

# OPERATING MANUAL

SOIL INVESTIGATION RIG  
GTR 790

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**NOTE:** Read the entire operating manual before starting any work!



Revision status: Mar - 16

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# 1 General

This operating manual forms the basis for working with the Soil Investigation Rig GTR 790, hereinafter referred to as "the device". It has a self-propelled rubber crawler track, a fully hydraulic mast and holding fixture for attachment devices. The following attachment devices can be used on the device:

- ▶ Drop weight DIN with 10 / 30 / 50 kg and 500 mm drop height
- ▶ Drop weight SPT with 10 / 30 / 50 / 63.5 kg and 500 / 750 mm drop height
- ▶ Hydraulic hammer GeoRam 250 with 25 kg total weight
- ▶ Hydraulic hammer GeoRam 390 with 39 kg total weight
- ▶ Core drill system with 100 mm crown diameter
- ▶ Core drill system with 150 mm crown diameter
- ▶ Rotary drilling drive with 700 Nm torque

Attachment devices, which are not part of the standard equipment, are marked with "(optional)" in this operating manual.

## 1.1 Operating Manual

The operating manual is the foundation for all work with the device. It is a component of the device and must be kept accessible to staff in its immediate vicinity at all times. You must comply with all specified instructions and safety information to ensure safe operation with the device. The personnel must therefore read through this operating manual carefully before starting any work and have understood everything. The locally applicable accident prevention regulations at the installation site and all general safety provisions must also be observed.

## 1.2 Indications, Abbreviations and Technical Terms

Indications, abbreviations and technical terms are used in this document with the following meanings:

Meaning	Indication
Please see	→
List	▶
List	-
Item number	1
Action step	1.
Note	<i>Text in italics</i>
Document annexed	

### 1.3 Explanation of Symbols

Warning and safety notes in this manual are marked with pictograms and highlighted in a shaded block. Warning and safety notes, which draw attention to fundamental hazards, are also marked with signal words that express the extent of the damage. These are structured as follows:

#### **SIGNAL WORD!**

... Origin of hazard. The consequences of failing to observe the hazard and behavioural instructions to avoid the hazard are described.

- ▶ Always proceed carefully when working to avoid accidents, personal injury and material damages!
- ▶ Always comply with all warning and safety instructions!

The pictograms in combination with signal words mean:



#### **DANGER!**

... indicates an imminent hazard that leads to death or serious injury if not avoided.



#### **WARNING!**

... indicates a potentially hazardous situation that can cause death or serious injury if not avoided.



#### **CAUTION!**

... indicates a potentially hazardous situation that can lead to material damages if not avoided.

#### **Tips and recommendations**

The following symbol is used in this manual to draw attention to tips and recommendations:



#### **NOTE!**

... highlights tips and recommendations as well as information for efficient and trouble-free operation.

#### **Special safety information**

The following pictograms are used to indicate special hazards in combination with safety instructions:



... denotes hazards due to electric current. Failure to observe the safety instructions may cause serious injury or death.



... denotes hazards due to crushing. Failure to observe the safety instructions may cause serious injury on moving parts.



... denotes hazards due to hot surfaces. Failure to observe the safety instructions may cause burns and serious skin injuries due to heat.

## 1.4 Limitation of Liability

All information and instructions in this manual were put together taking into account the applicable standards and provisions, the latest technological developments as well as our many years of knowledge and experience.

The manufacturer assumes no liability for damages and accidents due to:

- ▶ Failure to observe the manual
- ▶ Improper use
- ▶ Use of non-trained and uninstructed personnel
- ▶ Unauthorized alterations
- ▶ Technical alterations
- ▶ Lack of maintenance
- ▶ Use of unauthorized replacement parts

The obligations, the general terms and conditions of Nordmeyer GEOTOOL GmbH as well as the manufacturer's delivery conditions agreed in the supply contract and the legal regulations valid at the time the contract is concluded are all applicable.

## 1.5 Manufacturer's Warranty

The manufacturer provides a warranty for the device in accordance with the terms and conditions of sale and purchase. This warranty is void if:

- ▶ Damages are caused by improper operation,
- ▶ Repairs or interventions are performed by non-authorized persons,
- ▶ Accessories and replacement parts are used that are not compatible with the device.

Defects must be immediately reported after detection. Defects must be promptly repaired to keep the extent of the damage to a minimum and not to compromise safety. Failure to comply with this will void any warranty claim. The manufacturer reserves the right to make modifications due to technical advances.

## 1.6 Customer Service

Contact our customer service department for any technical information. You can obtain information about the relevant regional contact partners by telephone and these can be contacted at any time via fax, email or the website.



### NOTE!

The contact details of Nordmeyer GEOTOOL GmbH can be found on the page following the cover page.

## 1.7 Copyright Protection

This document is copyright protected. The unauthorized transfer of this manual to third parties, duplication of any kind even in the form of excerpts, as well as the use or disclosure of the contents without the written approval of the manufacturer is not permitted. Contraventions shall be punishable. Further claims remain reserved.

## 2 Safety

This section presents an overview of important safety issues for the protection of the operator and the user against possible hazards and the safe and fault-free running of operations. Non-compliance with the instructions, warning and safety information can lead to considerable hazards arising.

### 2.1 Intended Use

The device may only be used for its intended purpose. It is intended exclusively for the following application in the industrial sector: the device is used to examine soils with different drilling methods as well as also being used for dynamic probing and ram core drilling.

### 2.2 Improper Use

Applications that go beyond the scope of applications listed in **Error! Reference source not found.** count as improper operation for which the manufacturer shall not be responsible if any damages should result. The user shall bear the risk in this case. The manufacturer shall not accept any damages that result from unauthorised mechanical, electrical or structural modifications to the device. Intended use also consists of complying with the commissioning, operation and maintenance conditions provided by the manufacturer as well as taking into consideration any foreseeable abnormal behaviour. There are information signs attached on the device that must be observed.

**WARNING!****Danger due to improper use!**

Any other use of the device other than that for which it is intended can lead to dangerous situations. Only use the device for the purpose for which it is intended according to the details in this document, especially in compliance with the limits of application specified in the technical data.

- Refrain from any other incorrect use of the device.
- Refrain from converting, retrofitting or altering the design or individual pieces of equipment with the intention of changing the application range or usability of the device.

- ▶ Claims of any kind due to damage resulting from improper use are excluded.
- ▶ The operator alone bears responsibility for all damages as a result of improper use.

## 2.3 Misuse

This section highlights the hazards that result from misuse of the device.

**WARNING!****Risk of injury due to misuse!**

Misuse of the device can lead to hazardous situation for individuals and cause serious property damages.

- Refrain from any misuse of the device.
- Do not use the device to transport people or other living beings and materials.

## 2.4 Responsibility of the Operator

The operator is any natural or legal person who uses the device or transfers it to third parties for use and is responsible for the safety of the user, the personnel or third parties during usage.

**Obligations of the operator**

The device is used in the industrial sector. The operator of the device is therefore subject to the legal obligations on safety in the workplace.

In addition to the warning and safety information in this manual, the safety, accident prevention and environmental protection regulations valid for the application of the device must be observed.

The operator must especially

- ▶ inform themselves of the applicable health and safety regulations,
- ▶ undertake a risk assessment to determine any possible additional hazards, which may arise from the specific application conditions at the installation site of the device,
- ▶ implement the necessary behavioural requirements for the operation of the device at the installation site in the operating instructions,
- ▶ check regularly during the entire service life of the device, whether the operating instructions drawn up by them correspond to the current status of the regulations,
- ▶ adjust the operating instructions to new provisions, standards and usage conditions should this be necessary,
- ▶ clearly and unambiguously govern the competences for the installation, operation, maintenance and cleaning of the device,
- ▶ ensure that all employees who are employed to work on the machine have read and fully understood this operating manual. They must also train the personnel about working with the device at regular intervals and inform them of any possible hazards and
- ▶ provide personnel that are entrusted with work on the device with the prescribed and recommended safety equipment.

The operator is also responsible that the device

- ▶ is always in a technically perfect condition,
- ▶ is serviced in accordance with the maintenance intervals
- ▶ has all of its safety devices checked for completeness on a regular basis and its functionality examined.

The operator has to additionally designate a representative who is responsible for the device, who is suitable due to their qualification, and do so in writing.

The Industrial Safety Ordinance (BetrSichV) requires that the operator instructs the person responsible for the device to draw up a risk assessment based on the forecasted work assignments and also determine the regular inspection intervals and the testing depth.

## 2.5 Responsibility of the Personnel

The device is used in the industrial sector. The personnel are therefore subject to the legal obligations on safety in the workplace.

In addition to the warning and safety information in this manual, the safety, accident prevention and environmental protection regulations valid for the application of the device must be observed.

The personnel must especially

- ▶ inform themselves of the applicable health and safety regulations,
- ▶ implement the necessary behavioural requirements for the operation of the device at the installation site in the operating instructions,
- ▶ correctly perform their assigned responsibilities for operation, maintenance and cleaning of the device,
- ▶ have read and understood this operating manual fully before starting work and
- ▶ use the prescribed and recommended protective equipment.

Furthermore, each person authorized to work on the device is responsible within their scope of competences, that the device

- ▶ is always in a technically perfect condition,
- ▶ is serviced in accordance with the maintenance intervals
- ▶ has all of its safety devices checked for completeness on a regular basis and its functionality examined.

## 2.6 Personnel Requirements

Any activities carried out on the device may only be done so by individuals who are able to do their work properly and reliably and in compliance with the respective requirements designated.

- ▶ Individuals whose response capabilities are influenced by e.g. drugs, alcohol or medicine may not carry out any work.
- ▶ The personnel must always observe the age and occupational provisions applicable at the installation site.



