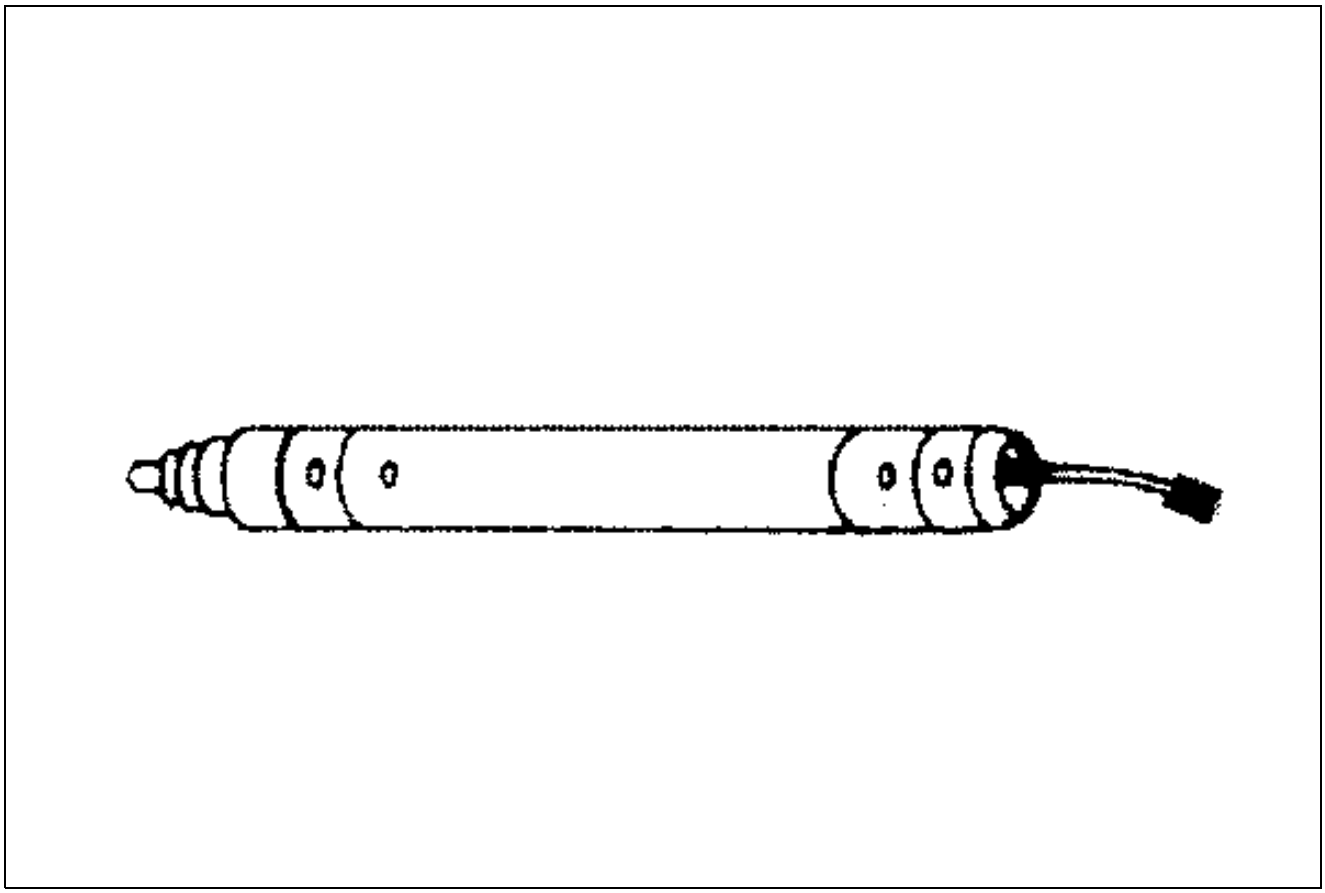
Translation of original operating manual

Soil displacement hammer GRUNDOMAT P - Generation with thrust control stud 45P - 130P



Serial No.: ___/___ _____

Version 12.10.2011/01GB

THE ONLY CHOICE FOR PERFECT PIPE INSTALLATION

Germany:
Tracto-Technik GmbH & Co.KG
Tel: +49(0) 27 23 80 80
Fax: +49(0) 27 23 80 81 80
www.tracto-technik.de
export@tracto-technik.de

United Kingdom:
TT UK Ltd.
Tel.: +44(0)1234.342.566
Fax: +44(01234.352.184
www.tt-uk.com
info@tt-uk.com

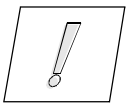
France:
Tracto-Techniques S.a.r.l.
Tél.: +33 (0)5.53.53.89.83
Fax: +33 (05.53.09.39.41
www.tracto-techniques.com
ttf@tracto-techniques.fr

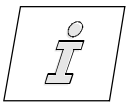
USA / Canada:
TT Technologies
Tel.: +1 (0)630.851.8200
Fax: +1 (0)630.851.8299
www.tttechnologies.com
info@tttechnologies.com

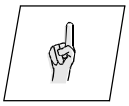
Australia:
TT Asia Pacific Pty Ltd.
Tel.: +66 (0)7 3420 5455
Fax: +66 (0)7 3420 5855
www.tt-asiapacific.com
info@tt-asiapacific.com

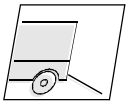
This operating manual is destined for the operator of the machine and his staff.
It contains texts and prints that should not (partially or totally) be further distributed.

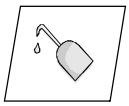
Contents

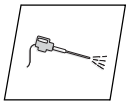


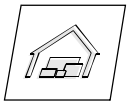


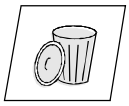


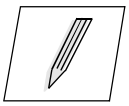




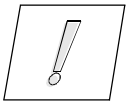


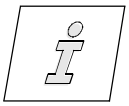


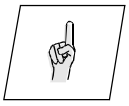


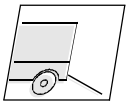


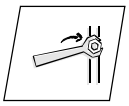
Picture Index











1 Instructions for using the operating manual

In this operating manual the user receives information:

- for the safety of the user,
- for a quick familiarization of the GRUNDOMAT P functions,
- for working safely with theGRUNDOMAT P and
- for maintenance of theGRUNDOMAT P.

To maintain the reliability of the machine, increase it's life cycle time and prevent any downtimes, the instructions of the operating manual must be paid attention to. For this reason the operating manual must always be available with the machine.

The operating manual does not replace any training course, but complements the gained knowledge.

1.1 Symbols

Extremely important information inside the operating manual are marked with the following:

1.1.1 Symbols for personal protection equipment

Use the safety helmet!

Use eye protection!

Use ear protection!

Use safety clothing!

Use insulated protection gloves!

Use insulated protection shoes!

1.1.2 Danger symbols

Danger!
This sign indicates the immediate danger of life and health of persons, up to perilous injuries or death.

Danger due to electrical power!
This sign indicates dangers of electrical power when using the GRUNDOMAT P.

Danger due to crushing!
The texts in connection with this sign inform about dangerous situations due to crushing.

Danger due to suspended loads!
The texts in connection with this sign inform about dangerous situations due to suspended loads.

Danger due to stumbling!
The texts in connection with this sign inform about dangerous situations due to stumbling.

Danger due to falling!
The texts in connection with this sign inform about dangerous situations due to falling.

Danger due to explosions!
The texts in connection with this sign inform about dangerous situations due to explosions.

Danger due to hot surfaces!
The texts in connection with this sign inform about dangerous situations with hot surfaces.

Danger due to cold surfaces!
The texts in connection with this sign inform about dangerous situations with cold surfaces.

1.1.3 Prohibition symbols

Entrance for unauthorized persons prohibited!
The texts in connection with this sign inform that the indicated place must not be entered by unauthorized people!

1.1.4 Indication symbols

"Grundi" likes to give you hints and help you to carry out activities quickly and safely.

1.2 Descriptions

On GRUNDOMAT P the pits and the drive directions are described as follows:

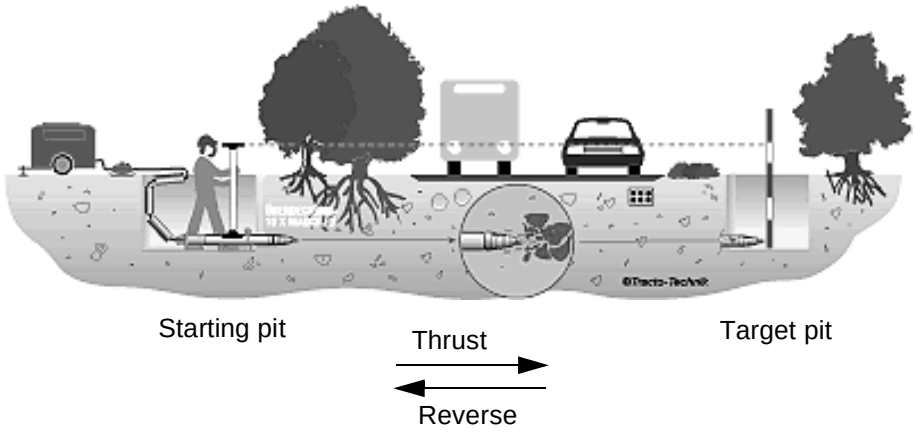


Fig. 1-1 Pits and drive directions

1.3 Validity of this operating manual

This operating manual is valid for the GRUNDOMAT P thrust generation and it's accessories.

GRUNDOMAT P

The weight, the permissible operating pressure as well as the serial number are engraved on the GRUNDOMAT P. The serial number has the following characteristics:

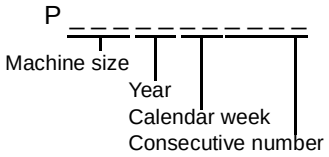


Fig. 1-2 Explanation of the serial number on the GRUNDOMAT P

Accessories

The compressed air heater UNITHERM is equipped with a suitable type sign with the following information:

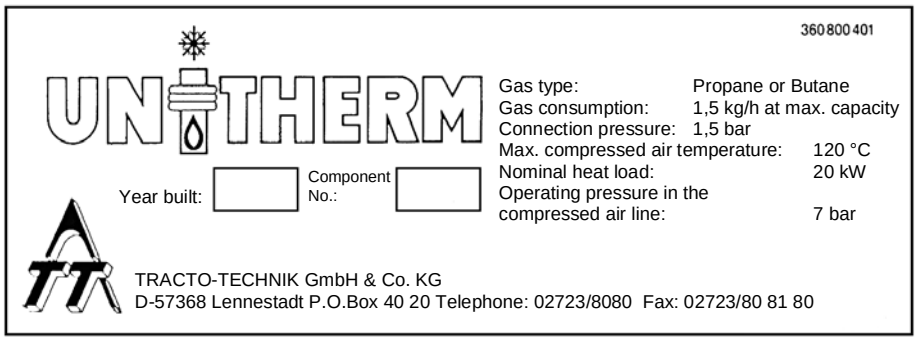
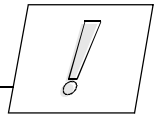


Fig. 1-3 Type sign compressed air heater UNITHERM



1.4 Warranty and product liability

Generally the “General sales conditions” of TRACTO-TECHNIK GmbH & Co. KG according to the VDMA regulations are valid.

Warranty claims for material and responsibility in case of material breakage or personnel injury are excluded when they are caused by one or more of the following causes:

- inadequate handling of the machine,
- inadequate assembly, starting, operation and maintenance of the machine,
- operation of the machine despite defective safety devices or inadequately fitted or non-functioning safety devices and safety covers,
- lack of respecting the instructions in the operating manual as to transportation,
- unauthorised technical modifications of the unit,
- unauthorized technical modifications of the control system,
- insufficient verification of components which are subject to wear and tear,
- inadequately carried out repair works,
- natural catastrophes and force majeure,
- vandalism,
- insufficient safety distances to adjacent pipes and cables,
- not wearing personal protection equipment.

For all original TRACTO-TECHNIK GmbH & Co. KG components a warranty period of 12 months after first use applies. Ground engaging tools and pieces of wear and tear are excluded from warranty.

2 Information regarding the GRUNDOMAT P

2.1 The GRUNDOMAT P and it's components

The whole unit comprises of the following components (s. fig. 2-1):

- GRUNDOMAT P (1)
- Lubricator (2)
- Starting cradle (4)
- Compressed air hoses (5)
- GRUNDOSCOPE (6; optional with measuring stick (optional)
- Compressed air heater UNITHERM with hoses (7; optional)
- Tension plate (8; optional) or cable clamp (3; optional)
- Pulling accessories (not pictured)

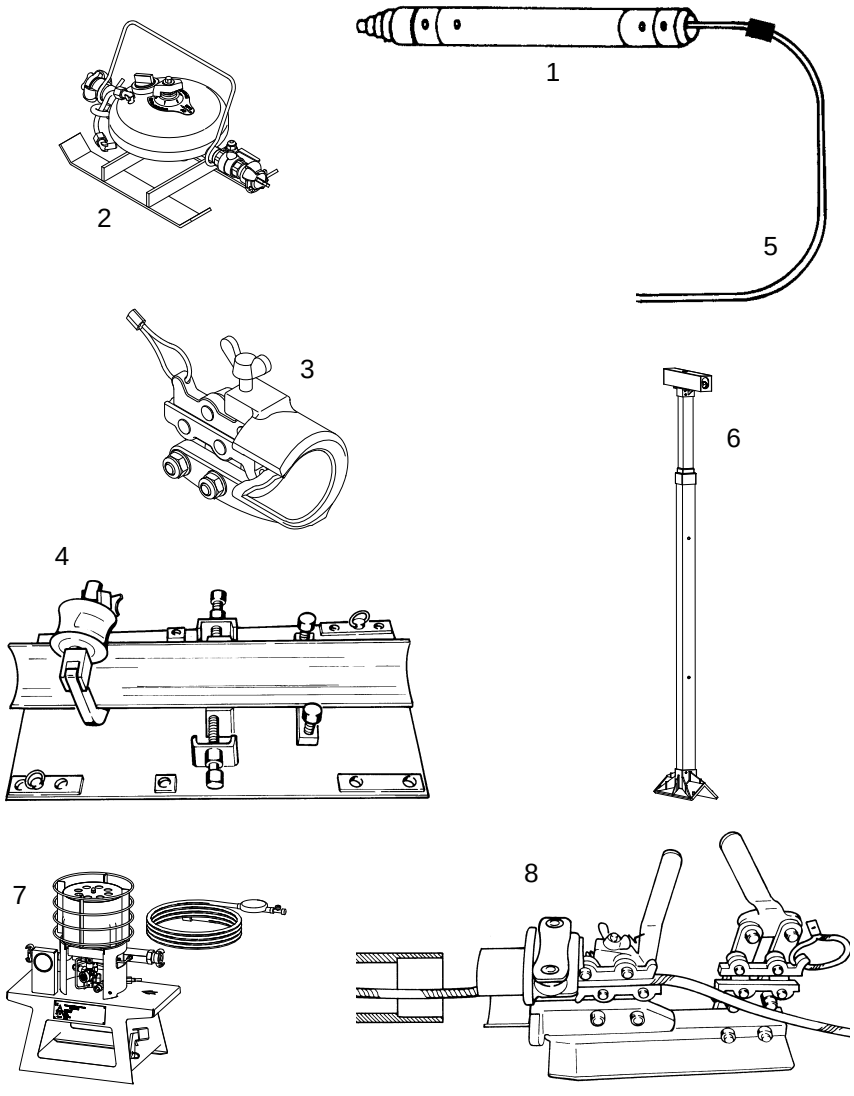


Fig. 2-1 GRUNDOMAT P and it's components

2.2 Function method of the GRUNDOMAT P

GRUNDOMAT P

The GRUNDOMAT P is a cylindrical compressed air hammer, which propels itself through the ground. The GRUNDOMAT P can pull in service and disposal pipes at the same time into the established bore hole.

The GRUNDOMAT P (but not the type 130 PK[1]) has a pretensioned, spring-loaded axial sliding chisel and interchangeable multi-cutter cone head assembly which works in a two stroke action: the soil is first displaced by the head while the casing of the machine is pulled into the bore in a 2nd step. This improves the target precision of the soil displacement hammer immensely.

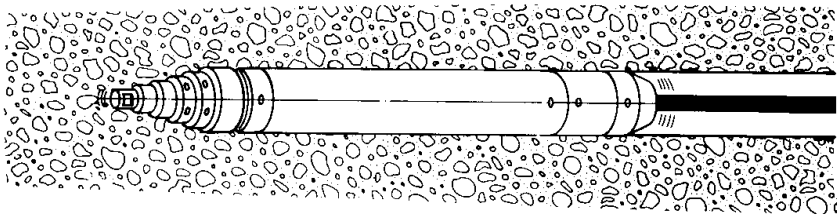


Fig. 2-2 GRUNDOMAT P

Drive of the GRUNDOMAT P

The drive of the GRUNDOMAT P is operated by compressed air. To achieve the optimal performance, a compressor with sufficient supply for the relevant machine type schould be chosen (air consumption of the individual machine types, see chapter 2.7, page 2-10).

Operating at the jobsite

To operate the GRUNDOMAT P a starting pit and a target pit must be prepared at the jobsite. Both pits must be arranged, so that a straight bore path can be achieved.

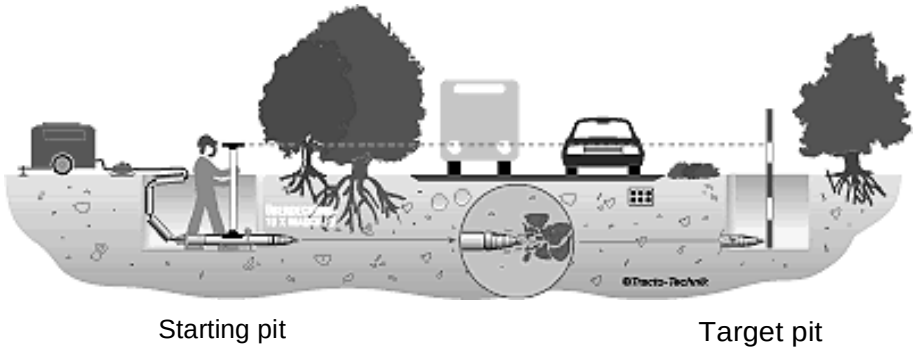


Fig. 2-3 Jobsite with starting and target pit

1. PK = Short version

The starting cradle is place inside the starting pit and anchored to the ground with ground stakes. Then the GRUNDOMAT P is placed into the guiding shells of the starting cradle and fixed in place with the clamp roller. The GRUNDOMAT P is supplied with compressed air from an external compressor.

Cable or pipe pulling

With the GRUNDOMAT P cables, PE or PVC pipes can be directly pulled into the ground during the bore process. To do so via special components cables, PE or PVC pipes can be directly connected with the GRUNDOMAT P. Alternatively the GRUNDOMAT P is loosened from the compressed air hose after the bore process inside the target pit. Cables, PE or PVC pipes are connected with the compressed air hose and pulled back to the starting pit through the ground. Pipes can also be pushed in manually into the bore hole. As a fourth possibility a bore process can be carried out with the GRUNDOMAT P. Later cables, PE or PVC pipes are fastened to the head of the GRUNDOMAT P and then pulled back into the bore in reverse mode.

Switching over

By pulling and turning the compressed air hose the GRUNDOMAT P can be steered during full power from forward to reverse.

The GRUNDOMAT P-generation is available in different sizes.

2.3 Components

2.3.1 Reverse cone

The reverse cone at the end of the GRUNDOMAT P allows the reverse run of the GRUNDOMAT P. It is applied

- for blind bores or
- when first of all a bore is carried out and the pipe is to be installed later or
- when pulling during the reverse run of the GRUNDOMAT P

2.3.2 PE pipe cutting nipple

The cutting cone (63) can be screwed directly into the plastic pipe. It is applied for the direct installation. The GRUNDOMAT P pulls the pipe during the bore process into the fresh bore hole.
To know which type of cutting nipple is available for which size of machine and pipe, please check in our accessories catalogue GRUNDOMAT P - in a special folder.

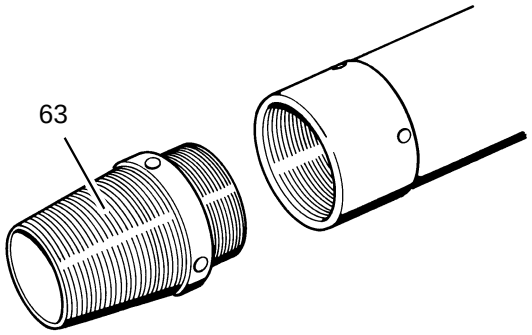


Fig. 2-4 PE pipe cutting nipple

2.3.3 Pull sleeve with cable connection

The pull sleeve (52) with cable connection is intended for direct installation of plastic pipe sections. The individual plastic pipes are slipped over the steel cable and the air hose (5). The insulation adapter (73) is screwed to the cable connection (51) and the pulling cable (50) is screwed to that. The first plastic pipe section is pligged into the pull sleeve (52) and tensioned (s. chapter 6.5.1, page 6-10). The GRUNDOMAT P pulls pipe section one by one during the bore process into the fresh bore hole.

