficiently at the following conditions:

- Air temperature of 25° C (77° F)
- Atmospheric pressure of 100 kPa (14.5 psi)
- Relative humidity of 30 %

Operation of the engine at conditions other than above will affect performance and exhaust emissions. Normally the equipment manufacturer takes this into account during the design of the machine and your equipment will perform within specifications over a wide range of climatic conditions. However if you must operate your equipment under very unusual climatic conditions, please contact your nearest Hatz distributor for advice.

MAINTENANCE SCHEDULE-CARB-RELATED PARTS.

The following minimum intervals are being adopted for adjustment, cleaning, repair, or replacement of following components:

At 1,500 hours, and 1,500 hours intervals thereafter:

- Fuel injector tips (cleaning only)

At 3,000 hours, and 3000 hours intervals thereafter:

- Fuel Injectors

The exhaust quality of engines can be influenced by the execution (the quality of execution) of above described maintenance work.
Therefore, the maintenance work has to be carried out by a qualified workshop.
Hatz authorised workshops, for example, are qualified workshops.
Hatz Diesel of America will give you respective addresses, if required.

EMISSION CONTROL SYSTEM AND ADJUSTMENTS.

The emission control system for this engine is EM (Engine Modification).
No adjustments are needed or possible.

CALIFORNIA EMISSION CONTROL SYSTEM WARRANTY STATEMENT.

YOUR WARRANTY RIGHTS AND OBLIGATIONS.

The **California Air Resources Board** and Motorenfabrik Hatz GmbH & Co. KG are pleased to explain the **emission control system warranty** on your **2008 and later** engine. In California, new heavy-duty off-road engines must be designed, built, and equipped to meet the State's stringent anti-smog standards. The Motorenfabrik Hatz GmbH & Co. KG must warrant the emission control system on your engine for the periods of time listed below provided there has been no abuse, neglect or improper maintenance of your engine.

Your emission control system may include parts such as the fuel-injection system and the air induction system. Also included may be hoses, belts, connectors and other emission-related assemblies.

Where a warrantable condition exists, the Motorenfabrik Hatz GmbH & Co. KG will repair your heavy-duty off-road engine at no cost to you including diagnosis, parts, and labor.

MANUFACTURER'S WARRANTY COVERAGE.

The 2008 and later heavy-duty off-road engines are warranted for **1500 hours of operation or two years of use, whichever first occurs.**
If any emission-related part on your engine is defective, the part will be repaired or replaced by Motorenfabrik Hatz GmbH & Co. KG.

OWNER'S WARRANTY RESPONSIBILITIES.

- As the heavy-duty off-road engine owner, you are responsible for the performance of the **required maintenance listed in your owner's manual**.
  Motorenfabrik Hatz GmbH & Co. KG recommends that you retain all receipts covering maintenance on your heavy-duty off-road engine, but Motorenfabrik Hatz GmbH & Co. KG cannot deny warranty solely for the lack of receipts or for your failure to ensure the performance of all scheduled maintenance.

- As the heavy-duty off-road engine owner, you should however be aware that Motorenfabrik Hatz GmbH & Co. KG may deny you warranty coverage if your heavy-duty off-road engine or a part has failed due to abuse, neglect, improper maintenance or unapproved modifications.

- Your engine is designed to operate on low sulfur diesel fuel or ultra-low sulfur diesel fuel only. Use of any other fuel may result in your engine no longer operating in compliance with California's emissions requirements.

- You are responsible for initiating the warranty process. The ARB suggests that you present your heavy-duty off-road engine to a Motorenfabrik Hatz authorised dealer as soon as a problem exists. The warranty repairs should be completed by the dealer as expeditiously as possible.

If you have any questions regarding your warranty rights and responsibilities, you should contact Hatz Diesel of America, Inc. at **(262)-544-0254**.

HATZ DIESEL SUPPLEMENTAL WARRANTY FOR 2008 AND LATER CALIFORNIA CERTIFIED HEAVY-DUTY OFF-ROAD ENGINES.

PARTS WITH SUPPLEMENTAL LIMITED WARRANTY.

