



MAX *Impact Power*

Operators Instruction & Parts Manual

MAX T240



Version 2023

Model: MAX T240

Registration number:.....

Purchase date:.....

Table of contents:		Page
1	TECHNICAL INFORMATION	4
1.1	MAX T240	4
1.3	Lubricator	4
2	CONSTRUCTION	5
2.1	BASIC SET OF T240	5
2.2	ACCESSORIES	6
2.2.1	Cones 355,6; 457; 610 i 711	6
2.2.2	Pipe plugs (locking plates / shutter plates)	6
2.2.3	Others	6
3	SAFETY INSTRUCTIONS	7
3.1	WARNING SIGNS:	7
3.2	PROHIBITORY SIGNS:	8
3.3	MANDATORY SIGNS:	8
4	USE OF MAX T240	8
5	OPERATION PRINCIPLE	9
6	CONSTRUCTION	9
6.1	MAX T240	9
6.2	AIR HOSE	10
6.3	COMPRESSOR CONNECTOR	11
6.4	LUBRICATOR	12
7	TRANSPORTATION	13
8	PREPARATIONS BEFORE USE	13
8.1	GENERAL INSTRUCTIONS	13
8.2	STARTING PIT	14
8.3	TARGET PIT	14
9	INSTRUCTIONS	14
9.1	SAFETY INFORMATION	14
9.2	ALIGNMENT OF THE MAX T240	15
9.3	CONNECTING THE AIR HOSE	16
9.4	FUNCTIONS OF THE LUBRICATOR	17
9.5	INSTALLING STEEL PIPES (RAMMING-JACKING)	18
9.6	CLEANING OF THE STEEL PIPES (AFTER PIPE JACKING, RAMMING)	19
10	MAINTENANCE	20
10.1	DAILY INSPECTION	21
10.2	WHEN MAX HAS NOT BEEN IN USE FOR A WHILE	22
10.3	TECHNICAL INSPECTIONS	22
11	TROUBLESHOOTING	23
12	CONNECTING CONE DIAGRAMS FOR RAMMING STEEL PIPES	24

1 Technical information

1.1 MAX T240

Parameter	Unit	Value
Diameter	[mm]	240
Length	[mm]	1639
Weight	[kg]	378
Air consumption	[m ³ /min]	6.0 – 7.0
Air pressure	[bar]	6
Impact energy	[J]	2000
Impact frequency	[Hz]	1,7 – 2,5
Pipe diameters	[mm]	219; 273; 323,9; 355,6; 406,4; 457; 508; 610; 711

1.2 Air hose

Parameter	Unit	Value
Diameter	[mm]	40
Length	[m]	10
Weight	[kg]	35,6

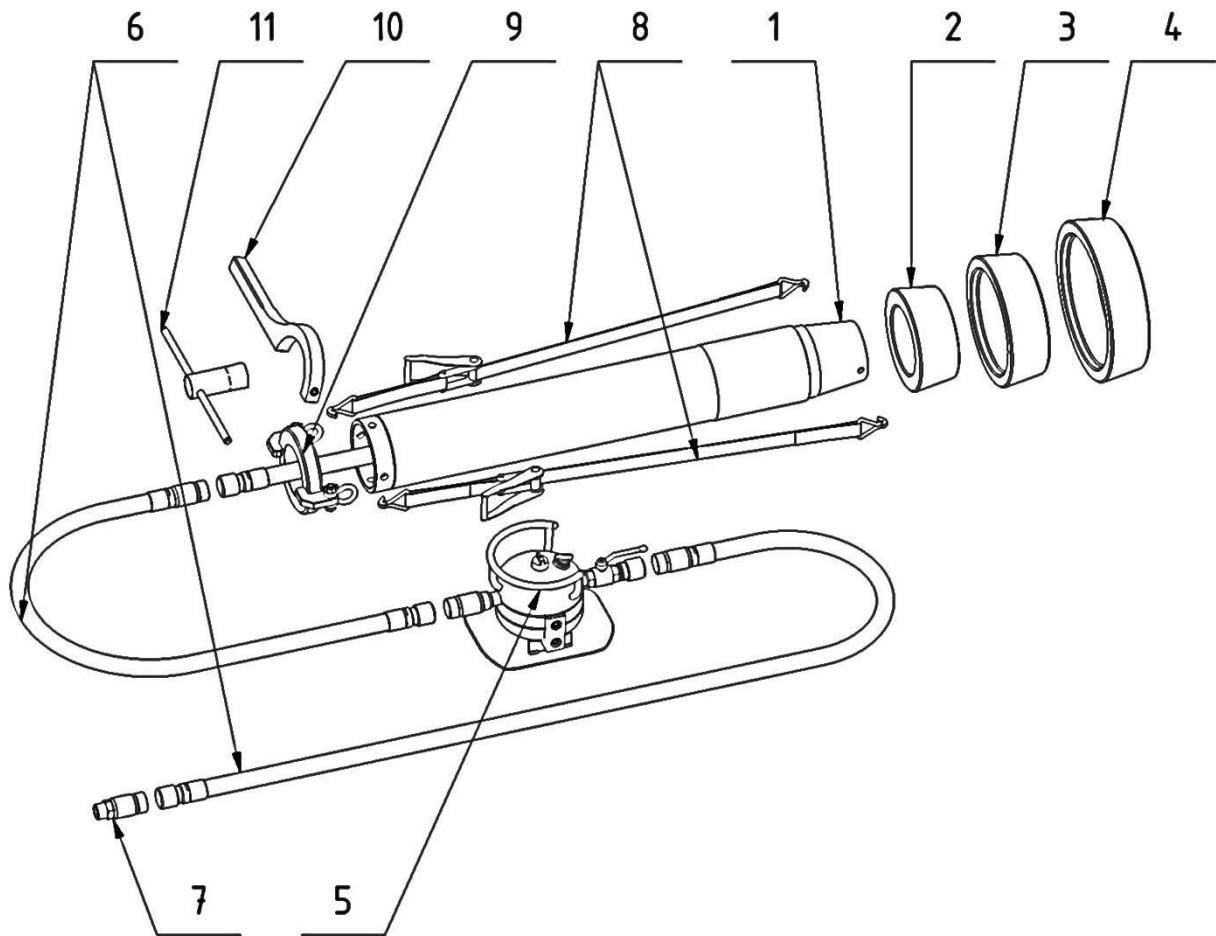
1.3 Lubricator

Parameter	Unit	Value
Length	[mm]	650
Width	[mm]	320
Height	[mm]	310
Weight (without oil)	[kg]	24
Tank capacity	[l]	5,2
Air pressure	[MPa]	0,6



