



CE

ProLine
124 (No CE) - 221 -
321 - 324

Cod. 4-135703 - 05/2018

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TRANSLATION FROM THE ORIGINAL LANGUAGE
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Thank you for selecting our tyre changer

CORGHI

Dear Customer,
Thank you for purchasing a Corghi equipment.
Your machine has been designed to provide years of safe and reliable service, as long as it is used and maintained in accordance with the instructions provided in this manual. Anyone using and/or carrying out maintenance on this equipment must read, understand and follow all warnings and instructions provided in this manual, and be properly trained. This Instruction Manual should be considered an integral part of your equipment and should remain with the equipment. However, nothing in this manual, and none of the devices installed on the equipment, can replace proper training, correct operation, careful evaluation of procedures and safe working practices.
Always be sure that your equipment is in excellent working order. In case any malfunction or possible dangerous situation are observed, immediately shut down the machine and resolve the situation before you proceed.
For any question related to the correct equipment use or maintenance, contact your local official Corghi dealer.
Sincerely,
Corghi

USER INFORMATION

User
Name _____
User
Address _____
Model
number _____
Series
number _____
Date of
purchase _____
Date of
installation _____
Spare parts
and service manager _____
Telephone
number _____
Commercial
manager _____
Telephone
number _____

TRAINING CHECK

	Qualified	Rejected
<u>Safety measures</u>		
Warning and caution labels	<input type="checkbox"/>	<input type="checkbox"/>
High risk areas and other potential hazards	<input type="checkbox"/>	<input type="checkbox"/>
Operative safety procedures	<input type="checkbox"/>	<input type="checkbox"/>
<u>Checking maintenance and performance</u>		
Head mounting inspection	<input type="checkbox"/>	<input type="checkbox"/>
Adjustment and lubrication	<input type="checkbox"/>	<input type="checkbox"/>
<u>Clamping</u>		
Steel/alloy rims	<input type="checkbox"/>	<input type="checkbox"/>
Reversed channel rims	<input type="checkbox"/>	<input type="checkbox"/>
Internal/external locking with steel jaws	<input type="checkbox"/>	<input type="checkbox"/>
<u>Bead breaking</u>		
Standard wheels	<input type="checkbox"/>	<input type="checkbox"/>
Low profile wheels	<input type="checkbox"/>	<input type="checkbox"/>
<u>Demounting</u>		
Standard wheels with plastic guards for tool head and lever	<input type="checkbox"/>	<input type="checkbox"/>
Proper tool head positioning to avoid damage	<input type="checkbox"/>	<input type="checkbox"/>
Bead lubrication when removing the low profile tyres	<input type="checkbox"/>	<input type="checkbox"/>
Reverse rims	<input type="checkbox"/>	<input type="checkbox"/>
<u>Mounting</u>		
Standard wheels	<input type="checkbox"/>	<input type="checkbox"/>
Mounting of stiff, low profile tyres	<input type="checkbox"/>	<input type="checkbox"/>
Wheels with reversed channel rim	<input type="checkbox"/>	<input type="checkbox"/>
Bead lubrication for proper mounting	<input type="checkbox"/>	<input type="checkbox"/>
<u>Inflating procedure</u>		
Safety measures	<input type="checkbox"/>	<input type="checkbox"/>
Lubrication and removal of the valve insert	<input type="checkbox"/>	<input type="checkbox"/>
Tubeless tyre inflation	<input type="checkbox"/>	<input type="checkbox"/>



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1. COMMISSIONING

1.1 INTRODUCTION

1.1.a. PURPOSE OF THE MANUAL

The purpose of this manual is to provide the instructions necessary for optimum operation, use and maintenance of your machine. If you sell this machine, please deliver this manual to the new owner. In addition, in order to provide the customers with any necessary safety information, please ask the new owner to complete and return to the manufacturer the ownership transfer form attached to the previous page of this manual. Alternately, the new owner can send an email to service@corghi.com.

This manual presumes that the technicians have a thorough understanding of rims and tyre identification and maintenance. He/she must also have a thorough knowledge of the operation and safety features of all associated tools (such as the rack, lift, or floor jack) being utilized, and have the proper hand and power tools necessary to work in a safe manner. The first section explains the basic information regarding the equipment. The following sections contain detailed information regarding the equipment, procedures and maintenance. Italics are used to refer to specific parts of this manual that offer additional information or clarifications. These references must be read in order to obtain information additional to the instructions provided. The owner of the equipment is solely responsible for enforcing safety procedures and arranging technical training. The equipment must only be used by qualified, specifically trained technicians. The owner or management is exclusively responsible for storing the documentation relative to qualified personnel. The equipment is designed for mounting, demounting and inflating tyres for light vehicles (cars, motorcycles, not trucks) with a maximum external diameter of 43 inches and a maximum width of 14 inches.