The following limited warranty is supplemental to the standard HATZ DIESEL LIMITED ENGINE WARRANTY and covers 2008 and later California certified Heavy-Duty off-road engines and applies to the following exhaust emission-related components:

- Fuel injector
- Fuel injection pump
- Cold start device
- Intake manifold
- Exhaust manifold
- Crankcase breather valve
- Oil filler cap
- Intake and exhaust gaskets at head interfaces
- Emission Control Information Labels

SUPPLEMENTAL LIMITED WARRANTY.

Hatz Diesel of America, Inc. hereinafter referred to as "HATZ" warrants each of the above-listed parts when installed in a new engine sold by Hatz to be free from defects in material and workmanship under normal use and service, for a period of twenty-four (24) months after the date of delivery to the original retail purchaser and Hatz will at their option, repair or replace at Hatz's sales headquaters, or at a point designated by Hatz, any part or parts which shall appear to the satisfaction of Hatz upon inspection at such point, to have been defective in material or workmanship.

- Any warranted part which is scheduled for replacement as required maintenance is warranted for the period of time up to the first scheduled replacement point for that part.

- Any replacement part which is equivalent in performance and durability may be used in non-warranty maintenance or repairs and will not reduce the overall engine warrranty obligations of Hatz. However, Hatz is not responsible for failure of such replacement parts or failure of any other parts directly caused by failure of such replacement parts.

- This warranty does not obligate Hatz to bear any transportation charges in connection with the repair or replacement of defective parts. This warranty is transferrable to subsequent owners within the original twenty-four (24) months time period.

- In order to obtain service under this warranty, the retail purchaser should contact Hatz Diesel of America, Inc. at (262)-544-0254 for information and the nearest service center. The retail purchaser will not be charged for diagnostic labor which leads to the determination that a warranted part is defective, nor for the repair or replacement of warranted parts if the work is performed at an authorized Hatz service center. If other engine components are damaged due to a failure of the above-listed warranted parts still under warranty, these other engine components will also be repaired or replaced at no charge.

- This warranty shall not apply to any engine which shall have been installed or operated in a manner not recommended by Hatz, nor to any engine which shall have been repaired, altered, neglected, or used in any way which, in the opinion of Hatz, adversely affects its performance, nor to any engine in which parts not authorized by Hatz have been used, which parts or the use of which have damaged or caused defects in or otherwise adversely affected the engine or its performance, nor to normal maintenance service or replacement of normal service items.

Hatz reserves the right to modify, alter, and improve any engine or parts without incurring any obligation to replace any engine or parts previously sold with such modified, altered, or improved engine or parts.

EMISSION-RELATED INSTALLATION INSTRUCTIONS

“Failing to follow these instructions when installing a certified engine in a piece of nonroad equipment violates federal law (40CFR1068.105(b)), subject to fines or other penalties as described in the Clean Air Act.”

“If you install the engine in a way that makes the engine's emission control information labels hard to read during normal engine maintenance, you must place duplicate labels on the equipment.”

EQUIPMENT-LABELLING REQUIREMENTS: FUEL LABEL (Chapter 3.5)

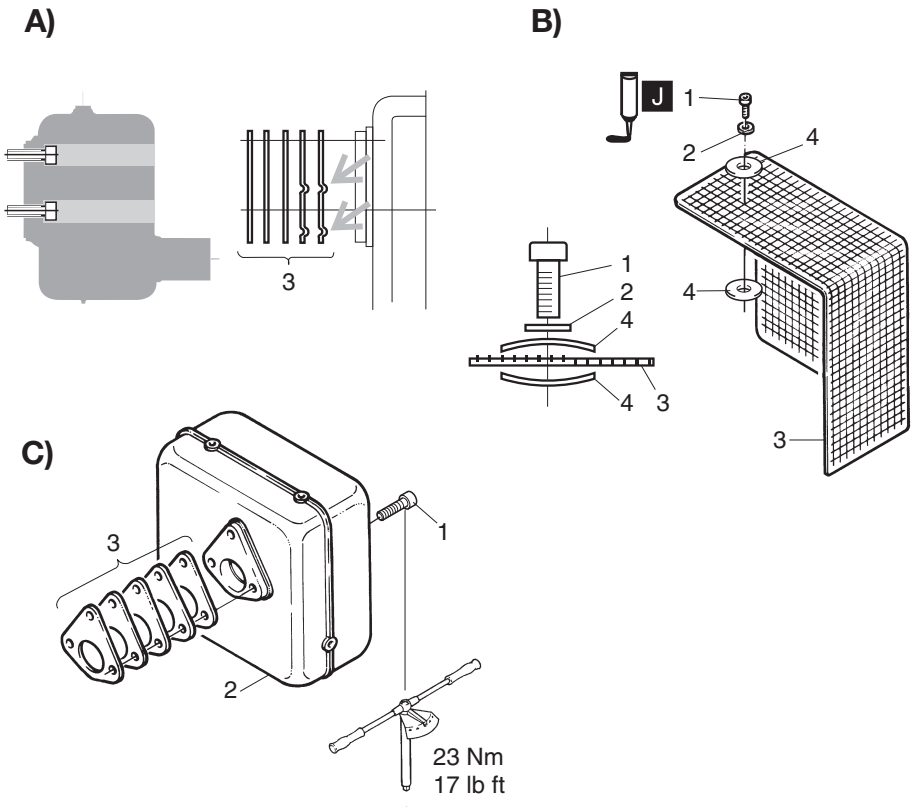
The fuel label has to be permanently attached to the equipment.
In case of an engine mounted fuel tank, every engine is equipped with an additional fuel label.
Otherwise, there are two loose fuel labels available with the engine.