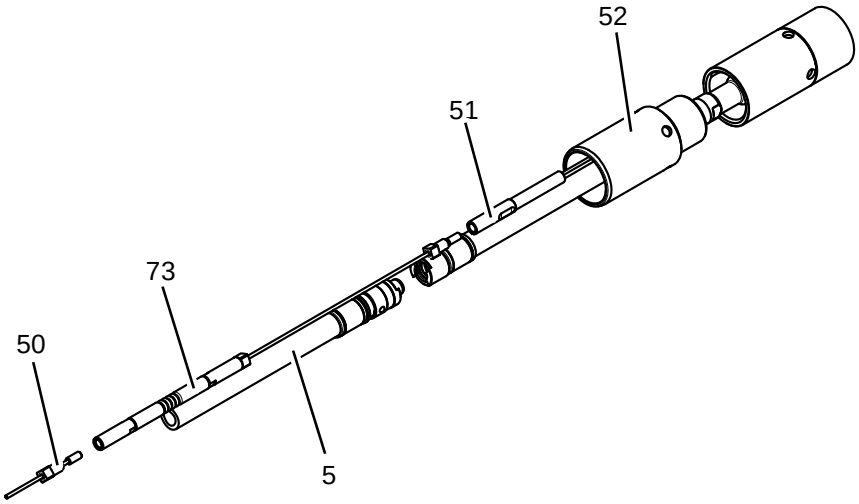


Fig. 2-5 Pull sleeve with cable connection

The plastic pipes to be pulled should be smooth on the outside and the inside and should not have any oversized sleeves (connections). it is recommended, to apply short pipes with plug sockets (s. fig. 2-6).

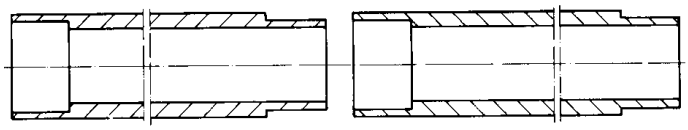


Fig. 2-6 Short pipes with plug sockets

2.3.4 Shock absorber

The shock absorber (54)

- is for the direct installation of steel pipes with threadings (53).
- buffers the hard strokes of the GRUNDOMAT P (1) Without the shock absorber, the threads of the steel pipes would be damaged after a very short period of use.
- protects the machine and avoids water flooding into the machine during drainage or (to a lesser degree) well drilling applications.

To know which type of shock absorber is available for which size of machine and pipe, please check in our accessories catalogue GRUNDOMAT P - in a special folder.

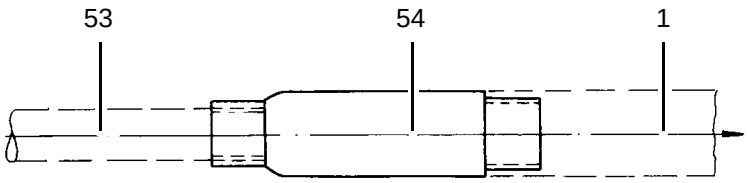


Fig. 2-7 Shock absorber

2.4 Tension plate and clamping plate

With the tension plate (GRUNDOMAT P-Type ≥ 95) or the clamping plate (GRUNDOMAT P-Type up to 85) pipe sections pushed on to each other are held together.

Cable clamp

The clamping plate consists of the following components:

- Pulling cable (not visible)
- Lock nut (65)
- Eyelet (68)
- Cable clamp (180)
- Retainer for the pipe (181)

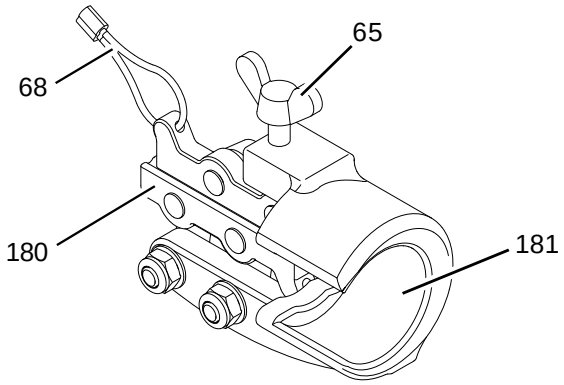


Fig. 2-8 Elements of the clamping plate

Tensioning plate

The tensioning plate consists of the following components:

- Pulling cable (50)
- Plug end for pull-in pipe (64)
- Lock nut (65)
- Clamp lever (66)
- Cable tension lever (67)
- Eyelet (68)
- Cable guide pulley (69)

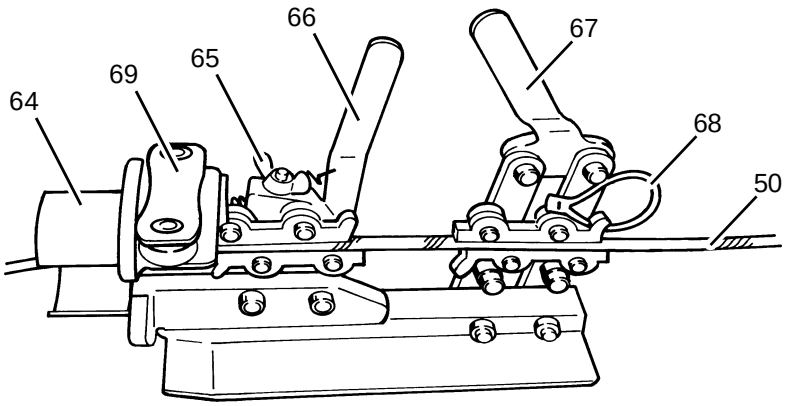


Fig. 2-9 Tensioning plate elements

2.5 Starting cradle

Due to the starting cradle the GRUNDOMAT P is given an exact guidance when running into the ground.
The starting cradle consists of the following components:

- non-return roller mechanism (30)
- Setting screws for the side fixation (31)
- Setting screws for the height adjustment (32)
- Guiding shells (33)
- Bore holes for ground stakes (36, only 3 are visible)

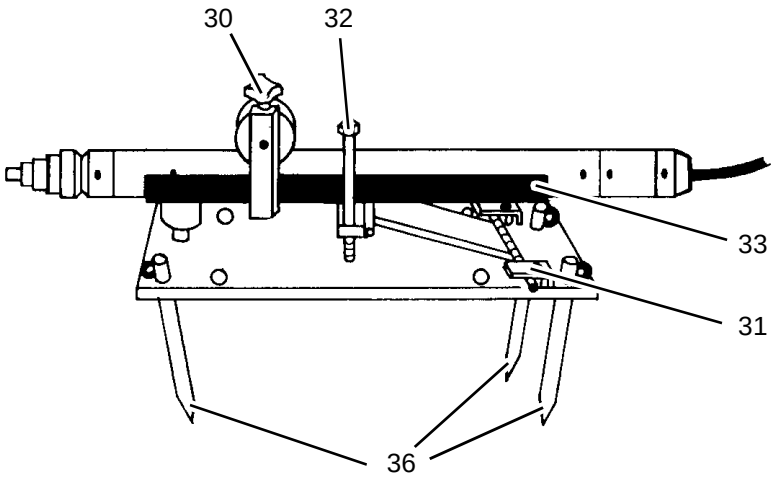


Fig. 2-10 Operating elements of the starting cradle for GRUNDOMAT P

Information!
The non-return roller mechanism is equipped with a reverse block, therefore it can only roll in the bore direction. Therefore this prevents any possible unwanted reverse movements of the GRUNDOMAT P.
If the GRUNDOMAT P is intended to run in reversem then the roller mechanism must be loosened.

2.6 Compressed air heater

The gas access of the compressed air heater is steered automatically, which means when the GRUNDOMAT P is switched off the gas flame is reduced to back burner. The compressed air heater consists of the following components:

- Cover (147)
- Ignition (148)
- Thermometre (149)
- Heating valve (150)
- Ignition flame valve (151)
- Ignition safety pilot (152)
- Burner (155)
- Flow switch valve (156)
- Stand with housing (157)
- Copper spiral (not visible)
- Pressure regulator with gas hose (158)

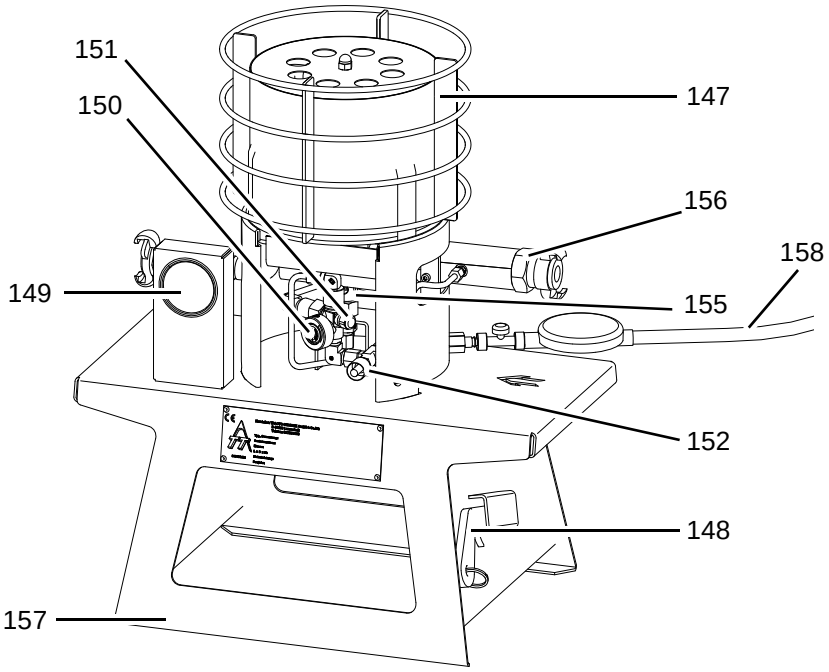


Fig. 2-11 Compressed air heater

2.7 Technical Data

Tab. 2-1 Technical data of the GRUNDOMAT P

Parameters		45 P	55 P	65 P	75 P	85 P	95 P	110 P	130 P
Length	mm	979	1103	1323	1443	1540	1732	1685	1750
diameter	mm	45	55	65	75	85	95	110	130
Weight	kg	9	14.4	25	34	46	65	96	117
No of strokes	min^{-1}	580	480	460	400	390	320	325	340
Air consumption	m^3/min	0.35	0.5	0.7	0.9	0.9	1.5	1.8	2.6
max. pipe-outer diameter without expander	mm	40	45	50	63	75	85	90	110
Noise capacity level LWA GRUNDOMAT P	dB (A)	105	107	109	109	109	110	112	115

Tab. 2-2 Technical data of theGRUNDOMAT P - Short version

Parameters		65 PK	75 PK	85 PK	95 PK	130 PK
Length	mm	1029	1243	1350	1532	1300
diameter	mm	65	75	85	95	130
Weight	kg	18	28	40	56	76
No of strokes	min^{-1}	640	460	480	360	370
Air consumption	m^3/min	0.65	0.8	0.7	1.3	2.4
max. pipe-outer diameter without expander	mm	50	63	75	85	110
Noise capacity level LWA GRUNDOMAT P	dB (A)	109	109	109	110	115

Information!
All GRUNDOMAT Types are equipped as a standard with a steel cable insulator on the pull sleve.

Tab. 2-3 Technical data of the lubricator

Parameters		GRUNDOMAT 45 P - 55 P	GRUNDOMAT 65 P - 110 P
Length x width x height	mm	345 x 170 x 190	500 x 220 x 240
Weight without oil	kg	4.5	9.5
max. operating pressure	bar	7	
Lubricator capacity:	l	1	3.5

Tab. 2-4 Technical data of the hose package

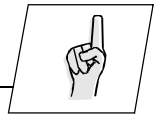
Parameters		45 P - 55 P	65 P - 75 P	85 P - 110 P	85 P - 110 P
Weight	kg	8.5	10.5	15	23
Nominal width	mm	13	19	25	25

Tab. 2-5 Technical data of the compressed air heater

Parameters		
Length	mm	520
Width	mm	340
Height	mm	640
Weight	kg	18
Gas consumption	kg/h	1.5
max. compressed air temperature	°C	120
Nominal heating capacity	kW	20

The GRUNDOSCOPE is available in the following lengths:

- 0.9 m up to 1.5 m
- 1.5 m up to 2 m



3 Safety

3.1 Scheduled types of application

The GRUNDOMAT P is only to be used

- to produce underground bores in penetratable soils, such as sand, loam, clay or soils with minor stone inclusions etc.,
- for the installation of supply and disposal pipes through the produced bore hole and
- to produce vertical bores from top to bottom e.g. for wells, sheet piling etc.

The GRUNDOMAT P must only be applied for a straight bore path.

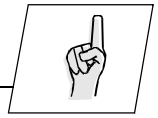
The GRUNDOMAT P must only be used with original accessories from from TRACTO-TECHNIK GmbH & Co. KG

The applied compressor together with the GRUNDOMAT P establish a complete unit.

For the scheduled type of application the appropriate application of the correct bursting tool is necessary.

Jobsite specific alterations to the GRUNDOMAT P or the accessories are not allowed without written permission from the manufacturer

To use the GRUNDOMAT P only for scheduled applications, it is necessary to pay attention to this complete operating manual.



3.2 Non-scheduled applications

Any other application of the GRUNDOMAT P, other than described in chapter 3.1, page 3-1 is non applicable.

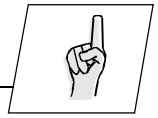
Especially

- the application of the GRUNDOMAT P, if the situation of any adjacent service pipes are known, as well as
- the vertical application of the GRUNDOMAT P from the bottom to the top

is not allowed.

The compressed air heater must not be applied inside closed rooms.

Use of the unit by insufficiently qualified personnel is not allowed. Tracto-Technik GmbH & Co. KG is not liable for any damages, caused by irregular applications.



3.3 Fundamental safetiness

When operating the machines the valid national health, work safety, -rules for prevention of accidents, fire regulations and environmental regulations must be paid attention to. Personnel operating the GRUNDOMAT P must be acquainted with these regulations.

Work with the GRUNDOMAT P must always be carried out circumspect and with care!

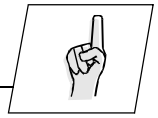
The operating manual must always be made available to the personnel, who are meant to work with the GRUNDOMAT P.

The responsibilities of the personnel must be determined before starting work.

If the operating behaviour of the GRUNDOMAT P changes, then the GRUNDOMAT P must be switched off immediately and secured before being re-started. The jobsite manager must be informed about the alteration.

Spare parts must be in accordance with the technical requirements set by Tracto-Technik GmbH & Co. KG. This is always guaranteed for when using original spare parts.

The maintenance rates indicated in the operating manual must be observed!



3.4 Personnel qualification

Personnel, who have to work with the GRUNDOMAT P, must:

- have been trained by TRACTO-TECHNIK GmbH & Co. KG and also by representatives, who have been authorised by TRACTO-TECHNIK GmbH & Co. KG.
- and who know the GRUNDOMAT P operating manual.

Personnel still to be instructed or personnel still doing their apprenticeship are only allowed to work with the GRUNDOMAT P under constant surveyance.

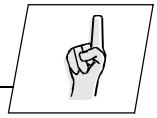
Only personnel older than 18 years of age are allowed to work with the GRUNDOMAT P independently.

The various activities on the GRUNDOMAT P require various personnel qualifications, which are listed in in table 3-1.

Tab. 3-1 Overview of the minimal personnel qualifications

Activities	Instructed personnel*)	Instructed personnel *) with the qualification “machine locksmith”	Tracto-Technik-Service technician	Jobsite supervisor
Head of assembly				●
Transportation	●			
Set-up, assembly	●			
Starting operation, operation, Putting out of action	●			
Disassembly	●			
Cleaning	●			
Mechanical works: Trouble-shooting, Repair and maintenance		●		
Work on the pneumatics Trouble-shooting, Repair and maintenance		●		
Disposal	●			

*) Instructed personnel have been trained by Tracto-Technik to operate the GRUNDOMAT P



The jobsite supervisor must absolve not only training through Tracto-Technik, but also in the field “earthwork method”. The person must have knowledge and supervision over:

- the possible dangers and how to prevent them
- securing the job-site
- using the correct personnel
- using the protection clothing
- the correct application of the accessories for the necessary job
- the complete range of functions of the GRUNDOMAT P
- the safety devices
- respecting the company’s conditions
- respecting the maintenance rates

Besides training by Tracto-Technik the operating personnel must have knowledge about:

- the possible dangers and how to prevent them
- securing the job-site
- using the protection clothing
- the safety devices
- respecting the company’s conditions
- the correct application of the tools and accessories for the necessary job.

Personnel, without this knowledge, or who can not operate the GRUNDOMAT P correctly must not be used for operation of the unit.

3.5 Working areas on the GRUNDOMAT P

The working areas on the GRUNDOMAT P are situated

- within the starting pit during the assembly and preparation work for starting to operate (e.g. setting up the starting cradle, aligning the GRUNDOMAT P),
- outside the starting pit when connecting the lubricator and UNITHERM and when operating/steering the GRUNDOMAT P.
- inside the atsrting pit for the connection of new pipes, when operating to press the PVS protection pipes when installing directly or when pulling in the pipes later,
- inside the target pit for disconnection of the GRUNDOMAT P or to assemble the pipes for later installation.

3.6 Safety indications and signs

Following safety indications and signs are attached to the GRUNDOMAT P.

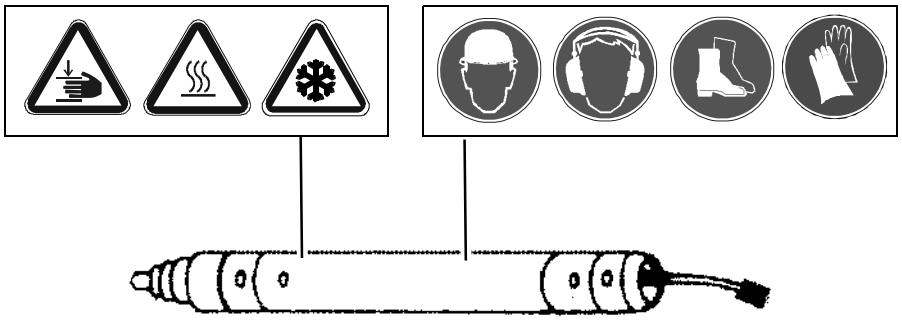


Fig. 3-1 Safety signs on the GRUNDOMAT P

Tab. 3-2 Safety signs on the GRUNDOMAT P

Safety indications, signs		Meaning
	Danger of bruises!	Between GRUNDOMAT P and the soil there is Danger of bruises!
	Hot Surface!	The GRUNDOMAT P can get hot, if the compressed air added is hot.
	Cold!	The GRUNDOMAT P can cool down considerably, if the compressed air inside the GRUNDOMAT P expands.
	Wear a protection helmet!	Danger due to machine falling down • during transport • during a non-scheduled application • when stored
	Wear protection gloves	
	Use ear protection!	Due to very loud noise developing you can damage your ears.
	Use insulated protection gloves!	The protection gloves are meant to protect you against power guiding parts, hot or cold parts, as well as crushing injuries.

The following safety signs are attached to the starting cradle, the compressed air heater, the lubricator and the tensioning plate. They must be checked regularly. If the safety signs on the starting cradle, the compressed air heater, lubricator and the tensioning plate are unreadable. then they must be replaced.

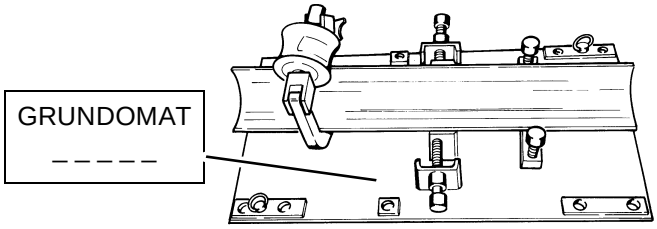


Fig. 3-2 Sign on the starting cradle

Tab. 3-3 Sign on the starting cradle

Safety indications, signs	Meaning
GRUNDOMAT – – – – –	The sign indicates, which GRUNDOMAT Type fits on the starting cradle.

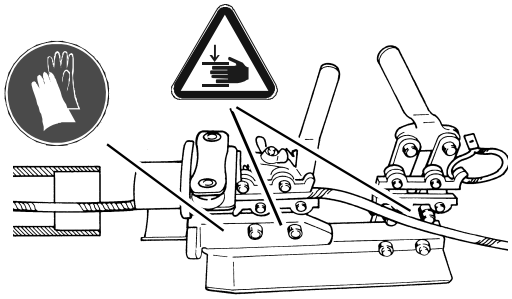


Fig. 3-3 Safety signs of the tensioning plate

Tab. 3-4 Safety signs of the tensioning plate

Safety indications, signs		Meaning
	Danger of bruises!	There is a danger of crushing on th clamping jaws of the tensioning plate and the pipe pieces to be pushed together.
	Wear insulated protection gloves (s. fig. 3-8, page 3-15)	Danger of injury on the pulling cable

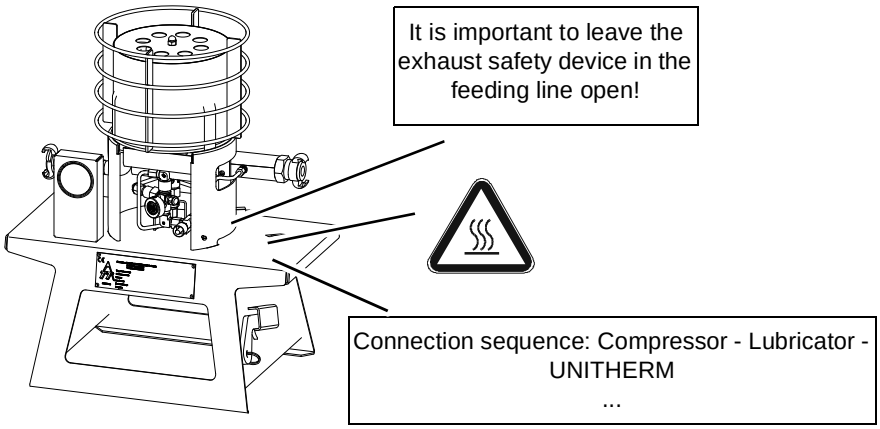


Fig. 3-4 Safety signs on the compressed air heater

Tab. 3-5 Safety signs on the compressed air heater

Safety indications, signs		Meaning
	Hot surfaces!	The compressed air heater can get hot.
It is important to leave the exhaust safety device in the feeding line open!		Make sure that the exhaust safety device of the feed line is open.
Connection sequence: Compressor - Lubricator - UNITHERM ...		The sign indicates, how and in which sequence the compressor, lubricator and UNITHERM are to be connected.