Additional copies of this manual and the documentation enclosed with the machine can be requested from the manufacturer, specifying the machine type and serial number.

WARNING: Design details are subject to change. Some illustrations may vary slightly in appearance from the machine you have.

1.2 FOR YOUR SAFETY

DESCRIPTION OF THE HAZARD

These symbols identify situations that could be detrimental to your safety and/or cause equipment damage.

		DANGER
	DANGER:	It indicates an imminent dangerous situation that, if not avoided, could lead to serious injury or death.

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WARNING



WARNING: It indicates a potentially dangerous situation that, if not avoided, could lead to serious injury or death.



CAUTION



CAUTION: It indicates a potentially dangerous situation that, if not avoided, could cause slight or mild injuries.

WARNING

WARNING: Used without the safety hazard symbol indicates a potential situation of hazard that, if not avoided, could cause material damage.

1.2.a. GENERAL WARNINGS AND INSTRUCTIONS

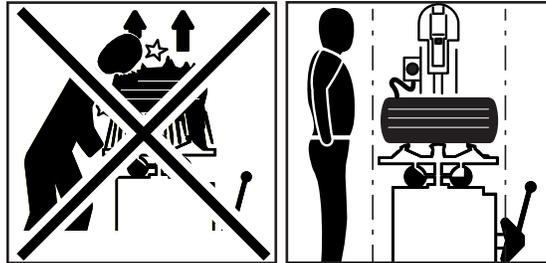


WARNING

Proceed with caution to prevent any injuries. Carefully read, understand and follow the warnings and instructions given in this manual. This manual is an integral part of the product. For future reference, store it together with the machine in a safe place.

1. Accidents could occur if the maintenance procedures described in this manual are not executed correctly, or if the other instructions it contains are not observed. This manual makes continuous reference to the possibility that accidents can occur. Any accident could lead to serious or fatal injuries to the operator or people nearby, or cause material damage.
2. Overinflated tyres can explode, producing hazardous flying debris that may result in an accident.
3. Tyres and rims that do not have the same diameter “do not correspond”. Never attempt to mount or inflate tyres and rims that do not correspond. For example, never mount a 16.5” tyre on a 16” rim and vice versa. It is very dangerous. Tyres and rims that do not correspond could explode and cause accidents.
4. Never exceed the inflation pressure for the tyre indicated by the manufacturer on the side of the tyre itself. Carefully check that the air hose is well inserted in the valve

5. Never bring your head or other body parts close to a tyre during inflation or bead insertion operations. This machine is not a safety device against the possible risk of explosion of tyres, air chambers or rims.



6. Keep a safe distance from the tyre changer during inflation, in order to remain outside the vertical cylinder area occupied by the wheel. Do not approach it.

DANGER

A bursting tyre can cause projections of its parts in surrounding areas with a force sufficient to cause serious injury or death.

Do not mount a tyre if its dimensions (indicated on the side) do not correspond exactly to the rim dimensions (printed inside the rim) or if the rim or the tyre is defective or damaged.

Never exceed the pressure recommended by the tyre manufacturer.

The tyre changer is not a safety device and does not prevent tyres and rims from exploding. Keep all persons not working on the machine out of the working area.

7. Risk of crushing. Presence of moving parts. Contact with moving parts can cause accidents.

The machine can only be used by one operator at a time.

- Keep bystanders away from the tyre changer.
- Keep your hands and fingers away from the rim edge during the demounting and mounting process.
- Keep hands and fingers clear of mount/demount head during operation.
- Keep your hands and other body parts away from moving parts.
- Do not use tools other than those supplied with tyre changer.
- Use lubricant that is specific for tyres in order to prevent tyre seizure.
- Pay attention while handling the rim or the tyre and while using the lever

8. Danger of electric shock.

- Do not clean electric parts with water or high pressure air jets.
- Do not operate the machine in the presence of a damaged electrical cable.
- If an extension is necessary, use a cable with rated features equal to or greater than those of the machine. Cables with rated features that are lower than those of the machine could overheat and cause a fire.