If the original fuel label is not readily visible after the engine is installed in the equipment then the second loose fuel label must be attached on the equipment in such a manner that it is readily visible to an average person.

INSTRUCTIONS ON THE INSTALLATION OF THE EXHAUST SYSTEM

Following are the instructions to properly install the exhaust system and related components consistent with the CARB emission regulation requirements.

1D41 · 1D50 · 1D81 · 1D90 S / Z



Exhaust-silencers and protection guard

The exhaust silencer is fitted in connection with studs, flat washers and hex.-nuts. Fixation is done by Allen screws.

Preparations:

- Remove protection guard in numerical sequence **1...4 (B)** if so fitted. It is mounted to the exhaust silencer with three screws.

Dismantling:

- Remove in numerical sequence **1...3 (C)**.

- For opening screws **1** a special tool is required (HATZ-Ident Nr. 630 815 00).

Assembly:

- Assemble in reverse sequence.

- Apply lubricant as specified by HATZ.

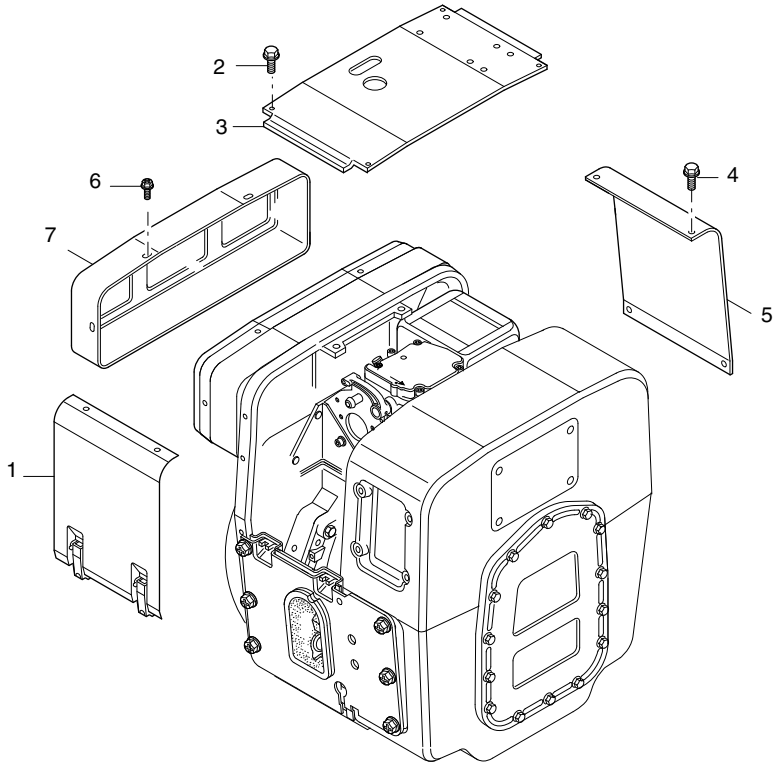
- Torque to specification!

