

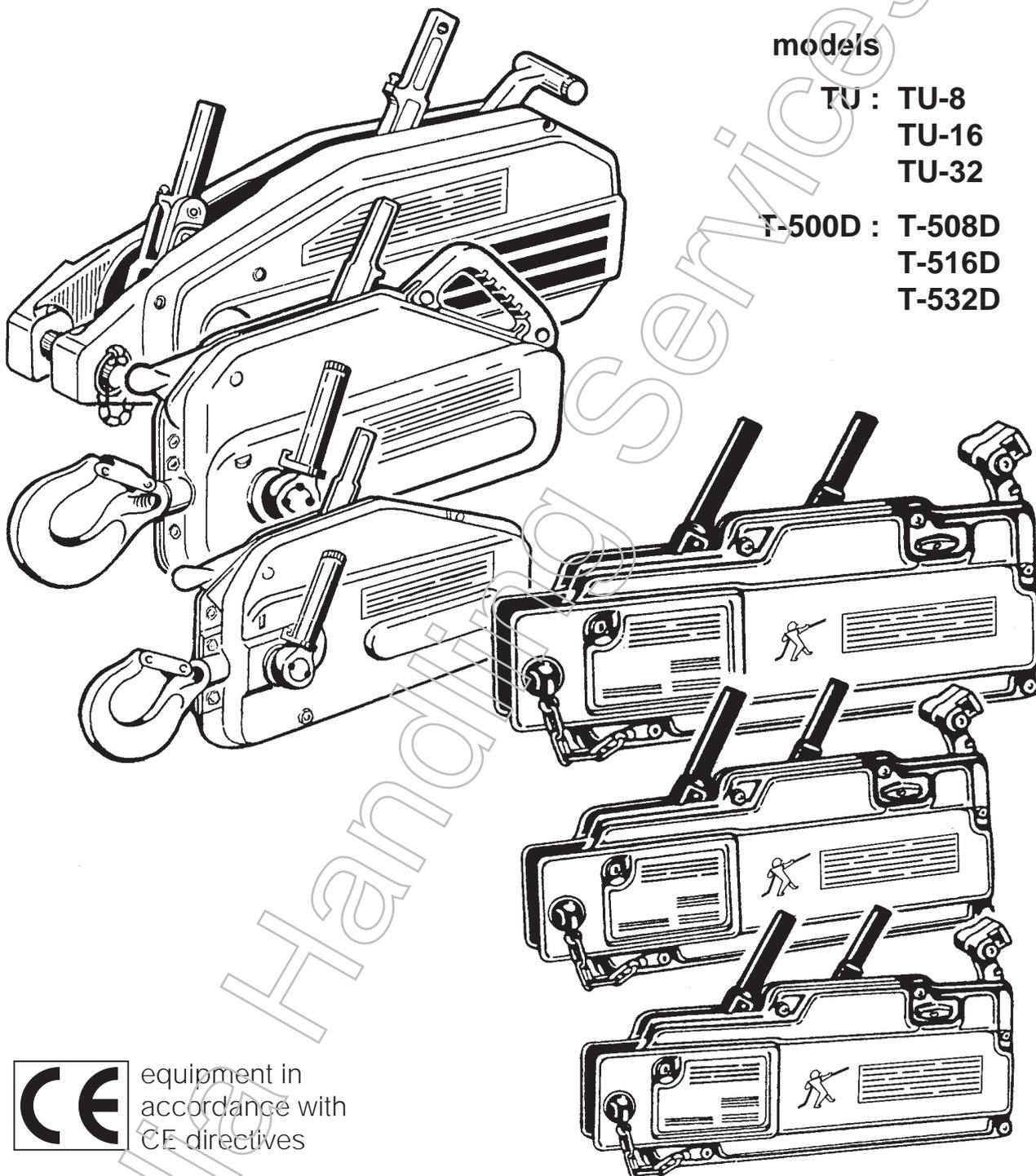
tirfor[®]

lifting and pulling machines operating and maintenance instructions

models

TU : TU-8
TU-16
TU-32

T-500D : T-508D
T-516D
T-532D



equipment in
accordance with
CE directives

0086086.03 - 01/95

 **Tractel** Group[®]

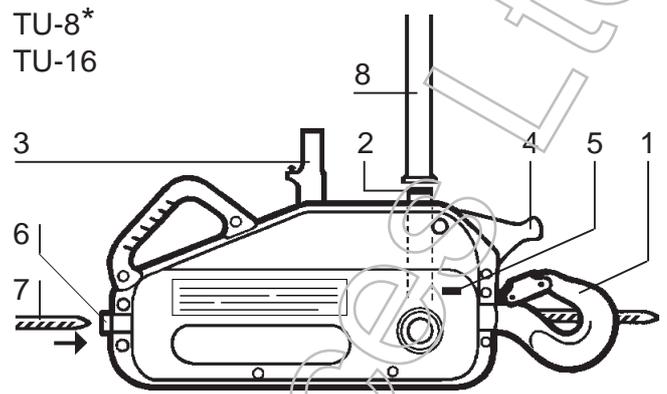
ORIGINAL MANUAL

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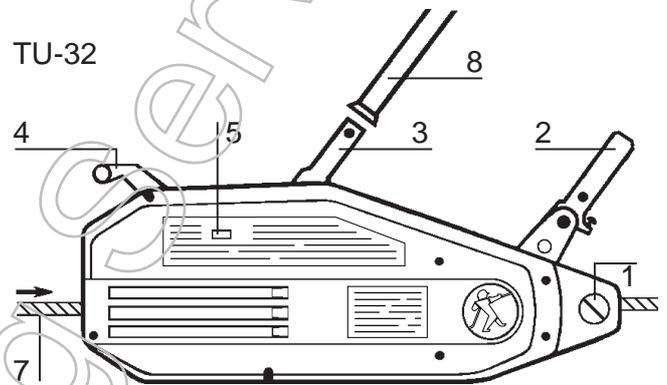
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Always concerned to improve the quality of its products, the TRACTEL Group reserves the right to modify the specifications of the equipment described in this manual. The companies of the TRACTEL Group and their agents or distributors will supply on request descriptive documentation on the full range of TRACTEL products : lifting and pulling machines, permanent and temporary access equipment, safety devices, electronic load indicators, accessories such as pulley blocks, hooks, slings, ground anchors, etc...

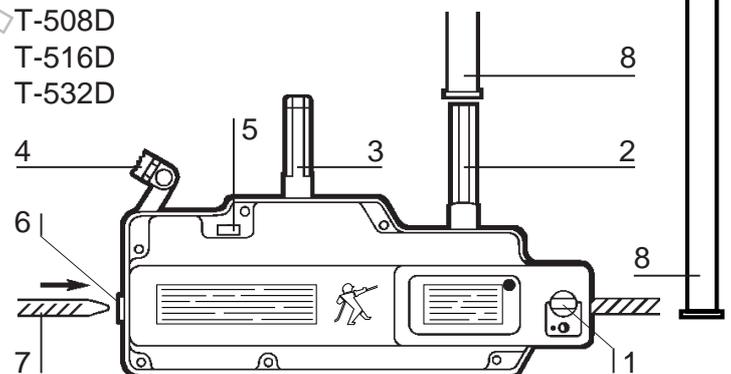
The TRACTEL network is able to supply an after-sales and regular maintenance service. Should you have any queries or require technical assistance, please do not hesitate to contact your TRACTEL dealer.