2 Construction

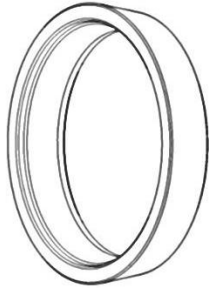
2.1 Basic Set of T240



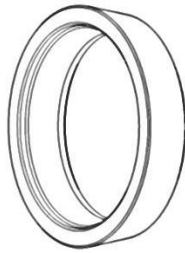
Nr	Description	Pcs
1.	MAX T240 Steel Pipe Rammer	1
2.	Cone 219,1; 273; 323,9	1
3.	Cone 406,4	1
4.	Cone 508	1
5.	Lubricator	1
6.	Air hose	2
7.	Compressor connector	1
8.	Belt	2
9.	Mounting plate	1
10.	Hook spanner wrench	1
11.	Socket tool S=65	1

2.2 Accessories

2.2.1 Cones 355,6; 457; 610 i 711



Cone 711



Cone 610

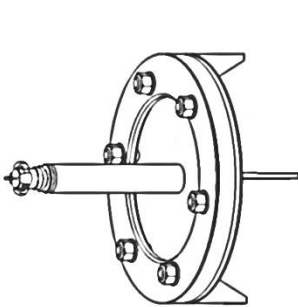


Cone 457

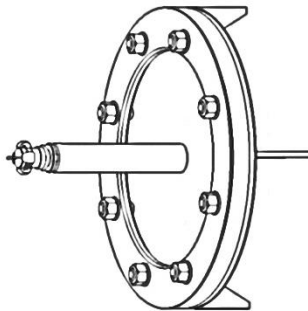


Cone 355,6

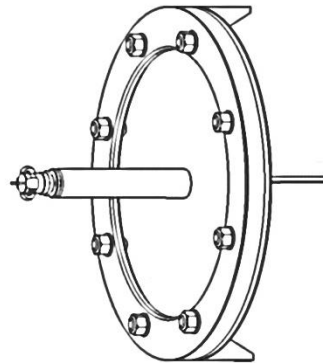
2.2.2 Pipe plugs (locking plates / shutter plates)



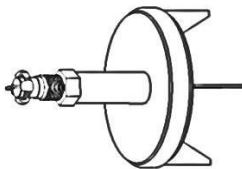
PW508



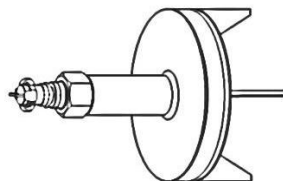
PW610



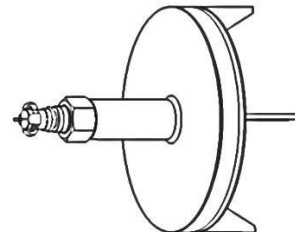
PW711



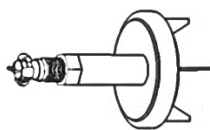
PW355



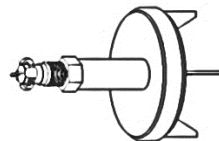
PW406



PW457



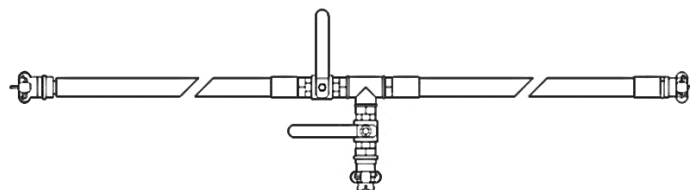
PW219



PW273

2.2.3 Others

- Locking rods (for the pipe plugs);
- Air pressure hose with valves (for the pipe plugs):



- Oil EkoMAX

For lubrication we recommend to use EkoMAX oil. An environmental friendly product that consists of bio-degradable components. The EkoMAX oil lubricant is available in 5 and 20 liter canisters.



3 Safety Instructions

Please note specific safety requirements as explained by procedures called out in this manual. Failure to follow these instructions could result in serious personal injury or death. All tools, materials and equipment manufactured and supplied by TERMA, are designed to be used by qualified and trained personnel only. TERMA will not be held liable for any injury or damage to either people or property resulting from the misuse of TERMA equipment.

3.1 Warning signs:



Danger to people, this symbol is used in conjunction with an inscription that says danger!



Danger of heavy swinging loads!



Danger of underground utilities!



Danger of explosion!



Entrapment hazard!



High Air pressure!



Danger of burning!

3.2 Prohibitory Signs:



General prohibition signs; this symbol is used in conjunction with a suffix that makes statements about the ban.



No unauthorized personnel are allowed!

3.3 Mandatory Signs:



Wear ear protection!



Wear safety glasses!



Wear hands protection!



Do not start, operate or service MAX until you have read and understood the operator's manual.

Failure to do so could result in serious injury!

4 Use of MAX T240

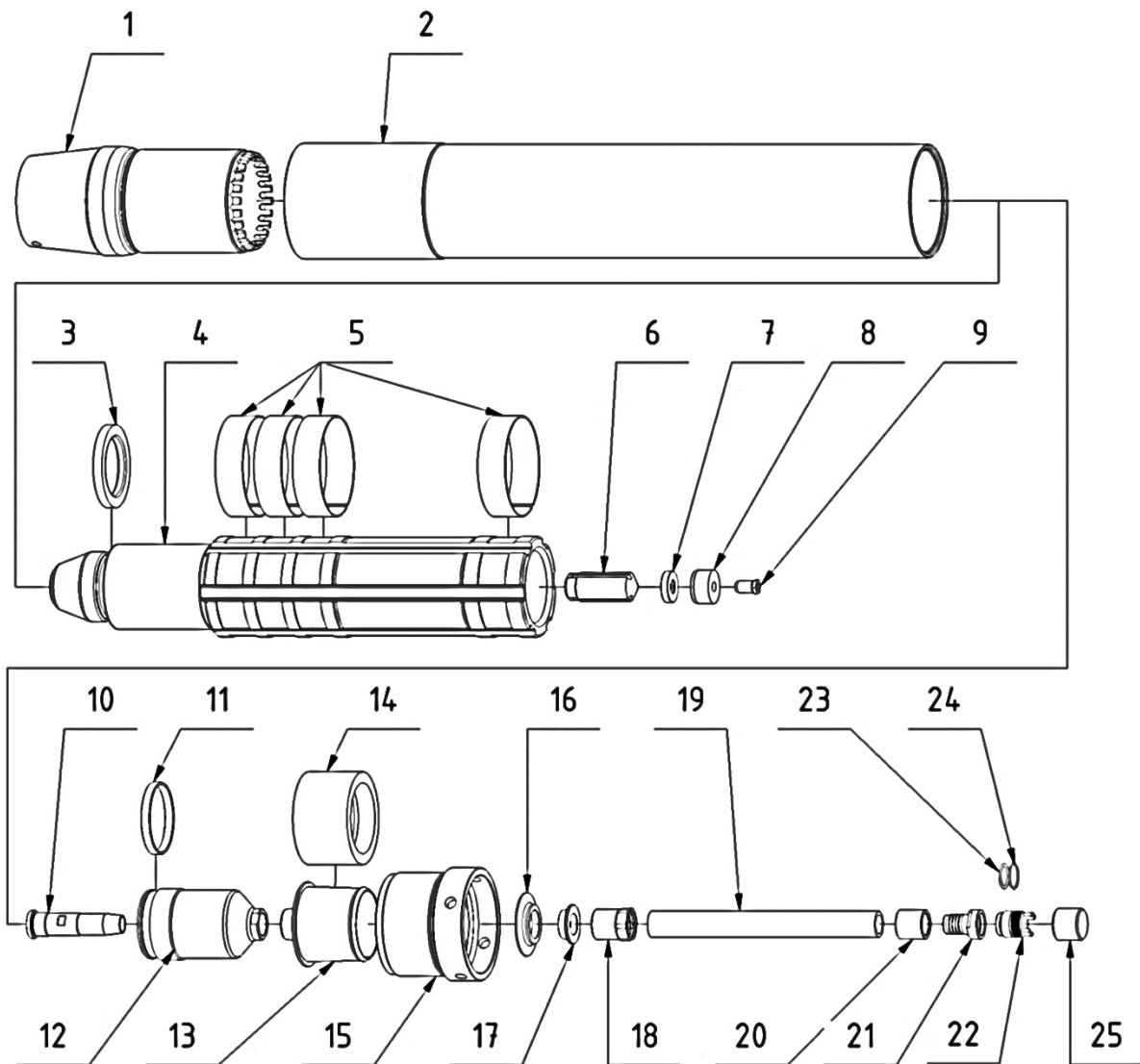
MAX T240 is used for the installation (ramming) of steel pipes with a diameter up to 711 mm. Using the MAX T240 for other purposes is not permitted. The manufacturer will not be held responsible for any damage sustained through improper use of the MAX T240.