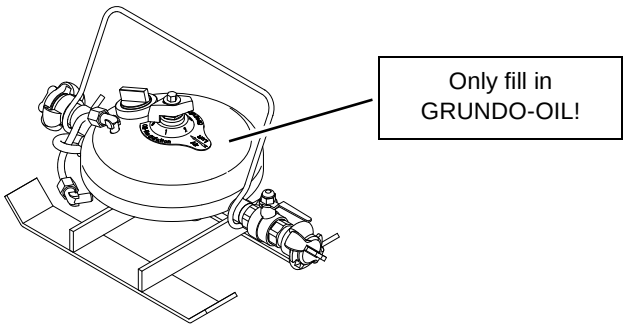


Fig. 3-5 Signs on the lubricator

Tab. 3-6 Safety signs on the lubricator

Safety indications, signs	Meaning
Only fill in GRUNDO-OIL!	Only fill in GRUNDO-OIL into the lubricator.

3.7 Protection devices on GRUNDOMAT P

The following safety device is available on GRUNDOMAT P:

Lubricator

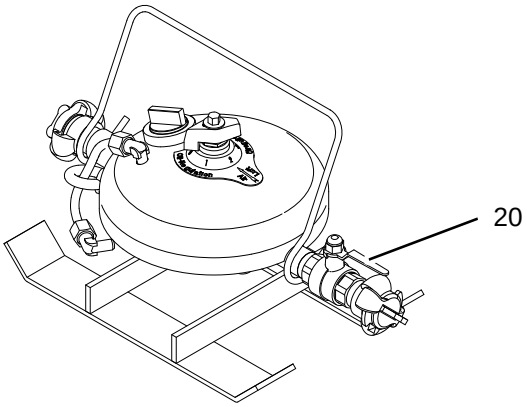


Fig. 3-6 Safety device on the lubricator

Tab. 3-7 Safety device on the lubricator

Item	Safety equipment	Function
20	Ball-valve	Switches the GRUNDOMAT P into position “Closed” pressure-less

Behaviour in case of emergency!

In emergencies switch the GRUNDOMAT P immediately to pressure-less, by setting the red ball valve (20) on the lubricator to the position “Closed”. The GRUNDOMAT P will slowly run down. After the GRUNDOMAT P has come to a standstill the compressed air system between lubricator and GRUNDOMAT P is pressure-less.

Danger!
If the GRUNDOMAT P gains contact underground with electrical cables, then the accessories, such as the pulling cable, lubricator, tension plate, clamping plate can carry electric current. Risk of danger!
Wear insulated protection gloves and electrician safety boots, if you have to touch one of the parts.

3.8 Dangers when working with the GRUNDOMAT P

Dangers can arise when working with the GRUNDOMAT P. Pay attention to the following described warnings.

The following dangers could occur when working in the ***starting pit*** with the GRUNDOMAT P:

Danger of bruises!

- between GRUNDOMAT P and soil during the forward movement into the bore path and during reverse
- on the clamping jaws of the cable winch of the tensioning plate
- when the pushing pipe sections together with the tensioning plate

Do not reach or step into the danger area!
Only personnel necessary for the operation should be situated in the starting pit (normally one person)!
If you must enter the starting pit during operation, then do not stand behind the GRUNDOMAT P, only to the side of it!
Leave the starting pit before starting to operate the GRUNDOMAT P!

Danger!
Danger due to the GRUNDOMAT P falling down in a bore path, which slanted leads upwards. If the GRUNDOMAT P is not held with sufficient resistance then it can fall down.
Use a sufficiently dimensioned resistance when starting the GRUNDOMAT P in bore paths leading upwards.
Wear a protection helmet and protection gloves.

Warning!
Danger of injury due to tensioning plate quickly moving backwards, if the winch cable should tear.
During the operation do not stand behing the GRUNDOMAT P or behind the tensioning plate.

Warning!
Danger due to friction on winch cable.
Wear protection gloves

To avoid dangers, switch the GRUNDOMAT P pressure-less and switch off the compressor when working in the starting pit.!

The following dangers could occur when working in the ***target pit*** with the GRUNDOMAT P:

Danger of bruises!

- between GRUNDOMAT P and soil upon arrival in the target pit
- when reversing between soil and GRUNDOMAT P

Do not reach or step into the danger area!
Only personnel necessary for the operation should be situated in the target pit (normally one person)!
If you must enter the target pit during operation, then do not stand behind the GRUNDOMAT P, only to the side of it!

To avoid dangers, switch the GRUNDOMAT P pressure-less and switch off the compressor when working in the target pit.

Give the operator in the starting pit a signal, once the bursting operation can be started without any danger and no further personnel are situated in the target pit.

The following dangers can be found on the whole jobsite:

Danger!
Danger of injury due to components breaking away when loosening the reverse cone or pull sleeve with a hammer and spanner!
Only trained personnel are allowed to work with the GRUNDOMAT P !
Wear protection glasses.

Warning!
Danger due to the GRUNDOMAT P exiting the soil at an unexpected point.
Align the GRUNDOMAT P out carefully on the starting cradle to reach the target pit. To do use the GRUNDOSCOPE with aiming frame.

Danger!
GRUNDOMAT P can be hot. Danger of skin burning!
GRUNDOMAT P can be very cold on the outside due to compressed air expanding in the interior.
Wear protection gloves!

Danger!
Compressed air heaters can get hot Danger of skin burning!
Wear protection gloves!

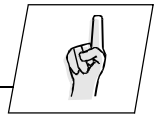
Danger!
Danger of injury to ears due to very loud noise developing
wear ear protection!
Set up the compressor as far away as possible from your working area.

Danger of stumbling

- over compressed air hoses
- over lubricator connection hose
- into the pits
- over the new pipe
- over tools and accessories

Always work with circumspect and care! Look out for any obstacles!
Pay attention to jerky movements of the pneumatic hoses!

Wear protection clothing!



3.9 Danger due to adjacent lines and pipes

During the bore process there is danger of damaging adjacent lines!
Plan the jobsite before starting the operation carefully with the check-list in the attachment (s. chapter 13.1, page 13-1).

Preventing dangers

To prevent any dangers in advance, a survey during the jobsite planning should be carried out about installed pipes and line within the jobsite area at the respective boards e.g.:

Over installed	*service lines you will get information at:*
• Telephone cable	Telephone exchange, private operator
• Electric cables	Power supply companies
• Gas pipes	Gas supply companies
• Water pipes	Water supply companies
• Sewage pipes	Water supply companies
• Oxygen pipes	Gas service companies
• Protection pipes	Private operators, Utility companies

In case of danger take action

The following dangers can arise by service lines, which are situated in the bore path, if they are damaged. In case of damages, depending on the type of pipe, various measures must be carried out. If it is not clear, where the pipe is situated, then a pit must be opened in the expected area and then the exact position of the pipe can be determined.

Telephone cable

In case of a damage do not look into a glass-fibre cable. Danger of injury to the eyes!

1. Pay attention to cable protection instructions of Telecommunication companies.
2. Notify the local telecom.

Electric lines

Danger due to electrical power!
If the GRUNDOMAT P gains contact underground with electrical cables, then the accessories, such as the pulling cable, lubricator, tension plate, clamping plate can carry electric current. Risk of danger!
Do not touch the GRUNDOMAT P and the accessories!
Warm people against touching the GRUNDOMAT P as well as the accessories.

If you can not be sure of avoiding contact with an electric cable, then apply compressed air hoses with textile inserts (5) and the insulation adapter (73).

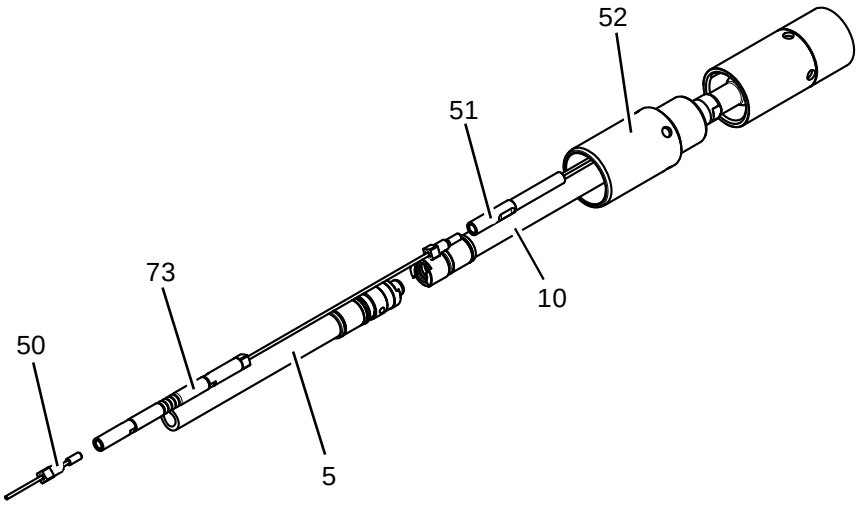


Fig. 3-7 Insulation adapter (73)

In applications, where there is a danger of the GRUNDOMAT P or the accessories making contact with electrical cables, then put on the following personal safety equipment before starting work:

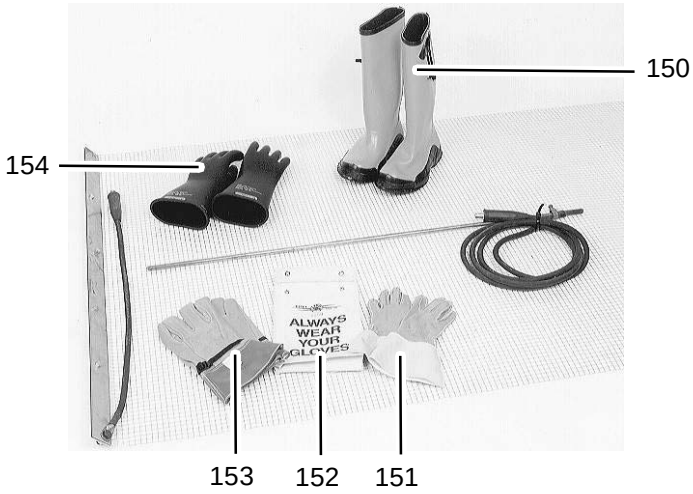


Fig. 3-8 Personal protection equipment in case of danger due to contact with power guiding parts

Tab. 3-8 Personal protection equipment in case of danger due to contact with power guiding parts

Item number	Object
150	Electrician safety boots
151	Inner gloves GL
152	Glove bag
153	Protection gloves GP 4
154	Rubber gloves

Before starting to operate the operating personnel must be wearing the following:
Protection helmet, protection glasses, protection clothing, the electricians-safety boots (150) and the three pairs of gloves over each other in this sequence: Inner glove GL (151), rubber glove (154), protection glove GP 4 (153).

Also, pay attention to the following indications:

1. Pay attention to cable protection instructions of utility companies.
2. Prevent entrance for non authorised persons.
3. Inform the respective utility company
4. Only touch the GRUNDOMAT P and the accessories, after the electrical cable has been switched off by the utility company.

Gas pipes

Danger of explosion!

1. Do not operate with open fire (lighters).
2. Shut down all motors (engines).
3. Do not operate electric buttons or withdraw cable plugs.
4. Secure the damage area.
5. Prevent entrance for non authorised persons.
6. Contact utility company.
7. Contact police, fire brigade, ambulance.
8. Make access for the fire-brigade, ambulance and the fault-clearing service.

Water pipes

1. Close the closing valve.
2. Contact utility company.

Sewage pipes

Danger of falling!
Do not enter into manholes or the canalisation.
Only enter the manhole with an expert or suitable equipment.

Danger!
Poisonous gas!
Use a gas warning device and safety mask!

3.10 Working in manholes and pits

When working in manholes pay attention to the following warnings:

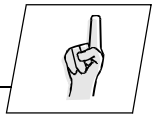
Danger!
Deeper starting and target manhole or deep starting and target pit.
Danger of injury due to falling.
Danger of stumbling when stepping on ladders or stepladders or loose step grids.
Construction faults, such as incorrectly installed grids or unstable ladders cause a danger of stumbling.

In deep starting and target manholes or starting and target pits

- determine the height of the starting and target manhole or starting or target pit,
- Pits and trenches with a depth of more than 1,25 m are only to be entered and left via appropriate facilities (steps, ladders, manhole steps),
- use a safety device when working at a starting depth of > 2 m.

If the danger of injury in deep shafts or pits can bot be prevented with any technical aids, then wear personal protection equipment against falling or in order to hold and save.

The personal protection equipment to hold and save consists of a safety belt or examined safety trousers with connection means, as well as buffering connection means (fall buffer, height security device). These are generally applied with rope and abseiling equipment and recovery lifting device or winch with sling attachment devices.
The personal safety equipment must be in accordance with the EU-guideline 89/686/EWG.
To apply personal safety equipment please pay attention to the EU guideline 89/656/EWG. Pay attention to the national regulations in the application field of the GRUNDOMAT P.



Danger!
Lack of oxygen can cause suffocation!
Gas-air mixtures can cause explosions or inflammation.
Contact with very poisonous, poisonous or less-poisonous (hazardous) materials via the skin, the mouth or by breathing in can lead to poisoning and also to death.
Bacteria or life-forms and their metabolic products as well as dirtiness can lead to infections.

1. Measure the oxygen content within the manhole repeatedly with single tests or with continuous tests with acoustic and optical signals. Sufficient exhaust is given when the available gasses or steam dilutes in the surrounding area, so that
   - the oxygen content is more than 19 Vol.-%,
   - the concentration of inflammable gasses or steam is below 10 % of the lower explosion limit and
   - the hazardous concentration of poisonous gasses or steam is prevented (pay attention to the maximal working area concentration value (MAK) and technical directive concentration values (TRK)).
     Carry out a written report of the measuring data recorded, if you discover any poisonous gasses or steam.

   If necessary set up a technical ventilation!

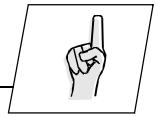
   A technical ventilation could be seen as sufficient, when for example a canal with an air flow of 600 m^3/h and m^2 canal cross section is provided. Ventilation with pure oxygen or air enriched with oxygen is not allowed.

2. If hazardous gasses or steam or lack of oxygen can occur, then always use a suitable safety mask!

3. Only enter the manhole under the observation of an expert.

4. As long as the danger of an explosive atmosphere in dangerous quantities can not be excluded,
   - then work with dangers of ignition can not be carried out,
   - no resources should be applied, which could cause danger of ignitions.

The above mentioned values are in accordance to German regulations! Pay attention to the national regulations in the application field of the GRUNDOMAT P !



Secure the starting and target manholes or starting and target pits as follows:

- Holes in the ground must be secured with appliances, (e.g. shaft covers after comleting work) so that people can not fall into them. The openings are to be sealed off or covered with an unmovable cover.
  Frozen shaft covers must not be thawed open with an open fire!
  Uncovered shaft covers must be secured against getting shut by mistake!
- The working area close to public roads or railway tracks must be secured with barriers, safety posts or signal devices.
- When working in pits and trenches the ground and rock walls must be escarped, so that people can not be endangered by any soil masses side-slipping. All influences must be taken into consideration, which can cause a drawback to the standing security of the ground (rain, vibrations etc.).

Pay attention to the following instructions:

- When working in shafts, always have a second person working at the surface for safety reasons. This second person should constantly have visual connection with you, but at least be within range of hearing each other.
- Always wear a catch belt or recovery trousers when entering the shaft. Secure the shafts with a depth of > 2 m with a safety rope, to be able to carry out a quick recovery in case of an emergency.
- The safety catch belt, safety trousers or safety rope must be secured against loosening at all costs.
- Make sure that at least one of the working group has had first aid training.

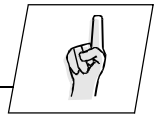
3.11 Behaviour in case of emergency!

Danger!
If the GRUNDOMAT P gains contact underground with electrical cables, then the accessories, such as the pulling cable, lubricator, tension plate, clamping plate can carry electric current. Risk of danger!
Wear insulated protection gloves and electrician safety boots, if you have to touch one of the parts.

1. Switch off the GRUNDOMAT P by shutting off the compressed air by closing the ball valve to control the compressed air quantity yourself. Switch off the compressor.
2. Depending on pipe or cable type carry out the suitable measures (s. chapter 3.9, page 3-13)!
3. Notify the owner/operator of the cable.
4. Estimate the type and extent of the damage.
5. Warn passer-bys and house occupants and keep them away from the site.

Have the cause cleared.

After the emergency you can switch the compressor back on.
Only re-start the GRUNDOMAT P after clearance of the cause.



3.12 Behaviour in case of accidents with bodily damage

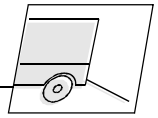
1. Switch off the GRUNDOMAT P immediately.

2. Administer first aid.
   - protect the injured.
   - move the injured into a safe position.
   - talk calmly to the injured person.
   - Administer first-aid treatment.

3. Report the accident via phone or radio: fire-brigade, ambulance, company management

Keep the details short and precise about:
- Place of accident
- Course of events
- Number of injured
- Types of injuries
- Your own name

4. Secure the accident area
   - Prepare access for the ambulance
   - Secure the accident area (warning lights, flags, signals)
   - Secure the pits
   - Safely store components
   - Extinguish possible fire



4 Transportation

4.1 Transport with lifting device

Conditions

- The lifting device (crane) must have sufficient loading capacity, weights (s. chapter 2.7, page 2-10).
- A sufficiently dimensioned belt and sufficiently dimensioned and permissible transport clamps from Tracto-Technik must be ready for use (s. chapter 2.7, page 2-10).

Preparations for transport

If you want to transport the GRUNDOMAT P, without working with it beforehand, then read further in this chapter under ***Transportation***.
If you want to transport the GRUNDOMAT P after working with it, then you must carry out the following preparations.

- Switch off the compressor and wait until the pressure has been completely relieved.
- Loosen the compressed air hose.
- The turning knob on the lubricator must be in position “0”.
- Loosen the lubricator connection hose.
- Place the protection caps on to the connections.

Transportation

Warning!
GRUNDOMAT P can fall down!
never lift or carry the GRUNDOMAT P by the connection hose!

Load the GRUNDOMAT P onto the truck and down from the truck as follows:

1. Check the belt and the transport clamps. Make sure that:
   - the metal inserts, collars and transport clamps are not bent,
   - the swaging is not faulty,
   - the central eyelet is intact,
   - the safety latches on the hooks are fully functional,
   - no rust is visible,
   - the belt and the transport clamps are suitable for the load.

2. Tighten the transport clamps to the GRUNDOMAT P.
3. Connect the transport clamps with the lifting device.

Danger!
Suspended loads! Do not stand under any suspended loads!

Wear protection clothing!

During the lifting process beware of power cables!

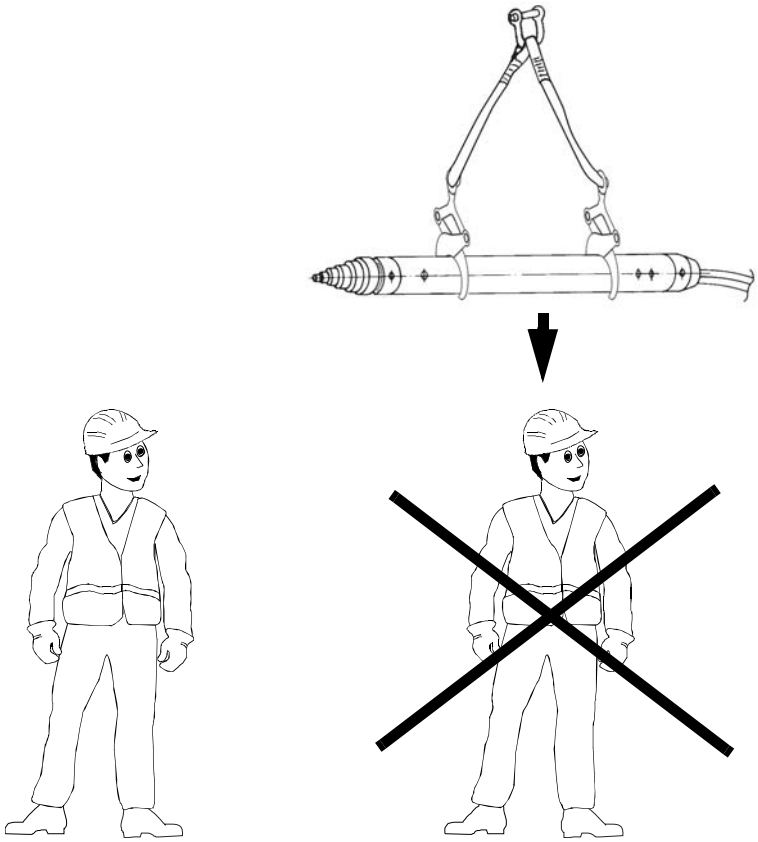
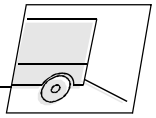


Fig. 4-1 Transport process of the GRUNDOMAT P.



Risk of fatal danger!
Lowering GRUNDOMAT P.
No personnel should be situated in the starting pit!

4. Lift the GRUNDOMAT P carefully and transport it to the requested place.

Danger!
Suspended loads! Falling starting cradle!
Do not stand under any suspended loads!

5. Transport the starting cradle separately in the same procedure with belt and lifting device and place it inside the starting pit.
6. Transport the accessories, such as the lubricator, compressed air heater UNITHERM or hose package manually and if necessary with a second person.
7. Place the lubricator and compressed air heater down outside the starting pit. The compressed air heater must be set up at a safe distance from the starting pit.