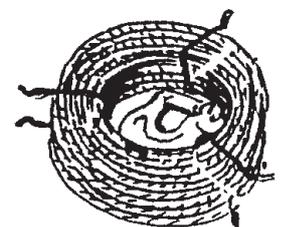
* without carrying handle



T-508D
T-516D
T-532D



1. Hook / anchor pin
2. Forward operating lever
3. Reverse operating lever
4. Rope release lever
5. Rope release safety catch
6. Rope guide
7. Wire rope
8. Telescopic operating handle



Wire rope on reeler

⚠ **GENERAL WARNING** ⚠

- 1- Before using the TIRFOR machine** it is essential for the safe and correct operation of the equipment **that this manual be read** and fully understood and that all the instructions be followed. **This manual should be made** available to every operator. Extra copies of this manual will be supplied on request.
- 2-** The TIRFOR machine allows the operator to carry out work with complete safety. Ensure that this machine is only handed over for use or rigging to an operator who is trained to operate it in a responsible manner.
- 3-** Never use a machine which is not in good working condition. **Replace any worn or damaged wire rope** (See Section 10). Continuous monitoring of the condition of the machine, its wire rope and anchor sling is an important safety consideration.
- 4-** The manufacturer declines any responsibility for the consequences of dismantling or altering the machine by any unauthorised person. Specially excluded is the replacement of original parts by parts of another manufacturer.
- 5- The models as described in this manual must not be used for lifting people.**
- 6-** Moreover, these models are designed for manual operation and **must not be motorised**. The TRACTEL Group has designed special motorised models (TU-16H and TU-32H).
- 7-** Never attempt to overload the machine.
- 8-** Standard TIRFOR machines are not designed for use in explosive atmospheres.
- 9- IMPORTANT :** If the equipment described in this manual is supplied to an employed person, check that you meet your obligations with respect to safety at work regulations (see page 11 - chapter 14)

LIFTING PEOPLE AND SPECIAL APPLICATIONS

For further information on equipment for lifting people, and on any special application, please refer to Tractel S.A.

TECHNICAL DATA

MODEL		TU-8	T-508D	TU-16	T-516D	TU-32	T-532D
Maximum working load	t	0.8		1.6		3.2	
Weight :							
machine	kg	8.4	6.6	18.0	13.5	27.0	24.0
telescopic operating handle	kg	1.0	1.0	2.4	2.3	2.4	2.3
standard 20 m of wire rope, complete	kg	6.1	6.1	13.1	13.1	26.6	26.6
Total weight of standard equipment	kg	15.5	13.7	33.5	28.9	56.0	52.9
Machine dimensions :							
length	mm	527	420	660	530	676	620
length with optional hook	mm	-	550	-	650	860	840
height	mm	265	250	330	315	330	355
width	mm	108	99	140	127	156	130
telescopic handle : closed/extended	cm	51/77	40/69	68/119	65/115	68/119	65/115
TIRFOR wire rope							
diameter	mm	8.3		11.5		16.3	
guaranteed breaking strain*	kg	4000		8000		16000	
weight per meter	kg	0.250		0.500		1.00	
Rope travel (forward/reverse)**	mm	70/76	46/63	56/70	42/57	30/48	18/36

* Including end fittings of the wire rope.

** One complete cycle of the operating lever at maximum working load.

1. DESCRIPTION OF EQUIPMENT

The TIRFOR machine is a hand-operated lifting and pulling machine. It is versatile, portable and multi-purpose, not only for pulling and lifting but also for lowering, tensioning and guying.

The originality of the TIRFOR machine is the principle of operation directly on the wire rope which passes through the mechanism rather than being reeled onto a drum of a hoist or conventional winch. The pull is applied by means of two pairs of self-energised jaws which exert a grip on the wire rope in proportion to the load being lifted or pulled. A telescopic operating lever fitted to either the forward or the reverse lever transmits the effort to the jaw mechanism to give forward or reverse movement of the wire rope.

The machine is fitted with a hook or anchor pin, depending on the model, so that it can be secured quickly to any suitable anchor point.

TIRFOR machines, intended for lifting and pulling materials, are available in two ranges each with three models of different capacities :

- T-500D range for light duty applications (with safety release catch)
- TU range for heavy duty applications (with safety release catch).

Each machine is supplied with a telescopic operating handle, and usually with a 20 m standard length of special TIRFOR wire rope fitted with a safety hook and wound onto a metal reeler. Longer or shorter lengths of wire rope are available on request.

This manual together with a guarantee card are supplied with each machine, as well as the CE declaration of conformity.

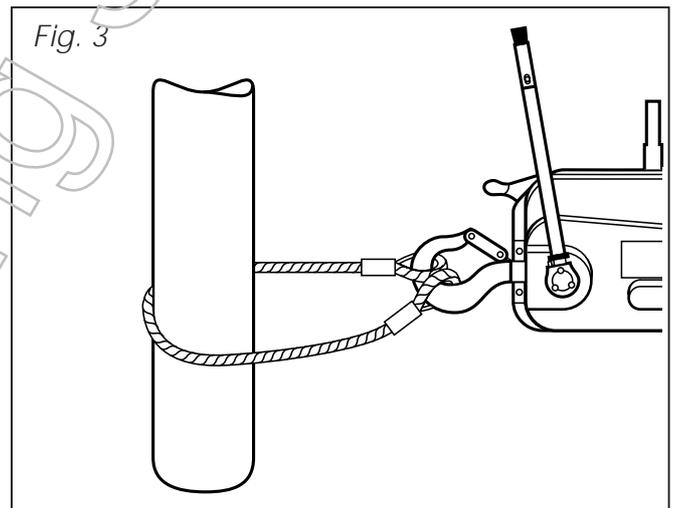
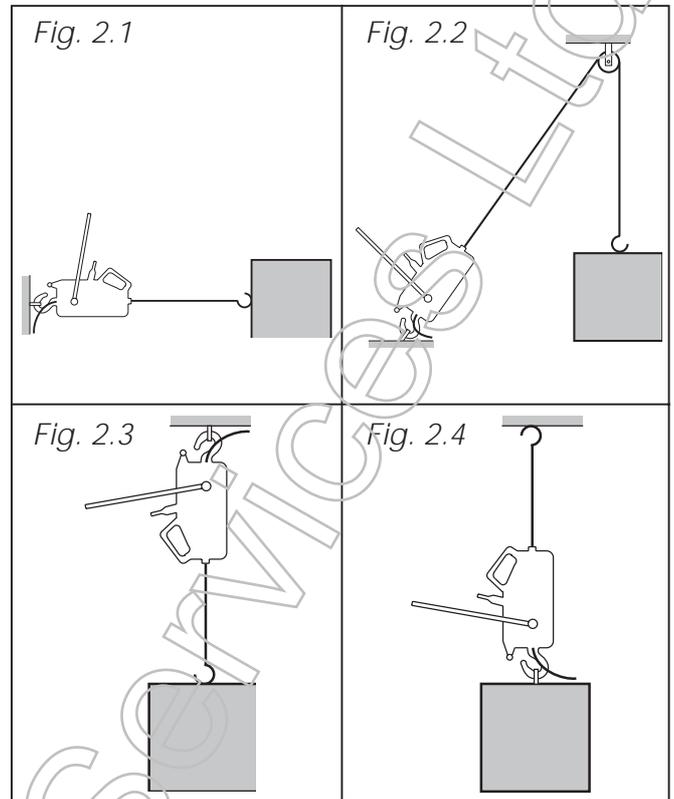
IMPORTANT : TIRFOR wire rope has been specially designed to meet the particular requirements of the TIRFOR machine. The manufacturer does not guarantee the safe operation of machines used with wire rope other than TIRFOR wire rope.