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- Make sure that the cable is positioned so that it cannot be pulled and the risk of tripping is avoided.
- 9. Risk of eye injuries. During the bead insertion and inflation phase, debris, dust and fluids could be projected into the air. Remove any debris present on the tyre tread and on the tyre surface. Wear protective goggles with OSHA, CE approval or other certified devices during all work phases.
- 10. Always carefully inspect the machine before using it. Missing, damaged or worn equipment (including the hazard adhesive labels) must be repaired or replaced before start-up.
- 11. Never leave nuts, bolts, tools or other materials on the machine. They could be entangled in moving parts and cause malfunctions or be ejected.
- 12. Do NOT mount or inflate tyres that are cut, damaged, decayed or worn. Do NOT mount tyres on damaged, bent, rusted, worn, warped or deformed rims.
- 13. Should the tyre get damaged during the mounting phase, do not try to complete the mounting operation. Remove it, take it away from the service area and mark it as damaged.
- 14. Inflate tyres in gradual steps, while continuously monitoring the pressure and observing the tyre itself, the rim and the bead. NEVER exceed the pressure limits indicated by the manufacturer.
- 15. The internal parts in this equipment could create contacts or sparks if exposed to flammable vapours (petrol, paint thinners, solvents, etc.). Do not install the machine in a narrow area or position it below floor level.
- 16. Do not operate the machine while under the influence of alcohol, medicines and/or drugs. If you are taking prescription or non-prescription medicines, contact a physician to be aware of the side effects that they might have on the ability to operate the machine safely.
- 17. Always use OSHA, CE approved and authorised personal protective equipment (PPE) or equipment with equivalent certifications while operating the machine. Consult your supervisor for additional instructions.
- 18. Do not wear jewellery, watches, loose clothing, ties and tie up long hair before using the machine.
- 19. Wear protective, non-slip footwear while using the tyre changer.
- 20. While positioning, lifting or removing wheels from the tyre changer, wear an appropriate back support and use a correct lifting technique.
- 21. Only appropriately trained personnel can use, service and repair the machine. Repairs must only be performed by qualified personnel. Manufacturer technicians are the most qualified individuals. The employer must determine if an employee is qualified to carry out any machine repair safely if the operator has attempted to make the repair.



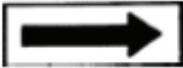
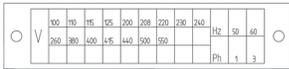
22. Before starting the machine, the operator must pay close attention to the warnings of the adhesive labels affixed to the equipment.
23. Disconnecting the pneumatic supply, both due to non-use or to maintenance of the machine or the pneumatic system of the workshop, can leave pneumatic actuators under pressure. Discharge the machine pneumatic system using the controls on the actuators.
24. Use a lifting device if the wheel weighs more than 10 kg, with a lifting frequency of more than 20 wheels/hour.



1.2.b. LABELS PLACEMENT

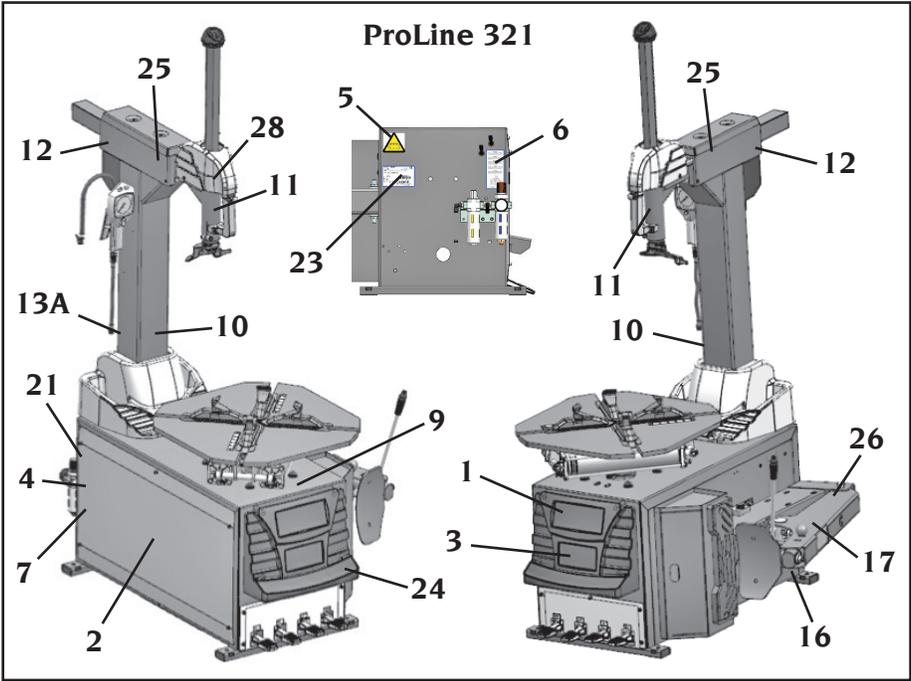
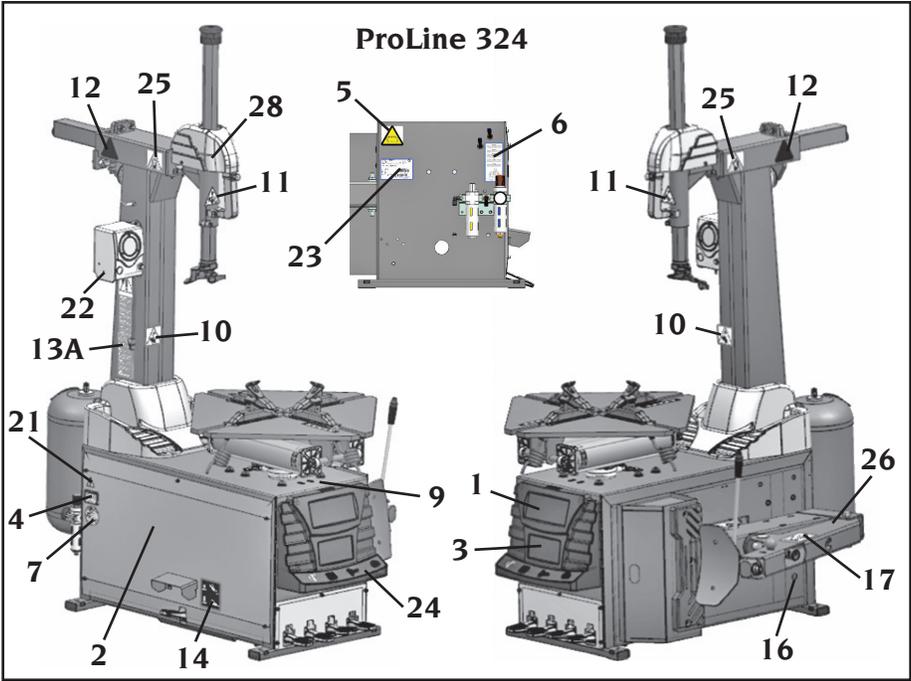
No.	Part Number	Drawing	Description
1	4-136038		LABEL, CORGHI LOGO FRONT
2	461236		LABEL, CORGHI LOGO LATERAL
3	4-135683		LABEL, PROLINE 124
	4-135682		LABEL, PROLINE 221
	4-135681		LABEL, PROLINE 321
	4-135680		LABEL, PROLINE 324
4	446429		LABEL, OPERATING PRESSURE
5	446442		LABEL, DANGER - PRESSURISED CONTAINER
6	4-113355		LABEL, FILTER