- Ensure gasket-kit is fitted in correct sequence i.e. the creased gaskets **3** face towards exhaust silencer **(A)**.

- Assemble protection guard if so fitted in reverse sequence **4...1 (B)**.

- Use anti-seize compound **J** as specified by HATZ.

- Ensure the concave side of the curved washers **4** face towards guard **3 (B)**.



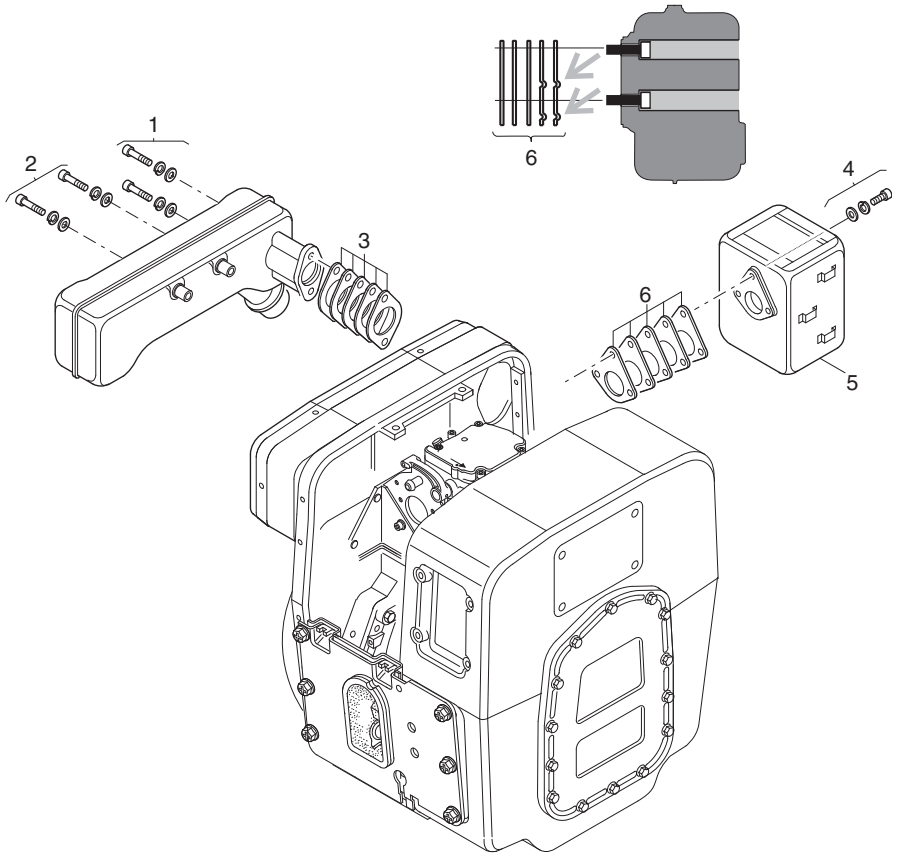
Encapsulated engine

Before dismantling the exhaust system the capsule has to be dismounted:

- Remove the four screws (2) of the top cover (3).
- Remove the side cover (1) by opening the two clips.
- Open the four screws (4) of the side cover (5).
- Remove the top cover (3) and the side cover (5)
- Dismantle the exhaust silencer cover (7) by opening the six screws (6).

Assembly:

- Assemble in reverse sequence.
- Apply lubricant as specified by HATZ.
- Torque to specification!
- Before tightening the capsule all screws have to be turned in and the different covers have to be correctly adjusted.



Sequence of dismantling the exhaust system:

- Open screws (1) and (2) and remove with shims.
- Remove big silencer with attached sealing gaskets (3).
- Open screws (4) and remove with shims.
- Remove silencer (5) with attached sealing gaskets (6).

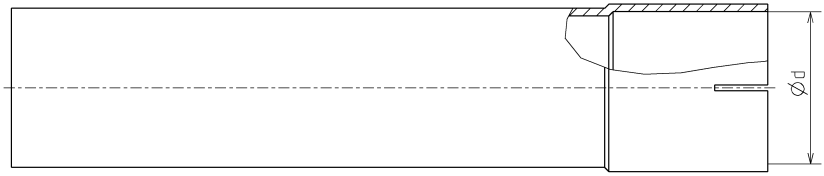
Assembly:

- Assemble in reverse sequence.
- Apply lubricant as specified by HATZ.
- Torque to specification !
- Ensure gasket-kit is fitted in correct sequence i.e. the creased gaskets (6) face towards exhaust silencer.
- Make sure that all parts are correctly placed and tightened.