2. RIGGING ARRANGEMENTS

Various ways of rigging are shown in Figs. 2.1, 2.2, 2.3 and 2.4. Figs. 4 and 5 show particular arrangements (one forbidden and the other recommended).

The machine may be anchored to a fixed point with the wire rope travelling towards the machine (Figs. 2.1, 2.2, 2.3), or travel along the wire rope, with the load, the wire rope itself anchored to a fixed point (Fig. 2.4).

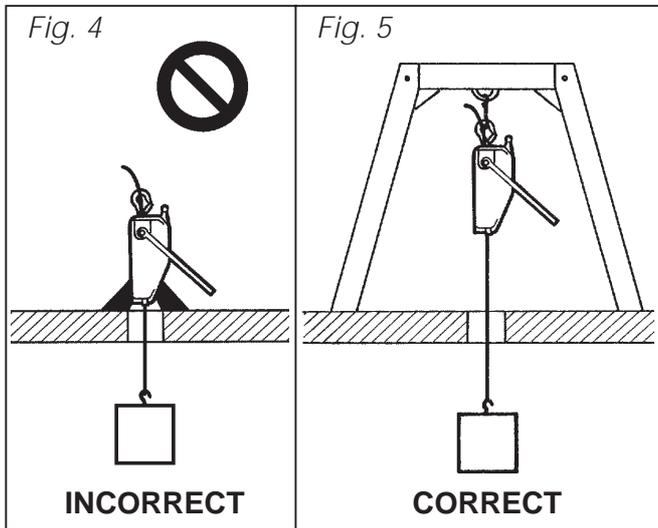
In example 2.2, the maximum working load of the pulley and the anchor point should be equal to or greater than twice the load.



N.B. Whatever the rigging arrangement, and if the machine is anchored directly to a fixed point, ensure that there are no obstructions around the machine which could prevent the wire rope, the machine and anchor from operating in a straight line. It is therefore recommended to use a sling of an appropriate capacity between the anchor point and the machine (Fig. 3).

⚠ WARNING ⚠ : Any rigging arrangement which requires the calculation of the forces applied should be checked by a competent engineer, with special attention to the appropriate strength of fixed point used.

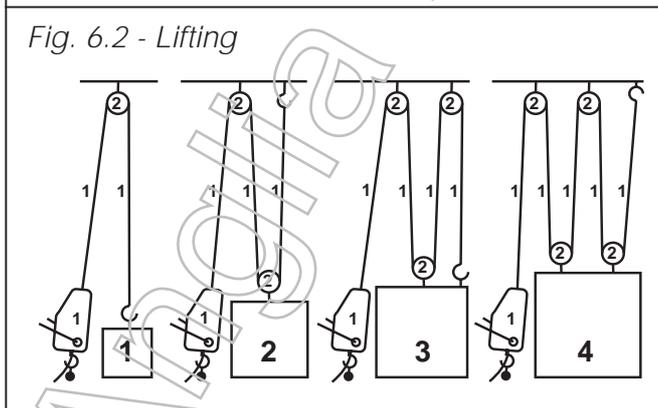
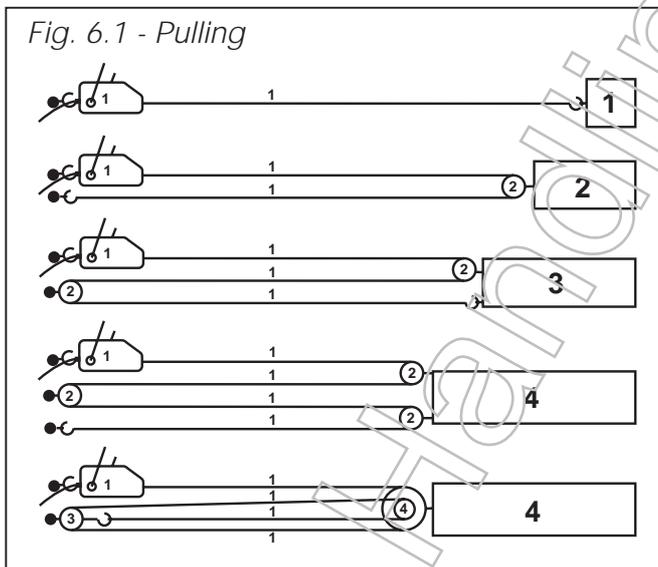
For work such as guiding the trunk in tree felling, the operator should ensure that he is outside the danger area by passing the wire rope around one or more return pulleys.



The capacity of the machine may be increased considerably for the same effort by the operator by using multiple sheave blocks. (See the examples set out in Figs. 6.1 and 6.2). The increase in the capacity shown is reduced depending on the efficiency of the pulleys.

The diameter of the pulleys used should be equal to at least 18 times the diameter of the wire rope. (Refer to the applicable regulations).

For any rigging arrangement other than those described in this manual, please consult TRACTEL S.A. or a competent specialist engineer before operating the machine .



3. INSTALLATING THE WIRE ROPE

N.B. When handling the wire rope it is recommended to protect the hands by using work gloves.

If the wire rope is to be anchored to a high anchor point, the wire rope should be anchored before fitting the wire rope in the machine.

1. Uncoil the wire rope in a straight line to prevent loops or kinks.
2. Release the internal mechanism (See section 4: «Releasing and engaging the jaws»).
3. Insert the wire rope through the rope guide at the end opposite to the anchor point (hook or anchor pin).
4. Push the wire rope through the machine, and if necessary, helping it by operating the forward operating lever.
5. When the wire rope appears through the anchor point, pull the slack wire rope through the machine, to the point required.
6. Engage the jaws by operating the rope release mechanism (See section 4 : «Releasing and engaging the jaws»).
7. Anchor the TIRFOR machine or the wire rope to the appropriate fixed point (See section 5 : «Anchoring») taking care to ensure that the anchor point (hook or pin, depending on the model) is correctly fixed.
8. Extend the telescopic operating handle until the spring locks into position. If necessary twist the two sections of the handle, one inside other, to align the spring (Fig. 1).
9. Replace the telescopic operating handle on the chosen operating lever (forward or reverse) and twist the handle to ensure that it is locked in position (about a half turn).

After this procedure, the machine is ready for operation, providing the load is correctly anchored to the machine or the wire rope (See section 5 : «Anchoring» and section 2 «Rigging arrangements»).

4. RELEASING AND CLOSING THE JAWS

Each machine is fitted with a lever (Fig. 1 Item 4) for releasing the jaw mechanism which should only be operated when the machine is not under load.

There are two positions for the rope release lever (See Fig. 7, 8 and 9) : released or engaged.

N.B. When not in operation, it is recommended that the rope release lever should be in the engaged position. The machine must therefore be released before attempting to feed in the wire rope.

4.1. TU-8 or TU-16 (Fig.7)

Releasing :

1. Completely press the rope release safety catch (5) and lift the rope release lever (4).
2. Release the safety catch and continue to lift the rope release lever until it locks into position. The internal mechanism is in the released position.