4.2 Transport with vehicle

Conditions

- Pay attention to the permissible total weight of the truck.(s. chapter 2.7, page 2-10)

Transportation

Transport the GRUNDOMAT P and the accessories on a truck as follows:

1. GRUNDOMAT P and the accessories must be loaded and tightened to wooden pallets.
2. Load the wooden pallets onto the truck.
3. Tighten the wooden pallets with tensioning strops to the fastening means on the truck surface.
4. Load the hose package, so that they can not get squashed. (Pay attention to the minimal bending radius!).
5. Make sure that no loose parts are placed on the loading surface.

The driver must pay attention to the safety instructions of the truck manufacturer as well as instructions regarding the transportation of loads.

No loose parts are allowed on the loading surface! Otherwise, there is danger of loads falling down or damages can be caused!

5 Set-up and installation

5.1 Planning of the jobsite

It is recommended to plan the jobsite by using the check list in the annexure (s. chapter 13.1, page 13-1).

5.2 Conditions for the jobsite

The whole jobsite must be sealed off against unauthorized people.
Set up a sign with the following text:

"JOBSITE - Entrance for unauthorized persons prohibited!"

When working in daylight and at night time the jobsite area must be lighted up to at least 100 Lux.

5.2.1 Minimal cover of the GRUNDOMAT P

By minimum cover we understand the distance between the machine casing and the road surface.

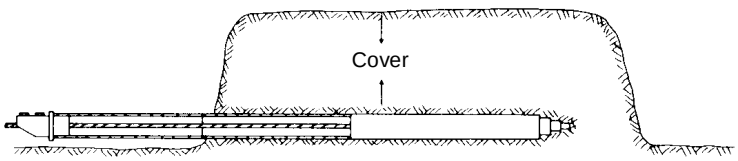


Fig. 5-1 Cover

During the bore GRUNDOMAT hammers displace the soil into the surrounding ground. GRUNDOMAT P - soil displacement hammers are designed with a reciprocating chisel head due to which the compaction area around the chisel head is less compacted and less cover is therefore required.

However, depending on the soil configuration and hardness a certain minimum cover is required to avoid any lifting of the surface.

To prevent surface damage, wei recommend the following thumb rule to calculate the minimal cover above the machine casing:

Minimum cover = 10 x diameter of the GRUNDOMAT P

Information!
Please pay attention to the following special regulations by utility companies If uncertain please contact the relevant utility company.

5.2.2 Pit dimensions

The pit must at least have the following dimensions:

- Width:
  min. 1000 mm for machines and working area for the operating personnel next to the starting cradle
- Depth:
  min. 10 x Diameter of the GRUNDOMAT P (minimal cover) + additional installation depth for starting cradle
- Length:
  variable, depending on the length of the GRUNDOMAT P, the bore path depth, the pipe outer diameter and the length of the pipe lengths to be installed
- side distance between two or more pressings:
  Min. 4 x diameter of the GRUNDOMAT P

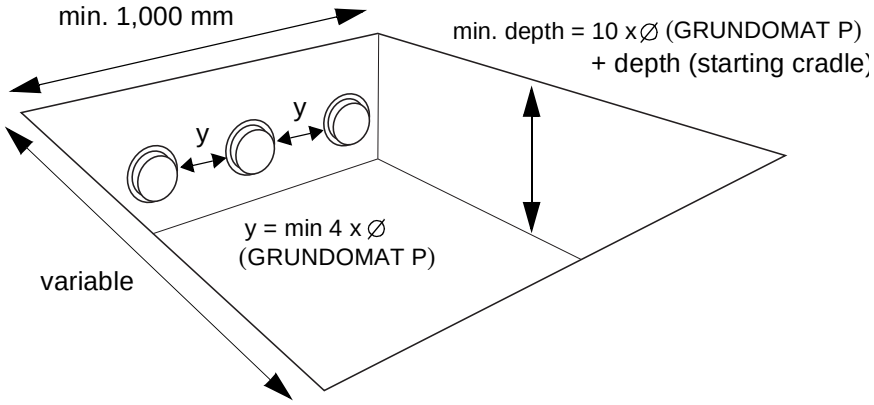


Fig. 5-2 Pit dimensions

The machine pit must be in a condition to take the load of the GRUNDOMAT P and the operating personnel.

5.2.3 Securing the pit

Danger!
Danger of stumbling in the pit !
Pay attention to the following regulations:

- Holes in the ground must be secured with appliances, (e.g. shaft covers after comleting work) so that people can not fall into them. The openings are to be sealed off or covered with an unmovable cover.
  Frozen shaft covers must not be thawed open with an open fire!
  Uncovered shaft covers must be secured against getting shut by mistake!
- The working area close to public roads or railway tracks must be secured with barriers, safety posts or signal devices.
- When working in pits and trenches the ground and rock walls must be escarped, so that people can not be endangered by any soil masses side-slipping. All influences must be taken into consideration, which can cause a drawback to the standing security of the ground (rain, vibrations etc.).

5.3 Assemble before starting every operation

Before starting every operation

- the suitable connection part must be assembled to the GRUNDOMAT P,
- the connection hose must be connected,
- the lubricator must be checked,
- fasten the starting cradle with the ground stakes inside the starting pit.
- the GRUNDOMAT P is aligned to the target pit.

5.3.1 Replacement of add-on accessories GRUNDOMAT P

One of the following connection parts must be assembled to the GRUNDOMAT P.
The choice depends on the soil conditions, bore length and type of bore:

- Reverse cone (standard in the delivered package) for blind bores as well as for soils, which do not collapse when being penetrated
- Pull sleeve with cable connection for the direct installations of PVC protection pipes or steel pipes without threadings
- Cutting cone for direct installations
- Shock absorber for direct installation of steel pipes with threadings

Information!
The accessory suitable for each GRUNDOMAT P types can be taken from the GRUNDOMAT P - accessory list in a special folder.

To assemble the connection parts proceed as follows:

1. Tension the GRUNDOMAT P in the work bench or place the GRUNDOMAT P on solid ground.
2. Clean the casing bores for the c-spanner on the GRUNDOMAT N and tighten the GRUNDOMAT P with a c-spanner (58 in fig. 5-3).
   Pay attention that the shank screw of the c-spanner does not touch the base of the casing bore, so that no dents can be caused on the casing.

Danger!
Danger of burns on the gas burner.
Wear protection gloves and protection clothing!
Work with care.

3. To protect the elastic block, heat up the threaded area very quickly with a gas burner.

Danger!
Danger of injury due to components breaking away!
Only trained personnel are allowed to work with the GRUNDOMAT P !
Wear protection glasses.

4. Strike with a second c-spanner (59 in fig. 5-3) and a hammer (60 in fig. 5-3) the component loose (here the reverse cone, 46 in fig. 5-3). Loosen the thread quickly.

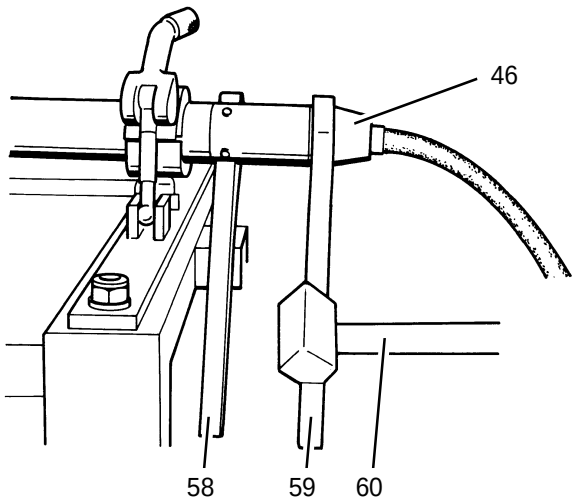


Fig. 5-3 Replacing add on accessories

5. Clean the thread of the casing (61 in fig. 5-4) thoroughly with a wired brush.
6. Wash down the threading of the component to be screwed on (46 in fig. 5-4) with a cold cleaning solvent.
7. Screw the component approx 1/4 of the threads into the casing of the GRUNDOMAT P.
8. Add adhesive to the thread of the component and the casing in accordance to the seperate repair instruction manual.

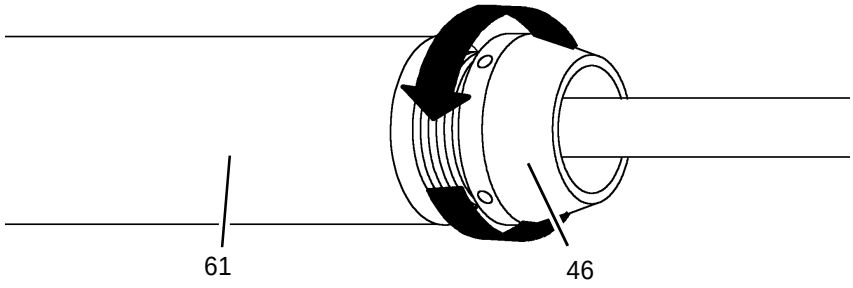


Fig. 5-4 Glue in the threading.

9. Tighten the component with a c-spanner (59) and a hammer (60) similar to fig. 5-3. Pay attention to the hammer weight when doing so.

Tab. 5-1 Hammer weights

GRUNDOMAT P	Hammer weight
45 P	0.5 kg
55 P	2 kg
65 P	2 kg
75 P	2 kg
85 P	2 kg
95 P	3 kg
110 P	3 kg

Information!
The striking forces can only be transfered without causing any damages, when the components are tighten.

5.3.2 Attaching the cutting cone

1. Cut or saw the PE pipe to the required length.
2. Place the PE pipe on the ground.
3. Pull the compressed air hose through the PE pipe.
4. Connect the hydraulic hose according to chapter 5.4.1, page 5-11 and GRUNDOMAT P.
5. Assemble the cutting cone to the GRUNDOMAT P according to chapter 5.3.1, page 5-4. Pay attention to the adhesive instructions in the separate repair manual.
6. Place the GRUNDOMAT P together with the start of the PE pipe on the supports and then turn the GRUNDOMAT P or the PE pipe (depending on the pipe length). Doing this the the cutting cone (63) cuts into the PE pipe.
7. Connect the compressed air hose according to chapter 5.4.1, page 5-11 to the lubricator.

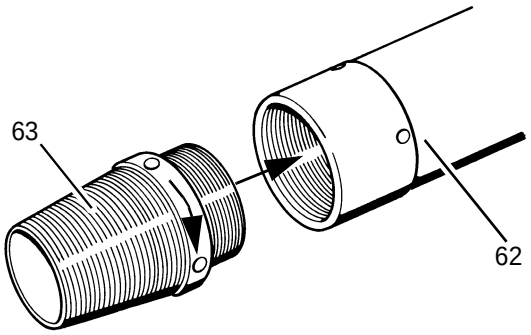


Fig. 5-5 Cutting cone with GRUNDOMAT P

5.3.3 Attaching the pull sleeve

1. Pay attenton that the pipes to be pulled in have smooth inner and outer surfaces.
   The pipes to be installed must not have any oversized sockets! it is recommended, to apply short pipes with plug sockets (s. fig. 5-6).

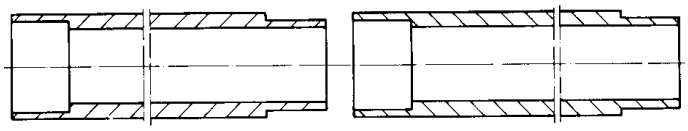


Fig. 5-6 Short pipes with plug sockets

2. Thread the pipe lengths on to the pulling steel cable (50) and the compressed air hose.
3. Screw the steel cable (50) to the insulation adapter (73) of the pull sleeve (52) and tighten the screwing with a spanner.
4. Connecting the compressed air hose (5) with the connection hose (10).
5. Plug the first pipe length into the pull sleeve (52).
6. Tighten the pulling steel cable (50) and the compressed air hose (5) together (e.g. with sticky tape)

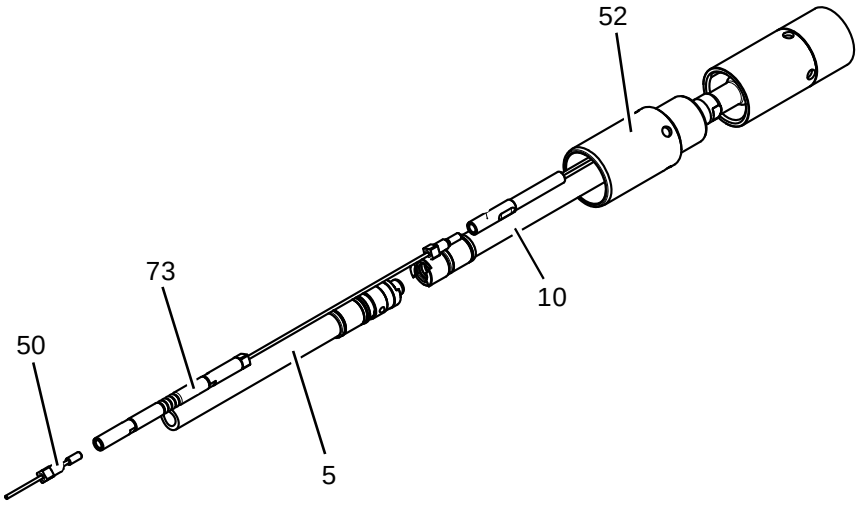


Fig. 5-7 Pull sleeve with cable connection

Using the pulling cable and the tension plate the pipes are tensioned for the installation process.

5.3.4 Preparing the steel pipes without threads

Steel pipes without threads can also be pulled in, as well as plastic pipes with inner sleeves by using the pull sleeve.

Pay attention that the steel pipes have a smooth outer surface. If necessary saw off any extruding socket connections and weld the pipes on.

Information!
We recommend to grease with GRUNDO-OIL to the outsides of the steel pipes, in case of longer distances and strongly binding soils. This improves the sliding rate.
Please apply only biodegradable greasing means!

Proceed according to chapter 5.3.3, page 5-8.

5.3.5 Attaching the shock absorber

To directly install steel pipes with threads, please proceed as follows:

1. Check the threading of the casing for any dirt and clean the threadings with a wired brush.
2. Assemble the shock absorber (54) to the GRUNDOMAT P (1) (s. chapter 5.3.1, page 5-4).
3. Screw the first steel pipe section (53) to the shock absorber (54) and securely tighten it.

Fig. 5-8 Shock absorber with connected steel pipe

5.3.6 Expanded bores / ramming

Apply an expander (s. fig. 5-9) for the installation of pipe cross-sections, which are larger than the machine diameter of the GRUNDOMAT P.

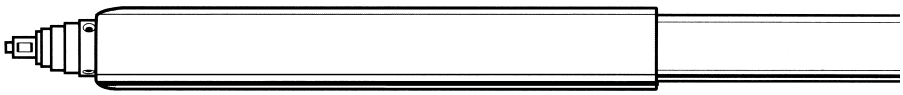


Fig. 5-9 Expander bore with an expander

Apply an add-on cone (s. fig. 5-10) for the ramming of steel pipes.

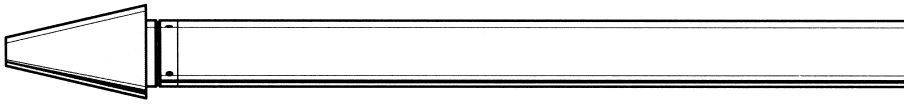
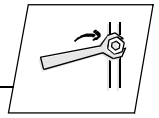


Fig. 5-10 Add-on cones for steel pipe ramming



5.4 Installation

5.4.1 Connection to the air compressor

Danger!
Danger of injury to ears due to very loud noise developing
wear ear protection!
Set up the compressor at a safe distance The connection hoses must only be extended with original hoses.

For the operation of the GRUNDOMAT P please use a compressor with sufficient air supply and pay attention to the maximal operating pressure (s. chapter 2.7, page 2-10)!

To connect the compressor only use connection hoses and couplings from TRACTO-TECHNIK GmbH & Co. KG.

Pay attention to the following regulations!

When installing the hydraulic hoses pay attention that:

- personal damage due to striking hydraulic hoses is prevented,
- that the minimal bending radius does not fall short,
- that the connection hoses are not squashed or bent,
- that the connection hoses are not placed over sharp edges,
- that the connection hoses do not touch any hot surfaces when in operation,
- that their natural position and mobility is not hindered,
- that the connection hoses are not strained by tension, torque and deformation during operation due to external influences,
- that the connection hoses are protected from external mechanical, thermal or chemical influences.

Use hose protection ramps at jobsites, where pedestrians, road and jobsite traffic is anticipated.

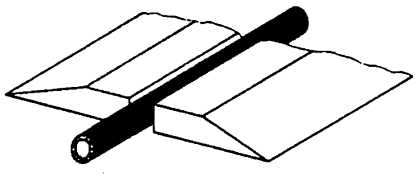


Fig. 5-11 Hose protection ramp

Connection hoses must be placed and secured, so that no danger during later operations can be prevented.

Danger can occur for instance due to

- striking, jolting movements during the operation,
- hose hitting-out after tearing off, e.g. due to outside influence.

Pay attention that the hose couplings are locked correctly, before starting to operate the GRUNDOMAT P.

5.4.2 Connection without compressed air heater

For this work the following dangers can occur:

Danger!
Danger of injury due to compressed air!
Keep the compressed air hose away from your body.
Do not point the compressed air hose in the direction of other people.

Warning!
Loud air noises!
wear ear protection!

The components are connected in this sequence:

1. Make sure that the compressor is switched off, or that the ball valve of the compressor is closed.
2. Connect the mody hose coupling of the lubricator connection hose with a 1/4 - turn on the compressor (9) and tighten the hose ring.

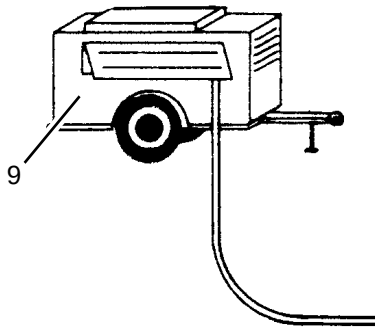


Fig. 5-12 Connection without UNITHERM

3. Hold the end of the lubricator connection hose tight during cleaning.
4. To clean the lubricator connection hose blow air through it, by switching on the compressor (9) (see operating manual of the compressor).
5. Switch off the compressor (9) again.

6. Connect the mody hose coupling of the lubricator connection hose with a 1/4 - turn on the lubricator (2) and tighten the hose ring.
7. Screw the hose nipple of the compressed air hose to the outlet (25) of the lubricator.

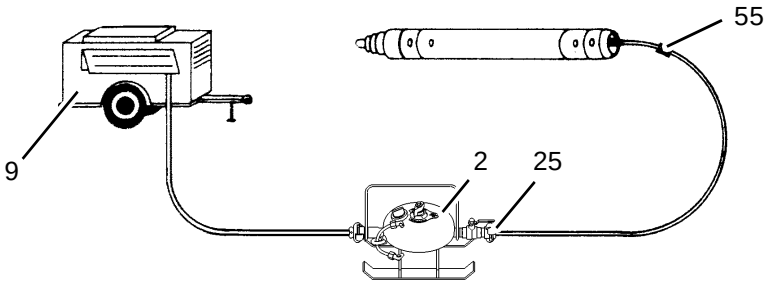


Fig. 5-13 Connection without UNITHERM

8. Hold the end of the hose end of the compressed air hose tight during cleaning.
9. To clean the compressed air hose blow air through it, by switching on the compressor (9) (see operating manual of the compressor).
10. Switch off the compressor (9) again.
11. Screw the hose socket of the compressed air hose to the hose nipple of the connection hose (55).

Information!
When operating in sandy or wet soils, a plastic tape should be used around the couplings to avoid them from getting dirty. This makes it easier to disconnect the hoses.

5.4.3 Connection with compressed air heater

The compressed air produced by the compressor slackens in the GRUNDOMAT P and therefore cools down. Air moisture condenses and in low outer temperature and/or high humidity an outer ice layer could occur on the GRUNDOMAT P, which could influence or even stop the propulsion.

Therefore, in outer temperatures of < 5 °C apply the compressed air heater UNITHERM. To do so install the UNITHERM (7) between the lubricator (2) and GRUNDOMAT P (1).

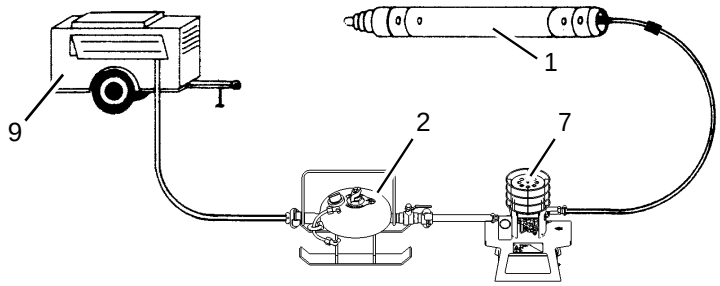


Fig. 5-14 Connection with UNITHERM

Danger of explosion!
Pay attention that the compressed air temperature does not rise to > 100 °C. Check regularly the temperature indicator on the UNITHERM. It is important to follow the instructions in the UNITHERM operating manual.

For this work the following dangers can occur:

Danger!
Danger of injury due to compressed air!
Keep the compressed air hose away from your body.
Do not point the compressed air hose in the direction of other people.

Warning!
Loud air noises!
wear ear protection!

The components are connected in this sequence:

1. Switch off the compressor.
2. Connect the mody hose coupling of the lubricator connection hose with a 1/4 - turn on the compressor (9) and tighten the hose ring.