SAMPLING OF EXHAUST EMISSIONS

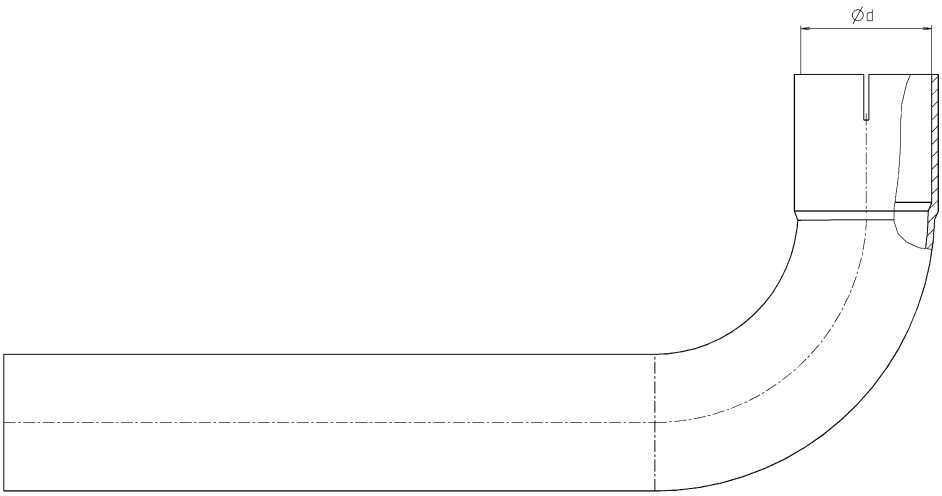
After the engine is installed in the equipment and placed in service, the sampling of exhaust emissions can be performed in a way that prevents diluting the exhaust sample with ambient air as follows:

Version 1



Specification 1: Adding a 20-centimeter linear extension to the exhaust pipe

Version 2



Specification 2: Adding a 20-centimeter bended extension to the exhaust pipe

Engine type	Ø d (mm)	Version 1 HATZ-Ident. Nr.	Version 2 HATZ-Ident. Nr.	Clamp HATZ-Ident. Nr.
1D41 S / Z	25	039 973 01	830 860 00	503 880 00
	38	830 857 00	830 858 00	037 409 00
1D50 S / Z	25	039 973 01	830 860 00	503 880 00
	38	830 857 00	830 858 00	037 409 00
1D81 S / Z	32	–	830 879 00	503 881 00
	48	–	038 775 00	504 103 01
1D90 S / Z	32	–	830 879 00	503 881 00
	48	–	038 775 00	504 103 01
1D41 C	33	–	–	–
1D81 C	48	–	038 775 00	504 103 01

CALIFORNIA

Proposition 65 Warning

Diesel engine exhaust and some of its constituents are known to the State of California to cause cancer, birth defects, and other reproductive harm.

Proof of maintenance

probst handling equipment

Warranty claim for this machine only apply for performance of the mandatory maintenance works (by an authorised specialist workshop)! After each completed performance of a maintenance interval the included form must be fill out, stamped, signed and send back to us immediately [1)].

1) via e-mail to service@probst-handling.com / via fax or post

Operator: _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _

Device type: _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ **Article -No.:** _ _ _ _ _ _ _ _ _ _ _ _ _ _

Device-No.: _ _ _ _ _ _ _ _ _ _ _ **Year of make:** _ _ _ _

First inspection after 25 operating hours

Date:	Maintenance work:	Inspection by company:
		Company stamp
		…… *Name* *Signature*

All 50 operating hours

Date:	Maintenance work:	Inspection by company:
		Company stamp
		…… *Name* *Signature*
		Company stamp
		…… *Name* *Signature*
		Company stamp
		…… *Name* *Signature*

Minimum 1x per year

Date:	Maintenance work:	Inspection by company:
		Company stamp
		…… *Name* *Signature*
		Company stamp
		…… *Name* *Signature*

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