Engaging :

1. Lift the rope release lever slightly.
2. Press and maintain pressure on the rope release safety catch, allowing the release lever to slowly travel back to its original position. Release the safety catch. The release lever locks in position under the effect of its spring.

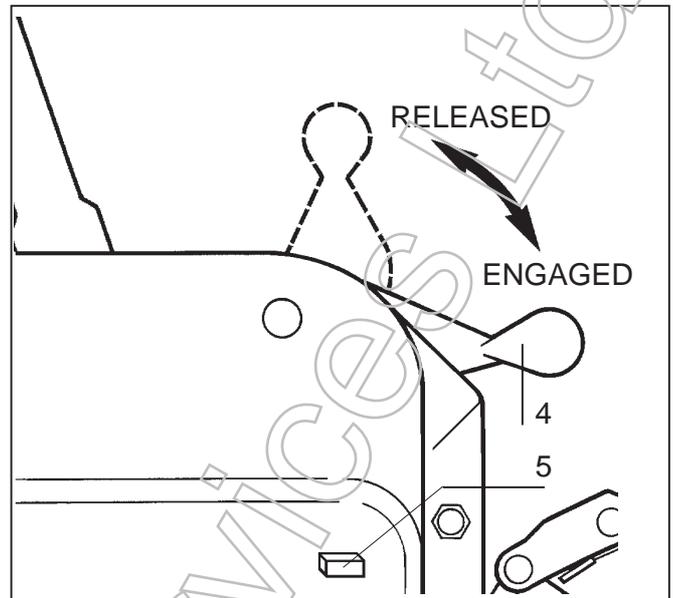


Fig. 7 - TU-8 and TU-16. Rope release lever.

4.2. TU-32 (Fig.8)

Place the anchor point against a support.

Releasing :

1. Completely press rope release safety catch (5) and push the rope release lever (4) towards the anchor point.
2. Release the safety catch and continue to push the rope release lever until it locks into position. The internal mechanism is in the released position.

Engaging :

1. Push the rope release lever towards the anchor point.
2. Press and maintain pressure on the rope release safety catch, allowing the release lever to slowly travel back to its original position. Release the safety catch. The release lever locks in position under the effect of its spring.

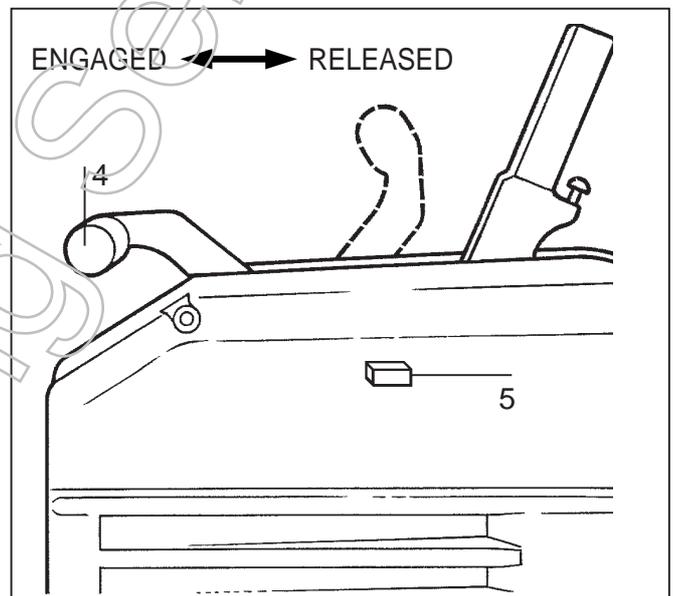


FIG. 8 - TU-32. Rope release lever.

4.3. T-500D range (Fig.9).

Place the anchor point against a support.

Releasing :

Turn the rope release safety catch (5) and push the rope release lever (4) towards the anchor pin until it locks into position when raised slightly at its limit. Release the safety catch.

Engaging :

1. Turn the rope release safety catch
2. Press the rope release lever vertically downwards, allowing the lever to travel back to its original position under the effects of its spring. Release the safety catch.

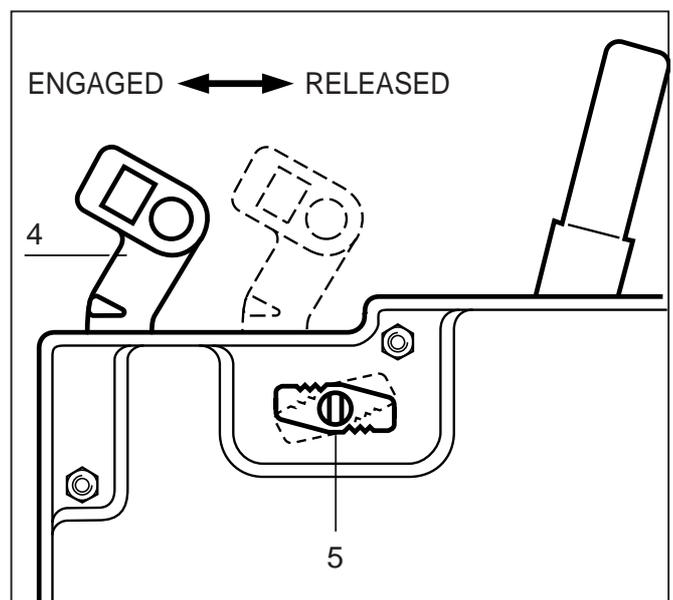


Fig. 9 - T500D range. Rope release lever

5. ⚠ ANCHORING ⚠

Failure to anchor the TIRFOR machine correctly runs the risk of a serious accident. The user must always ensure before operation that the anchor point(s) for the machine and wire-rope are of sufficient strength to hold the load.

It is recommended that TIRFOR machines should be anchored to a fixed point or to the load using an appropriate capacity sling. It is forbidden to use the machine's wire rope as a sling by passing it around the load and hooking it back onto itself (Fig.10 : incorrect anchoring arrangement; Fig.10a : correct anchoring arrangement).

The anchoring arrangement of models TU-8 and TU-16 is a hook fitted with a safety catch (Figs. 11 and 12). In all cases when anchoring the machine the safety catch of the anchor hook should be correctly closed, in its position at the tip of the hook (Fig.12). This advice for the machine anchor hook also applies to the hook fitted to the wire rope.

TIRFOR machines TU-32 and T-500D are anchored by means of a removable anchor pin, fitted across the two ends of the side cases (Fig. 13 and 14) and locked in position by a spring clip (See Figs. 15 and 16).

Optional hooks are available to fit the anchor point of models T-500D and TU-32.

To anchor using the anchor pin, follow the procedure below:

1. Open the spring clip of the anchor pin.
2. Remove the spring clip from the anchor pin.
3. Slide the anchor pin out of the side cases (Fig. 14).
4. Fit the anchoring arrangement, such as a sling, between the side cases.
5. Refit the anchor pin through the side cases and anchoring arrangement, such as the eyes of a sling.
6. Refit the spring clip to the anchor pin.
7. Close the spring clip, ensuring that it fits correctly over the end of the anchor pin and cannot fall out.

⚠ Warning ⚠ : It is essential for the safe operation of the machine to ensure that, before loading the machine, the anchor points, hooks or pins, are correctly secured, (with the safety catch correctly located on the hook - Fig. 12).