5 Operation principle

The MAX T240 is a pneumatic rammer, which is driven by compressed air. Like any pneumatic tool, MAX T240 requires a compressor with adequate capacity for optimal operation. To ensure the longevity of the MAX, over pressure (max 6 atm) should be avoided at all times. The compressed air is passed through the MAX-oiler with the compressed air hose attached to the MAX – it is this mechanism that moves the MAX. The exhausted air leaves the MAX via its backside.

6 Construction

6.1 MAX T240

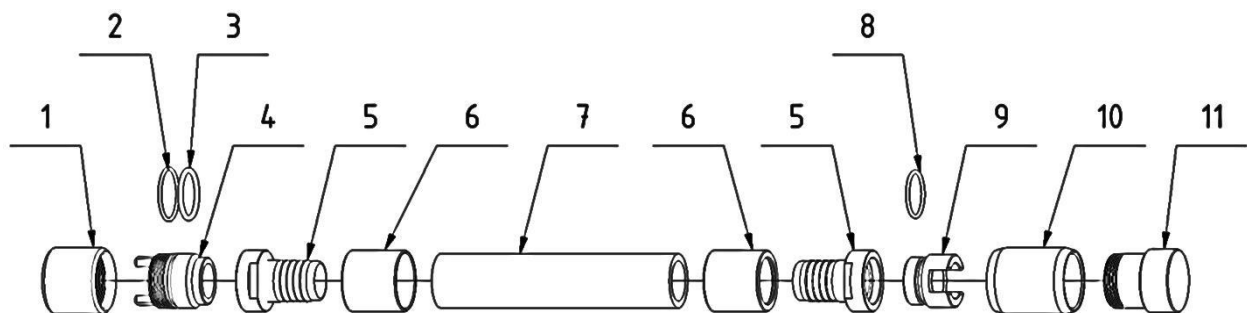


Drawing 6.1.1

Nr	Description	Pcs
1.	Head	1
2.	Cylinder	1
3.	Piston Sealing Ring	1
4.	Piston	1

5.	<i>Piston Sliding Rings</i>	4
6.	<i>Inertial Valve</i>	1
7.	<i>Inertial Valve Ring</i>	1
8.	<i>Inertial Valve Damper</i>	1
9.	<i>Inertial Valve Nozzle</i>	1
10.	<i>Core</i>	1
11.	<i>Controller Seal</i>	1
12.	<i>Controller Piston</i>	1
13.	<i>Hub</i>	1
14.	<i>Vibration Damper</i>	1
15.	<i>Controller Nut</i>	1
16.	<i>Exhaust Valve</i>	1
17.	<i>Exhaust Valve Ring</i>	1
18.	<i>Hose Ring</i>	1
19.	<i>Hose</i>	1
20.	<i>Clamping Sleeve</i>	1
21.	<i>Hose Connector</i>	1
22.	<i>Hose Screw</i>	1
23.	<i>Sealing I (o-ring 42,8x5)</i>	1
24.	<i>Sealing II (o-ring 47,6x3,5)</i>	1
25.	<i>End Cap F</i>	1

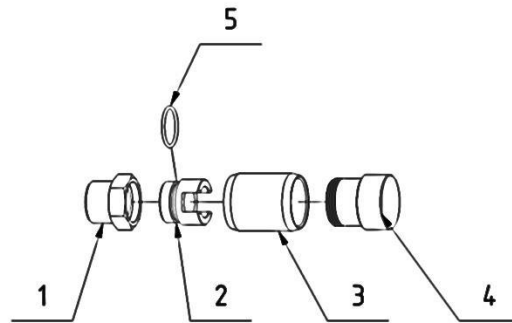
6.2 Air hose



Drawing 6.2.1

Nr	Description	Pcs
1.	<i>End Cap F</i>	1
2.	<i>Screw Sealing I (o-ring 47,6x3,5)</i>	1
3.	<i>Screw Sealing II (o-ring 42,8x5)</i>	1
4.	<i>Screw</i>	1
5.	<i>Hose Connector</i>	2
6.	<i>Clamping Sleeve</i>	2
7.	<i>Hose</i>	1
8.	<i>Female Connector Sealing (o-ring 41x3,6)</i>	1
9.	<i>Hose connector (female)</i>	1
10.	<i>Nut</i>	1
11.	<i>End Cap M</i>	1