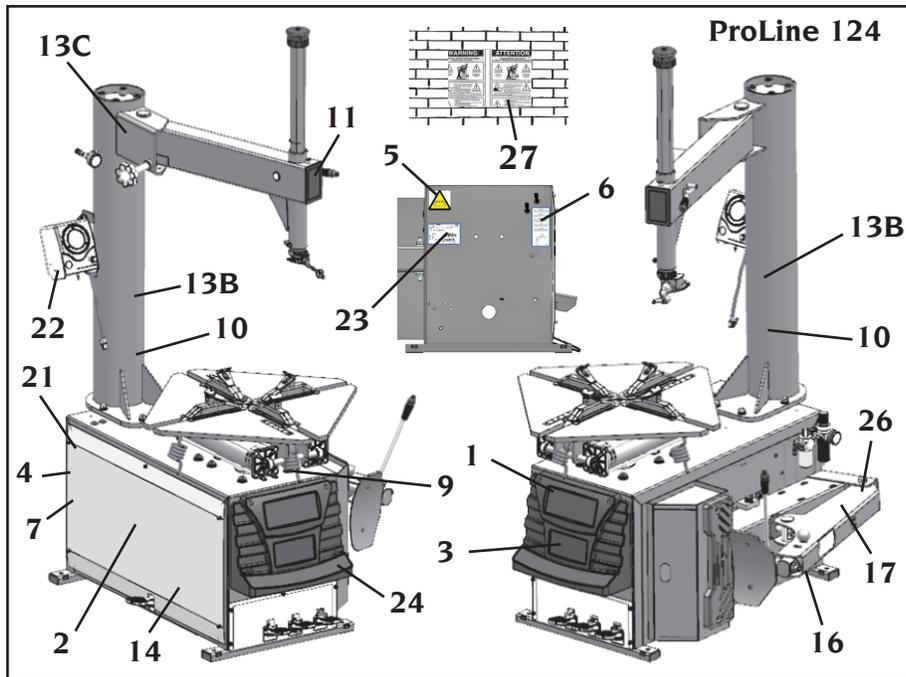
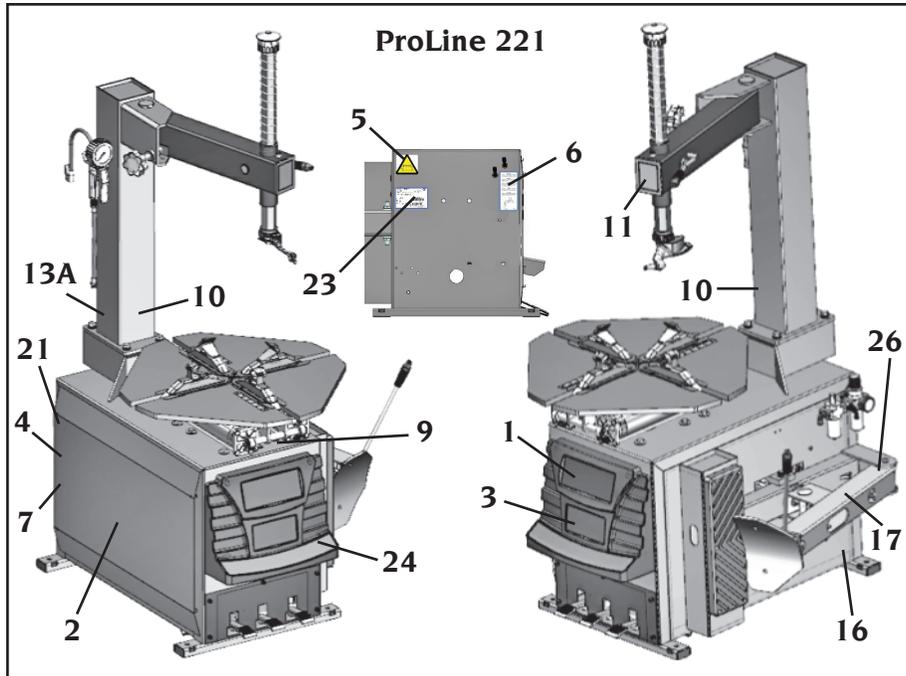