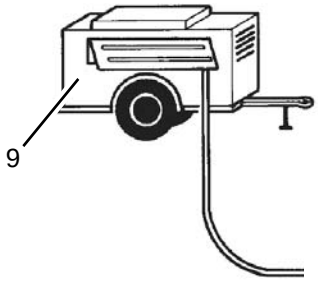


Fig. 5-15 Connection on the compressor

3. Hold the end of the lubricator connection hose tight during cleaning.
4. To clean the lubricator connection hose blow air through it, by switching on the compressor (9, fig. 5-15) (see operating manual of the compressor).
5. Switch off the compressor (9) again.
6. Connect the mody hose coupling of the lubricator connection hose with a 1/4 - turn on the lubricator (2, fig. 5-14) and tighten the hose ring.

7. Screw the connection hose (56) to the lubricator (2) and to the UNITHERM (7).

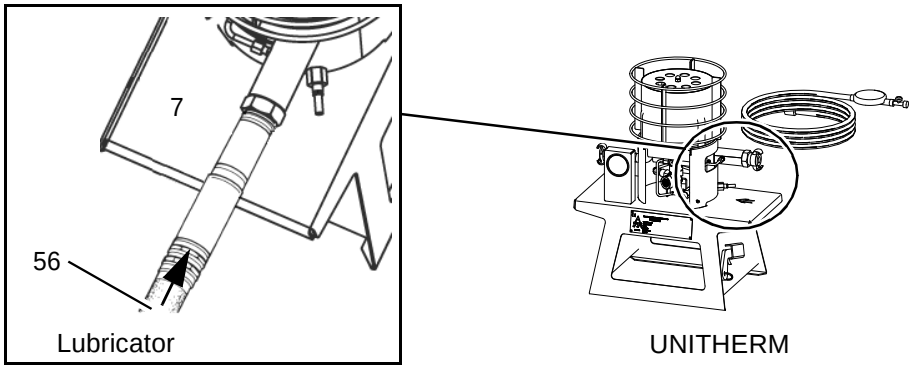


Fig. 5-16 Connection on the UNITHERM

8. Screw the hose nipple of the compressed air hose to the outlet (57, fig. 5-17) of the UNITHERM.
9. Hold the end of the hose end of the compressed air hose tight during cleaning.
10. To clean the compressed air hose blow air through it, by switching on the compressor (9) (see operating manual of the compressor manufacturer)
11. Switch off the compressor (9) again.
12. Connect the male coupling of the compressed air hose with the female coupling of the connection hose (55).

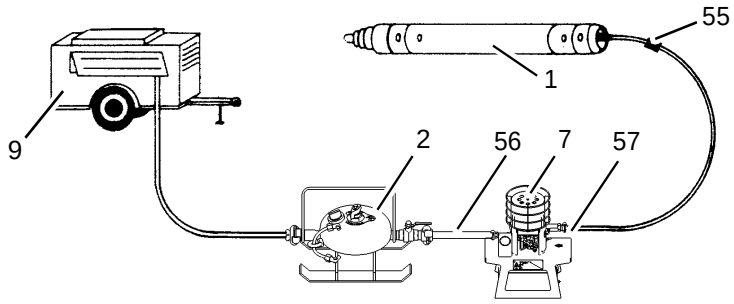


Fig. 5-17 Connection with UNITHERM

13. To connect the compressed air heater to a gas connection connect the gas hose (158) to the connection nipple of the UNITHERM and the connection fitting of a propane or butane gas cylinder (see the UNITHERM operating manual).

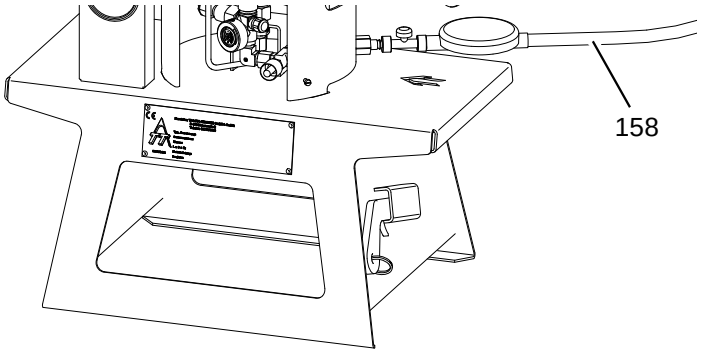


Fig. 5-18 Connected gas hose on the UNITHERM

Information!
When operating in sandy or wet soils, a plastic tape should be used around the couplings to avoid them from getting dirty. This makes it easier to disconnect the hoses.

5.5 Checking the lubricator

Check oil level

Check on teh transparent filling leve hose 823), whether sufficient oil (e. g. GRUNDO-OIL) is inside the lubricator. If this is not the case, then re-fill oil according to chapter 9.3.2, page 9-4.

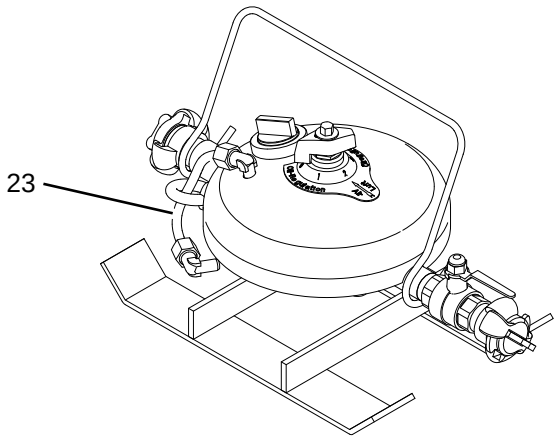


Fig. 5-19 Checking the lubricator

5.6 Setting up the starting cradle

Conditions to start operation

Pay attention to the following indications:

- Pay attention to the details regarding minimal cover above the GRUNDOMAT P according to chapter 5.2.1, page 5-1.
- Secure the pits according to chapter 5.2.3, page 5-3.
- Makre sure that no adjacent pipelines are beneath the starting cradle. These could get damaged when striking in the ground stakes and cause a danger to the operator.

Setting up the starting cradle

Set up the starting cradle as follows:

1. Cut off the pit wall vertically, where the bore is to be carried out.
2. Determine the entrance height of the GRUNDOMAT P into the soil. Here you must pay attention to the details regarding minimal cover. (s. chapter 5.2.1, page 5-1) and the position of any existing service pipes.
3. Align the starting cradle (4) with the non-return roller mechanism (30) to the planned bore path.
4. Set up the starting cradle as close as possible to the pit wall, where the bore is to be carried out.

Information!

The distance between starting cradle and pit wall depends on the machine size of the GRUNDOMAT P.

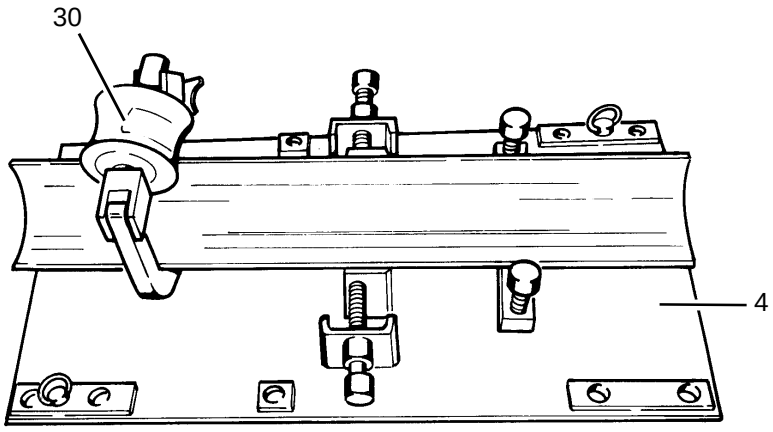


Fig. 5-20 Starting cradle

5. Fasten the starting cradle to the ground with ground stakes (34) through the bore holes.

Information!
Extremely loose soils may require more ground stakes to fasten the starting cradle. If the soil inside the starting pit is very soft, then place some planks beneath the starting cradle for additional support.

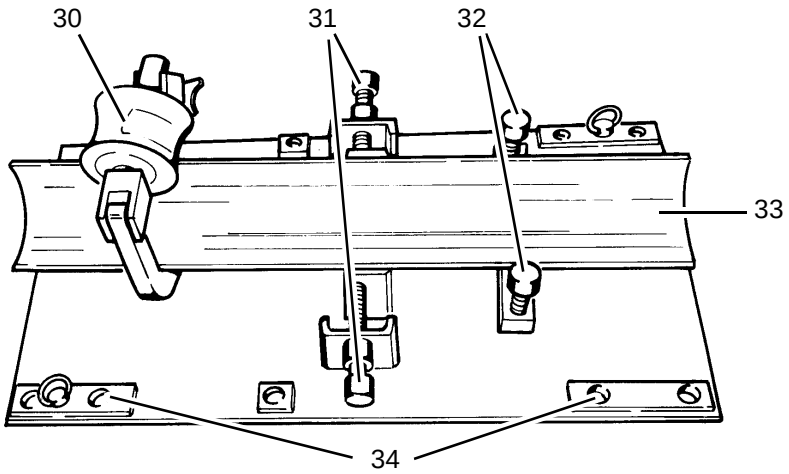


Fig. 5-21 Starting cradle

Assembly and Alignment of the GRUNDOMAT P

1. Place the GRUNDOMAT P into the guiding shell (33) of the starting cradle.
2. Fix the GRUNDOMAT P with the non return roller mechanism (30) in place on the starting cradle.

Information!
The non return roller mechanism (30) should be clamped, so that it rolls with the machine. The GRUNDOMAT P must slide through beneath the non return roller mechanism (30).

Warning!
Danger of accidents!
When the roller mechanism (30) is closed then the GRUNDOMAT P must not run backwards!

5.7 Alignment of the GRUNDOMAT P

Due to the non steerable method of the GRUNDOMAT P the direction can not be altered during the propulsion. Therefore it is very important to carefully align the GRUNDOMAT P towards the target pit.

We recommend to apply the optionally available GRUNDOSCOPE with aiming frame for a precise alignment.

Warning!
Danger when the GRUNDOMAT P exits out of the soil at an unexpected point. Align the GRUNDOMAT P out carefully on the starting cradle to reach the target pit. To do use the GRUNDOSCOPE with aiming frame.

Use the GRUNDOSCOPE as follows:

1. Fasten the aiming frame vertically in the target pit, so that it is clearly visible from the starting pit. Have a second person available if necessary, who can hold the aiming frame.
2. Place the GRUNDSCOPE on the GRUNDOMAT P inside the starting pit. The arrow marking will point to the target pit.
3. If necessary increase the length of the GRUNDOSCOPE, by pulling it out. The GRUNDOSCOPE will latch in place at the maximal length, intermediate lengths can also be set (without latching function).
4. Use the telescopic sight of the GRUNDOSCOPE to aim at the aiming frame inside the target pit.
5. Pay attention that the water level on the GRUNDOSCOPE is level, so provide a straight lined bore path.

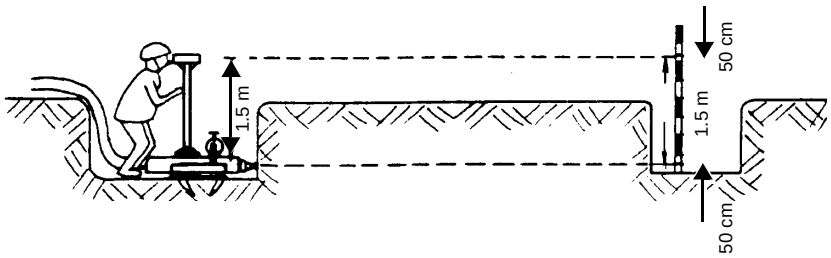


Fig. 5-22 GRUNDOSCOPE with surveyor's staff

Function control of GRUNDOSCOPE

Check the GRUNDOSCOPE before every application as follows:

1. Place the GRUNDOSCOPE on the GRUNDOMAT P and aim at the next aiming frame.
2. Turn the GRUNDOSCOPE by 180° and now look on the oppposite direction through the GRUNDOSCOPE. The same point must be aimed at.

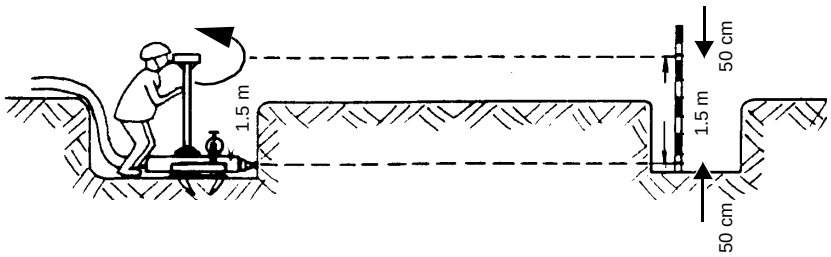


Fig. 5-23 Function check of the GRUNDOSCOPE

GRUNDOMAT P align roughly

The GRUNDOMAT P can be aligned to the target pit by adjusting the starting cradle:

3. Loosen the adjustment screws of the fixing device (31).
4. Roughly align the GRUNDOMAT P with the setting screws of the height adjustment (32) vertically.
5. Roughly align the GRUNDOMAT P with the setting screws of the height adjustment (31 in fig. 5-21) vertically.
6. Place the GRUNDOSCOPE on the GRUNDOMAT P.
7. Use the telescopic sight of the GRUNDOSCOPE to aim at the aiming frame inside the target pit. To do so stand behind the GRUNDOMAT P.

Information!
The telescopic line is - depending on the setting of the GRUNDOSCOPE - 1.5 m or 2 m above the intended bore line (parallel adjustment).

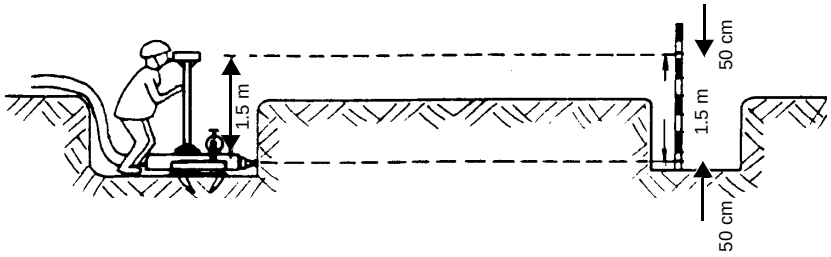


Fig. 5-24 Applying the GRUNDOSCOPE

8. Check the height of the telescopic line with a folding rule, if necessary.

9. Align the GRUNDOMAT P horizontally and vertically to the target point in the target pit.
   - Loosen the setting screw of the fixing device (31) and align the guide shell (33) manually. With the setting screw of the height adjustment (32) align the GRUNDOMAT P vertically.
10. Tighten the clamp screws of the fixing device (31).

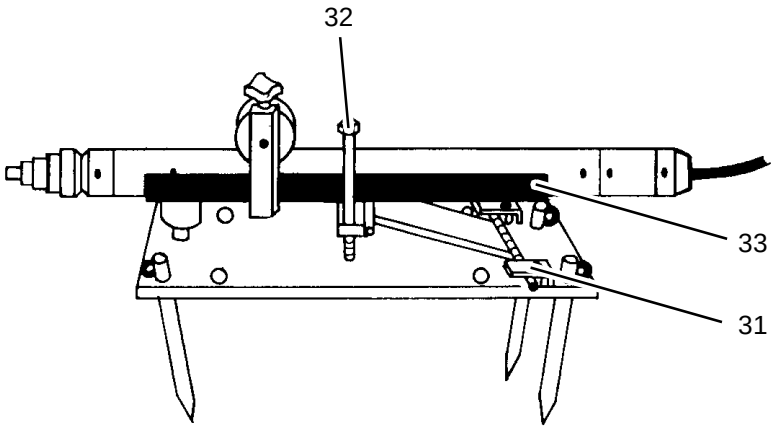


Fig. 5-25 Horizontal and vertical alignment of the GRUNDOMAT P

5.8 Check all the connections

Check all connections and hoses once again for their tightness and intact condition (s. fig. 5-12 and fig. 5-14, page 5-15), before starting to operate the GRUNDOMAT P.

6 Operation

Wear protection clothing!

6.1 Operating elements and their functions

6.1.1 Operating elements of the lubricator

The operating elements for operating the GRUNDOMAT P are situated on

- lubricator 3.5 l or 1 l (s. fig. 6-1)
- GRUNDOMAT P (s. chapter 6.1.3, page 6-5)
- Compressor (see compressor operating manual)

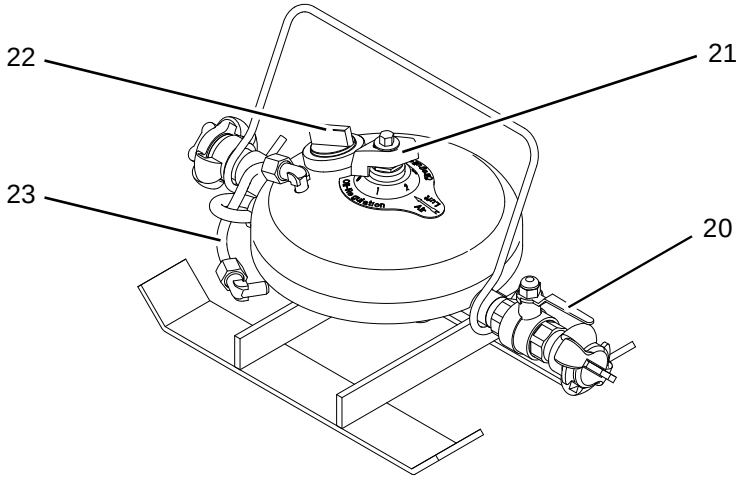


Fig. 6-1 Operating elements of the lubricator

Tab. 6-1 Operating elements of the lubricator

Item number	Operating elements	Function
20	Ball-valve	Compressed air quantity step-less from “Closed” to “open” can be set. **Indicación:** If the ball valve is in the position “Closed” then the GRUNDOMAT P runs out slowly. After the standstill of the GRUNDOMAT P the complete compressed air system between lubricator and GRUNDOMAT P is pressure-less after a short time.
21	Turn knob	to dosis the oil quantity from step 1 (= low oil flow) to step 5 (= high oil flow)
22	Oil inlet cover	to fill in oil The oil filling cover is a screwed connection with a safety exhaust. It is only possible to fill in oil in a pressure-less condition.
23	Transparent filling level hose	for visual check of the oil quantity inisde the lubricator.

Adjust the oil quantity on the knob (21). The following table shows recommended settings for the turning knob depending on the type of GRUNDOMAT P and it's consumption ratings. Increase the oil quantity, if the GRUNDOMAT P looks likely to freeze.

Tab. 6-2 Settings for knob and oil consumption

GRUNDOMAT P	Setting knob	Oil consumption (l/h)
45 P	-	0.1
55 P	-	0.1
65 P	3	0.1 - 0.2
75 P	3	0.1 - 0.2
85 P	2 - 3	0.2 - 0.3
95 P	2 - 3	0.2 - 0.3
110 P	2 - 3	0.3 - 0.4
130 P	1	0.5 - 0.6

Indicación:
For the GRUNDOMAT Types 45 P and 55 P the 3.5 litre lubricator is not applicable, as no fumigation would occur due to the low air consumption. Therefore the 1 litre lubricator is recommended. The oil consumption is in accordance to the details in table 6-2.

Only apply GRUNDO-OIL for these machines!

Danger!
If the GRUNDOMAT P gains contact underground with electrical cables, then the accessories, such as the pulling cable, lubricator, tension plate, clamping plate can carry electric current. Risk of danger!
Wear insulated protection gloves and electrician safety boots, if you have to touch one of the parts.

6.1.2 Operating elements of the tension plate and the clamping plate

Danger!
If the GRUNDOMAT P gains contact underground with electrical cables, then the accessories, such as the pulling cable, lubricator, tension plate, clamping plate can carry electric current. Risk of danger!
Wear insulated protection gloves and electrician safety boots, if you have to touch one of the parts.

GRUNDOMAT 45 P to 110 P

The clamping plate consists of the following operating elements:

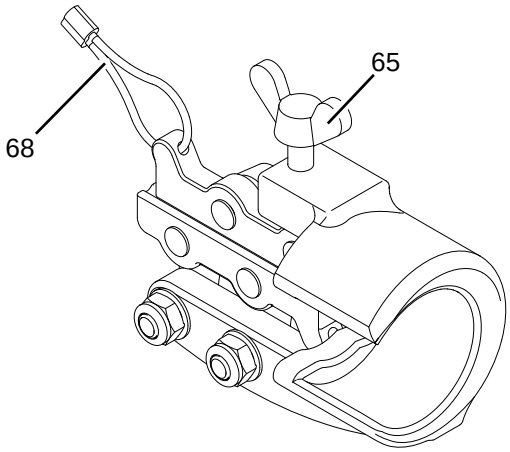


Fig. 6-2 Operating elements on the clamping plate

Tab. 6-3 Operating elements on the clamping plate

Position	Operating element
65	Thumb screw
68	Eyelet

GRUNDOMAT 95 P to 130 P

The tension plate consists of the following operating elements:

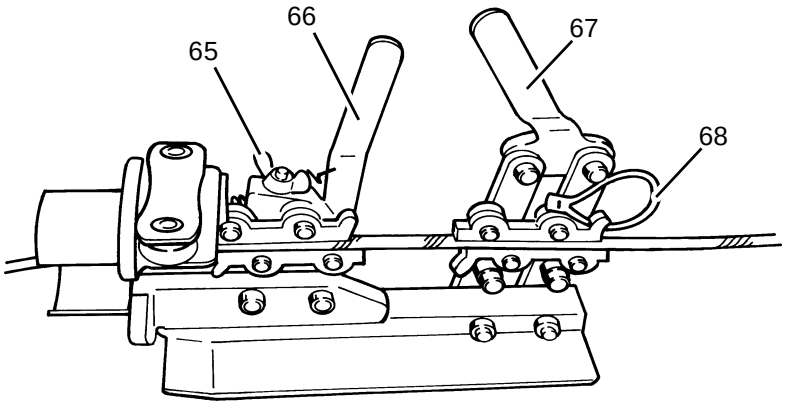


Fig. 6-3 Operating elements of the tension plate

Tab. 6-4 Operating elements of the tension plate

Position	Operating element
65	Thumb screw
66	Clamping handle
67	Cable tensioning handle
68	Eyelet

6.1.3 Altering the running direction of the GRUNDOMAT P

Function of the control stud

With the control stud 2 gear positions are possible:

- 1 forward gear
- 1 Reverse gear

If the machine is under operating pressure then by carrying out a 1/4 turn of the compressed air hose to the left, the machine can be switched over to reverse gear. A locking sound can be heard.