### **WARNING!**

#### **Risk of injury due to inadequate qualifications!**

Improper work can lead to significant personal injury and material damages. All activities may only be carried out by individuals who have the required training, necessary knowledge and experience.

### **Instructed personnel**

Trained personnel are those individuals who have been extensively and demonstrably informed of the tasks assigned to them and any possible hazards.

### **Specialist personnel**

Specialist personnel are those that, due to their professional training, knowledge and experience as well as knowledge of the pertinent regulations, are able to carry out the work assigned to them in a correct manner while recognising possible hazards themselves and having the capability to avoid personal or material damages.

### **Qualified electricians**

All work on the electrical equipment may only be carried out by qualified electricians in principle. Qualified electricians are those who, due to the specialist training, knowledge and experience as well as knowledge of the pertinent regulations, are able to carry out work on electrical systems, while recognising possible hazards themselves and having the capability to avoid personal or material damages due to electrical current.

### Unauthorized persons



#### **WARNING!**

#### **Risk of injury due to unauthorized persons!**

Untrained persons are not aware of the hazards in the work area and are considered as unauthorized persons.

Unauthorized persons are to be kept away from the working area, if in any doubt, address those concerned and dismiss them out of the working area. Interrupt all work processes for as long as unauthorized persons remain in the working area.

## 2.7 Personal Protective Equipment

The wearing of personal protective equipment is absolutely necessary during all work processes in order to keep all health hazards to a minimum.

- ▶ Correctly put on the designated protective equipment and wear during all work processes before initiating operation.
- ▶ In addition, always observe the signs with pictograms concerning personal protective equipment attached around the working area.

The protective equipment listed below must be worn and must always be in perfect condition.



#### **Protective work clothing**

Tight-fitting work clothes with low tensile strength, with tight sleeves and no protruding parts, chiefly to protect against entanglement with moving device parts. No rings, chains or other jewellery must be worn.



#### **Protective gloves**

To protect your hands from abrasion, grazes, scratches, scrapes, cuts, penetrations or similar shallow skin damage.



#### **Protective shoes**

To protect the feet from injury due to falling parts and from slipping and falling on slippery surfaces.



#### **Industrial safety helmet**

To protect the head from injuries due to falling or flying parts or materials.



#### **Ear protection**

To protect against damages to hearing due to noise-inducing parts of work processes.



### Protective goggles

To protect against eye injuries due to flying parts, particles, splashing liquids or due to escaping compressed air.

## 2.8 Hazards

The device has been subjected to a risk assessment. The hazards ascertained as a result have been eliminated and any risks detected reduced as far as possible. Nevertheless, there are residual risks arising out of the device that are described in this section.

The warning and safety information expressed here and in the operation chapters of this manual must be observed at all times in order to avoid any possible health risks and dangerous situations.

### 2.8.1 Risks due to Mechanical Hazards



#### **WARNING!**

##### **Risk of injury due to moving components!**

Driven movable components or parts can cause severe injuries!

- Make sure that nobody ventures into the danger zones or in the immediate vicinity thereof.
- Do not remove covers such as flaps, doors, hatches or maintenance covers.
- Do not take safety devices and/or functions out of operation, do not render them inoperable or circumvent them.
- Never reach into running equipment.
- Switch off the energy supply and secure against restart before entering the danger zones.



#### **WARNING!**

##### **Risk of crushing!**

Driven movable components or parts can cause severe injuries! Moving parts can crush body parts during operation.

- Do not enter danger zones during operation.
- Always carry out set-up and maintenance work as well as fault removal with the highest of care and attention to potential crushing points.
- Wear protective equipment against crushing when working on danger points.

### 2.8.2 Risks due to Electrical Hazards



#### **DANGER!**

##### **Danger to life due to electrical current!**

Touching parts charged with voltage leads to death. Damage to the

insulation or individual components can endanger life.

- De-energize the electrical system before all work on the electrics. Check for absence of voltage!
- Switch off the electrical supply and secure against restart before carrying out maintenance, cleaning and repair work.
- Immediately switch off the power supply in the event of damages to the insulation and initiate repair procedures.
- Do not bypass fuses or take them out of operation.
- Always pay attention to the correct current information when replacing defective fuses.
- Keep water and moisture away from live parts.

Any work on the electrical system must only be carried out by qualified electricians in principle.

### 2.8.3 Risks due to Thermal Hazards



#### **CAUTION!**

##### **Risk of injury due to hot surfaces!**

Contact with hot components can cause burns.

- Wear protective clothing and gloves when working near hot components such as the motor of the device.
- Make sure that the components have cooled down to room temperature before all work procedures.

### 2.8.4 Risks due to Noise



#### **WARNING!**

##### **Damage to hearing due to noise!**

Any noises occurring in the work area can lead to severe hearing loss up to deafness.

- Wear ear protection during all work.
- Only stay in the danger zones for as long as necessary.

### 2.8.5 Risks due to Vibrations



#### **WARNING!**

##### **Long-term damages due to strong vibrations!**

Strong vibrations can damage your health.

- Do not render vibration dampeners ineffective.
- Do not remain in or around strongly vibrating danger points during operation.

### 2.8.6 Risks due to Materials and Substances

**WARNING!****Risk of poisoning when handling lubricants and operating materials!**

Lubricants can lead to poisoning or skin irritation.

- Observe the safety information of the lubricant manufacturers.
- Avoid spillages and spraying.
- Do not eat, drink or smoke during work.
- Apply protective skin cream before handling lubricants.
- Wear protective gloves made of plastic during work, wear protective goggles with side shields when working with oils.
- Wash and apply skin care cream after work.

**DANGER!****Risk of explosion when handling fuels!**

Fuels burn and explode upon contact with sparks or flames.

- Avoid spillages and spraying whilst fuelling and during work.
- Do not smoke during work. Avoid contact with skin and eyes.
- Wear protective gloves made of plastic during work, wear protective goggles with side shields when working with oils.
- Wash hands after fuelling.

### 2.9 Safety Devices

**WARNING!****Danger to life due to defective or bridged safety devices!**

Non-functional, bridged or overridden safety devices do not protect against hazards and can lead to severe injuries or death.

- Always check before beginning any work, that all safety devices are correctly installed and fully functional.
- Never take the safety devices out of operation.
- Make sure that the safety devices are always freely accessible.

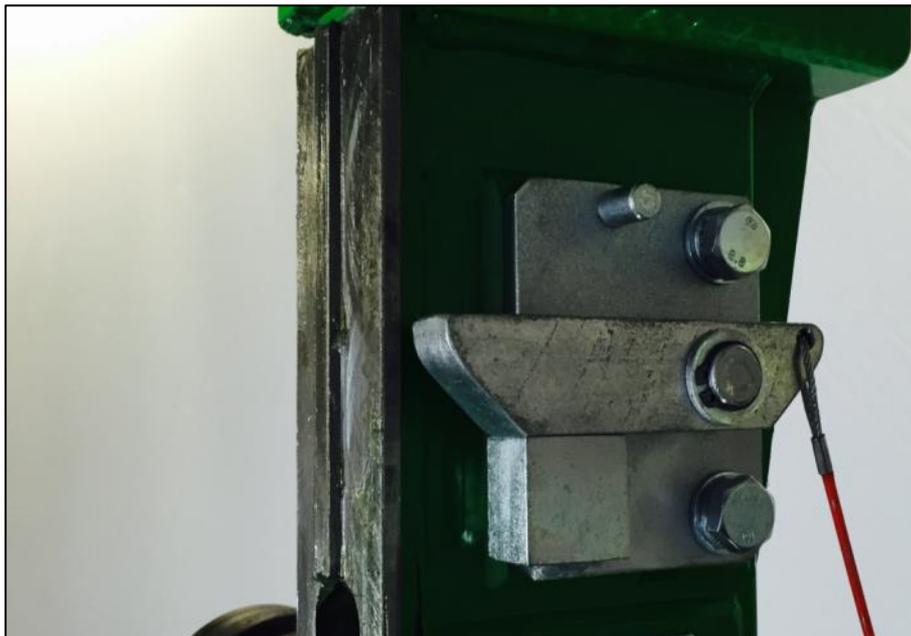
**Emergency stop switch**

The device has an emergency stop switch. Actuating this switch causes the hydraulic system to become suddenly depressurized and the motor to turn off. The switch can be found on the left side of the control station (example):



**Safety mechanism for the attachment devices**

The device has a safety mechanism for the attachment devices in the form of a safety latch, in which the attachment device must be brought in when working on the rod assembly or in front of the mast!



Slowly ramp-up the attachment device to the limit stop on the mast head: safety latch engages (catches) automatically!

**WARNING!**

Only protection against the attachment device falling can be guaranteed with a correctly applied safety latch.

Before working under the attachment device, make sure that the attachment device is secured with the safety latch.