No.	Part Number	Drawing	Description
7	446598		LABEL, SWITCH OFF THE POWER
9	418135		LABEL, ROTATION DIRECTION
10	446433		LABEL, DANGER - TURNTABLE
11	446435		LABEL, DANGER - TOOL HEAD
12	446434		LABEL, RISK OF INJURY, REAR POLE, DO NOT STAND BEHIND THE MACHINE
13A	461931		LABEL, DANGER OF INFLATION
13B	462778		LABEL, DANGER OF INFLATION (ONLY AMERICAN MARKET)
13C	432740		LABEL, DANGER OF INFLATION (ONLY AMERICAN MARKET)
14	435150		LABEL, INFLATION PEDAL (only 124 TI - 321 TI - 324 TI)
16	446388		PLATE, CORRECT POWER SUPPLY
17	446431		LABEL, HAND CRUSHING HAZARD (IF BEAD BREAKER IS PRESENT)

No.	Part Number	Drawing	Description
21	425211		LABEL, DANGER OF ELECTRIC SHOCK
22	446436		LABEL, DOYFE UNION
23	-		LABEL, MODEL SERIAL NUMBER
24	463509		LABEL, COLUMN TILTING
	439213		LABEL, TURNTABLE OPENING/CLOSING
	439212		LABEL, BEAD BREAKER ACTIVATION
	439214		LABEL, ROTATION TURNTABLE
25	35017099		LABEL, RISK OF IMPACT, FRONT POLE
26	462081A		RISK OF CRUSHING HANDS
27	450005		WARNING POSTER ENGLISH/FRENCH (ONLY AMERICAN MARKET)
28	4-136235		LABEL 2 POSITIONS HANDLE







HAZARD LABELS KEY



part n. 446431. Risk of bead breaker crushing.



part n. 446442. Danger - pressurised container.



part n. 425211A. Danger of electric shock.



part n. 461931. Inflation hazard.



part n. 462778. Inflation hazard (for North America market).



part n. 432740. Inflation hazard (for North America market).



part n. 446433. Risk of crushing hands.



part n. 446434. Risk of pole tilting.



part n. 446435. Risk of crushing hands.



part no. 35017099 Risk of front pole tilting



part n. 425083. Earth ground terminal.



part n. 446237. Earth ground terminal.



part n. 462081A. Risk of crushing hands.



450005. WARNING POSTER OF SAFETY. It must be applied close to the tyre changer in a position visible to the operator.

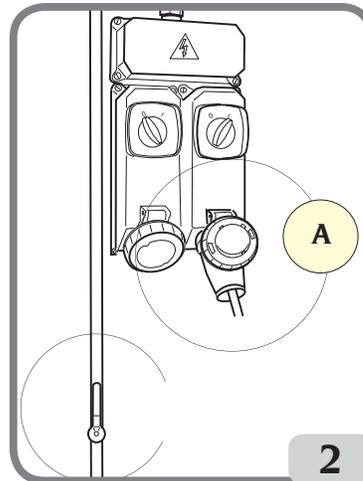
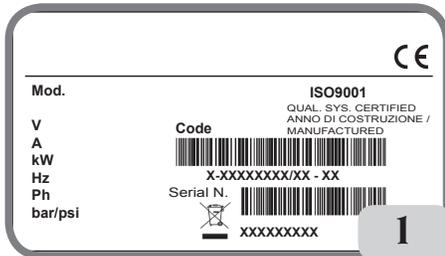
1.2.c. ELECTRICAL AND PNEUMATIC CONNECTIONS

WARNING
A good earth connection is essential for correct operation of the machine.