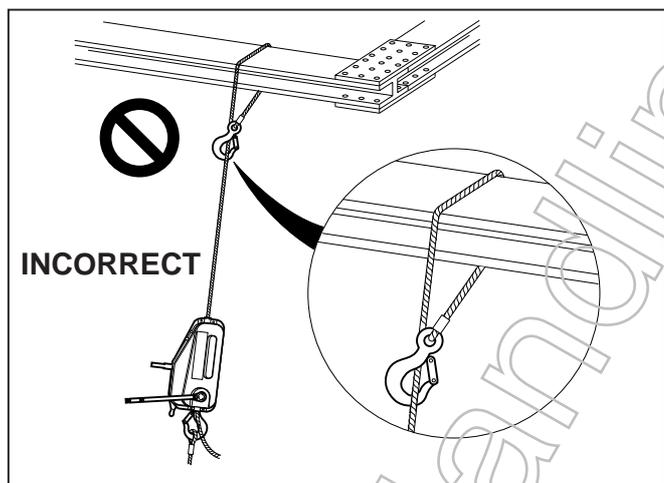


Fig. 10 - Incorrect slinging.

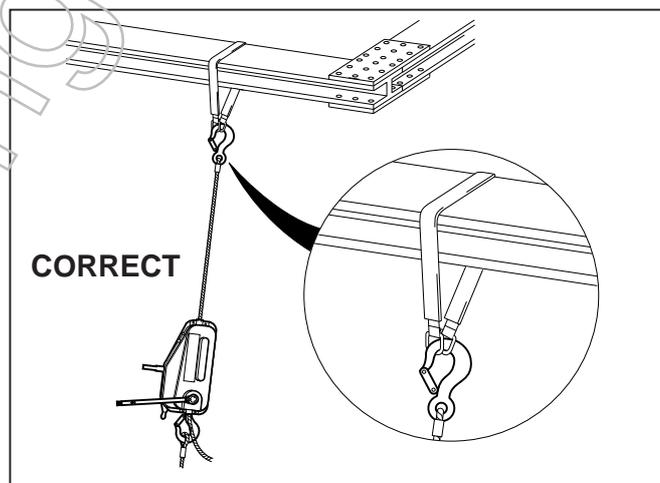


Fig. 10a - Correct slinging.

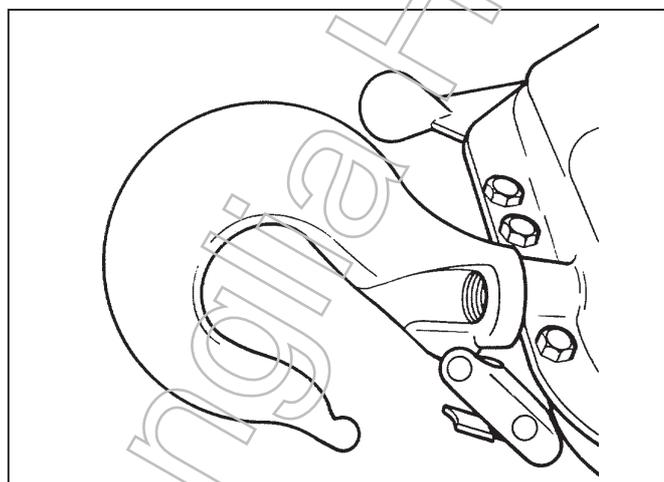


Fig. 11 - Machine anchor hook with catch in open position

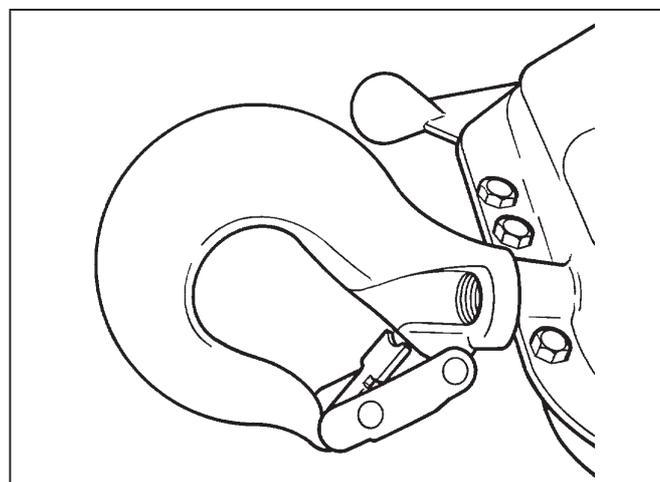


Fig. 12 - Machine anchor hook with catch in closed position.

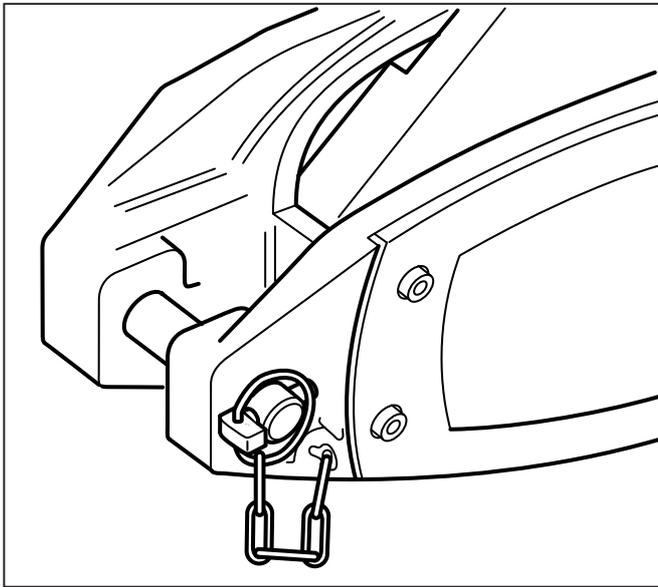


Fig. 13 - Anchor pin in position.

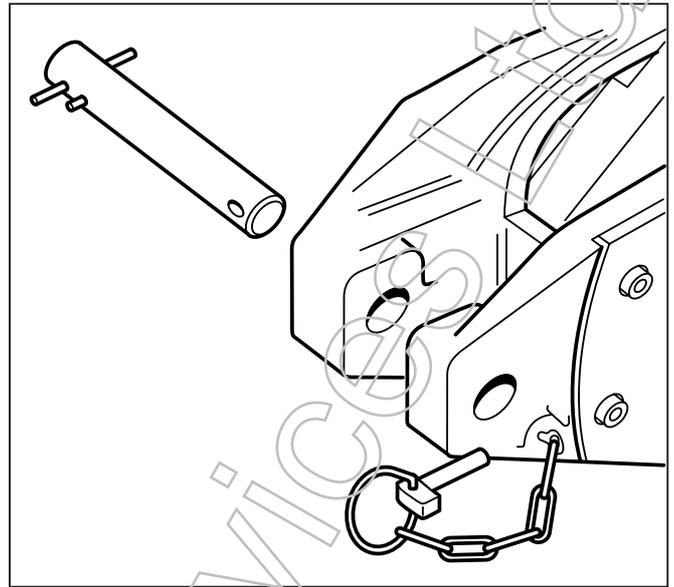


Fig. 14 - Anchor pin removed.