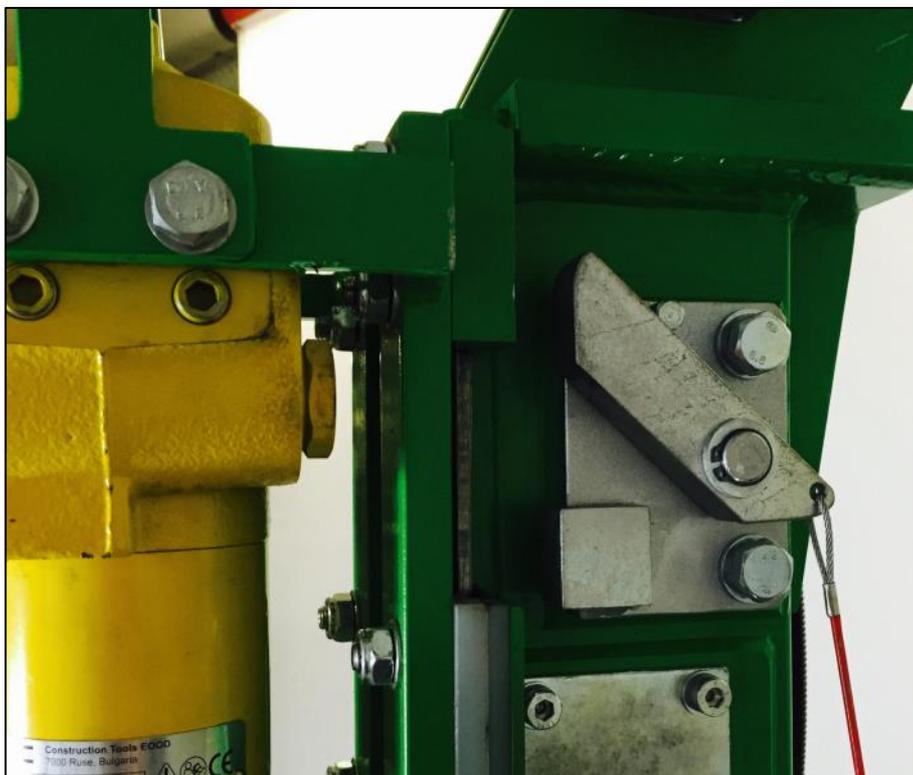
**DANGER!**

Always maintain the safety latch in a perfect condition. Heavy wear may lead to the attachment device falling in an uncontrolled manner.

Before working under the attachment device, make sure that the attachment device is secured with the safety latch and this is in a perfect condition.

Proceed as follows to release the safety latch:

1. Ramp-up the attachment device until the limit stop.
2. Pull and hold cable! In the process, slowly moving the attachment device down.
3. Move the attachment device so far down until it passes the safety latch and is free again.



## 2.10 Replacement Parts

Only replacement parts from the manufacturer must be used to ensure correct safety. You can request such information from the manufacturer.



### NOTE!

The contact details of Nordmeyer GEOTOOL GmbH can be found on the page following the cover page.

## 2.11 Securing against Restart



### WARNING!

#### Risk of injury due to unauthorized restart!

Individuals situated in the danger zones may be injured due to unauthorized restart of the energy supply when working on the device.

- Always observe the notes for securing against restart in the instructions contained in this manual.
- Comply with the procedure for securing against restart described below before any work on components, assemblies or individual parts.

After finishing work:

- ▶ Correctly re-install all safety devices and check that everything is fully functional.
- ▶ Ensure that no individuals are situated near danger points and in the entire danger zone.

## 2.12 Correct Behaviour in Accidents and Hazardous Situations

This section will address the correct behaviour when encountering accidents or hazardous situations.

### Preventative measures

Always be prepared for accidents and fire.

- ▶ Keep first aid equipment (first aid box, blankets etc.) and fire extinguisher readily to hand.
- ▶ Familiarize personnel with accident reporting, first aid and rescue equipment.
- ▶ Keep access routes free for emergency vehicles.

### Proper response in an emergency

- ▶ Immediately shut down the device and initiate first aid measures.
- ▶ Rescue any affected persons from the danger zone.
- ▶ Inform the responsible authority at the installation site.
- ▶ Alert the emergency services in the event of serious injuries.
- ▶ Keep access routes clear for escape routes.

## 2.13 Signage



### CAUTION!

#### Risk of injury due to illegible symbols!

Labels and signs that have become unclear no longer make danger points clearly identifiable and can no longer highlight possible injury risks.

- Always keep pictograms, safety, warning and operating instructions clearly legible.
- Immediately replace damaged or indecipherable pictograms, labels, signs or inscriptions.



### Comply with the operating manual!

Read the operating manual before beginning any work!



### Risk of crushing!

There is a risk of serious injury due to moving parts on the marked components.

## 2.14 Installation Site

In principle, you should work with the device in open areas. Work with the device in enclosed spaces is strictly prohibited due to exhaust fumes of the combustion engine that are hazardous to health. Contact the manufacturer if working in enclosed spaces is absolutely necessary.



### NOTE!

The contact details of Nordmeyer GEOTOOL GmbH can be found on the page following the cover page.

### 3 Technical Data

The technical data of individual components is also contained in the attached documents of the technical documentation.

#### 3.1 Dimensions

The dimensions of the device refer to the length overall.

Device information	Value	Unit
Length / depth	2,400	mm
Width	790	mm
Height, working position	2,900	mm
Height, transport	1,400	mm
Track width	790	mm

#### 3.2 Weight

The indicated weight of the device refers to the total weight without accessories.

Device standard information	Value	Unit
Total weight	780	kg
SPT impact unit	approx. 85	kg
Hydraulic hammer	approx. 35	kg

#### 3.3 Performance and Connection Values

The device is operated by a Honda GX 390 with electric start by default, the performance values are listed under **Error! Reference source not found..** If another motor is selected based on an add-on option, then the corresponding data can be found in the manufacturer's operating manual in the annex of this documentation.

**3.3.1 Performance Values**

Device information	Value	Unit
No. of cylinders	1	Quantity
Performance at 3,600 rev/min	8.7	kW
Cubic capacity	389	cm <sup>3</sup>
Oil filling	1.1	Litre

**CAUTION!****Device damage due to the use of improper fuel!**

The use of incorrect or poorer-quality operating materials leads to device damage. Only use the fuel specified.

Fuel
Petrol

**3.3.2 Connection Values**

Data	Value	Unit
Voltage (DC)	12	V

**Hydraulic oil****CAUTION!****Device damage due to the use of incorrect hydraulic oil!**

The use of incorrect or poorer-quality operating materials leads to device damage. Only use the hydraulic oil specified.

Hydraulic oil
See data sheet (data sheet located in the annex)

### 3.4 Operating Conditions

The machine is intended exclusively for outdoor use. The location of use must be level so that a straight status of the machine is maintained.

Data	Value	Unit
Continuous operation, max.	Suitable for continuous operation	-
Start-up break	Not required	-
Maintenance intervals	See motor	-
Service life	>10	Years

### 3.5 Emissions

Device information	Value	Unit
Sound pressure level, max.*	75	dB(A)
Dynamic probing*	105	dB(A)

\* measurement conditions:

- ▶ Noise measurement in accordance with DIN EN ISO 2151:2009
- ▶ Measurement distance: 1m
- ▶ Device in normal operation with more effective rated power

### 3.6 Storage Requirements

The device must only be put into storage under the following conditions:

- ▶ Do not keep the device outdoors.
- ▶ Store the device with dry and dust-free conditions.
- ▶ Do not expose the device to aggressive media.
- ▶ Protect the device from sunlight.
- ▶ Storage temperature: 5 °C to 45 °C
- ▶ Relative humidity: max. 60 %

Regularly check the general conditions of all parts when storing for longer than 3 months.

### 3.7 Name Plate

The nameplate is located on the device. The nameplate is used to identify the device.

## 4 Structure and Function

This section will describe the structure and function of the individual components of the GTR 790.

### 4.1 General

The device is a soil surveying device, with which boring, dynamic probing as well as ram core drilling can be carried out. The device drives on a crawler undercarriage with rubber tracks. The device is equipped with a drop weight device in its default version. Components of basic model include:

- ▶ Drive motor
- ▶ Hydraulic system with control valve
- ▶ Device frame
- ▶ Mast
- ▶ Chassis
- ▶ Attachment device

### 4.2 Components

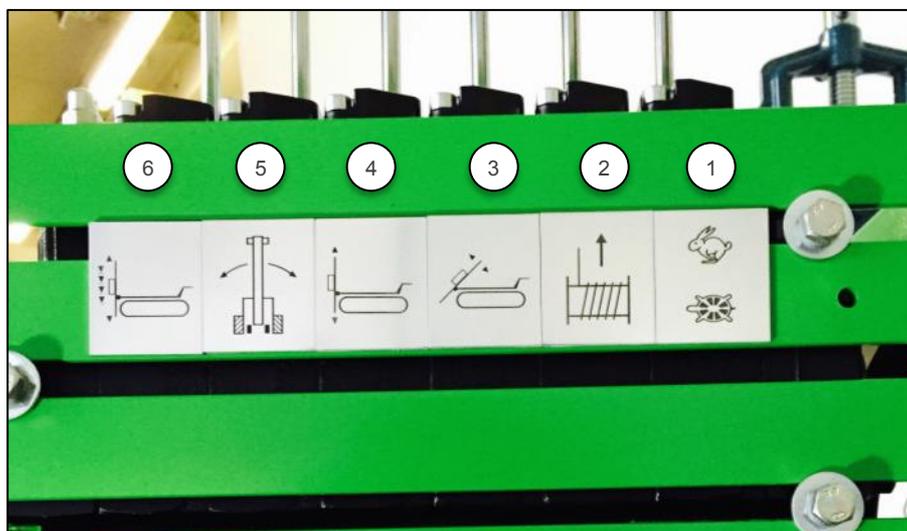


Component	Item number
Mast	1
Attachment device	2
Drive motor	3
Chassis with rubber track	4
Hand winch / hydraulic winch (optional)	5
Cantilever (optional)	6
Rod extraction cylinder	7

### 4.3 Hydraulic Valves

The unit has one or two valve blocks (optional). These valve blocks are situated on the operating platform. The valve functions are displayed as symbols on silver-coloured plates below the valves. Depending on the configuration, the set-up of the valve lever may differ from device to device.