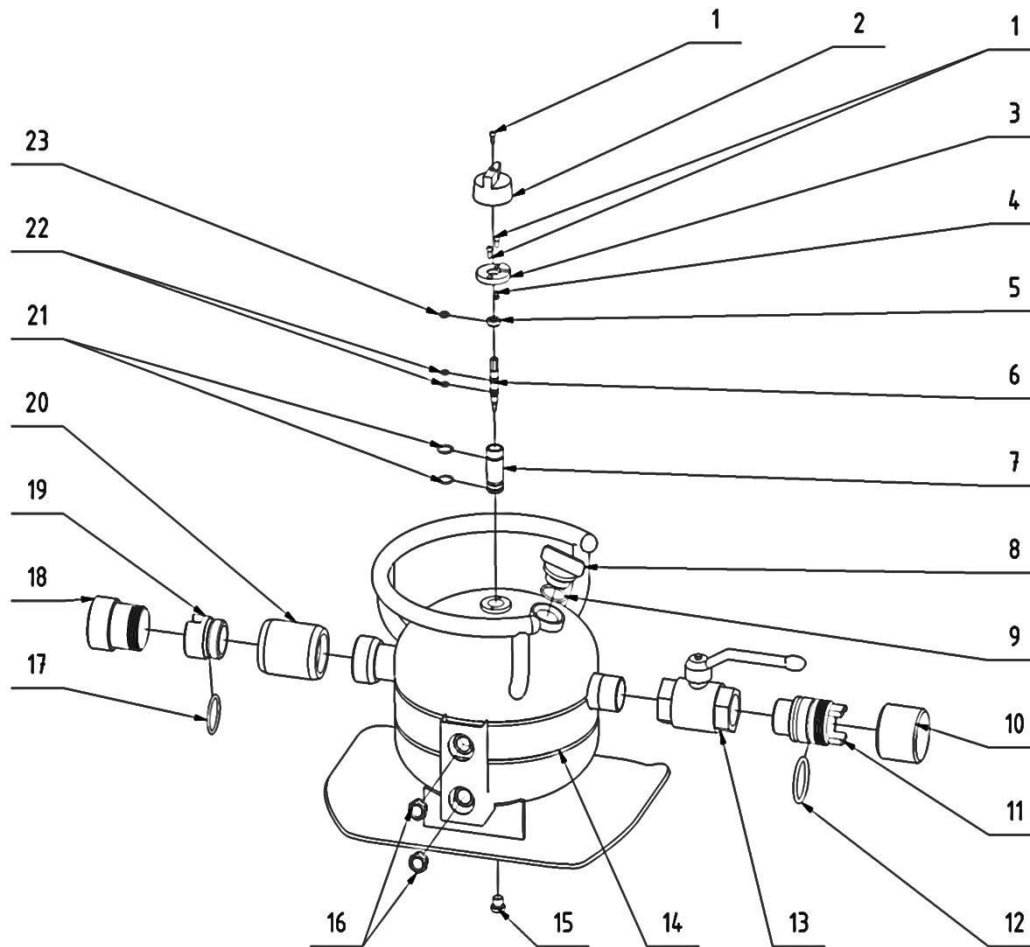
6.3 Compressor connector



Drawing 6.3.1

Nr	Description	Pcs
1.	<i>Air Compressor Reduction</i>	<i>1</i>
2.	<i>Female Connector</i>	<i>1</i>
3.	<i>Nut</i>	<i>1</i>
4.	<i>End Cap M</i>	<i>1</i>
5.	<i>Female Connector Sealing (o-ring41x3,6)</i>	<i>1</i>

6.4 Lubricator



Drawing 6.4.1

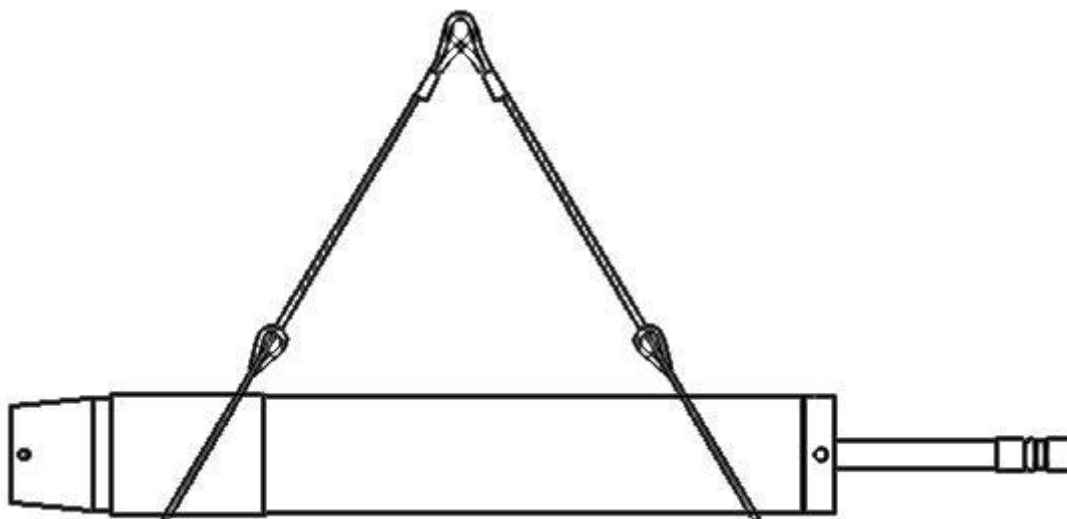
Nr	Description	Pcs
1.	Knob Screw	3
2.	Knob	1
3.	Shackle	1
4.	Screw	1
5.	Gland II	1
6.	Spire	1
7.	Gland I	1
8.	Filler Cap	1
9.	Sealing IV (o-ring 30,2x3)	1
10.	End Cap F	1
11.	Hose Screw	1
12.	Sealing III (o-ring 47,6x3,5)	1
13.	Ball Valve	1
14.	Tank	1
15.	Drain Plug	1
16.	Oil Level Indicator	2
17.	Sealing I (o-ring 41x3,6)	1

18.	End Cap M	1
19.	Female Connector	1
20.	Nut	1
21.	Sealing V (o-ring 18x2)	2
22.	Sealing VI (o-ring 8x2)	2
23.	Sealing VII (o-ring 10x2)	1

7 Transportation

Due to the heavy weight of the machine, the MAX T240 should be handled with extra care and only be transported and lifted with leads. When moving the MAX by hand, ensure that you always lift the body of the MAX.

**MAX should never be moved, carried, pulled or dragged by the hose!
This is a precaution to avoid any damage to the hose, MAX and yourself!**



The machine should be securely moved and lifted by straps at the front and back of the cylinder, in such a manner that sliding out is avoided

Make sure there are no persons under a lifted device! Persons under the load are in a danger zone for themselves and others.

Always check the quality and condition of the lifting straps before use!

8 Preparations before use

8.1 General Instructions

Before starting the MAX, you need to check for the existence and exact position of the buried pipe and cables by contacting the respective utilities or owners of networks. The exact location and existence of the buried cables and pipes should be determined by using trial pits or cable and pipe detection equipment.



The area where work is carried should be marked and locked to avoid unauthorized entry to the site!



Should you accidentally hit an electrical cable, leave the site immediately. Ensure no-one else enters the site and contact the electrical company to turn off the electrical supply!



Should you accidentally hit a gas pipe, leave the site immediately, ensure no one else enters the site and contact the gas company to turn off the gas supply!

8.2 Starting pit

The depth should be based on depth of planned installation. Trench width cannot be less than 2 m. The starting pit should be longer minimum 4 meters than the section of installed pipes.



For narrow Start and End pits (especially those with a depth of 1 meter or more) we recommend that the Start and End pit walls are supported, this is to avoid undue strain, and potentially, their collapse!