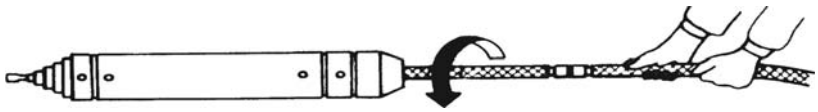


Fig. 6-4 Altering the running direction of the GRUNDOMAT P

If the machine is not under pressure, then switch over to forward gear, by

- turning the compressed air hose a 1/4 turn to the left.
- A locking sound can be heard.

6.2 Control steps prior to starting the operation

Check before starting to operate the GRUNDOMAT P:

- whether all hoses are securely installed (hose bridges),
- whether all hose couplings have been connected correctly, whether they are tight and show no damages (if necessary contact the Tracto-Technik customer service team),
- whether the GRUNDOMAT P as well as connected and accessory parts show no visible damages (if necessary contact the Tracto-Technik customer service team),
- whether the lubricator contains sufficient oil (if necessary re-fill GRUNDO-OIL),
- whether the compressor is ready for operation (sufficient fuel, motor oil) and the permitted operating pressure is set (see compressor operating manual),
- whether the compressed air heater, if it is applöied, is connected to the gas access point,
- whether the operating personnel wears protection clothing (safety shoes, safety glasses, safety gloves, work clothes, protection helmet, hearing protection),
- whether sufficient warning has been given, or whether it is clear that any unauthorised people are not allowed to access the jobsite, the compressor and the GRUNDOMAT P.

6.3 Starting to operate the compressed air heater

Danger of explosion!
Pay attention that the compressed air temperature does not rise to > 100 °C. Check regularly the temperature indicator on the UNITHERM. It is important to follow the instructions in the UNITHERM operating manual.

Danger!
Compressed air heaters can get hot Danger of skin burning!
Wear protection gloves!

1. Remove the cover of the compressed air heater and open the valve on the gas cylinder.
2. Press the red button (161) on the pressure reliever and open the yellow heating valve (150).
3. Press the red ignition safety button (152) and keep it pressed. Ignite the flame with a lighter and keep the ignition safety button for approx. 5 seconds.
4. Place the cover back on.

The compressed air heater is now ready for operation. The full heating power is only provided when compressed air flows, otherwise only the backburner will burn.

5. Set the yellow heating valve (150), so that the temperature for the compressed air for the operated GRUNDOMAT P is at maximally 100 °C.

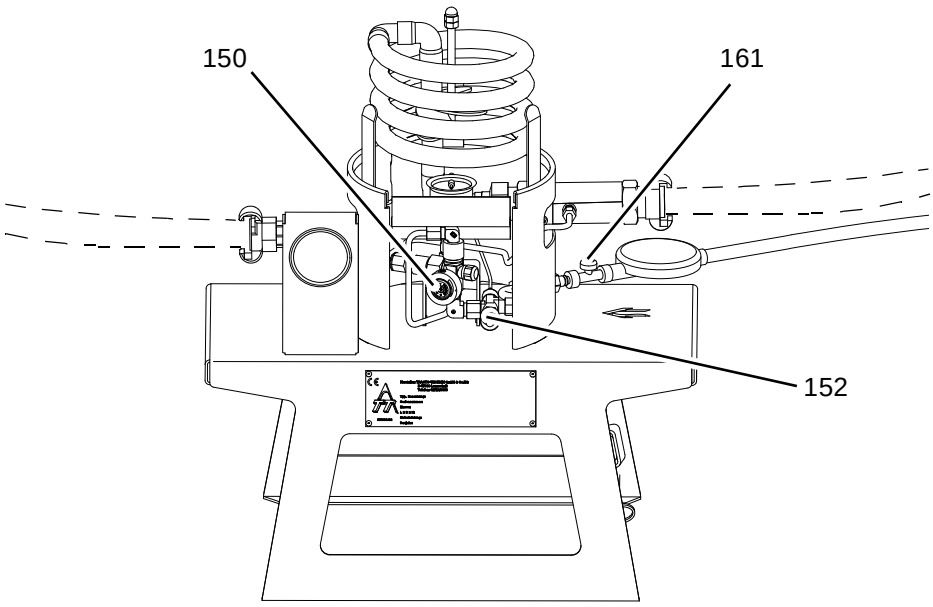


Fig. 6-5 Compressed air heater

6.4 GRUNDOMAT P precise alignment and starting

Determine the situation of any existing service pipes (Electricity, gas, water, Telekom etc.) before starting to operate the GRUNDOMAT P. To do so contact the relevant service companies. Check the situation of the service pipes with cable search device, as well as by carrying out test abrasions.

Conditions to start operation

- Carry out all checks chapter 6.2, page 6-6 before starting to operate.
- The GRUNDOMAT was roughly aligned according to chapter 5.7, page 5-22.

1. Starting the compressor.
2. Check, that nobody is standing behind the GRUNDOMAT P.
3. Set the GRUNDOMAT P by switching the compressed air hose to thrust (s. chapter 6.1.3, page 6-5).

Warning!
Danger of injury due to parts being under pressure!
Open the compressed air on the ball valve of the lubricator slowly and carefully to start operating. If you are sure that hoses, components and plugged connections are tight and screwed on correctly, then you can open the ball valve quickly to open the compressed air entry.

4. Operate the ball valve (20) on the lubricator fractionally, to open the compressed air entry and let the GRUNDOMAT P run slowly into the ground.
5. Close the compressed air entry, when the GRUNDOMAT P has run halfway into the ground.
6. Check by using the GRUNDOSCOPE the direction of the GRUNDOMAT P. If necessary correct the alignment of the GRUNDOMAT P with the adjustment screws on the fixation device and the setting screws of the height adjustment on the starting cradle according to chapter 5.7, page 5-22.
7. Start the GRUNDOMAT P with throttled compressed air, by fractionally opening the ball valve (20) on the lubricator.
8. Check with the GRUNDOSCOPE the direction of the GRUNDOMAT P, until this is completely situated in the ground.
   If necessary correct the alignment of the GRUNDOMAT P with the adjustment screws on the fixation device and the setting screws of the height adjustment on the starting cradle according to chapter 5.7, page 5-22.

Information!
An exact and precise alignment of the GRUNDOMAT P is necessary for a high target precision.

9. As soon as the GRUNDOMAT P is completely in the ground, leave the starting pit. Operate the GRUNDOMAT P outside the starting pit by using the lubricator.
10. Turn the ball valve (20) on the lubricator to “open”.
    => The GRUNDOMAT P drives with full compressed air.

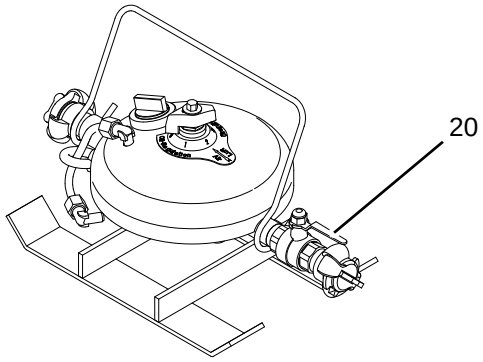


Fig. 6-6 Lubricator

6.5 Direct installation

6.5.1 Direct pulling of PVC protection pipes without added pushing on the pull sleeve

If you have assembled the pull sleeve to the GRUNDOMAT P and the GRUNDOMAT P is almost completely in the soil, then tension the pulling cable inside the tension plate or the clamping plate. Then precede as follows:

Information!
Information regarding tension plates and clamping plate, as well as suitable plastic pipes can be taken from the GRUNDOMAT P - accessory list in a separate folder.

1. Align the GRUNDOMAT P according to chapter 5.7, page 5-22 to the target pit.
2. Start the GRUNDOMAT P according tochapter 6.4, page 6-8.
3. Halt the GRUNDOMAT P. Only operate the tension plate and clamping plate when the GRUNDOMAT P is switched off.
4. Thread the pipe lengths to be installed on to the steel cable and the compressed air hose.

Case 1: Clamp pulling cable with tension plate for GRUNDOMAT P-Type ≥ 95

5. Tension the pulling cable as follows:
   - Place the tension plate depending on space available behind the first pipe or first pipe length.
   - With the clamp lever (66) open the front clamp of the tension plate.
   - Place the pulling cable (50) into the front clamp.
   - Let go of the clamp lever(66).
   - Pull the eyelet (68) to the rear, to loosen the rear clamp.
   - Place the pulling cable (50) into the rear clamp.
   - Let go of the eyelet (68).

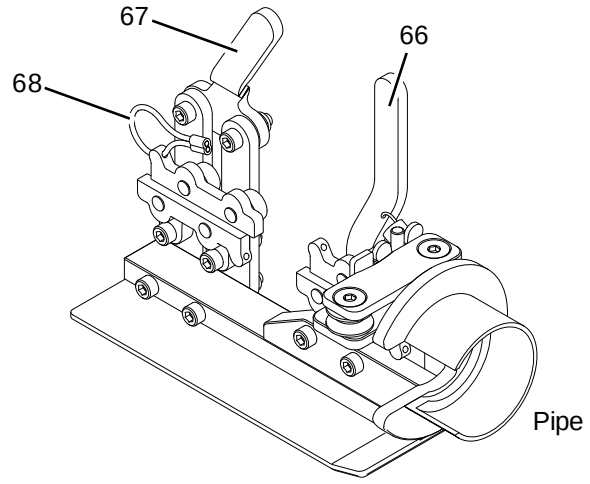


Fig. 6-7 Tensioning plate

Warning!
Danger of crushing between pipe pieces suddenly slipping into each other.
Wear protection gloves Work with care.

Danger!
If the GRUNDOMAT P gains contact underground with electrical cables, then the accessories, such as the pulling cable, lubricator, tension plate, clamping plate can carry electric current. Risk of danger!
Wear insulated protection gloves and electrician safety boots, if you have to touch one of the parts.

6. Tension the pulling cable (50), until the pipe and the GRUNDOMAT P form a complete unit. To do so move the cable tensioning lever (67) forward and backward.
7. During the tensioning guide the plug end (64) of the tension plate into the socket of the last pipe section.
8. Secure the clamp lever (66) with a lock nut (65) against unintentional loosening.
9. Mark the pulling cable (50) behind the front clamp (see arrow in fig. 6-8).
10. Leave the pit and start to operate the GRUNDOMAT P (s. chapter 6.4, page 6-8).
11. During the bore pay attention to the mark point 9. Stop the GRUNDOMAT P, if the pulling cable slides through the front clamp.

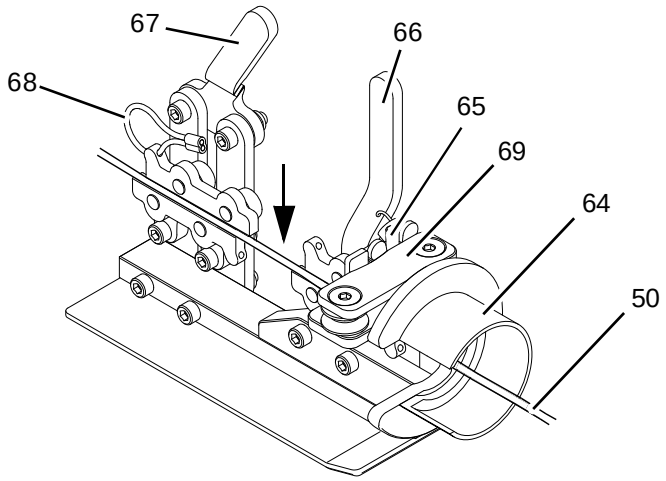


Fig. 6-8 Tensioning plate

12. Stop the GRUNDOMAT P, as soon as the first complete pipe length is inside the ground or the tension plate is almost in front of the pit wall.
13. Loosen the lock nut (65).
14. Loosen the tension plate.
15. place the tension plate behind the the next pipe section on the pulling cable.
16. Repeat these steps, until all pipes are installed.

Case 2: Clamp pulling cable with tension plate for GRUNDOMAT P-Type up to 85

17. Clamp the pulling cable as follows:
    - Place the clamping plate depending on space available behind the first pipe or first pipe length.
    - Loosen the lock nut (65).
    - Pull the eyelet (68) to the rear, to loosen the cable clamp (180).
    - Place the pulling cable (50) into the cable clamp (180) from the side.
    - Let go of the eyelet (68).

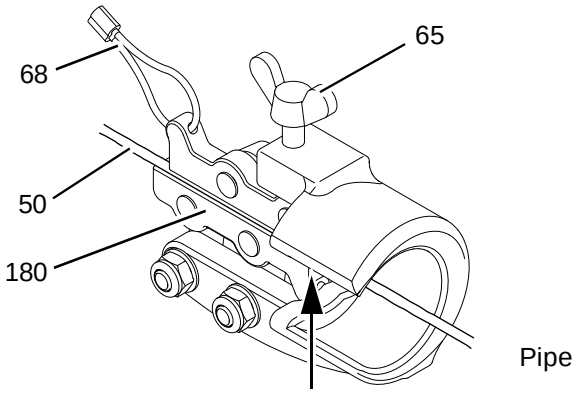


Fig. 6-9 Clamping plate

18. Guide the socket of the final pipe section into the retainer for the pipe (64) of the clamping plate. If necessary apply the adapter piece suitable for the pipe.
19. Tension the pulling cable manually.
20. Secure the cable clamp (180) with a lock nut (65) against unintentional loosening.
21. Mark the pulling cable (50) behind the cable clamp (180) (see arrow in fig. 6-9).
22. Leave the pit and start to operate the GRUNDOMAT P (s. chapter 6.4, page 6-8).
23. During the bore pay attention to the mark point 21. Stop the GRUNDOMAT P, if the pulling cable slides through the cable clamp (180).
24. Stop the GRUNDOMAT P, as soon as the first complete pipe length is inside the ground or the clamping plate is almost in front of the pit wall.
25. Loosen the lock nut (65).
26. Loosen the clamping plate.
27. place the clamping plate behind the the next pipe section on the pulling cable.
28. Repeat these steps, until all pipes are installed.

6.5.2 Simultaneous pulling of PVC protection pipes with pushing on

When pulling in the initial pipe must always remain inside the pull sleeve (52) of the GRUNDOMAT P. The pipe connections must not loosen. The pulling cable (50) is therefore pre-tensioned according to chapter 6.5.1, page 6-10 via the tension plate. In case of pipes with external sleeves and/or collapsing/non cohesive soils (such as sand, gravel etc), the procedure described in chapter 6.5.1, page 6-10 does not suffice. The pipe requires additional rear static pressure.

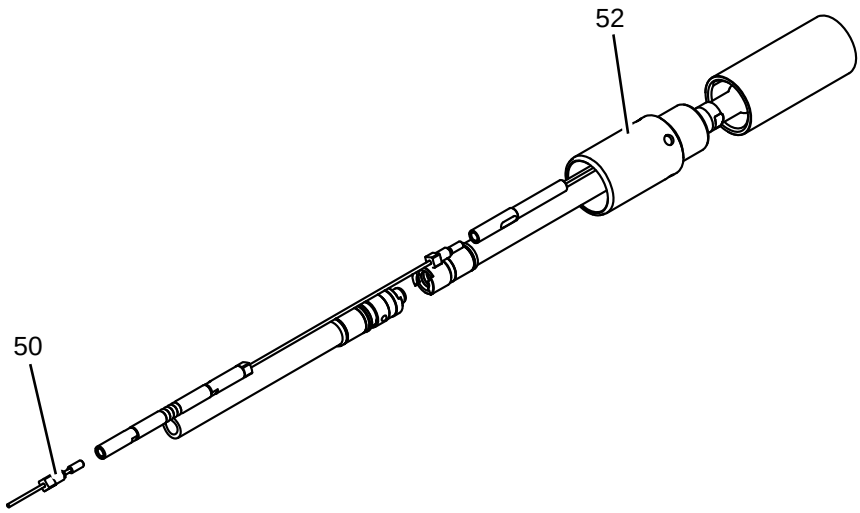


Fig. 6-10 Pull sleeve with cable connection

Then proceed as follows:

Warning!
Danger of injury due to de-tensioning of the spring packet or the steel cable striking out!
Wear protection clothing! Make sure you have a tight anchoring.

Danger!
If the GRUNDOMAT P gains contact underground with electrical cables, then the accessories, such as the pulling cable, lubricator, tension plate, clamping plate can carry electric current. Risk of danger!
Wear insulated protection gloves and electrician safety boots, if you have to touch one of the parts.

1. Pull the first pipe section according to chapter 6.5.1, page 6-10.
2. Fasten the winch (70) to a ground stake of the starting cradle or to another secure anchoring position inside the starting pit.

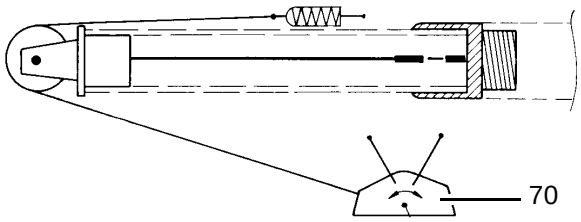


Fig. 6-11 Pushing the GRUNDOMAT P via the pipe length to be installed.

3. Hook the spring pack (71) to the other side of the starting cradle or to another secure anchoring position inside the starting pit.
4. Place the steel cable (72) of the winch (70) to the cable guide pulley (69) of the tensioning plate.
5. Fasten the steel cable (72) to the winch (70) on the spring pack (71).
6. Press the plastic pipes forward during the bore constantly with the winch (70) .
7. Pull the remaining plastic pipes according chapter 6.5.1, page 6-10 inwards.

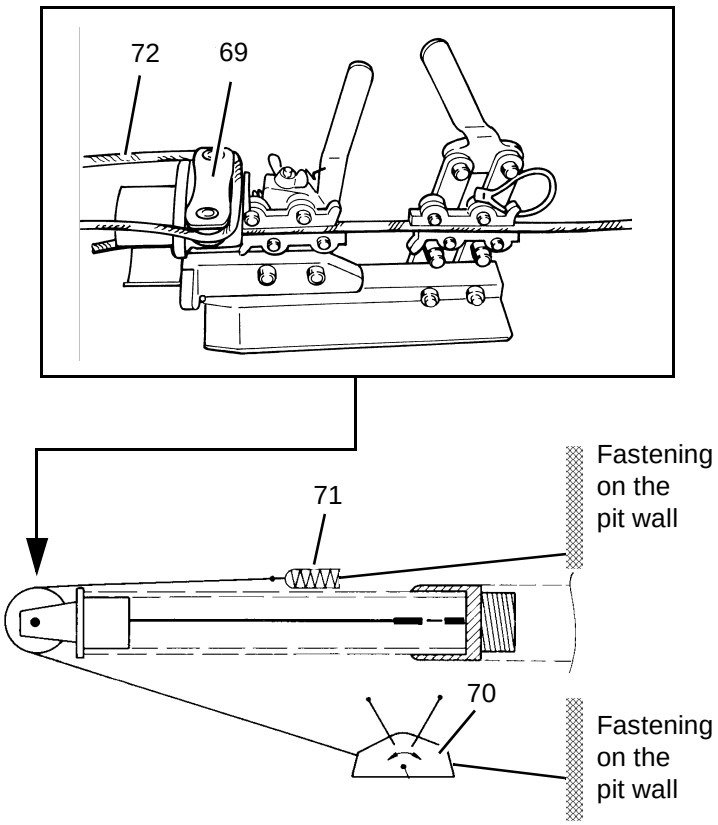


Fig. 6-12 Pushing the GRUNDOMAT P via the pipe length to be installed.

6.5.3 Simultaneous pulling of steel pipes (without a thread)

Steel pipes without threaded connections (s. chapter 6.5.1, page 6-10) can be pulled in such as plastic pipes with inner sleeves.

Danger!
If the GRUNDOMAT P gains contact underground with electrical cables, then the accessories, such as the pulling cable, lubricator, tension plate and the steel pipe can carry electric current. Risk of danger!
Wear insulated protection gloves and electrician safety boots, if you have to touch one of the parts.

6.5.4 Direct pulling of steel pipes (with a thread)

Danger!
If the GRUNDOMAT P gains contact underground with electrical cables, then the accessories, such as the pulling cable, lubricator, tension plate and the steel pipe can carry electric current. Risk of danger!
Wear insulated protection gloves and electrician safety boots, if you have to touch one of the parts.

1. Align the GRUNDOMAT P according to chapter 5.7, page 5-22 to the target pit.
2. Start the GRUNDOMAT P according tochapter 6.4, page 6-8.
3. Stop the GRUNDOMAT P, as soon as the first steel pipe section (53) is situated up to approx. 20 cm in the soil.
4. Screw the next steel pipe section on and tighten it securely.
5. Repeat the steps point 1 - point 4 for all further steel pipe sections.

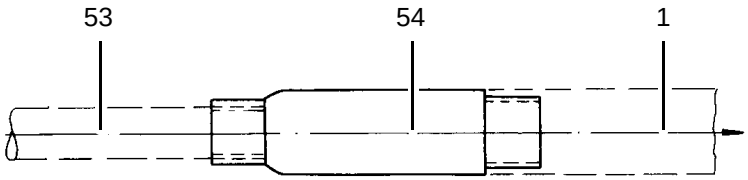


Fig. 6-13 Shock absorber with connected steel pipe

6.6 Checking the GRUNDOMAT P during the application

Constantly check the condition of the GRUNDOMAT P during the bore process.