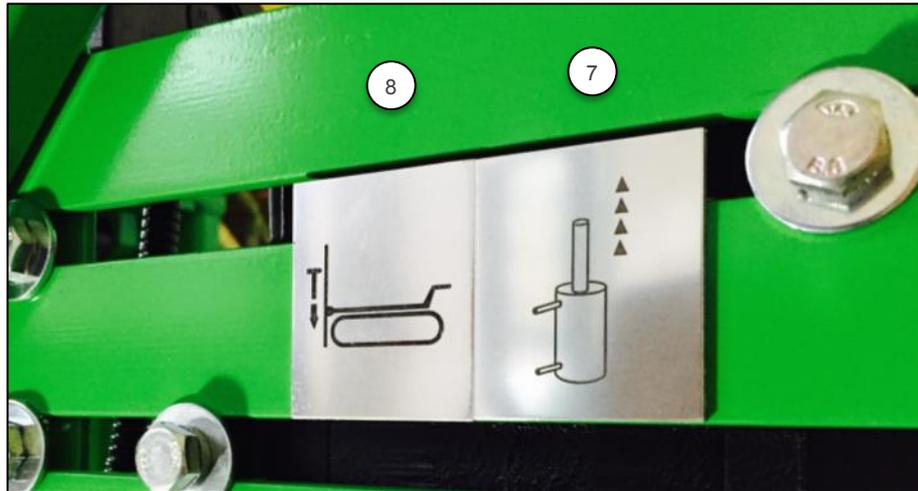
#### Right valve block



Component	Item number
V1 Rubber tracks high (fast) gear	1
V2 Hydraulic cable winch (optional)	2
V3 Ramp-up mast / deposit mast	3

V4 Raise / lower mast (upper part)	4
V5 Swivel mast sideways (+/- 12.5°)	5
V6 Chain motor on	6

**Left valve block**



Component	Item number
V7 Automated rod extraction	7
V8 Hydraulic hammer operation (optional)	8

**Detailed description of the valve function**

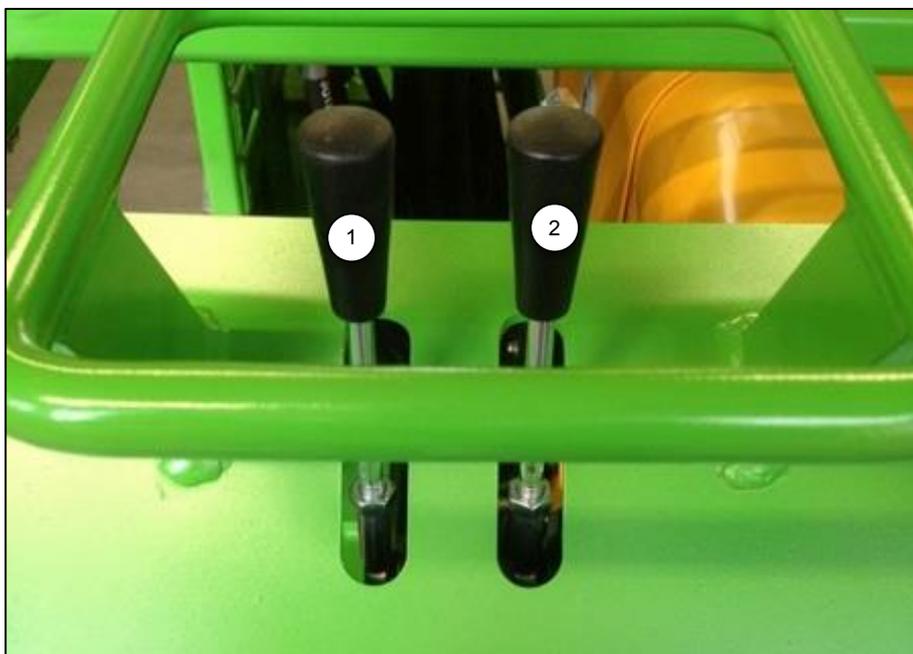
The detailed description of the valve function assumes that the works manager stands head on in front of the valve block. The following actions are described from their perspective. This can differ depending on the configuration.

Valve number	Action	Reaction
V1	Lever in neutral	Normal operation.
	Press lever forwards	The hydraulic circuit of the right valve block is combined with the hydraulic circuit of the chassis. The functions work faster when the lever is pressed forward.

V2	Pull lever	Winch turns to the right
	Press lever forwards	Winch turns to the left
V3	Pull lever	Mast straightens up
	Press lever forwards	Mast deposits
	Comment	<b>⚠ Attention:</b> The mast must be brought into the central position before it is deposited - this is because it can make contact with and damage the tank or hydraulic valves during depositing.
V4	Pull lever	Mast (upper part) raises
	Press lever forwards	Mast (upper part) lowers
	Comment	<b>⚠ Attention:</b> Observe bolt position for each function. (See <b>Error! Reference source not found.</b> )
V5	Pull lever	Mast bends to the right.
	Press lever forwards	Mast bends to the left.
V6	Pull lever	Chain moves upwards, impact unit is driven along.
	Press lever forwards	Chain moves downwards.
	Comment	The driving speed is dependent on the rpm of the drive motor. Low rpm: low speed Full throttle: maximum speed.
V7	Automated rod extraction	Auto-reverse valve operation
V8	Hammer operation	Hammer starts to strike

#### 4.4 Drive Levers

Drive levers are found on the device with which both track-frames can be operated independently of one another.



Component	Item number
Drive lever left hand track	1
Drive lever right hand track	2

#### 4.5 Battery Switch

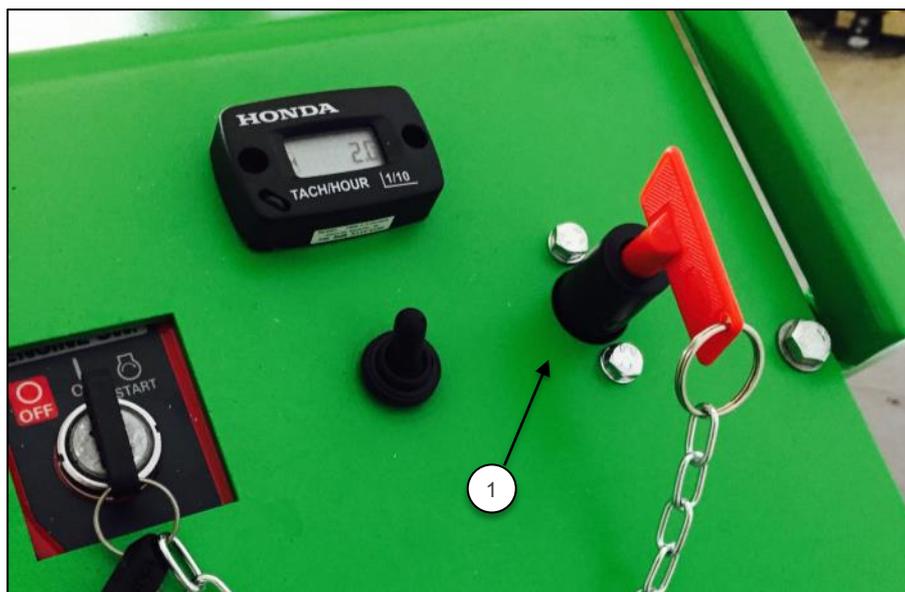
The battery switch is found next to the operating platform for the drive levers. The key must be removed during work breaks, transport, longer downtimes or when the machine is left unattended. Unnecessary consumption of the battery should be avoided. The reversing starter of the motor can be used to start the motor by hand if you have problems with the battery or in the event of a total failure.



##### **ATTENTION!**

##### **Danger to life due to electrical current!**

The drive motor is not fully de-energized even after actuating the battery isolating switch. Disconnect the battery when working on the drive motor!



Component	Item number
Battery switch	1

#### 4.6 Hydraulic Tank

The hydraulic oil for the entire hydraulic system of the device is found in the hydraulic tank. It has an filler with sieve (item number 1) and a return line filter (item number 2).



---

Component	Item number
Filler for hydraulic oil	1
Return filter for hydraulic oil	2

#### 4.7 Fuel Tank

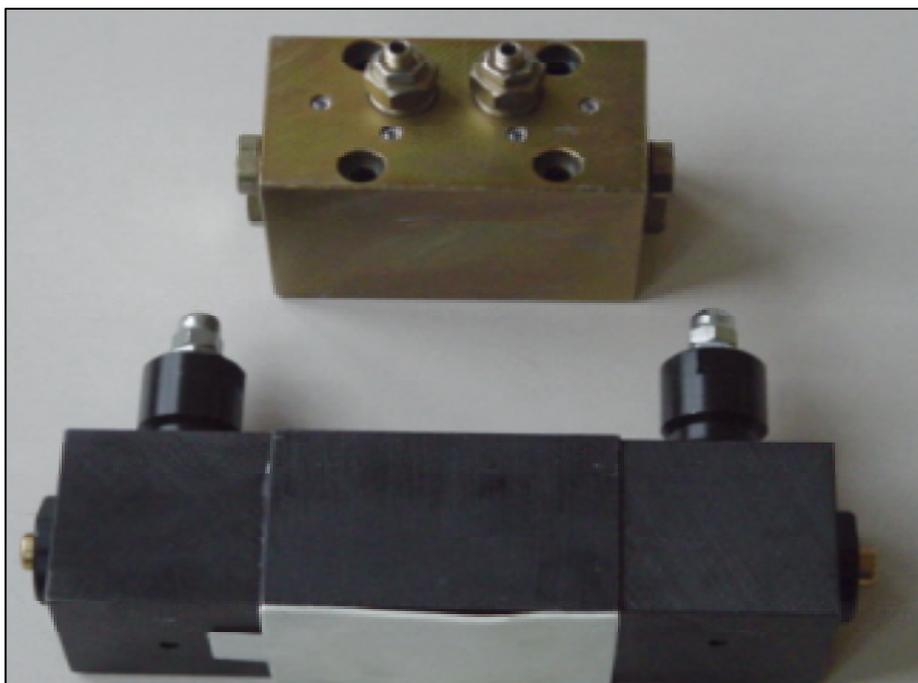
The fuel tank is found on the motor of the device. More information is contained in the accompanying operating manual of the motor manufacturer.