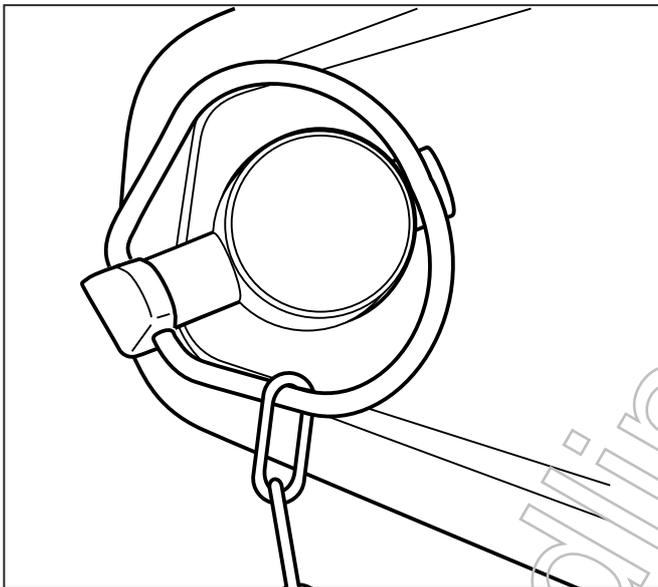


Fig. 15 - Spring clip closed.

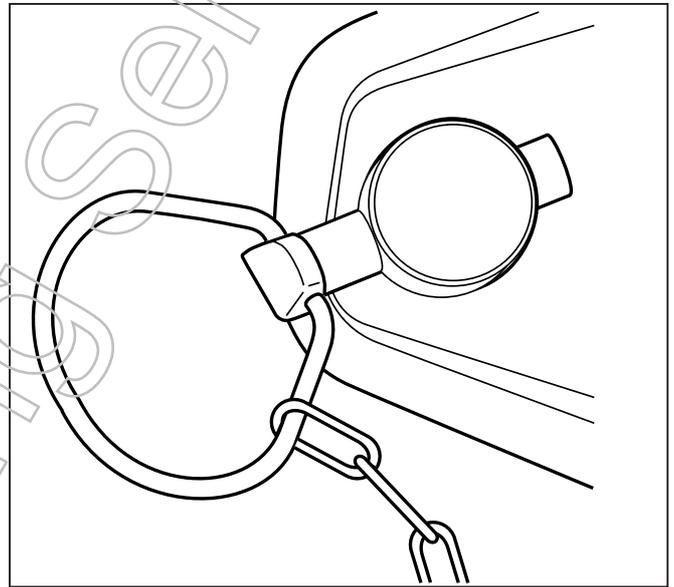


Fig. 16 - Spring clip open.

6. OPERATION

TIRFOR machines are very easy to use. Place the telescopic operating handle on either the forward or reverse operating lever, lock it into position by twisting, and move the operating handle to and fro. The operating arc is variable for ease of operation.

When operation stops, both jaws automatically grip the wire rope and hold the load which is spread equally between the jaws.

The to-and-fro operation of the forward or reverse lever gives continuous movement of the load.

7. RELEASING THE WIRE ROPE AND STORAGE

It is essential to take the load off the machine before attempting to release the jaws. To do this, operate the reverse operating lever until there is no tension in the wire rope.

Remove the telescopic operating handle and return it to the closed position.

Release the machine and follow the instructions for installing the wire rope in the reverse order. Re-engage the jaws of the machine before putting it into storage.

Store the machine and wire rope in a dry place, away from the effects of the weather. The wire rope should be completely removed from the machine and rewound onto its reeler.

Before reeling the wire rope, it is recommended to inspect it, clean it with a brush and then grease it. (See section 10).

8. SAFETY DEVICES

8.1 Overload limiting safety devices

All TIRFOR machines incorporate a shear pin system. In case of overload, one or more pins (depending on the model), fitted to the forward operating lever, shear and prevent further forward or lifting operations. Reverse operation is still possible to enable the load to be lowered or the wire rope to be slackened.

8.2 Rope release safety device

Models TU and T-500D are fitted with a «two-handed» rope release system which requires deliberate operation by the user to release the machine. See section 4: «Releasing and engaging the jaws».

9. REPLACING THE SHEAR PINS

Figures 17,18,19 and 20 show the position of the shear pins for the various models. Spare shear pins are in the stub of the operating levers for models TU-8 and TU-16, and in the rope release lever for the other models, behind the plastic cap.

Remove the sheared pins with a suitable punch.

For models TU-8 and TU-16, remove the forward operating handle stub by using an extractor. Remove the sheared pins. Refit the forward operating handle stub on the crank and align the grooves for the shear pins (Figs. 17 and 18).

For models T-500D and TU-32, align the holes of the upper and lower sections of the forward operating lever.

Position the spare shear pin(s) and drive it/them in with a hammer.

⚠ Warning ⚠ : It is forbidden to replace sheared pins by anything other than genuine TIRFOR shear pins of the same model.