Always ensure that work is carried out in areas marked clearly with signage stating that work is in progress. No unauthorized personnel are allowed!

8.3 Target pit

The width and depth of the end pit should take into account the potential deviation from the line pipe driving.

9 Instructions

9.1 Safety Information



Operation of MAX T240 only to be carried out by suitably trained, qualified, and certified personnel only. New operators or operators in training should only work under the constant supervision of a fully qualified person.



Operating crew should always wear the appropriate safety equipment: ear protection, safety shoes/boots, hard hat, safety glasses, gloves etc.

All items should be inspected before any work commences.



Faulty or damaged items should be replaced immediately by a trained, qualified and certified person only.



Any changes or alterations to the MAX or to the accessories will invalidate the guarantee.

The MAX should only be operated when all parts (lubricator, hoses, accessories) have been secured and checked.

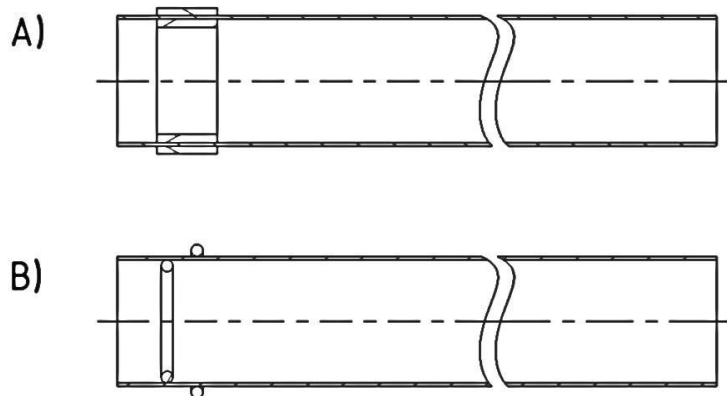
9.2 Alignment of the MAX T240

Steel Pipe Ramming as indicated by the following:

a) preparing of pipe through welding at the beginning of the pipe:

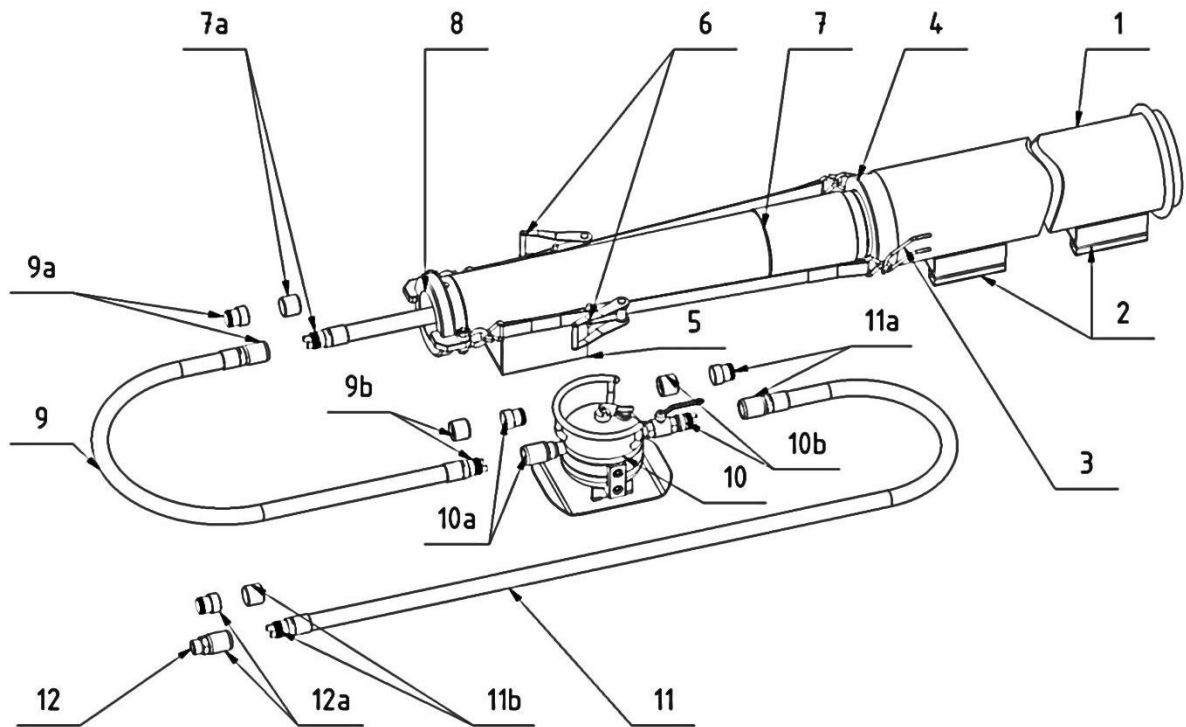
- two rings: one inside and one outside the pipe (Drawing 9.2.1, variant A)

- or welding the steel rod $\varnothing 10-12$ mm (Drawing 9.2.1, variant B)



Drawing 9.2.1

b) At the second end of installed pipe weld two handles **(3)** for connect the pipe **(2)** with T240 by using two belts **(7)**. See Drawing 9.2.2.



Drawing 9.2.2

- c) Put the pipe in the start pit using brackets **(2)** and correct the position using Optical Set
- d) Put the cone (cones) **(4)** inside the pipe **(1)**
- e) place the MAX T240 **(7)** to the same axe like pipe, using brackets **(5)**
- f) insert MAX T240 to the cone **(4)**
- g) connect the MAX T240 with pipe using two belts **(6)** and mounting plate **(8)**

9.3 Connecting the Air Hose



Before connecting, blow air through the air hose to remove dirt or any other debris or contamination.

Connecting air hose as indicated by the following (Drawing 9.2.2):

- a) Place the compressor in a safe and stable location; take into consideration the length of the installation



Secure the compressor against unexpected movements!

- b) Remove End Cap **(12a)** and **(11b)**, and connect hose **(11)** to Compressor Connector **(12)**
- c) Remove End cap **(11a)** and purge Hose **(11)** using air from air compressor, to remove any debris from hose **(11)**.



Whilst blowing air through the hose, do not blow compressed air from the hose at people. The air and dirt can cause injury.