#### 4.8 Setup Instructions for the Auto-reverse valve for rod extraction

The auto-reverse valve for rod extraction optionally built-in to the Nordmeyer GEOTOOL hydraulic units enables the independent counteraction of the direction of movement of the extraction cylinder on the upper and lower end points.

The valve measures the pressure in the respective pressure line and counteracts the flow direction of the hydraulic oil when reaching an adjustable pressure level. The system pressure of the devices is set to 150 bar and the working pressure on the cylinder side to approx. 135 bar (corresponds to 90% of the system pressure).

If the cylinder reaches one of its two end points, the working pressure rises (>135 bar) and the valve switches. The settings for the upper and lower switching point are different.



### Setting

The auto-reverse valve for rod extraction is set on the corresponding extraction cylinder as a factory setting. If the viscosity of the hydraulic oil changes due to temperature influences or pressure conditions due to wear, the valve can be re-set as follows:

1. Check the system pressure. If it is substantially lower than 150 bar and cannot be brought to this value through readjustment, then there is an error at the pump or upstream hydraulic parts. The switching valve does not function in this case. Such a check can only be carried out using a pressure gauge, which is connected to the pressure side of the pump, the corresponding control block or at the corresponding Minimes connection.

There are two grub screws secured by hexagon nuts found on the rear side of the automatic valve block, which act on spring-loaded valve needles. Cap nuts can also be mounted to protect the thread.

2. Release counter nuts.
3. Loosen both grub screws completely (leave approx. 3 threads so that the grub screw and the spring behind it cannot fall out).
4. Now start the motor (initiate full throttle with combustion motors) and switch on the extraction cylinder lever with connected cylinder. In this state, the cylinder moves until the next dead centre and no further. If the system pressure setting is correct, the motor speed decreases, but the engine is not "choked".
5. Depending on the position of the cylinder, the corresponding grub screw is now carefully screwed in until the switching takes place and the cylinder moves.
6. Further turn the grub screw for about 20 degrees and secure with counternut.
7. The cylinder then remains in the other end position. The procedure is the same as described above with the wide grub screw.

For the setting, the grub screw of the respective pressure side is relevant as follows:

- ▶ If the cylinder is positioned at the upper end, the setting for the lower tube is taken and vice versa. The grub screw is found on the same side of the valve as the corresponding tube outlet to the drawing cylinder.
- ▶ Adapt to the correct pressure point by slight rotation of the grub screw.

### Emergency operation

Actuation pins or a brass button for switching the cylinder can be found on the side of the switching valve in each case within a hexagon union nut. The valve can be temporarily counteracted by inserting an object (pin, screwdriver or the like) and pushing in the actuation pin or by directly pressing the brass button.

## 5 Transport, Packaging and Storage



### NOTE!

**Transport, installation and initial commissioning may only be carried out by employees commissioned by the manufacturer or by persons authorized by them.**

The operator's operating or maintenance personnel may assist if required, but only after instructions have been given by those authorized and under strict observance of the following information.

### 5.1 Safety Information on Transport



#### DANGER!

##### Risk of personal injury and material damages!

No load or lifting gear may be used when transporting the device with a forklift.

#### Transporting the device with hoisting equipment

The device can be directly transported with hoisting equipment under the following conditions:

- ▶ The hoisting equipment must be able to support the weight.
- ▶ The straps must be correctly attached to the device.
- ▶ The operator must be authorized to operate the hoisting equipment.

Apply the following procedure during lifting:

1. Slowly lift the device and check that the device is suspended vertically, if necessary correct the centre of gravity position with the lifting tackle.
2. Transport the device to its determined position.



#### WARNING!

##### Danger to life due to falling loads!

Falling loads or parts can strike dead persons.

- Never linger under suspended loads.
- Do not carry out any operations within the swivelling range of the hoisting equipment.
- Always wear a safety helmet when undertaking crane works.



#### WARNING!

##### Risk of injury due to swivelling transport goods!

Transport goods with off-centre centre of gravity can swivel out greatly and seriously injure individuals in the vicinity. Set a spacious swivelling range for the hoisting equipment before lifting transport goods. Observe all transport notes and symbols on the transport goods. Always wear a safety helmet when undertaking crane works.



**ATTENTION!**

**Damages due to improper transportation!**

Improper transport can result in significant damages on the transport goods and any objects in the vicinity.

- Always exercise great care and caution when loading/unloading and internally transporting goods.
- Transport must only be undertaken with vehicles permitted on public roads.
- Observe notes and symbols on the packaging.
- Transport locks must only be removed upon assembly.



**Attachment point**

Only attach slings on the designated points.

## 5.2 Transportation



**NOTE!**

Two eyelets for the attachments can be found on each of the crawler tracks of the chassis.



**DANGER!**

**Risk of injury and material damages!**

No loading or lifting gear may be used when transporting the device by means of a forklift.

### Transporting the device with hoisting equipment

The device can be directly transported with hoisting equipment under the following conditions:

- ▶ The hoisting equipment must be able to support the weight.
- ▶ The straps must be correctly attached to the device.
- ▶ The operator must be authorized to operate the hoisting equipment

Apply the following procedure during lifting:

1. Slowly lift the device and check that the device is suspended vertically, if necessary correct the centre of gravity position with the lifting tackle.
2. Transport the device to its determined position.

### 5.3 Storage



**ATTENTION!**

**Storage damages!**

Damages due to long periods of storage can occur. Therefore:

- The stopcock of the fuel tank must be closed for prolonged storage times!
- The mast must be deposited and the attachment devices positioned above the centre of gravity of the device for prolonged storage times!
- All bare metal surfaces must be lightly oiled to prevent corrosion!

## 6 Installation and Initial Commissioning

This chapter describes how the device is installed and how it is put into operation. The safety information presented here should be particularly adhered to.

### 6.1 Safety Information on Installation



**WARNING!**

**Risk of injury due to improper commissioning!**

Improper work performance and errors during commissioning can lead to serious injury when working and life-threatening situations during commissioning and operation.

- Trained personnel that have been authorized by the operator may only carry out any installation work.
- Ensure sufficient work clearance before starting work.
- Always pay close attention to order and cleanliness in the work area!

### 6.2 Set-up and Commissioning

Specialist personnel put the device into operation. In doing so, the following notes regarding personnel and personal protective equipment must be observed:

Personnel	▶ Trained specialist personnel
Personal protective equipment	▶ Protective work clothing
	▶ Robust protective gloves
	▶ Non-skid safety shoes

## 7 Operation

This chapter describes how the device is operated. The safety information presented here should be particularly adhered to.

### 7.1 Safety Information on Operation



**WARNING!**

**Risk of injury due to improper operation!**

Improper operation can lead to serious injury.

- Trained personnel that have been authorized by the operator may only carry out operation.
- Always check before beginning any work, that all safety devices are correctly installed and fully functional.
- Never take the safety devices out of operation.
- Always pay close attention to order and cleanliness in the work area! Loose objects, components, tools, materials and cleaning equipment just lying around may be sources of accidents.



**WARNING!**

**Risk of injury due to moving components!**

Moving parts can cause serious injuries during operation!

- Do not linger in danger zones or in the near vicinity.
- Do not render safety equipment inoperable.
- Never reach into running equipment.
- Wait until all lagging components have come to a standstill and any residual energy has been depleted before working on the danger points.



**DANGER!**

**Risk of injury due to incorrect workplace!**

Setting up a workplace that is unsuitable/incorrect can lead to serious injuries and even death. Therefore:

- Always be present behind the device when it is moving.
- Never walk beside the device.

Specialist personnel put the device into operation. In doing so, the following notes regarding personnel and personal protective equipment must be observed

Personnel	▶ Trained specialist personnel
Personal protective equipment	▶ Protective work clothing
	▶ Robust protective gloves
	▶ Non-skid safety shoes

## 7.2 Preparatory Measures



### WARNING!

#### Risk of injury due to improper preparation!

Improper preparation can lead to serious injury and material damages. Therefore:

- Operation may only be carried out by trained personnel that have been authorized by the operator.
- Immediately shut down the device in the event of any irregularities and inform the responsible authorities.
- Always check before beginning any work, that all safety devices are correctly installed and fully functional.
- Do not render safety equipment inoperable.
- Wait until all lagging components have come to a standstill and any residual energy has been depleted before working on the danger points.
- Check the hydraulic oil level and tank level and refill hydraulic oil/diesel fuel if necessary.
- Check hydraulic system, tank and gear drive for leakage.
- Check screw connections for tightness.

## 7.3 Switching On and Off

Proceed as follows for turning the motor on and off:

1. Set all valves in the neutral position.
2. Unlock the emergency stop buttons.
3. Start the motor in accordance with the operating manual of the motor manufacturer.



### NOTE!

The hydraulic system is also under pressure if the motor is running. Therefore make sure before starting the motor that all valve levers are in the neutral position (centre position).

## 7.4 Movement



### DANGER!

#### Risk of injury due to incorrect mast position!

The device may only be operated with the mast correctly folded in transport position. Therefore:

- Ensure that the mast is in the transport position on the device. Place the drop weight (or respective attachment) on the mast bottom when changing locations at the bore hole.