Ground heaving

During the whole bore process pay attention to the surface, in order to identify any ground heaving in time. In this case stop the GRUNDOMAT P immediately and switch it into reverse mode.

Course deviation

There is the danger of course deviation, if

- the GRUNDOMAT P runs with a higher speed than 15 m/h.
- the compressed air hose strikes to and fro inside the starting pit.

Throttle the compressed air access in these cases via the ball valve on the lubricator.

Information!
Make sure that the lubricator is always accessible. Set up the lubricator outside the starting and/or target pit.

low soil friction

If the soil friction is too low, then the GRUNDOMAT P “swims”, meaning the thrust starts to stutter.
To even out a low soil friction, press in the pipes to be installed (immediate installation) simultaneously with a cable winch according to (s. chapter 6.5.2, page 6-14). By pressing the pipes in this way, the force of the reverse stroke is retained and therefore evens out the low soil friction.
Reduce the compressed air if necessary.

Difficulties when starting.

If there should be any initial difficulties during the bore with the GRUNDOMAT P, then please proceed as follows:

Warning!
Danger due to remaining pressure or remaining air within the system.
Always wear protection glasses, to protect your eyes against any possible materials shooting out.

1. By turning the compressed air hose, set the GRUNDOMAT P once from forward run to reverse and thenimmediately back to forward run (s. chapter 6.1.3, page 6-5).
2. It may be necessary to fill additionally approx. 100 ml GRUNDO-OIL into the compressed air hose.
   - To do so switch off the compressed air via the ball valve on the lubricator.
   - Switch off the compressor.
   - Wair for a few minutes, until the compressed air hose is pressure-less.
   - Disconnect the compressed air hose from the lubricator.
   - Fill the GRUNDO-OIL into the compressed air hose.

Compressed air hose and pulling cable

During the operation constantly make sure, that the compressed air hose and, if required, the pulling cable of the cable winch to press in the pipes do not get blocked by obstacles.

Compressor

Check whether the compressor builds up sufficient pressure. Please observe the operating manual for the compressor.

Pipe installation

Check, when installing directly (s. chapter 6.11, page 6-24) that the pipe is pulled in or the GRUNDOMAT P carries on running without the pipe. If necessary, apply the direct pulling of PVC pipes by pressing (s. chapter 6.5.2, page 6-14).

Danger of explosion!
Pay attention that the compressed air temperature does not rise to > 100 °C.
Check regularly the temperature indicator on the UNITHERM. It is important to follow the instructions in the UNITHERM operating manual.

6.7 Reverse of the GRUNDOMAT P

Reverse possible

Please note that the reverse run is only possible with the following components:

- End cone
- PE pipe cutting nipple with or without pipe
- Pull sleeve with pulled in pipe sections
- Pipe puller with swivel coupling and pulled in pipe

Reverse is not possible

Please note that the reverse run with the following components **is not** possible:

- Pull sleeve without pipe
- Pipe puller with swivel coupling, without pipe
- Pull sleeve expander with or without pipe

Switch the GRUNDOMAT P into reverse, if

- you have carried out a blind bore,
- the GRUNDOMAT P has hit a non-negotiable obstacle.

Switch the GRUNDOMAT P under operating pressure into reverse, by turning the compressed air hose a 1/4 turn to the left.

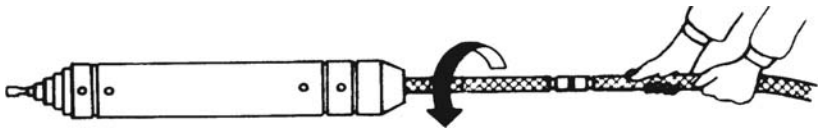


Fig. 6-14 Reverse run of the GRUNDOMAT P

6.8 Target arrival of the GRUNDOMAT P

Throttle the compressed air access up to a standstill, as soon as the GRUNDOMAT P has reached the target pit.

- To do so decrease the compressed air via the ball valve (20) on the lubricator.

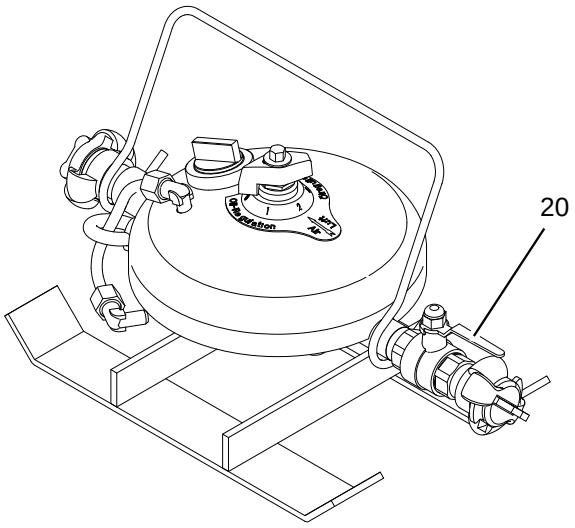


Fig. 6-15 Ball valve Lubricator

Information!
Pay attention that the GRUNDOMAT P does not carry out any empty strokes. These will eventually lead to damages on the GRUNDOMAT P.
Pay attention to any possible adjacent service lines inside the target pit!

6.9 Pipe joints (pipes with external sleeves)

Not all pipes available on the international market are ideally suitable for use with GRUNDOMAT P, as pipes with various socket connections are available on the market. In the following text the most usual socket types and their applicability with the GRUNDOMAT P are tested.

the pipe sockets should not extract to the outer side, if possible. In no case should they have internal or external sharp corners as they would be hindering the pipe pulling procedure as well as the introduction of cables into ducts installed. Pipes with internally and externally smooth sleeves are therefore highly recommended.

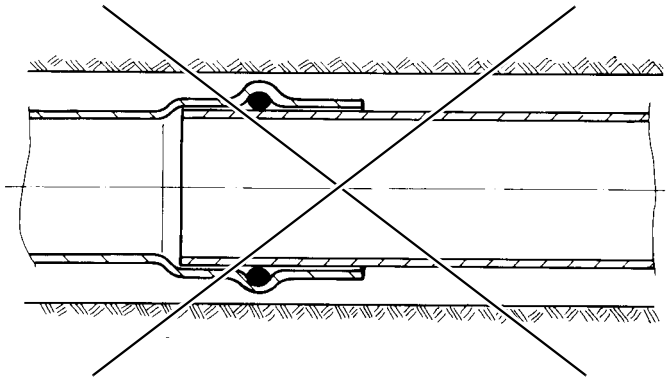


Fig. 6-16 Cable duct with preformed spigot and socket connection and seal

- The bore should be 10 to 15% larger in diameter than the outer diameter of the pipe to be installed.
- In case of non-cohesive, collapsing soils the pipe would be stuck in the ground so that the GRUNDOMAT P will eventually come to a standstill.

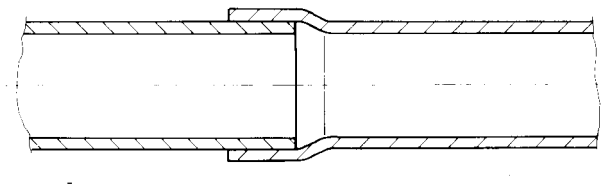


Fig. 6-17 Cable duct with preformed spigot and socket connection

This pipe type should be used in cohesive soils only.

In case of collapsing, shrinking soils the pipe needs rear static pushing, especially when using pipes with preformed sleeves. Preformed sleeves can easily burst during pipe pulling.

Double insert sleeves, whicha re available as inner or outer connections, are not suitable. These sockets move easily out of their position and are therefore a danger to the bore.

Tracto-Technik recommends, to saw off any inconvenient socket connections and to use plug in sockets (s. fig. 6-18).

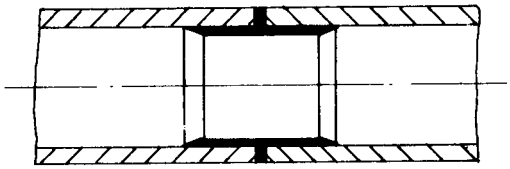


Fig. 6-18 Internal sleeve connection

These sleeves are ideal for transmitting the rear static pressure as the walls of the pipes are butted up to each other. Inner diameter reduction is minimal as the wall thickness of these sleeves is kept to an absolute minimum. The outer surface of the pipe is absolutely smooth.

The internal sleeve connections have been developed by Tracto-Technik and are currently available in the following dimensions:

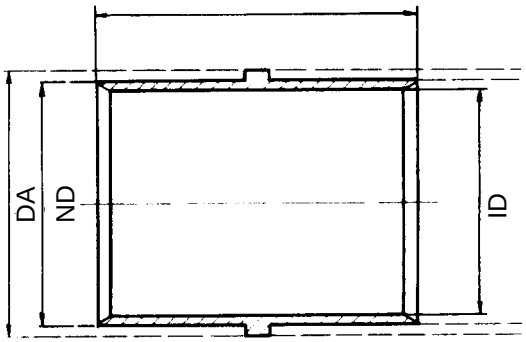


Fig. 6-19 Dimensions of the internal sleeve connections

Tab. 6-5 Dimensions of the internal sleeve connections

Protection pipe ND	Protection pipe Outer diameter (mm)	Wall thickness (mm)	Dimensions of the internal sleeve connections (mm)			Part No.:
			Outer diameter OD	Inner diameter ID	Length	
110	125	3.7	125	111.0	145	GRU 2003900
100	110	3.2	110	99.0	118	GRU 2003901
100	110	5.3	110	93.0	116	GRU 2003902
80	85	2.5	85	74.4	99	GRU 2003903
75	80	2.7	80	69.5	100	GRU 2003904
50	63	1.9	65	56.0	89	GRU 2003905
40	50	1.8	50	42.0	78	GRU 2003906

6.10 Subsequent cable or pipe pulling

If the soil remains in place (the bore hole does not collapse when being penetrated), then you can bore with a reverse cone (s. chapter 2.3.1, page 2-4).

The following accessories are suitable for subsequent installations of cables and pipes (s. GRUNDOMAT P - accessory list in special folder):

- Compressed air hose with male coupling (40)
- Compressed air hose with female coupling (41)
- Adapters (42)
- Pipe puller (43)
- Cable protection sleeve (44)

Subsequently cables and pipes can only be pulled in manually over shorter distances (depending on the soil, e.g. house connections). The bore diameter must be approx. 7 % above the diameter of the cable protection sleeve, as the cable protection sleeve will otherwise have a strong braking effect.

Pipes can also be pulled in with the GRUNDOMAT P during the reverse run. To do so the pipe is connected to the GRUNDOMAT P with a pulling hook and cable protection sleeve.

Then pull or push the cable, PE- or PVC pipe into the bore after completing the bore process. To do so apply the compressed air hose situated inside the bore hole. Connect the required accessory (e.g. pipe puller and cable protection sleeve) to the TT hose coupling of the compressed air hose.

Accessories for subsequent pulling of PE pipes

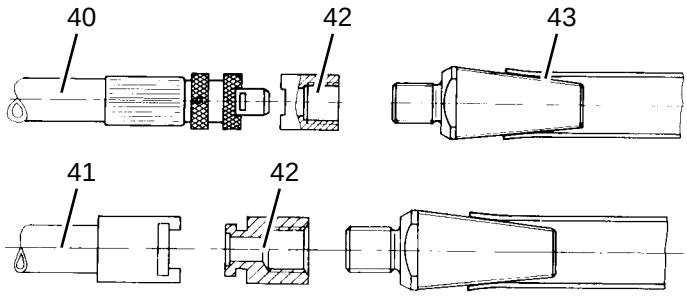


Fig. 6-20 Accessories for subsequent pulling of PE pipes

Accessories for subsequent pulling of a cable or pipe aided by a cable protection sleeve.

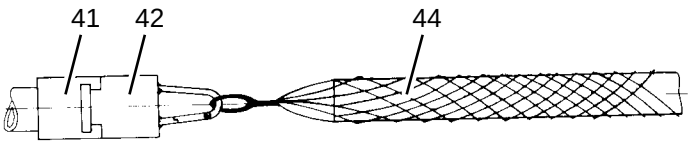


Fig. 6-21 Accessories for subsequent pulling of a cable or pipe aided by a cable protection sleeve.

6.11 Putting out of action

Please observe the operating manual for the compressor to stop operating.

1. Shut off the compressed air via the ball valve (20) on the lubricator.
2. Switch off the compressor.
3. Secure the compressor against being re-started accidentally. Please also observe the operating manual for the compressor.

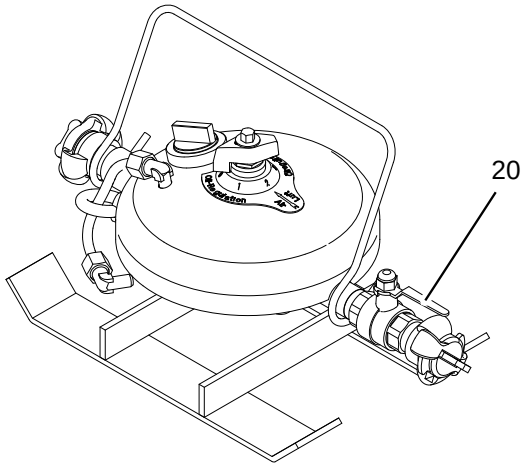


Fig. 6-22 Lubricator

4. To switch off the compressed air heater, turn the heating valve (150) clockwise up to the stopper and close the gas cylinder.

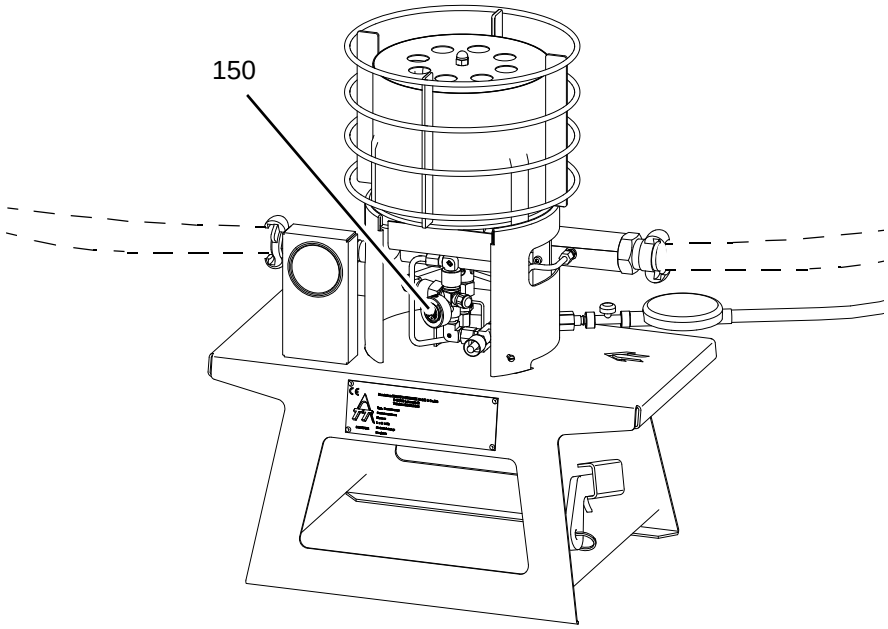


Fig. 6-23 Heating valve of the compressed air heater

7 Disassembly and de-installation

To empty the GRUNDOMAT P, proceed as follows:

1. Stop operating the GRUNDOMAT P and the compressor (s. chapter 6.11, page 6-24).
2. Set the knob (21) of the lubricator to the position “0”.

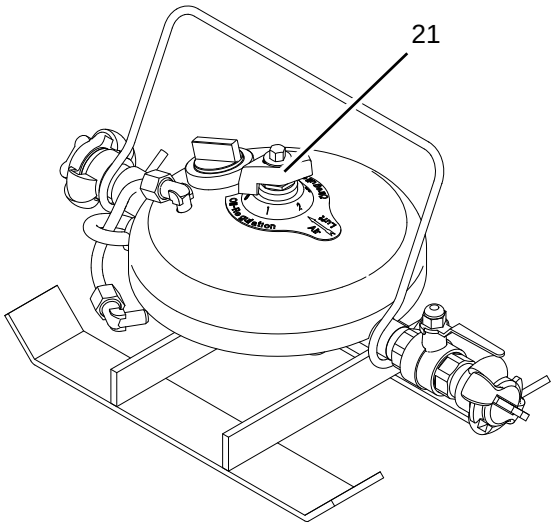


Fig. 7-1 Knob on the lubricator

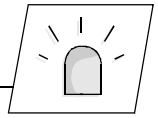
3. Disconnect the applied accesory from the GRUNDOMAT P.
4. Loosen the connection hoses.

Information!

Pay attention when dismantling the connection hoses.

- that they are pressureless,
- that they are not squashed or bent,
- that they are not pulled over sharp edges,
- the minimal bending radius,

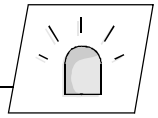
5. Provide the hose connections with protection caps.
6. Transport the GRUNDOMAT P and it's accessory as decribed in chapter 4.1, page 4-1.



8 Faults and trouble shooting

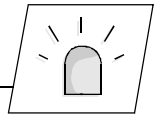
Tab. 8-1 Faults and trouble shotting on the GRUNDOMAT P with accessories

Faults	Cause	Fault rectification
The speed decreases during the bore.	The compressor no longer produces the required pressure.	Check the operating pressure of the compressor.
	Air leakage caused by defective or faulty seals on the hose couplings.	Have any faults seals renewed at an official workshop. If necessary contact the Tracto-Technik customer service.
	The greasing of the GRUNDOMAT P is insufficient.	Increase the oil quantity applied on the turning knob of the lubricator. Check the oil level on the transparent filling level hose of the lubricator. If necessary re-fill oil. Check, whether the correct type of oil is being applied (e.g. GRUNDO-OIL).
	Compressed air cools down due to expansion in GRUNDOMAT P, so that the outer temperatures < 5 °C and/or higher air moisture cause it to freeze.	Apply the compressed air heater UNITHERM (s. chapter 5.4.3, page 5-15)
	When directly pulling pipes, extremely shrinking soils can lead to an increased friction onto the pipe. This especially the case, when pipes with outer sockets are applied.	use thinner, outer smooth or larger GRUNDOMAT P types. The pipe outer diameter should be at least 10 % smaller than the diameter of the GRUNDOMAT P. (s. tab. 2-1, page 2-10).
The GRUNDOMAT P is started without any problems. Half way in the ground the bore speed is slowly reduced until the machine comes to a standstill.	The friction on the machine and possibly on the pipe incrfeases, as the soil is very sticky and therefore shrinking strongly. The machine will get held tight.	Assemble an oversized add-on cone (see GRUNDOMAT P - accessory list in a special folder). In these types of soil generally apply an oversized multicutter cone (see GRUNDOMAT P - spare parts list in special folder).



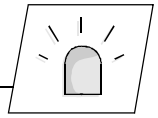
Tab. 8-1 Faults and trouble shotting on the GRUNDOMAT P with accessories

Faults	Cause	Fault rectification
The general impact energy of the GRUNDOMAT P decreases.	The control stud and piston seals are damaged, worn out, or missing.	Have any faults seals renewed at an official workshop. If necessary contact the Tracto-Technik customer service.
	The multicutter cone will not move either forward or backwards.	Dismantle the head and clean it. Exchange any faulty seals, as well as any worn out or broken springs in an official workshop. If necessary contact the Tracto-Technik customer service.
	The greasing of the GRUNDOMAT P is insufficient.	Check the oil level on the transparent filling level hose of the lubricator. If necessary re-fill oil. Increase the oil quantity applied on the turning knob of the lubricator.
	The control stud and piston are sticky (not moving freely).	Add a small amount of oil into the compressed air hose. **Danger!** Danger of injury due to the comporessed air hose being under pressure! Disconnect the air hose only in a pressurefree state(s. chapter 6.11, page 6-24).
	An incorrect oil type has been applied (e.g. machine oil).	The machine parts are gummed. Dismantle and clean the GRUNDOMAT P (s. chapter 9.2, page 9-3).
	The piston and control stud seals are worn out.	Have any faults seals renewed at an official workshop. If necessary contact the Tracto-Technik customer service.
The run of the GRUNDOMAT P is not precise to the target.	The alignment of the GRUNDOMAT P has not been carried out correctly.	Check the GRUNDOSCOPE and the aiming frame (s. chapter 5.7, page 5-22). Align the GRUNDOMAT P again with more care. Use the starting cradle, the GRUNDOSCOPE and the aiming frame.
	The GRUNDOMAT P “floats” in soft soil.	Reduce the compressed air on the ball valve of the lubricator. Press in the pipes with the cable winch (s. chapter 6.5.2, page 6-14).
	The propulsion of the GRUNDOMAT P was faster than 15 m/h.	Reduce the compressed air on the ball valve of the lubricator.
	The GRUNDOMAT P is not fitted with the right displacement head.	Apply one of the following penetration heads: • **Stepped head** in stoney soils, • **smooth head** for sandy, loamy soils.



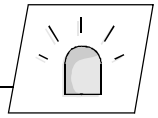
Tab. 8-1 Faults and trouble shotting on the GRUNDOMAT P with accessories

Faults	Cause	Fault rectification
The run of the GRUNDOMAT P is not precise to the target.	The stepped head is strongly worn.	Have the stepped head renewed at an official workshop. If necessary contact the Tracto-Technik customer service.
	The wear between the front casing and the chisel is too strong.	Have the parts renewed at an official workshop. If necessary contact the Tracto-Technik customer service.
Reversing from forward to backward motion is a problem.	The control mechanism is defective.	Check, whether any parts on the control unit have loosened or are damaged, if necessary renew parts.
GRUNDOMAT Pswitches over self-acting.	Compressed air hose turned too strongly to the left.	Turn the compressed air hose to the right
	Compressed air hose not laid out straight, compressed air hose twisted.	Lay out the compressed air hose straight.
	Control unit damaged.	Have the control unit replaced, ring Tracto-technik customer service.
Connection hose turns and interweaves when switching over.	Torsional spring is pre-tensioned very strong.	Set the torsion spring a bit more loose.
	Control unit damaged.	Have the control unit replaced, ring Tracto-Technik customer service.