- d) Remove End Cap **(10b)**, connect Lubricator **(10)** to the hose **(11)**.
- e) Remove End Cap **(10a)** and **(9b)**, connect hose **(9)** to the Lubricator **(10)**.
- f) Remove End Cap **(9a)** and purge hose **(9)** by open valve **(3)** - (Drawing 9.4.1) on the lubricator, using air from compressor, to remove any debris from hose **(9)**.
- g) Remove End Cap **(7a)** and connect hose **(9)** to the MAX T240 **(7)**

9.4 Functions of the Lubricator

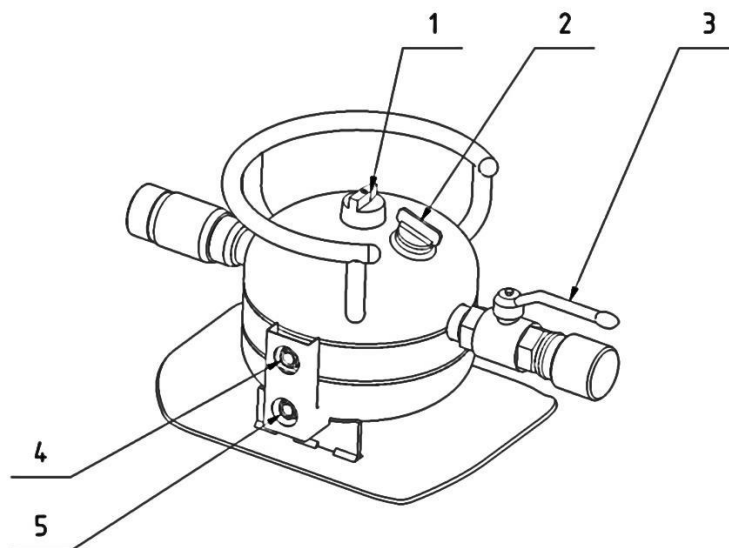
The lubricator ensures that the necessary lubricant is mixed with air and supplied to MAX. The compressed air from the compressor blows through the lubricator where it mixes with the lubricant - this results in a spray effect of oil and air. In this form, it passes through the air hose to the inside of the MAX device and ensures optimum lubrication for all moving parts. As a lubricant, we recommend EkoMAX oil, which is safe to use and bio-degradable.

The lubricator (drawing 9.4.1.) comes with:

- Valve to adjust the air supply **(3)**. Transverse position of the valve lever closes the supply of compressed air. Lever in the longitudinal direction means full opening of the valve.
- Oil adjustment knob **(1)** to adjust the amount of oil with the air.
- Oil level indicator, maximum level **(4)**
- Oil level indicator, minimum level level **(5)**
- Oil filler cap **(2)**



The oil filler cap **(2) should never be unscrewed whilst the MAX is in operation!**



Drawing 9.4.1

9.5 Installing steel pipes (ramming-jacking)



The MAX should only be operated when all parts (lubricator, hoses, accessories) have been connected, secured and checked.

Steel Pipe Ramming as indicated by the following steps:

- Connect air hoses accordance to 9.3.
- Place the MAX T240 and steel pipe (see 9.2.) in the direction of planned installation
- Before start MAX T240 open the oil adjustment knob (1) (Drawing 9.4.1)



Danger of explosion!



During pipe installing there is always the possibility that soil and other debris in combination with the exhausted air could be thrown from the end of the pipes. Stay in a safe place and use Eye and hear protection!



It is prohibited for anyone to put hands between MAX and cones, between cones and tube and between tube and wall of pit. There is a danger of Entrapment!



During a long-lasting pipe jacking operation the cone, head, pipe and other parts of the machine can get hot, Risk of Burns!

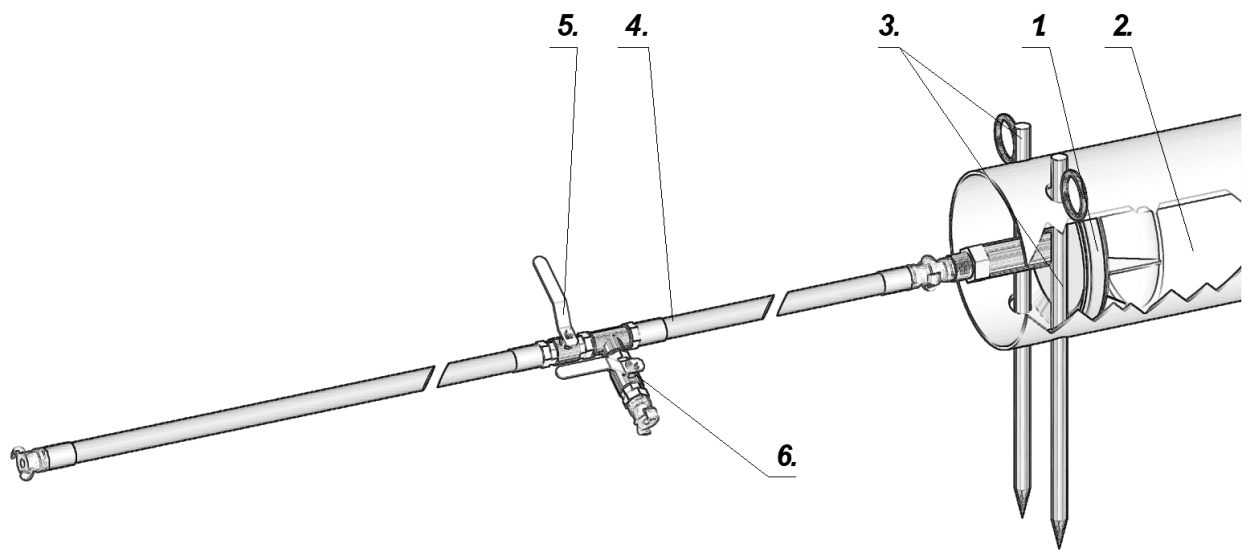
- open valve (3) (Drawing 9.4.1) for start the MAX T240. At the beginning valve (3) should be opened not at the maximum set (0,3 – 0,4 MPa)
- Continue inserting pipe by setting valve (3) at the maximum set (0,6 Mpa)
- Control the tension of belts (6) (Drawing 9.2.2), if necessary stop the MAX T240 and tension belts.
- Stop the MAX T240 and disconnect all hoses and connection parts.



Before disconnect hoses and other pneumatic elements, make sure that there is not compressed air inside

- close all hoses using End Cap, roll up hoses
- clean all equipment from debris

9.6 Cleaning of the steel pipes (after pipe jacking, ramming)

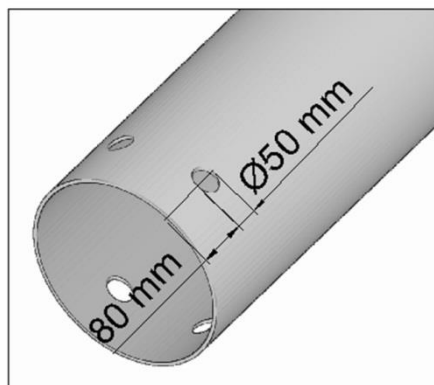


Drawing 9.6.1

For clearing the pipes, proceed as follows (Drawing 9.6.1): Pipe plug **(1)** (size used, depend on the diameter of the pipe), Foam pipeline pig **(2)**, Locking rods **(3)** to secure the pipe plug, Air hose for pipe plugs **(4)** with valves (5, 6), as well an apparatus for cutting/burning/welding.