When moving, remain behind the device and actuate the drive lever on the control bridge into the desired direction of movement. Each track is individually hydraulically driven, this means:

Action	Reaction
Both drive levers pushed forward uniformly	Device moves forwards
Both drive levers pulled back uniformly	Device moves backwards
Left drive lever further forward than the right drive lever	Curved path straight to the right
Right drive lever further forward than the left drive lever	Curved path straight to the left

The driving speed of the device is dependent on the rotational speed of the motor, just like the hydraulic functions:

- ▶ High rotational speed = fast
- ▶ Low rotational speed = slow

The parking brake is activated once the drive levers are released.



**DANGER!**

**Risk of tipping due to inclined terrain!**

The device can tip over on inclined terrain. Therefore:

- Move slowly and carefully.
- If in doubt, stop and ensure that the inclination is not dangerous for the device.



**NOTE!**

Proceed slowly during manoeuvring, traversing across difficult terrain or making curved movements and only actuate the drive levers lightly. Operate the drive levers with caution on quicker movements.



**DANGER!**

**Risk of injury during reverse movement and in narrow passages!**

When undertaking reverse movements or movements in narrow passages, there is an increased risk of crushing due to enclosure between the device and obstacles. Therefore:

- Move slowly and carefully.
- If in doubt, stop and ensure that the inclination is not dangerous for the device.

Let the drive lever slowly slide back into the neutral position to stop the device.

**NOTE!**

If all levers are released, the device will stop immediately and the parking brake engaged.

## 7.5 Setting up the Workplace

This chapter describes how the devices are set-up at the corresponding working positions so that secure footing is guaranteed.

Proceed as follows to set-up a drilling site:

1. Ensure a level floor.
2. Establish a secure position for the drill by means of beams and planks in the case of soft ground.
3. Check that the chassis is deployed to the widest possible lane.
4. Ramp-up the mast, on the mast base position and align vertically.
5. Place supporting timber under the mast base in the case of soft ground.

## 7.6 Erect and Fold Mast

**DANGER!****Risk of breaking items at rig when erecting or folding the mast!**

Erecting or folding the mast can lead to crushing hazards. Therefore:

- Work must be performed by instructed personnel.
- Work slowly. No jerky movements.

**DANGER!****Risk of injury and material damages when the attachment device is raised high!**

Folding the mast with the drop weight raised high can lead to injuries and material damages. Therefore always keep the drop weight (or attachment) lowered when erecting and folding the mast.

The mast is folded on the device in the transport position. Proceed as follows to erect the mast:

1. Check the space under the mast base!
2. Bring the lower part of the mast with the corresponding hydraulic valve into the vertical working position.
3. Pull bolt at the pivot point in the centre of the mast (see photo).



4. Once the mast is vertically erected, place bolt in the appropriate hole at the mast pivot point and fix mast.



**DANGER!**

**Risk of injury due to incorrect mast positioning!**

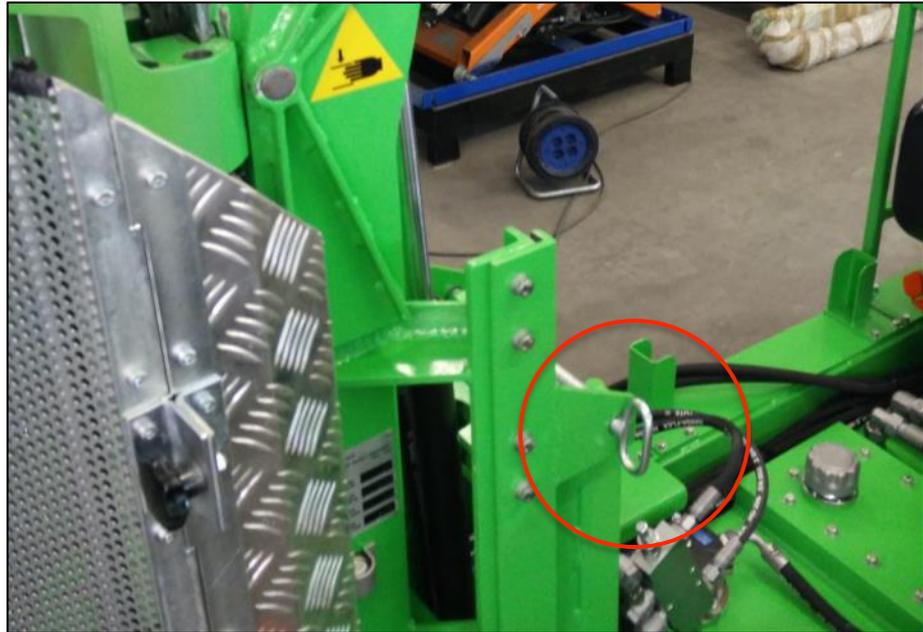
In order to highlight the risk of the device toppling over due to non-compliance with the instructions, we have again given an example here showing where this hazard is particularly high:

The operator selects a laterally angled, soft floor as a set-up site. Now he erects the mast. If he now moves the drop weight up on the mast, the centre of gravity of the drill shifts, a crawler track is increasingly burdened, the floor gives way and the device is liable to toppling over. If the mast is folded with the drop weight raised up, this can lead to injury and material damage. Therefore always bring down the drop weight during erecting and folding.

## 7.7 Moving the Mast vertically

This chapter describes how the mast can be adjusted vertically in order to adapt the mast to the work situation in accordance with the ground conditions.

1. Pull the bolt on the mast carriage (see photo).
2. The mast carriage is now free and can, for example, be placed on the ground.

**NOTE!**

The lifting cylinder in the mast has two different functions:

- Folding up/down the mast upper part
- Vertically move the mast lower part/mast carriage

By inserting the bolt at the mast carriage (see photo), the mast carriage is fixed and the mast upper part can be erected/folded.

## 7.8 Dynamic Probing

This section describes the individual steps (numbered consecutively), which must be undertaken for dynamic probing. Some points include a photo that is continually adjusted for illustration of the fact.

1. Move the device to the intended probing position. Proceed with caution to avoid tipping of the device when undertaking curved movements and ascents and over difficult terrains.
2. Ensure the device is secure at the probing position.
3. Swivel the mast with the mast upper part erected out vertically to the front.
4. Set the mast to ground, slightly lifting up the crawler chassis front in doing so. Ensure firm positioning of the mast, use supports (e.g. wood planks or the like) in the case of soft ground.
5. Vertically align the mast using the hydraulic valve provided for this purpose.
6. Insert retaining pin (key pin) on the drop weight and drive this up with the valve for the chain drive. Place screed in front of the mast.



**WARNING!**

The drop weight is only protected against falling when it is correctly hooked in.

Make sure that the drop weight is hooked before working under it.

7. Open the arms of the rod guide and insert the guide blocks with corresponding diameter. Position the probing rod and place the brass piece on top of the rod above. Close the guide afterwards.



8. Move up the drop weight to the stop. Lift safety device by pulling the cable, hold and in doing so, slowly bring down the drop weight and place it on the probing rod into the anvil with the brass piece on top. Check the vertical position of the mast once again and adjust if necessary! The following image illustrates a situation in which the mast must be readjusted by means of a spindle.



9. Remove safety bolt in the drop weight.
10. Check the blow counter to see whether this is set to "0". This is achieved by pressing the button to the right on the impact counter.

**CAUTION!****Once again check the following points before switching on:**

- Is the device secure against tilting and is the mast aligned vertically to the probing rod?
- Is the key pin removed from the drop weight?
- Is the safety bolt removed from the mast profile and is the hook of the winch unhooked and hoisted up?
- Is the drop weight correctly resting on the hammer?
- Is no-one situated within the working area of the drop weight?

11. Put the chain into operation and start the impact process. Read the number of impacts per covered decimetre ( $n \cdot 10$  value) on the impact counter during dynamic probing.
12. The drop weight remains at an automatic standstill in the lowest position, i.e. the chain continues to run, but the drop weight is no longer registered and therefore not raised. If the depth of penetration per impact is greater than 10 cm (for soft grounds), the last impact may cause the drop weight to strike onto the lower end stop of the mast. Observe the process and stop the blow mechanism beforehand if this becomes the case.
13. Bring the drop weight back into the lowest position and secure.
14. Extend the rod to the next rod through screwing. Start the dynamic probing process again.



**DANGER!**

**Risk of crushing due to interfering in the running impact operation!**

The operating manual should be strictly followed both during the initial placement of the probing rod, as well as when introducing additional probing rods, in order to ensure occupational safety.

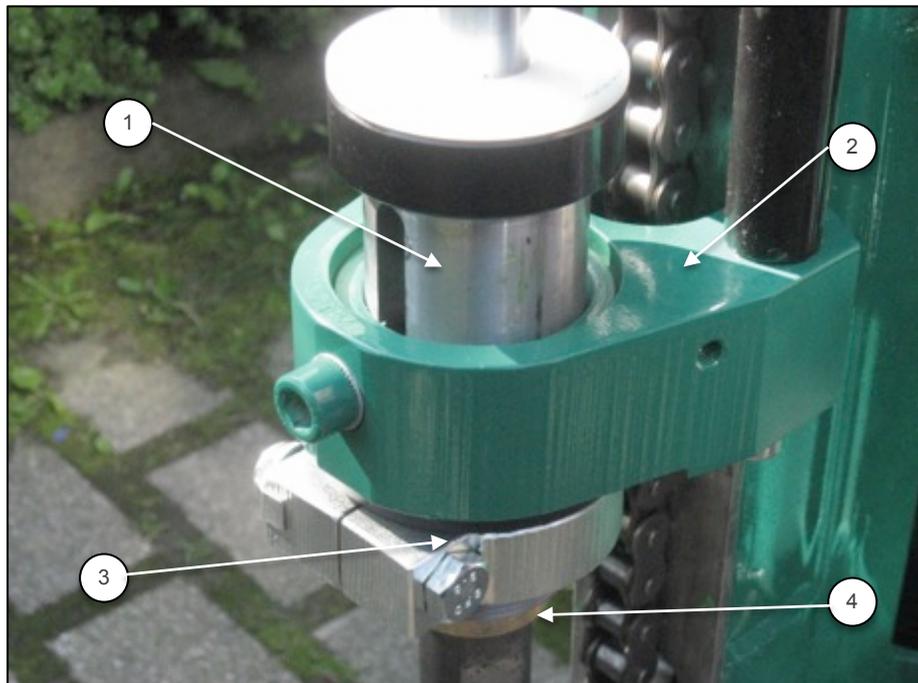
- No manual interaction may be carried out on the running impact unit during operation.
- During operation of the device, no additional individuals may be in the danger area except for the operator!