The electric connection used must be suitably sized:

- to the electric power absorbed by the machine, indicated on its data plate (Fig. 1);
- to the distance between the operating machine and the power supply connection point, to



ensure that the voltage drop under full load does not exceed 4% (10% during start-up) of the rated voltage value specified on the plate - The user must:

- fit a power plug in compliance with current regulations on the power supply lead;
- connect the machine to its own electrical connection - A, Fig. 2 - equipped with a differential automatic circuit breaker with 30mA sensitivity;
- install protection fuses on the power line that are suitably sized in accordance with the indications provided on the machine data plate (Fig.1);
- connect the machine to an industrial socket; the machine must not be connected to domestic sockets.

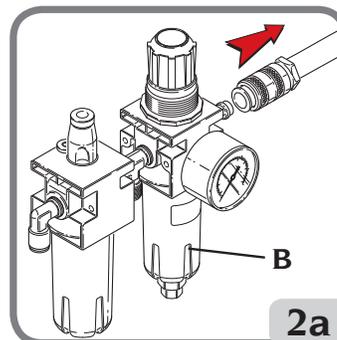
Make sure that the available pressure and performance of the compressed air system are compatible with what is necessary for correct machine operation - see the section "Technical data". For the correct operation of the machine, the pneumatic supply line must provide a pressure range from a minimum of 8 bar to a maximum of 16 bar.

WARNING

For correct equipment operation, the air produced must be suitably treated (not above 5/4/4 according to standard ISO 8573-1).

Check that the lubrication cup (B, Fig. 2a) contains lubricating oil; top up is necessary. Use SAE20 oil.

The pneumatic supply inlet point, in the workshop line, must be equipped with a pneumatic supply shut-off valve, placed upstream the filter/regulator unit supplied with the machine (B Fig. 2a).





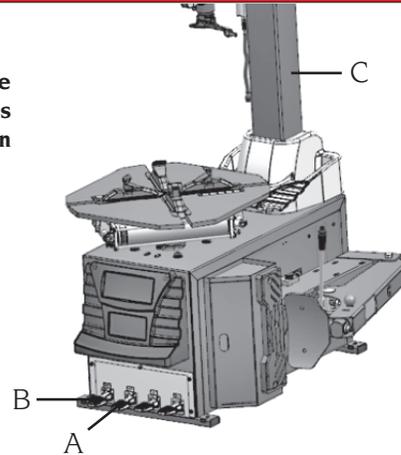
DANGER

Before proceeding with the electrical and pneumatic connection and whenever the electrical and pneumatic power supply is restored, make sure that the machine is in the configuration described below:

- pedal A COMPLETELY LOW (turntable E closed).

ONLY FOR VERSIONS WITH TILTING POLE:

- pedal B COMPLETELY LOW (pole C not tilted).



1.2.d TECHNICAL DATA

- Turntable locking

ProLine 221 - ProLine 321

- internal from 12" to 23"
- external from 10" to 21"

ProLine 124 (standard position) - ProLine 324

- internal from 14" to 28"
- external from 12" to 26"

- Power supply voltage

- single-phase 115-230±10% Volt 50/60Hz
- three-phase 230-400±10% Volt 50/60Hz
- DV 230±10% Volt 1ph 50/60Hz

- Rim width - ProLine 221 - ProLine 124 from 4" to 13"

- Rim width - ProLine 321 from 4" to 14"

- Rim width - ProLine 324 from 4" to 16"

- Maximum wheel diameter - ProLine 221 940 mm (37")

- Maximum wheel diameter - ProLine 321 - ProLine 324 1120 mm (44")

- Maximum wheel diameter - ProLine 124 1250 mm (49")

- Maximum opening of bead breaker ProLine 124 - 221 - 321: 75 mm (3") / 330 mm (13")

- Maximum opening of bead breaker ProLine 324: 100 mm (4") / 400 mm (16")

- Bead breaking force 15000 N (pressure 10 bar)

- Operating pressure 8 - 10 bar

- Air consumption (TI version) 180 NI/min (average) 764 NI/min (max)

- Air consumption (NON-TI version) 155 NI/min (average) 520 NI/min (max)

- Weight - ProLine 321 295 kg (310 kg TI version)

- Weight - ProLine 221 223 kg

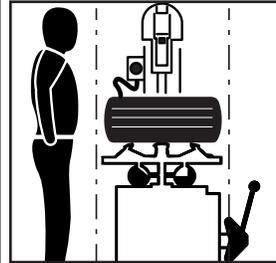


- Weight - ProLine 324 239 kg (255 kg TI version)
- Weight - ProLine 124 235 kg
- Noise level when operating 70 dB (A)

Motor rating	kW	Number of rpm	Torque Nm	Weight of electric/electronic part kg
400Volt/3ph 50Hz DV	0,75	6,5-13	1100	12
400Volt/3ph 50Hz	0,75	6,5	1100	7,5
200/230Volt/3ph 60Hz	0,75	6,5	1070	7,5
200/230Volt/3ph 50Hz	0,75	6,5	1070	7,5
200/230Volt/1ph 60Hz	1,1	6,5	980	13,6
200/230Volt/1ph 50Hz	1,1	6,5	980	13,6
110/115Volt/1ph 60Hz	1,1	6	1000	14,5

The noise levels indicated correspond to emission levels and do not necessarily represent safe operating levels. Although emission levels and exposure levels are connected, this relation cannot be used as a safe parameter to determine whether or not further precautions are necessary. The noise level to which the operator is exposed to depends on a number of factors, such as duration of exposure, characteristics of the workplace, other sources of noise etc. Permissible noise exposure levels may also vary from country to country. In all cases, this information will enable machine users to better assess the danger and risks involved.