To remove soil after pipe driving, proceed as follows:

- a) Remove by hand or shovel some soil, depth of removal is 3 to 4 times the diameter of the pipe.
- b) make a four holes in the pipe for the locking rods **(3)** in accordance with the drawing the holes need to be burned out, drawing 9.6.2.



Drawing 9.6.2

- c) To avoid damaging the pipe plug, remove the slag and wait for it to cool.
- d) Put foam pipeline pig **(2)** in the prepared pipe (Drawing 9.6.1).
- e) Pipe plug **(1)** to be placed inside the pipe and secure with the locking rods **(3)**
- f) Tighten up the pipe plug using tool 60 mm
- g) Connect the Air hose with valves on the shorter end of the pipe plug.
- h) The other end of the Air hose tube connected to the Air compressor.

- i) Ensure that the valves **(5)** and **(6)** are closed, ensure all connections are well secured and tightened.
- j) Start the compressor.
- k) Open the valve on the compressor (keep the valves on the hose closed) and wait till the hose is filled with compressed air.
- l) To start clearing the pipe open the valves **(5)** on the air hose.



During operation of Pipe Ramming, soil and other debris in combination with the exhausted air could be thrown from the back of the machine. This can lead to serious injuries or endanger life. Stay in a safe place, Never stand in line with the machine or with the pipes and always use Eye protection!

The area where work is carried should be marked and locked to avoid unauthorized entry to the site!

- m) If the device does not start after 2 minutes the compressor needs to be switched off.
- n) Release air slowly by opening carefully the valves **(6)**.
- o) Close the valves **(5)**.
- p) To seal and lubricate the pipe pig **(2)** some water can be inserted though the valve **(6)** in the hose **(4)**.
- r) Close the valve **(6)**
- s) Step i) till l) to be repeated.
- t) When the removal of the soil core begins, reducing the air supply can be used to limit the speed and the power the debris will be thrown out.

10 Maintenance



It is prohibited to repair, perform internal inspections or carry out any maintenance on MAX. Maintenance only can be performed by a qualified technician who has been trained to perform these jobs, or, alternatively at a manufacturer service center.

Technical changes to MAX, repairs and maintenance carried out, outside of a manufacturers service center, will invalidate MAX's warranty and guarantee claims.



It is prohibited to use MAX or its accessories when they are in sub-standard, technically poor condition.

10.1 Daily inspection

The scope of daily service/inspection includes:

- a) External visual inspection of the machine, lubricator and hoses.
- b) Check the screw connections of the head, cylinder, tail piece and make sure there is no gap anywhere between any of the elements.
- c) Check the connections and fittings of the hoses as well as on the lubricator.
- d) Check the air hoses for damages.
- e) Check the condition of the seals of the pneumatic hoses
- f) Control the oil level In the lubricator.
- g) Check for any oil leaks in the lubricator and its valves.

Maintenance after completion of work includes :

a) Normal dry working conditions

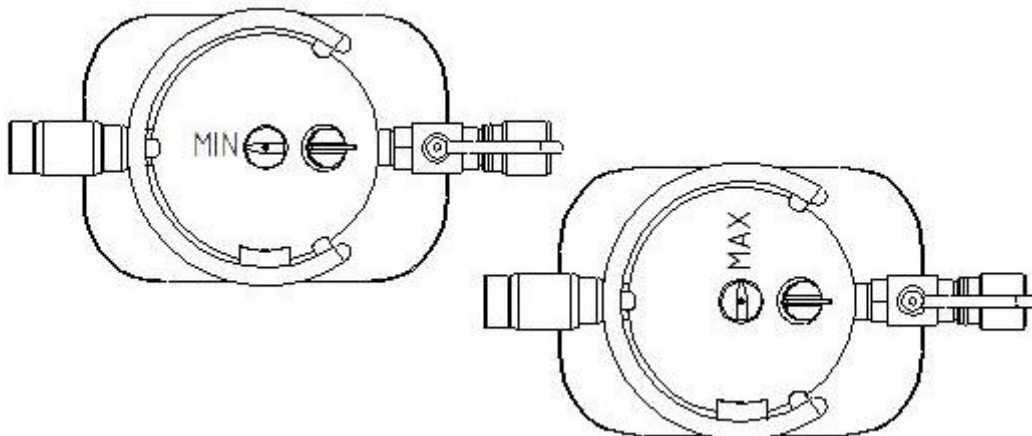
- place the machine on a dry surface.
- Turn the machine on for 20 seconds with maximum lubrication (Drawing 10.1.1)

b) Wet working conditions (wet ground, rain, snow)

- place the machine on a dry surface.
- Turn the machine on for 30 seconds with minimum lubrication,
- Pour 150ml anti-corrosion oil **KorMAX** into the short hose connected to the machine
- Turn on the machine for 3-5 seconds to distribute the oil gradually through the inside of the machine.

c) Possibility of debris inside the machine, like mud and Clay.

- place the machine on a dry surface.
- Pour 200ml diesel oil into the short hose connected to the machine
- Turn on the machine for 30 seconds to distribute the oil gradually through the inside of the machine and dissolve all contaminants, then turn of the machine.
- Pour 150ml anti-corrosion oil **KorMAX** into the short hose connected to the machine
- Turn on the machine for 3-5 seconds to distribute the oil gradually through the inside of the machine.



Drawing 10.1.1

10.2 When MAX has not been in use for a while

If the machine will not be in use for more than 7 days, it should be properly preserved. This is best to be done in our workshop or in one of the workshops of our authorized dealers. If you do not have this possibility, you can do the following:

- a) By compressed air clean the hose from sand, oil and water
- b) Connect and start the machine with the lubricating valve in closed position.
- c) The action described in point b, should be repeated until no more water and oil comes from the machine.
- d) Stop the machine and disconnect the air hose and add 150 cm³ of anti-corrosion oil **KorMAX** in the small air hose connected to the rammer.



Before decoupling the air hose, check that it is not under pressure!

- e) Connect the hoses and restart the machine.
- f) Stop the machine, disconnect the hoses and place caps on the machine and hoses.

10.3 Technical Inspections

This appliance must be performed at least every 80 mth in the specialized service establishments.

Inspection of MAX:

- a) Disassemble all parts of MAX
- b) Clean all parts
- c) Inspect all components, checking for wear and tear:
 - Anvil
 - Piston
 - Inside and outside surfaces of cylinder
 - threads connections
 - sliding and sealing elements
 - Injection hose sleeves

Inspection of the Air hose:

- a) Check injection sleeves.
- b) Check all couplings for wear and tear, possibly, renew the seals.

Inspection of the lubricator:

- a) Check the valves for leaks and smooth operation.
- b) Check the couplings for wear and possibly replace seals.
- c) Check the needle and all around it, possibly replace seals.
- d) Check the pipes for blockages and clean or replace them if necessary.