**CAUTION!**

**When working with the drop weight, it is essential to ensure that the frame of the drop weight follows the drive after each impact, i.e. that the whole free length of the anvil must be visible above the guide lower section before each impact.**

- Tilting of the rod/driving core pipe leads to clamping of the anvil in its guide and thus to increased wear of the total drop weight system!
- Before placement on the next rod, it must be ensured by means of readjustment of the mast, that the anvil is lightly placed on the upper end of the rod with brass hammer!
- In no way should the rod be brought into the anvil through drawing movement!



Element	Item number
Anvil with sliding area	1
Carriage lower guide	2
Lower edge of the anvil	3
Dynamic probing rod with brass hammer	4

## 7.9 Rod Extraction

Depending on the add-on option, the device is fitted with a hydraulically controlled auto-reverse valve. The correct procedure for rod extraction is described below:

1. Disconnect the drop weight with key pin or move hydraulic hammer into the uppermost position and let the safety snap into place.
2. Bring the mast into the inclined position by ramping-up the device. The mast base remains in its original point of contact so that the drill hole can be struck again. The location of the device is not altered. Thus, the rod may be drawn past at the drop weight.
3. Unfold the guide at the mast base. Position the rod extraction cylinder onto the plank over the end of the rod. Firmly screw on another rod part.
4. Position the clamping device on the rod extraction cylinder.
5. Actuate valve. The rod extraction process takes place automatically.



### **DANGER!**

#### **Risk of crushing due to interference when the rod extraction mode is running!**

Interrupt the rod extraction procedure and bring the extraction cylinder to a standstill to release the rod transported to the ground surface.



### **DANGER!**

#### **Risk of being struck dead due to the rod extraction process!**

The rod extraction process runs automatically and if operation is unsupervised, this can lead to the rod being drawn meters high above the ground which can in turn drop down or bump into obstacles above the device.

- Always observe the rod extraction process!
- Closely monitor the cylinder and rods.

## 7.10 Altering Drop Weights

The drop weight can be used for light, medium, heavy and SPT dynamic probing activities in accordance with the DIN 4094 / SPT standard. For changing to another standard please proceed as follows:

1. Move the drop weight into the lowest position.
2. Release the four screws at the uppermost impact weight with an Allen key and remove it. The weight is reduced from 63.5kg by 13.5kg to 50kg for the heaviest of dynamic probing applications.
3. Take down the upper weight carefully and reattach remaining weights plate with the shorter screws provided for this purpose (see accessory kit).
4. If another weight plate is taken down, the weight is reduced from 50kg by 20kg to 30kg for moderately difficult dynamic probing applications.

If all plates are taken down, the base unit has a 10kg weight for light dynamic probing operations.

## 7.11 Exchanging the Attachment Device

Various attachments can be operated on the device:

- ▶ Drop weights (SPT/DIN)
- ▶ Hydraulic hammer on mast carriage (GeoRam 250 / GeoRam 390)
- ▶ Rotational drive with 700 Nm on mast carriage
- ▶ Core drilling system with 100 mm or other diameter



### **WARNING!**

#### **Increased risk of injury when replacing the attachment!**

Due to the heavy weight of the attachment, the exchange procedures described in this section must be undertaken by two employees.

### 7.11.1 Removing the Attachment Device

To remove an attachment from the mast, you must proceed as follows:

1. Move the chain into a position, in which no carrier can be found in the lower part of the mast.
2. Bring the mast into the bent central position, disconnect with the short transverse bolt and position the lower part of the mast vertically. Lower the mast base to the ground.
3. Remove the attachment device. To do so, lift up the attachment device by using the winch and winch cable until it is freely suspended above the mast profile
4. Now direct the attachment device on a wheelbarrow and remove from the drilling hole.

### 7.11.2 Fitting an Attachment Device

There is no attachment device on the mast! An attachment device can now be installed. The following points describe the installation of the hydraulic hammer and also apply to other attachment devices:

1. Move the chain into a position, in which no carrier can be found in the lower part of the mast.
2. Bring the mast into the bent central position and position the lower part of the mast vertically. Lower the mast base to the ground.
3. Raise the attachment device with its mast carriage over the mast lower part and slide the lower carriage guide on the guide profile of the mast. Continue to release the hammer carriage downwards until the complete carriage guide is inserted into the mast profile.
4. Erect the mast upper part and lock.
5. When raising the mast chain, the carrier incoming below from the mast is threaded into a section within the carriage, where it locks in place. The attachment device can be traversed with the chain.



#### ATTENTION!

#### Material damages due to non-compliance!

The hammer and rotary drill head attachment devices may not be moved until completely to the bottom of the mast, because this may cause the support of the pressing carrier to be drawn out of the section of the working carriage on its way into the mast profile, which may bring about damages in doing so. Therefore this process must then be terminated if the lower edge of the working slide reaches the screw of the chain guide roller.

### 7.11.3 Setting the Pressure of an Attachment Device

If the device has been supplied with a hydraulic hammer, then the valve is already pre-set by default. You should proceed as follows with other devices:

1. The technical description of the attachment device should be taken from the permissible working pressure specified by the manufacturer. The hydraulic hoses may not be connected yet; the quick-release couplings are not connected!
2. Release retaining nut. When the motor is running, the valve level is swivelled out and held. Only the currently set pressure is now displayed on the gauge. Alter the pressure to the working pressure you require for your attachment device using the rotary knob:
  - ▶ Turn the rotary knob to the left: pressure decreases
  - ▶ Turn the rotary knob to the right: pressure increases
3. Subsequently re-fasten the retaining nut.

## 7.12 Working with the Hydraulic Hammer

The following points show how to correctly proceed with the hydraulic hammer on a step by step basis:

1. Raise up the hydraulic hammer with the chain to the mast until you reach the stop and ensure, that the safety catch locks in place.

2. Open the rod guide and position the window sampling rod in with the mounted impact adapter (use the guide jaws in accordance with the window sampling rod diameter).
3. Once again raise up the hydraulic hammer until the stop, release the safety latch (pulling the cable), slowly bring down the hydraulic hammer and in doing so, insert the impact adapter in the hydraulic hammer. Lock flap closure into place!
4. Use your left hand to pull the valve for the hydraulic hammer operation towards you. The hydraulic hammer is now ready. Use your right hand to actuate the valve for the chain and hold (away from the body) until the chain begins to move downwards (feed motion) and the hydraulic hammer pushes onto the driving core pipe (contact pressure). The hammer begins to make impacts.
5. Now track the feed motion of the penetration of the driving core pipe by means of the throttle valve. The contact pressure should be regulated as such, that the hammer makes optimum impacts:
  - ▶ Not enough contact pressure: hydraulic hammer makes no or reduced impacts
  - ▶ Too much contact pressure: hydraulic hammer is blocked and no longer makes impacts
6. If the hydraulic hammer reaches the lower position at the mast (**IMPORTANT!** Lower edge of the carriage at the same height as the axis of the pulley), the chain no longer exerts feeding motion or contact pressure. Switch off the hammer and move up the chain into the securing.



## 7.13 Shutdown in Emergency

The device movements must be stopped as quickly as possible in hazardous situations and the energy supply cut off.

In the event of a hazard:

1. Switch off the motor or actuate the emergency stop button.
2. Inform those responsible at the installation site.
3. Alert the emergency services if necessary.
4. Rescue any injured persons and initiate first aid measures.
5. Keep access routes free for any emergency vehicles.

After the rescue operations:

1. Inform the competent authorities if necessary.
2. Commission specialist personnel with the troubleshooting.



### **DANGER!**

#### **Danger to life due to reconnection!**

Ensure before reconnection, that nobody can be found in the danger zones.

3. Thoroughly examine the device for optimal technical condition before reconnection and ensure that all safety equipment is re-installed in its proper state and fully functioning.

## 8 Maintenance

This chapter describes how to keep up maintenance of the device, which guarantees continuous device safety.

### 8.1 Safety Instructions for Maintenance



#### **WARNING!**

##### **Risk of injury due to improper maintenance!**

Improper maintenance can lead to serious injury. Maintenance work may only be carried out by trained specialist personnel that have been authorized by the operator.

- Ensure sufficient installation clearance before beginning work.
- When using a high pressure cleaner, never direct the jet to the valve blocks.
- Ensure before re-commissioning, that all protective devices have been correctly installed and are fully functional.
- Make sure that no individuals are in the danger zones when reconnecting.



**WARNING!**

**Risk of injury due to unauthorized reconnection.**

People can be injured when working on individual components due to unexpected activation of the power supply. Switch off the energy supply and secure it against reconnection before all work on the individual components.



**WARNING!**

**Risk of injury due hazardous substances!**

Hazardous substances contain harmful constituents and can lead to poisoning, burns or skin irritation.