1.2.e. AIR PRESSURE


DANGER

- **RISK OF EXPLOSION**
- **Never exceed tyre pressure recommended by tyre manufacturer.**
- **Always match the tyre and rim dimensions.**
- **Take care to avoid any damage to the tyre.**
- **During inflation, keep outside the vertical cylinder area occupied by the wheel.**

The machine is equipped with an internal pressure limiting valve to minimize the risk of over inflating the tyre.

1. Never exceed these pressure limitations:
 - The supply circuit pressure (from the compressor) is **220 psi (16 bar)**.
 - The operating pressure (indicated on the regulator) is **150 psi (10 bar)**.
 - The tyre inflation pressure (displayed on the pressure gauge) must never exceed the pressure indicated by the manufacturer on the sidewall of the tyre itself.
2. Activate the air inflation jets only when inserting the bead.
3. Fully bleed air pressure system before disconnecting power supply line or other pneumatic components. Air is stored in a reservoir to operate the inflation jets.
4. Activate the air inflation jets only if the rim is correctly clamped on the tyre changer (if required) and the tyre is completely mounted.

1.3. ADDITIONAL RIM/TYRE INFORMATION

WARNING

Wheels equipped with pressure sensors and special rims or tyres could require particular work procedures. Consult wheels and tyre manufacturer's service manuals.

1.4. INTENDED MACHINE USE

This machine must only be used to demount and mount vehicle tyres from/on the rims, using the provided tools. Any other use is improper and may result in injury.

1.5. PERSONNEL TRAINING

1. Employers are responsible for providing a training program for all employees who work on the wheels concerning the hazards deriving from maintenance and the safety procedures to be observed. Service or maintenance refer to mounting and demounting wheels and all the correlated activities, such as inflation, deflation, installation, removal and handling.
 - Employers are required to make sure that operators do not work on the wheels unless they have received suitable training regarding the correct maintenance procedures for the type of wheel being serviced and the operative safety procedures.
 - Information to be used for the training program includes, as a minimum, the information contained in this manual.
2. Employers are required to make sure that every employee demonstrates and maintains the ability to work on the wheels safely, including the performance of the following activities:
 - Demounting of tyres (including deflation).
 - Inspection and identification of the rim wheel components.
 - Tyre mounting.
 - Use of any restraint device, cage, barrier, or other systems.
 - Handling of wheels with rims.
 - Tyre inflation.



- Move away from the tyre changer while inflating the tyre and do not lean over to inspect the wheel during inflation.
 - Wheel installation and removal.
3. Employers must evaluate the ability of their employees to carry out these tasks and work on the wheels in absolute safety and must provide additional training as required to make sure that all employees maintain their skills.

1.6. PRELIMINARY CHECKS

Before starting to work, carefully check that all machine components, particularly rubber or plastic parts, are in place, in good condition and operate correctly. If the inspection reveals any damage or excessive wear, no matter how slight, immediately replace or repair the component.

Walk around the machine to ensure that all components are in good condition and operational, and that there are no foreign objects or debris (rags, tools, etc....) in or near the machine which could affect its operation.

These checks must be carried out:

- Before starting the machine.
- At regular time intervals.
- After any modification or repair.

The machine may only be started after this pre-use check is successfully completed. Do not use the machine if it is placed out of service for tune up, maintenance, lubrication, etc.

1.7. DURING USE

If strange or unusual noises are heard or any unusual vibration is detected, if a component or system is not operating correctly or if you observe anything unusual, immediately stop using the machine.

- Identify the cause and implement all the necessary corrective measures.
- Contact your supervisor if necessary.

Make sure that all other people are standing at least 6 metres (20 feet) from the machine.

To switch off the machine in case of emergency:

- disconnect the power supply plug;
- interrupt the compressed air supply by disconnecting the supply pipe.

 WARNING	
<p>The interruption of the pneumatic supply can leave some actuators under pressure as indicated by the pictogram affixed on the machine. Use the controls to bleed the air they contain.</p>	

1.8. OPTIONAL ACCESSORIES

Contact the sales network to find all the optional accessories suitable for this machine.

2. TRANSPORT, STORAGE AND HANDLING

Machine transport conditions

The tyre changer must be transported in its original packing and kept in the position indicated on the packing.