Tab. 8-2 Faults and trouble-shooting on compressed air heater

Faults	Cause	Fault rectification
No gas exiting the burner	The hose excess flow cutoff valve is damaged.	Press shortly the red button on the hose excess flow cutoff valve with the gas cylinder open.
After letting go of the ignition safety button the flame will switch off.	Ignition safety pilot is closed, as the temperature sensor is not in the flame.	Bend the temperature sensor into the flame and keep the ignition safety head pressed for approx. 5 seconds.
Temperature is over the permissible highest point.	The yellow heating valve is set too high.	Throttle the heating valve or increase the air supply.
Temperature of the compressed air is not high enough.	The heating valve has been throttled.	Open the heating valve further.
	The compressed air is too high.	Reduce the compressed air access or apply a larger size compressed air heater.
The flame goes out in idle mode.	The ignition flame is set too low.	Remove the PVC cap from the regulation valve and set the ignition flame higher with a screwdriver.
Compressed air heater dies not switch from ignition to heating flame.	The air exit side of the compressed air heater is pressure-less as air exits freely.	Connect the GRUNDOMAT P.
	The compressed air is too low.	Increase the compressed air allowance.
	The air pistion to regulate the heating flame is jammed.	Contact the Tracto-Technik customer service.
Compressed air heater will not switch or only slowly from heating to ignition flame.	The exhaust bore hole is closed.	
	The air pistion to regulate the heating flame is jammed.	
Coupling seal is burnt.	Incorrect seals have been applied.	
Function fault on the UNITHERM	-	



Our customer service is always willing to support you to rectify any faults:

Germany:
TRACTO-TECHNIK GmbH & Co. KG
Tel.: +49 27 23 8080
Fax: +49 27 23 808180
www.tracto-technik.de.
Email:export@tracto-technik.de

USA / Canada
TT Technologies Inc.
Tel. +1 630.851.8200
Fax: +1 630.851.8299
www.tt-technologies.com
Email:info@tttechnologies.com

UK:
TT UK Ltd.
Tel. +44 1234.342.566
Fax: +44 1234.352.184
www.tt-uk.com
Email:info@tt-uk.com

France:
Tracto-Techniques S.a.r.l
Tel. +33 5.53.53.89.83
Fax: +33 5.53.09.39.41
www.tracto-techniques.de.
Email:ttf@tracto-techniques.fr

Pacific Rim (Australia):
TT Asia Pacific Pty Ltd.
Tel. +61 7 3420 5455
Fax: +61 7 3420 5855
www.tt-asiapacific.com
Email:info@tt-asiapacific.com

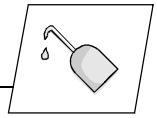
9 Maintenance

Information!
Assembly and disassembly work are described in a separate repair manual. Please contact your Tracto-Technik customer service, to obtain the repair manual for your machine (s. chapter 8, page 8-5).

9.1 Maintenance intervals

Tab. 9-1 Maintenance intervals

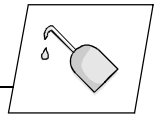
Maintenance activity		Maintenance intervals				Further information
		8 h	40 h	150 h	annually *)	
GRUNDOMAT P	Cleaning the outside	x				After daily operation, chapter 10, page 10-1
	Cleaning the inside			x		Have the GRUNDOMAT P claned at an official workshop.
	Visual check regarding soundness	x			x	s. chapter 9.2, page 9-3
	Check the connections for their tightness	x				Before starting operation, s. chapter 5.8, page 5-25
	Check the chisel for any damages and function			x		Check the striking surface for any tears or damages. Have a faulty chisel exchanged at an official workshop.
	Check the multicuttercone for it's tightness and function			x		Move the multicuttercone when the GRUNDOMAT P is de-activated manually. The multicuttercone must not strike to and fro. Have a faulty multicuttercone exchanged at an official workshop,
	Check the screwed connections for their tightness			x		s. chapter 9.2, page 9-3
	Check the piston			x		Have the piston, especially the slide surface, seals and impact surface checked for any damages in an official workshop.
	Check the seals.			x		Check the GRUNDOMAT P for any leakages. Have the seals renewed at an official workshop.
	Expert check				x	s. chapter 9.7, page 9-10



Tab. 9-1 Maintenance intervals

Maintenance activity		Maintenance intervals				Further information
		8 h	40 h	150 h	annually *)	
Lubricator	Visual check of the operating elements	before starting each operation,				-
	Cleaning the outside	x				After daily operation, s. chapter 10, page 10-1
	Check filling level of greasing means and if necessary, re-fill	before starting each operation,				s. chapter 9.3.2, page 9-4
	Check control hoses for their tightness and sealability.			x		Have any leaking control hoses replaced in an official workshop.
	Check operating elements for smooth running and their tightness.			x		-
	Function test of the lubricator	before starting each operation,				s. chapter 9.3.3, page 9-6
	Exchange the lubricator	If required.				Have the lubricator renewed at an official workshop.
Starting cradle	Visual check regarding soundness	before starting each operation,				s. chapter 9.4, page 9-7
Tension plate / clamping plate	Visual check regarding soundness and function check	before starting each operation,				s. chapter 9.4, page 9-7
Compressed air heater	Check the hoses for their tightness and soundness		x			s. chapter 9.6, page 9-9
	Check hose excess flow cutoff valve	before starting each operation,				s. chapter 9.5, page 9-8
	Visual check!	x				-
	Check the high temperature seal for soundness	before starting each operation,				-

*) The annual maintenance activities are to be carried out by Tracto-Technik-Service personnel.



9.2 Maintenancen work on GRUNDOMAT P

1. Switch off the GRUNDOMAT P before starting any maintenace work and ensure it is pressure-less (s. chapter 6.11, page 6-24).

Visual check!

2. Check, whether the GRUNDOMAT P and it's connections are intact. If damages or tears are visible, then
GRUNDOMAT P do not start operating with them again. If necessary contact your Tracto-Technik customer service (s. chapter 8, page 8-5).

Screwed connection of the connections

3. Check the tightness of all screwed connections of the hose connections, as well as the quick couplings. If necessary re-tighten them.

9.3 Maintenance of the lubricator

9.3.1 Visual check!

Check the lubricator for any visible damages before starting every operation. Do not start to operate the GRUNDOMAT P if the lubricator is damaged. If necessary contact your Tracto-Technik customer service.(s. chapter 8, page 8-5).

Check the readability of the signs (s. chapter 3.6, page 3-6) and if necessary renew these also.

9.3.2 Greasing

To ensure a troublefree operation, it is necessary to carefully grease the GRUNDOMAT P. Therefore always supply the GRUNDOMAT P via the lubricator with sufficient GRUNDO-OIL. Check the oil level of the greasing means on the transparent filling level hose of the lubricator (23).

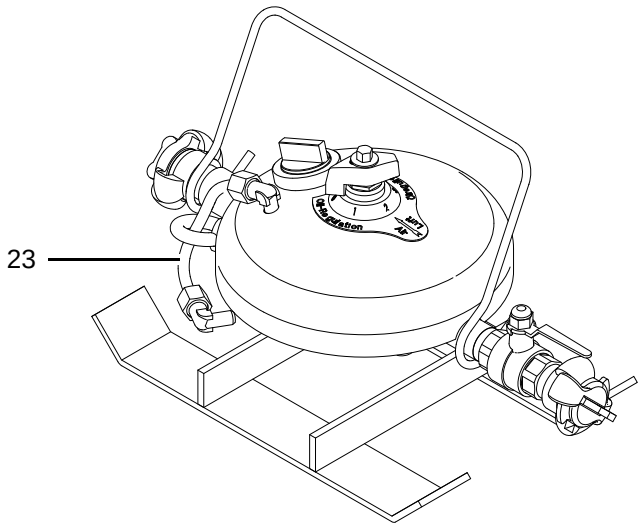


Fig. 9-1 Transparent filling level hose on the lubricator

Lubricants/grease

The recommended greasing means for the GRUNDOMAT P is GRUNDO-OIL. When applying greasing means from other suppliers, make sure that the following characteristics for the grease is provided.

- synthetic
- suitable for this type of machine
- prevents the interior of the GRUNDOMAT P from freezing.
- without health hazards
- hardly inflammable
- biodegradable within the shortest time
- without any danger to the hoses
- not resinous
- permitted for applications in the ground.
- Compatibility with materials installed inside the machine (e.g. Polyurethane (PUR))

Fill the oil container of the lubricator

Information!

The oil filling cover is a screwed connection with a safety exhaust. It is only possible to fill in oil in a pressure-less condition.

1. Switch off the GRUNDOMAT P before starting any maintenace work and ensure it is pressure-less (s. chapter 6.11, page 6-24).
2. Unscrew the oil filling cover (22) on the lubricator.
   Fill the recommended greasing means into the oil container of the lubricator. Check the oil level on the transparent filling level hose of the lubricator (23).
3. Screw the oil filling cover (22) back tight on the lubricator.

9.3.3 Function test of the lubricator

Warning!
Danger due to compressed air
Always wear protection glasses, to protect your eyes against any possible materials shooting out.

1. Set the operating pressure on the compressor in accordance with the technical data (s. chapter 2.7, page 2-10) and start it.
2. Connect the lubricator to the compressed air hose.
3. Throttle the flow rate of the 3.5 litre lubricator to approx. 1.5 m^3/min or the 1 litre lubricator to approx. 0.5 m^3/min (if necessary with the lock valve (20 in fig. 9-2) on the lubricator).
4. Set the knob (21 in fig. 9-2) of the lubricator to the position “0”.
5. Open the ball valve (20 in fig. 9-2) and let compressed air flow through.
6. Check the outlet of the lubricator for any oil mist (e. g. by holding a piece of cardboard or a clean cloth against the outlet). No oil mist should exit when the knob is in position “0”!
7. Set the knob (21 in fig. 9-2) of the lubricator to the position “5”.
8. Repeat the test point 6. Now oil mist should be visible.

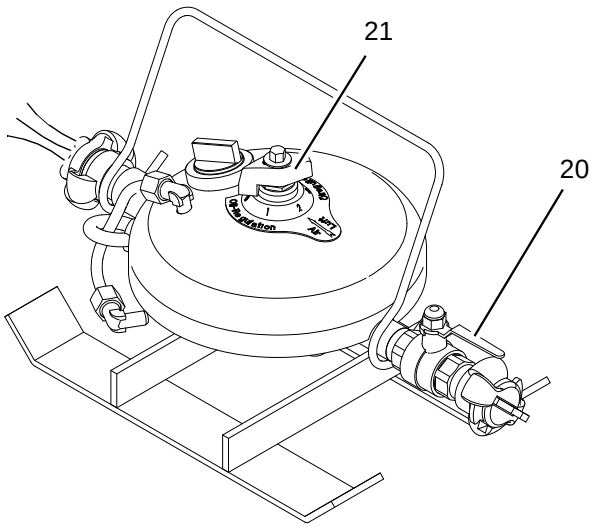
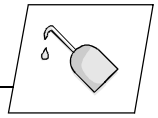


Fig. 9-2 Function test of the lubricator



9.4 Maintenance of starting cradle, tension plate and clamping plate

1. Switch off the GRUNDOMAT P before starting any maintenace work and ensure it is pressure-less (s. chapter 6.11, page 6-24).

Visual check!

2. Check, whether the starting cradle, the tensioning plate and the clamping plate are intact. If damages or tears are visible, then do not apply them anymore. Check whether the springs and clamping jaws on the tensioning plate and clamping plate are intact. If they are no longer functional, then do not apply them anymore. If necessary contact your Tracto-Technik customer service (s. chapter 8, page 8-5).

Screwed connection of the connections

3. Check the tightness of all screwed connections. If necessary re-tighten them.

4. Check the readability of the safety signs and if necessary renew them (s. chapter 3.6, page 3-6).

9.5 Maintenance of the compressed air heater

1. Switch off the GRUNDOMAT P before starting any maintenace work and ensure it is pressure-less (s. chapter 6.11, page 6-24).

2. Check the function of the hose excess flow cutoff valve, by connecting the gas hose (158) to a propane or butane gas cylinder, pressing the red button (161) and then letting go again.
   - When the red button is pressed gas should flow out.
   - If you let go of the red button, then the valve should close.

3. Check the readability of the signs and if necessary renew them (s. chapter 3.6, page 3-6).
4. Check the hose connections, connection parts and screwings for their soundness.

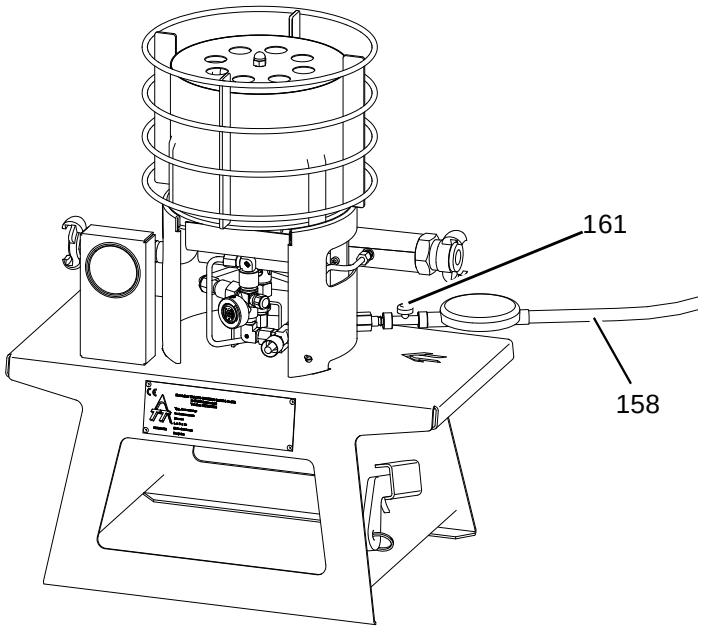


Fig. 9-3 Compressed air heater with gas hose - Check the hose excess flow cutoff valve

9.6 Compressed air / Connection hoses

The applied compressed air / connection hose must not be extended!
They must be exchanged if the following criteria is determined.

- Damages on the outer surface up to the inner layer (e.g. scoured areas, tears, fissures),
- Embrittlement of the outer surface (Tears in the hose material),
- Deformations, which do not apply to the natural form of the hose, in a pressure-less or a pressure state, or when bends are visible,
- Damages or deformings to the hose fitting (influence of sealability), in case of slight surface damages there is no need to exchange,
- Loosening of the hose out of the fitting,
- Function and tightness reduced corrosion on the fitting,
- Assembly requirements not paid attention to,
- Storage and/or application duration of the hose or the hose line has been exceeded.

Pay attention when exchanging the compressed air/ connection hoses:

1. Hoses, which have already been in use in a hose line, should not be re-assembled for hose lines.
2. Hoses must be exchanged in appropriate intervals, even when there are no visible damages concerning safety regulations to the hose line.
3. The application duration of the hose line should not exceed 6 years, including a storage time of two years at the most. A variation of this application time can be determined in accordance with testing and experience values in the individual application field, especially taking the jobsite conditions into account.
4. Even when stored correctly and under permissible strain the hoses and hose lines still place under natural aging. That is why their storage and application duration is limited.
5. Incorrect storage, mechanical damages and unacceptable strains are the most common causes of breakdowns.

9.7 Expert check

The complete GRUNDOMAT P must be checked by an expert after a certain turn-around.
Specialists are considered to be persons that have obtained knowledge and experience on directional bore rigs through their professional qualification and expertise, or that have back-ground knowledge on the respective legal requirements on work protection, accident prevention, or being such technical specialists that they can judge on the operating safety and state of the boring system.
Specialists must be constantly trained and kept up to date with the technical standards and the regulations.

General tests:

- Sight check
- Function check
- Check safety devices
- Rectify faults and re-check (in case faults are found)

Testing turn-around for the GRUNDOMAT P:

- Before the first operation
- At least once per year
- After repairs and conversions

Any faults discovered should be remedied before the next bore job commences! The result of the repair should be checked by an authorised person before starting the next job.

The results of the specialists tests must be held in a protocol and provided for any examinations carried out by the employer's liability insurance association and the industrial and trade supervision!

In case of any further questions please contact Tracto-Technik customer service. The expert check can be carried out by Tracto-Technik GmbH & Co. KG
You can find the contact address in chapter 8, page 8-5.

10 Cleaning

Cleaning should be carried out before every jobsite with the GRUNDOMAT P.

1. Switch off the GRUNDOMAT P before starting any maintenace work and ensure it is pressure-less (s. chapter 6.11, page 6-24).
2. Dismantle the connection hoses.

Cleaning

Warning!
Damages on internal components of the GRUNDOMAT P!
Never spray with a high pressure cleaner in the inside of the casing.

3. Clean the GRUNDOMAT P on the outside with a high-pressure cleaner.
4. Clean the tensioning plate and the starting cradle with a high-pressure cleaner.
5. Clean the lubricator and the GRUNDOSCOPE with the aiming frame after operation with a damp cloth.

11 Storage of the GRUNDOMAT P

Conditions

The GRUNDOMAT P must be switched off, the system made pressure-less and the compressed air/connection hoses disconnected.
Make sure that the components filled with GRUNDO-OIL are stored in places, which are secure in accordance with the respective laws of the country.

11.1 Preparation for storage

Clean the GRUNDOMAT P, compressed air and connection hoses, as well as the servo control stud. Add corrosive protection (oil or wax) to the GRUNDOMAT P.
The GRUNDOMAT P, the lubricator, as well as the compressed air and connection hoses are seen as separate units, each to packed in individual plastic packing material.

11.2 Storage conditions

The GRUNDOMAT P, lubricator, as well as the compressed air and connection hoses are to be packed and stored on wooden pallets. Pay attention to the following storage conditions:

- dry,
- under roof,
- free of frost

Storage of grease

Lubricants such as oils and grease should be stored in clean, closed containers/ cans so that dust and humidity cannot penetrate the the oxydation effect of the air is kept to a minimum. The oxydation effect of the air should be kept to a minimum. The storage area should be dry and cool.

Do not let oils and grease penetrate into the soil, water or the sewage system.

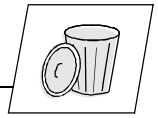
11.3 Storage of the compressed air and connection hoses

When storing the compressed air and connection hoses the following should be aimed at:

1. Store cool, dry and with as little dust as possible, wrapped in plastic packing, avoided direct sun or ultraviolet light, keep away from nearby heating sources.
2. Avoid storage temperatures below –10 °C for elastomers.
   The most appropriate storage conditions are temperatures between +15°C and +25 °C as well as a relative air humidity below 65 %.
3. In close contact to the unit do not use any ozone forming light sources, e.g. fluorescent light sources, mercury discharge lamps or electrical units with sparks.

The compressed air and connection hoses must especially not have contact with materials, which could cause any damage, e.g. acids, caustic solutions, solvents.
The compressed air and connection hoses are free of tension and must be stored in a horizontal position. When storing in rings the minimal bending radius must not fall short (s. chapter 2.7, page 2-10).

Elastomer hoses must be checked before being used for operation, if stored for a longer period than 3 years, whereby the manufacture date or date of the last check is relevant.
The storage time for the applied compressed air hoses should not exceed 4 years and for hose lines 2 years.



12 Disposal

12.1 Disposal of lubricants or grease

Empty oil containers, waste oil and oily cloths, battery fluid, diesel and coolant must be disposed of at disposal depots in accordance to the respective country laws.

12.2 Disposal of GRUNDOMAT P

Pay attention to the respective countries disposal regulations!
Before disassembling the GRUNDOMAT P it must be shut down and the hydraulic oil must be removed completely from the GRUNDOMAT P and the accessories.
To dispose dismantle the GRUNDOMAT P and the accessories and dismember GRUNDOMAT P as well as the accessories into the individual material groups:

- plastics,
- nonferrous metals (e.g. copper waste),
- electrical waste (engines),
- steel.

Dispose of the materials in accordance with your countries common laws!

13 Annexure

13.1 Checklist for jobsite planning

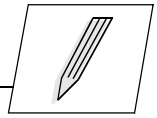
Taking the below mentioned aspects into consideration determine the date for the assembly of the starting and target pits.

Tab. 13-1 Checklist for jobsite planning

		Comments
local conditions	Accessibility of the jobsite location	
	Working surface in entrance and target area	
	Surface for laying out the new pipe	
	Ground conditions	
	Geological examination of the ground required	
	Obstacles in the intended bore path (fundaments, pipes)	
	Plans of adjacent pipelines	
	Minimal safety distance according to guidelines	
	Determine location for starting and target pits according to the technical frame conditions	
	Height difference between entrance and exit point	
	Cover minimal maximal	

Tab. 13-1 Checklist for jobsite planning

		Comments
Technical frame conditions	Material of the pipe	
	Outer- / Inner diameter	
	Wall thickness	
	Length	
	Check if a lifting device is necessary and if so, have it ready for use	
	Plan transportation to jobsite	
	Determine the date of the jobsite	
Legal frame conditions	Local regulations (working times, pit ordnance, residential requirements), traffic regulations	
	Environmental requirements in case of damage	
	Clarify liability in case of work accidents	
	Clarify liability in case of work defects	
	Clarify liability in case of environmental damages	
Approvals from authorities	Obtain necessary approvals (traffic, water navigation board, manhole approvals)	
personnel	Determine jobsite leader	
	Determine assistant workers	



13.2 Explanations according to EC guideline for machines 2006/42/EG