- Observe the safety data sheet of the manufacturer.
- Avoid spillages and fog formation.
- Do not eat, drink or smoke during work.
- Avoid skin and eye contact.



**WARNING!**

**Risk of injury due to incorrect replacement parts!**

Defective replacement parts can seriously affect safety and cause damages and malfunctions and even complete breakdown. Use original replacement parts in principle.

## 8.2 Maintenance Plan

The following sections describe maintenance works, which are required for optimum and fault-free operation.

- ▶ If, during regular checks, you notice increased wears marks on the components, shorten the maintenance intervals based on the actual wear and tear that is visible!
- ▶ Draw up a maintenance log for each instance of maintenance work! Such logging helps with fault analysis, enabling the adaptation of the required intervals to the actual usage conditions and any possible warranty claims in a valid manner.
- ▶ Carrying out the named work is time and/or load dependant in some cases. When making entries in intervals as well as in deadlines and in operating hours (OH), the case in which the event first applies is valid.
- ▶ If you have any questions on maintenance work and intervals, contact the manufacturer.



**NOTE!**

The contact details of Nordmeyer GEOTOOL GmbH can be found on the page following the cover page.

<b>Interval</b>	<b>Maintenance work</b>	<b>Personnel</b>
Before each operation	Check operational elements and safety equipment for perfect technical condition and if necessary, organize replacement of defective components or bring about repair.	Operator
Before each operation	Check motor oil, hydraulic oil and fuel filling level.	Operator
Daily	Clean the device under heavy soiling, oil the chain and mast guide.	Instructed personnel
Weekly	Check the voltage of the rubber crawler track.	Operator
Weekly	Check the emergency stop switch.	Operator
Weekly	Clean device and visual inspection of device parts.	Instructed personnel
Weekly	Tighten, clean and oil carrier chain.	Instructed personnel
Weekly	Check guide for wear, clean and grease.	Instructed personnel
Monthly	Clean return line filter for hydraulic oil and perform a general check for leakages on the hydraulic system.	Instructed personnel
Monthly	Lubricate pivoting bearing.	Instructed personnel
Annually	Replace hydraulic oil.	Specialized firm
Annually	Inspection by a specialist device operator in accordance with the BetrSichV.	Machine officer

### 8.3 Maintenance Work

The following sections list and describe the various maintenance works that are to be carried out.

#### 8.3.1 Cleaning

Personnel	▶ Instructed personnel
Personal protective equipment	▶ Protective work clothing
	▶ Robust protective gloves when working on components. Chemical-resistant protective gloves when handling hazardous materials.
	▶ Safety shoes
	▶ Light respiratory protection when handling hazardous materials.
	▶ Protective goggles with side shields when working on pressurized system components.

Check device for contaminants daily. When encountering superficial contaminants:

1. Switch off device and secure against reconnection.
2. Remove contaminants properly.

In this context it must be remembered:

- ▶ Not to use aggressive cleaning agents.
- ▶ To absorb oil deposits with binding agents.
- ▶ To dispose of cleaning cloths and processing waste in an environmentally friendly manner in accordance with the applicable local regulations.
- ▶ To check after cleaning work, that all previously opened covers and safety equipment have been re-sealed properly and are fully functioning.
- ▶ To not spray on the valve blocks with a strong jet when using a high pressure cleaning device, since doing so could damage the seals.

#### 8.3.2 Charging the Starter Battery

The starter battery has to be recharged if it is empty. To do so, proceed as follows:

1. Switch off the machine and secure against reconnection.
2. Connect the battery to an IU-OU charging unit. When you do so, make sure that no other charging device is used other than the one mentioned above.
3. When the battery has fully charged, re-store the charging unit securely and avoid misuse or damages.

**WARNING!****Risk of injury due to misuse of the battery!**

If the battery is misused, then there is the danger that the battery will explode. Therefore:

- Only ever use charging units with the IU-OU labelling.

**8.3.3 Tensioning the Carrier Chain**

The carrier chain must be checked weekly for tension with the spring balance. Proceed as follows for this purpose:

1. Move the mast carriage downwards.
2. Hook on the spring balance in the middle of the chain between the drive wheel and return wheel on the mast frontal side. With a pulling force of 4-5 kg on the scale, the distance from the mast to the chain amounts to only 8 mm.

Proceed as follows to tension the carrier chain:

1. Release upper side retaining nut on the mast (axis of the tensioning wheel).
2. Release counter nut in the mast head.
3. Tension the chain using clamping lever by clamping nut SW19 until you have the correct tension.
4. Retighten counter nut. Retighten retaining nut.

**8.3.4 Maintaining the Hydraulic Tank****WARNING!****Material damage due to oil spillages!**

The hydraulic oil heats up in operation and expands. This can lead to an overflow of hot oil. Therefore:

- Never fill up the hydraulic oil tank above the mark.

The filler neck with a chromed closure cap, as well as the return filter for the hydraulic oil, can be found on the hydraulic tank. If oil leaks out of the device due to leakages, hose break or the like, the oil level in the tank must be filled up with the same oil variant so far, that the steel sieve of the filler neck is covered with oil on its lower horizontal surface.

**8.4 Measures after Successful Maintenance**

Carry out the following steps before switching on after finishing maintenance work:

1. Check all previously released screw connections for tight fit.
2. Check to see whether all previously removed protective equipment and covers are reinstalled correctly.
3. Ensure that all tools, materials and other equipment used have been removed from the working area.

4. Clean the working area and remove any possible spilled substances, such as e.g. fluids, processing materials or the like.
5. Ensure that all safety equipment on the device functions properly.

## 9 Malfunctions

The following chapter describes how to proceed in the event of faults.

### 9.1 Safety Information for Fault Removal



#### **WARNING!**

##### **Risk of injury due to improper fault removal!**

Inappropriate work performance during fault removal can lead to serious injury.

- Repairs may only be carried out by trained specialist personnel that have been authorized by the operator.
- Before starting, ensure that there is sufficient room to carry out the work.
- Always pay close attention to order and cleanliness in the work area! Loose objects, components, tools, materials and cleaning equipment just lying around may be sources of accidents.
- Check for correct installation and replacement parts when components have been replaced. Observe tightening torques.
- Before re-commissioning, ensure that all safety devices have been correctly installed and are fully functional.
- Before re-commissioning, ensure that nobody is present in the danger zones.



#### **WARNING!**

##### **Risk of injury due to unauthorized reconnection**

People can be injured when working on individual components due to unexpected activation of the power supply. Switch off the energy supply and secure it against reconnection before all work on the individual components.



#### **DANGER!**

##### **Danger to life due to electrical current!**

Touching parts charged with voltage leads to death. Damage to the insulation or individual components can endanger life.

- Switch off the electrical supply and secure against restart before carrying out maintenance and repair work.
- Keep water and moisture away from live parts.

## 9.2 Behaviour during Malfunctions

In principle:

1. Immediately switch off the device in the case of faults which pose an immediate danger to persons or material.
2. Switch off all energy supplies and secure against reconnection.
3. Inform those responsible at the installation site.
4. Depending on the type of the fault, allow competent and authorized specialist personnel to ascertain and remedy the fault.

## 10 Disassembly and Disposal

Disassembly and disposal are described in the following chapters.

### 10.1 Safety Instructions for Disassembly and Disposal



#### **WARNING!**

##### **Risk of injury due to improper disassembly!**

Inappropriate work performance during disassembly can lead to serious injury.

- Disassembly work may only be carried out by trained specialist personnel that have been authorized by the operator.
- Before starting, ensure that there is sufficient room to carry out the work.
- Always pay close attention to order and cleanliness in the work area! Loose objects, components, tools, materials and cleaning equipment just lying around may be sources of accidents.
- Be careful with sharp-edged components, corners and points.
- Always secure components during disassembly as such, that none drop or fall.
- Disassemble components correctly and professionally subject to the local regulations for occupational safety and environmental protection.
- Contact the manufacturer in case of unclarities.



#### **NOTE!**

The contact details of Nordmeyer GEOTOOL GmbH can be found on the page following the cover page.

Personnel	▶ Instructed and authorized personnel
Personal protective equipment	▶ Protective work clothing
	▶ Robust protective gloves when working on components. Chemical-resistant protective gloves when handling hazardous materials.
	▶ Safety shoes
	▶ Light respiratory protection when handling hazardous materials.
	▶ Protective goggles with side shields when working on pressurized system components.
	▶ Industrial safety helmet

## 10.2 Disassembly

Proceed as follows to disassemble the device:

1. Switch off the device and secure against reconnection.
2. Physically disconnect the entire energy supply, discharge residual energies. Check absence of voltage and pressure.
3. Remove and dispose of operating and auxiliary materials as well as residual production materials in an environmentally correct manner.
4. Clean assembly groups and components properly and dismantle in accordance with the local regulations for occupational safety and environmental protection.

## 10.3 Disposal

If no return or disposal agreement was made, send dismantled components for recycling:

- ▶ Scrap metallic residues.
- ▶ Recycle plastic parts.
- ▶ Sort and dispose of other components according to the material properties



### ATTENTION!

#### Environmental damage due to incorrect disposal!

Improper or careless disposal can lead to significant environmental contamination.

- Let specialist companies dispose of electronic waste, components, operating and auxiliary materials.
- Observe the handling and disposal regulations of the safety data sheets

for hazardous materials.

When in doubt, consult the manufacturer or seek information from the local municipal authorities or specialist disposal companies for environmentally friendly disposal.

## **11 Annex**

The following documents listed below can be found in the annex of these operating instructions:

- ▶ CE Declaration of Conformity
- ▶ Honda motor original operating manual
- ▶ HINOWA chassis original operating manual
- ▶ Spare parts list
- ▶ Hydraulic oil certificate

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