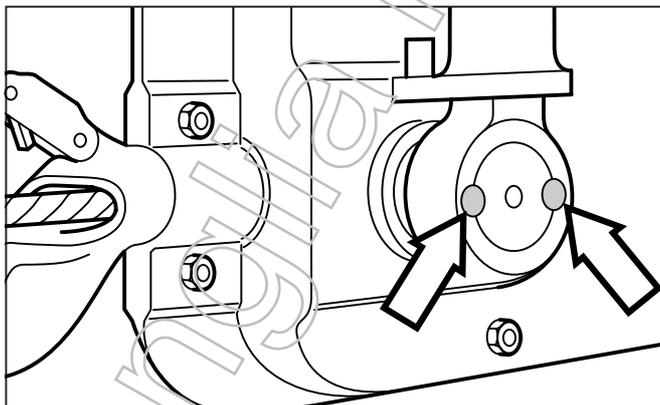


Fig. 17 - TU-8

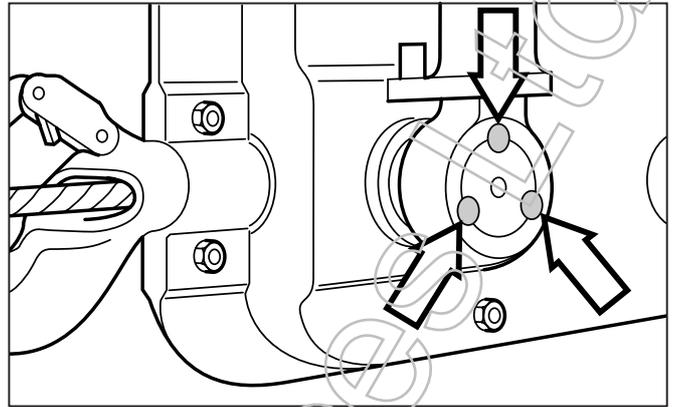


Fig. 18 - TU-16

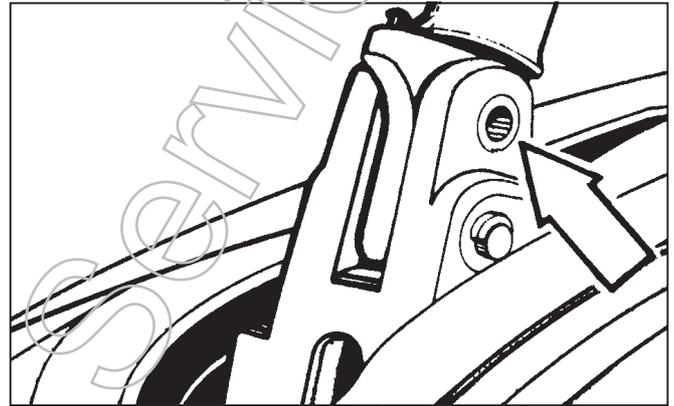


Fig. 19 - TU-32

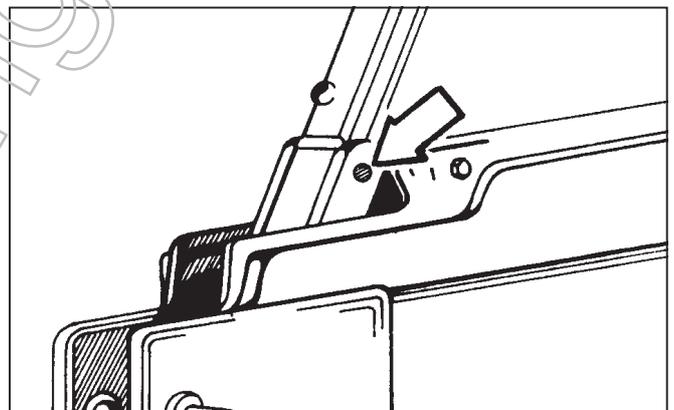


Fig. 20 - T-500D

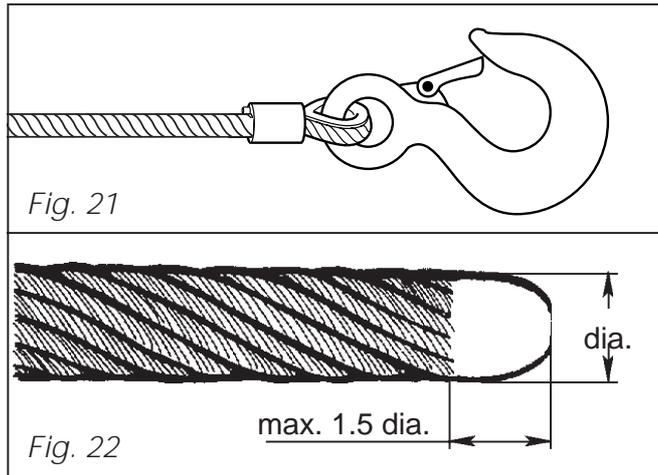
Before putting the machine back into operation, ensure that the cause of the overload is removed. If necessary, use multiple sheave blocks (See Fig.6).

Remember to re-order sheared pins and put them back in the correct place.

10. WIRE ROPE

⚠ To guarantee the safe operation of TIRFOR machines, it is essential to use them exclusively with TIRFOR wire rope which has been specially designed to meet the requirements of the TIRFOR machine.

TIRFOR wire ropes have a red strand which is visible on new rope. One end of the wire rope has an end fitting, such as a safety hook, fitted to a thimble fixed by a metal ferrule (See Fig. 21). The other end of the wire rope is fused and tapered (See Fig. 22).



⚠ A wire rope in good condition is a guarantee of safety, to the same extent as a machine in good condition. It is necessary to continuously monitor the state of the wire rope, to clean and oil it with a rag soaked with motor oil or grease. Grease or oil containing graphite additives or molybdenum disulphide must not be used.

Visual examination of the wire rope

The wire rope should be examined daily to detect any signs of wear (damage or broken wires : See examples in Fig. 23).

In case of any apparent wear, have the wire rope checked by a competent person. Any wire rope with a reduction from the nominal diameter by more than 10% should be replaced. (See Fig. 24 for the correct method of measuring the diameter of a wire rope).

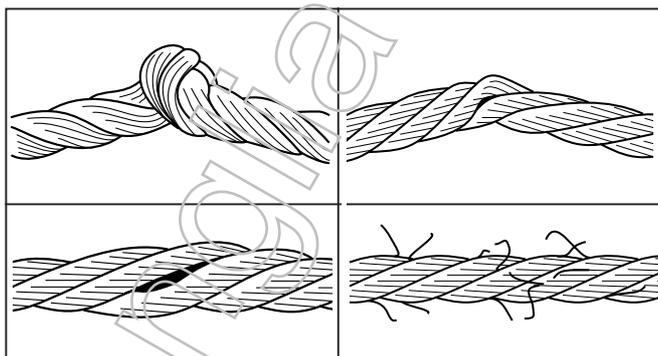


Fig. 23 - Examples of damaged wire rope

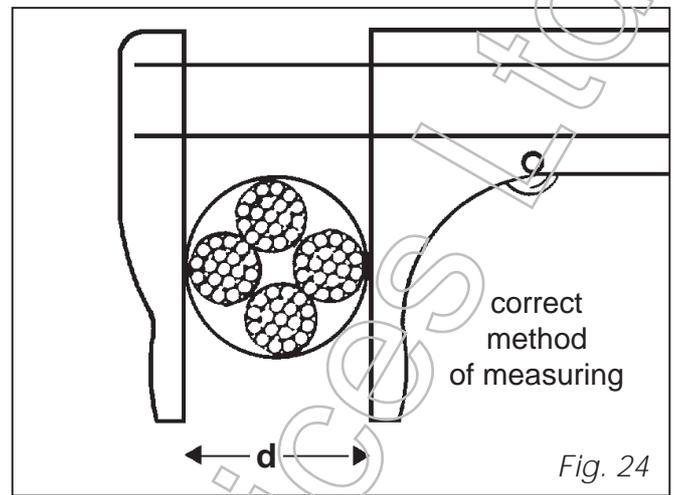


Fig. 24

IMPORTANT : It is recommended, specially for lifting applications, to ensure that the length of wire rope is greater than actually required. Allow an extra meter approximately.

When lifting or lowering loads over long lengths of wire rope, steps should be taken to stop the load from rotating to prevent the wire rope from unlaying. Never allow a tensioned wire rope to rub over sharp edges. The wire rope must only be used with pulleys of an appropriate diameter.

Never expose the wire rope to temperatures beyond 100 degrees C.

Never use wire rope that has been subject to damage such as fire, corrosive chemicals or atmosphere, or exposed to electric current.

Storage : See section 7.

11. MAINTENANCE INSTRUCTIONS

The machine should be inspected, cleaned and lubricated at regular intervals, at least annually, by an approved TRACTEL S.A. repairer. Never use grease or oil containing graphite additives or molybdenum disulphide . To clean the machine , allow the machine to soak in a bath of some proprietary cleansing fluid but not acetone and derivatives or ethylene trichloride and derivatives. Then shake the machine vigorously to loosen foreign matter and turn it upside down to allow the dirt to come out through the openings for the operating levers. Allow the mechanism to drain and become dry. After this treatment, **ensure that the machine is well lubricated** by applying a quantity of oil (type SAE 90-120) onto the internal mechanism through the openings for the operating levers, and for the models TU-8 and TU-16, through the special lubrication holes. To carry out this procedure, it is best for the machine to be not under load and in the released position.

Alternatively operate the forward and reverse

operating levers to allow the lubricant to penetrate all parts of the mechanism.

N.B. Excess lubrication cannot cause the machine or wire rope to slip.

Any machine where the side cases show signs of dents or damage, or of which the hook is damaged (models TU-8 and TU-16), should be returned to an approved repairer of TRACTEL S.A.'s network.