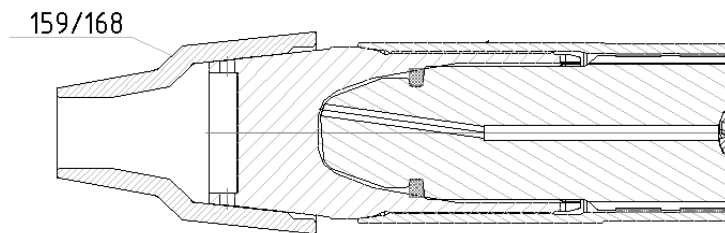
11 Troubleshooting

Problem	Reason	Solution
1	2	3
At the beginning of the rammering tube changing the right direction	Inequality of ground in the front wall of Start Pit	Improve the front wall in Start Pit
Unacceptable variations in the pipe from the correct direction.	The set of mole and pipe is wrong setting.	Set a new rammering trajectory
	Wrong shape of pipe (lack of concentricity on all length)	
	Inaccuracy in connecting pipe sections.	
	Huge obstacles (Stones) on the rammering trajectory .	
At the beginning of the work tube oscillating and does not dig into the ground.	Air pressure is too high.	Reduce the air pressure to 0,3 - 0,4 MPa.
	Due to wrong shapes in the edge of tube, incorrect connections between pipe and cone.	Improve the fixing using belts. Repair the edge of pipe.
Tube oscillating with metallic noise	The section of tube had broken.	Repair the tube. Set a new rammering trajectory.
Jacking stopped during the installation.	Pipe stalled in the ground.	Continuously operate the machine for 1 - 2 hours. Do not allow for long breaks in moist and loamy soils.
The rammer does not work after opening the valve.	Damage of the inside surface in hose.	Remove the damaged part of hose.
	Damage of sealing ring in the connection.	Replace the sealing ring
	Wedged of piston: - Corrosion of working surfaces, - Foreign objects inside the machine	Disassemble the machine, wash, wipe, and lubricate parts.
	- damaged the working surfaces inside MAX T240	To repair in service or a specialized facility
	Damaged piston seals	Replace the seals
	Damaged controller seals	Replace the seals
The machine does not run smoothly, does not provide a satisfactory performance	Insufficient withdrawal of piston before exhaling caused thickens or lack of oil. Corrosion parts.	Disassemble the machine, wash, wipe, and lubricate parts.
	swamped nozzle or too small hole in nozzle	Clean the nozzle or install bigger nozzle
The frequency of working is too high, incorrect mode	Piston Sealing Ring damaged	Replace the ring
	Air pressure is too low	Increase air pressure, change the nozzle

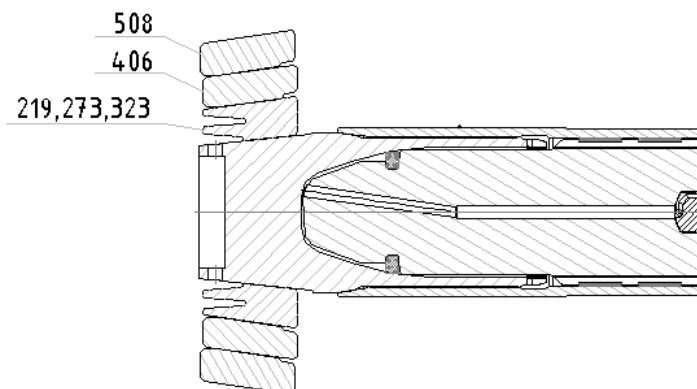
	Leaks of air in the power supply circuit	Remove the leaks
Air consumption is too big	Inertial Valve does not close the Inertial Valve Nozzle, Inertial Valve Nozzle blocked in Inertial Valve Ring	Tighten the nozzle into the socket, replace the outlet.
	Damage of Controller seals	Replace the seals

12 Connecting cone diagrams for ramming steel pipes

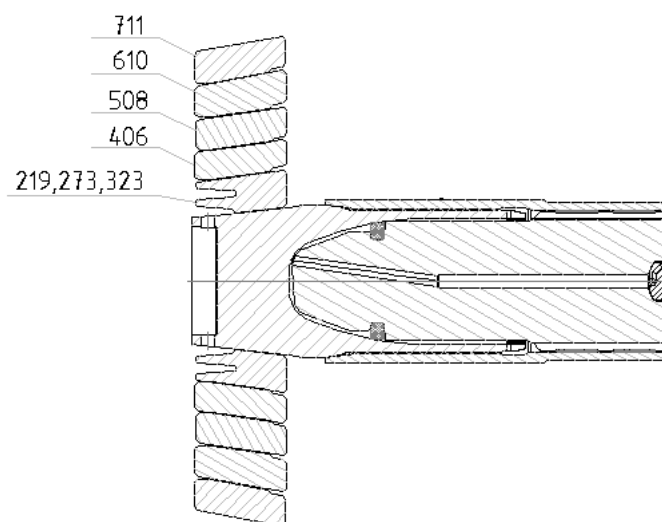
a) Cone 159/168 mounted directly on the T240 rammer.



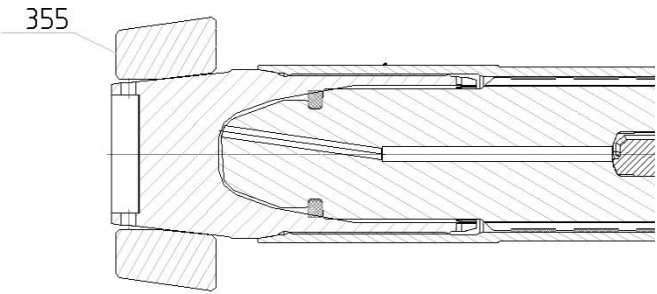
b) Basic Set of cones included in T240 Basic Set.



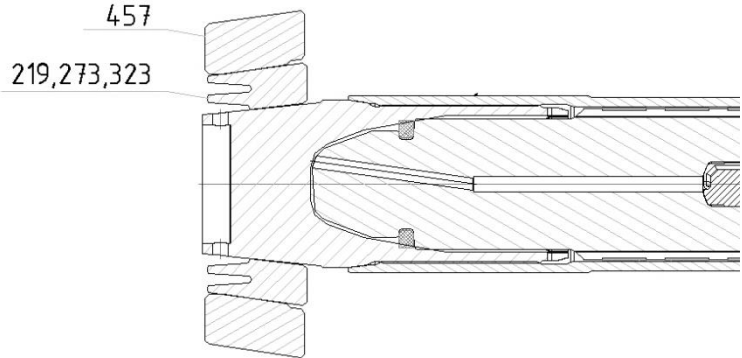
c) Adding cones 610 i 711 mounted on the Basic Set of cones



d) Cone 355 mounted directly on the T240 rammer.



e) Cone 457 mounted to the first cone (219,273,323) included in Basic Set of cones.





TERMA
SINCE 1990

<http://www.termagroup.pl>

e-mail: mole@termamax.com

<http://termamoling.pl>

MAX *Impact Power*

Your Local Dealer:

.....
.....
.....
.....
.....
.....