12. WARNINGS AGAINST HAZARDOUS OPERATIONS

The operation of TIRFOR machines, in accordance with the instructions of this manual, is a guarantee of safety. Nevertheless, it is useful to draw the attention of users to the **following warnings** :

- TIRFOR machines as described in this manual must not be used for lifting people.
- Never attempt to motorise the models of TIRFOR machines described in this manual.
- TIRFOR machines must not be used beyond their maximum working load.
- TIRFOR machines must not be used for applications other than those for which they are intended.
- Never attempt to operate the rope release mechanism whilst the machine is under load.
- Never obstruct the operating levers or the rope release lever.
- Never operate the forward and reverse operating levers at the same time.
- Never use a handle, other than the telescopic operating handle supplied, to operate the TIRFOR machine.
- It is forbidden to replace sheared pins by anything other than genuine TIRFOR shear pins of the same model.
- Never anchor the machine other than by its appropriate anchor point.
- Never obstruct the machine, which could prevent the machine, the wire rope and the anchor points from operating in a straight line.
- Never use the TIRFOR wire rope as a sling.
- Never apply a load to the loose wire rope exiting

- from the anchor point of the TIRFOR machine.
- Never subject the controls to sharp knocks.
- Never attempt to reverse the rope completely through the machine whilst under load.
- Do not operate the TIRFOR machine when the rope ferrule gets to within 10 cm of the machine. Otherwise the ferrule is likely to foul the casing and push the rope guide inside the machine.

13. TROUBLESHOOTING

1) The forward operating lever moves freely and does not operate the mechanism :

the machine has been overloaded and the shear pins have sheared. See section 9 for replacing the shear pins.

2) Pumping :

A lack of lubricant in a TIRFOR machine sometimes brings about a condition known as «pumping» which is not at all dangerous, but which is inconvenient. This situation occurs when the jaw which is gripping the rope becomes locked onto it preventing the other jaw from taking over the load. As the operating lever is moved in one direction the machine travels a few centimeters, but when the operating lever travels in the other direction the machine moves back the same distance in sympathy with the jaw which is locked onto the rope. The TIRFOR machine should be thoroughly lubricated and it will recommence working normally.

3. Jerkiness :

This is also a symptom of lack of lubrication. The TIRFOR machine should be thoroughly lubricated.

4. Blockage :

If the wire rope becomes blocked in the machine, generally because a damaged section of wire rope is stuck within the jaws, it is imperative to stop operating the machine. The load should be taken by another machine on a separate wire rope, or by another means, whilst ensuring that all **safety precautions** are taken. When the blocked machine is no longer under load, the damaged rope may be released and removed. Should this not be possible, return the machine and wire rope to the manufacturer or an approved repairer.

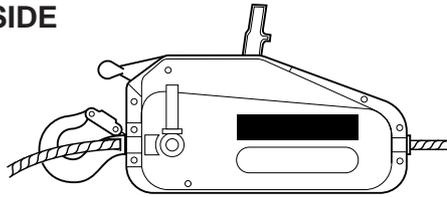
14. HEALTH AND SAFETY AT WORK

All lifting equipment must be supplied, operated, maintained and tested according to the provisions of the relevant health and safety at work regulations.

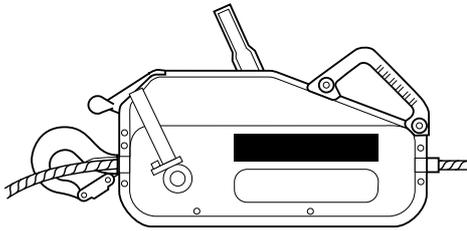
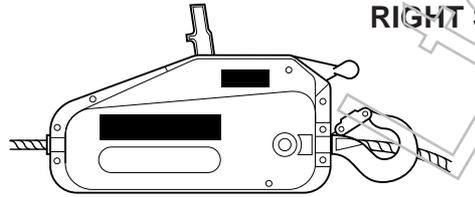
It is also the responsibility of every company to ensure that their employees have been fully and properly trained in the safe operation of their equipment.

LEFT SIDE

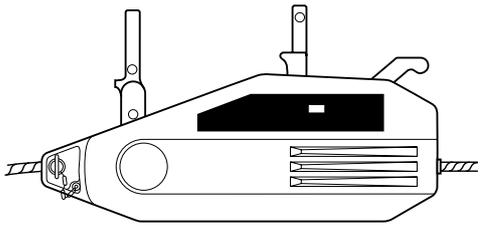
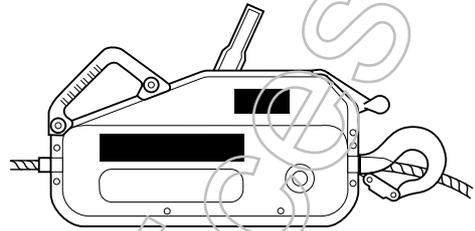
RIGHT SIDE



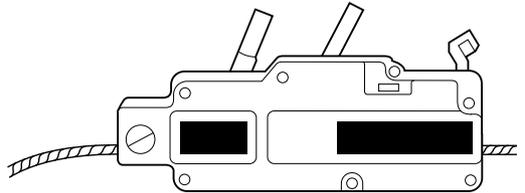
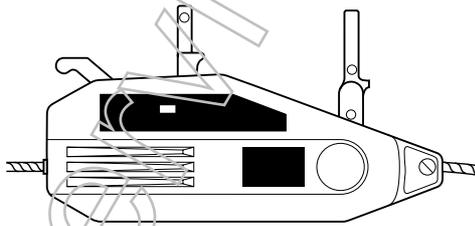
TU-8



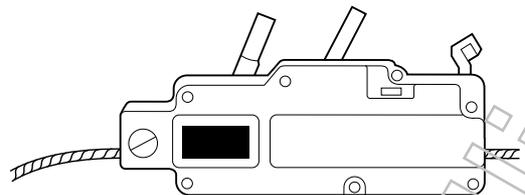
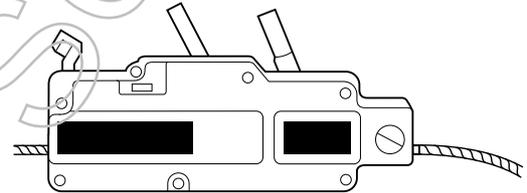
TU-16



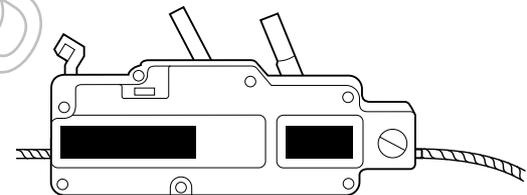
TU-32



T-508D
T-516D

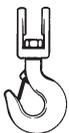


T-532D

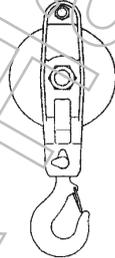
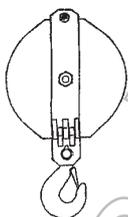


Ensure that the labels indicated above in black are in place.
Replacement labels can be supplied on request.

Accessories for TIRFOR machines



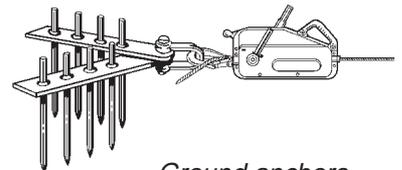
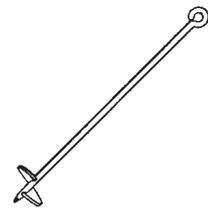
Hook
for TIRFOR
T-500D
and TU-32



Pulley blocks
and side opening blocks



Slings



Ground anchors