- Packing dimensions:

- width 910 mm
- depth 1150 mm
- height 1000 mm

- Weight with package:

- Standard version 250 kg
- TI version 260 kg

Ambient conditions for machine transport and storage

Temperature: $-25^{\circ} \div +55^{\circ}\text{C}$.

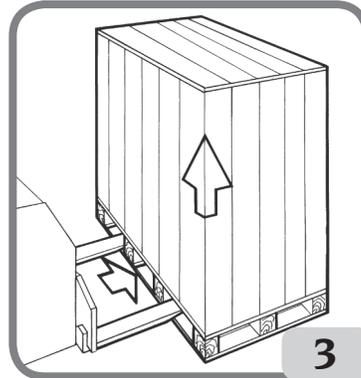
WARNING

Do not stack other goods on top of the packing to avoid damaging it.

Handling

To move the package insert the forks of a forklift truck into the specific slots on the base of the package itself (pallet) (Fig. 3).

Before moving the machine, refer to the LIFTING/HANDLING section.



WARNING

Keep the packing material intact for possible future transport of the machine.

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3. UNWRAPPING

WARNING

Pay careful attention when unpacking, assembling, handling and installing the machine as described below. Failure to observe these instructions could damage the machine and compromise operator safety.

WARNING

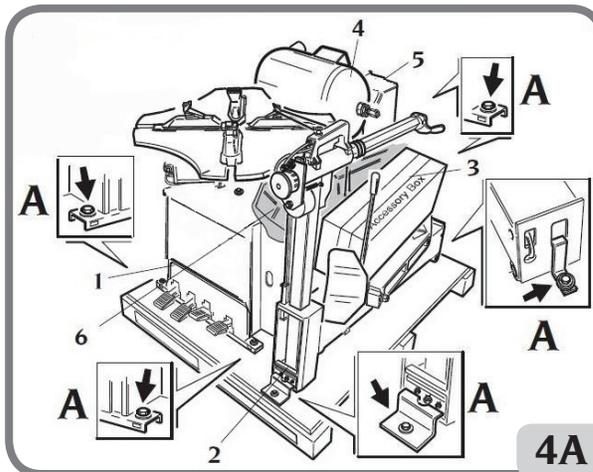
Before removing the machine from the pallet, make sure the items shown below have been removed.

Remove the upper part of the package and make sure that the machine has not suffered damage during transport; identify the points for fastening to the pallet.

-The machine consists of

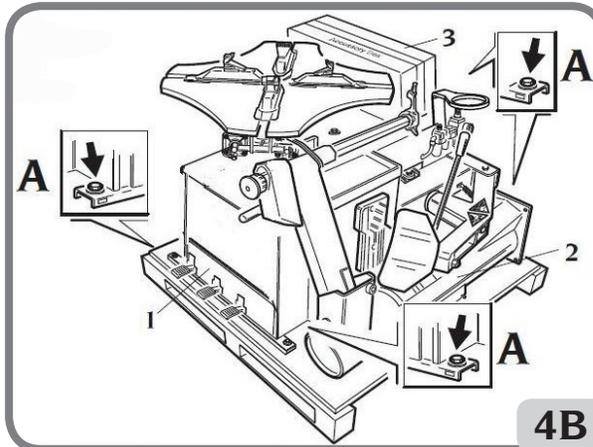
ProLine 321 - 324 (fig.4A):

- 1 body
- 2 head
- 3 included
- 4 air tank (TI version only)
- 5 pole guard
- 6 arm guard



ProLine 124 - 221 (fig.4B):

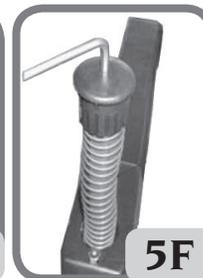
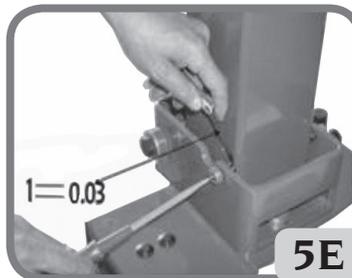
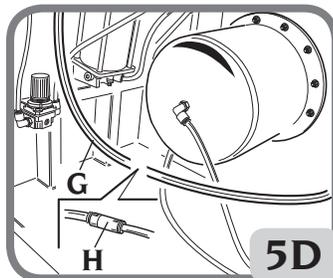
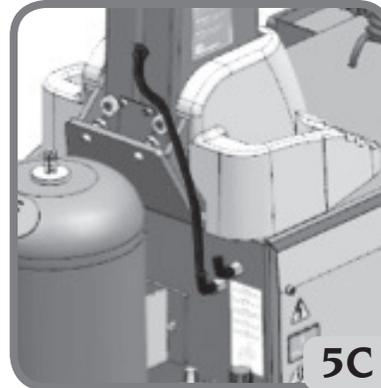
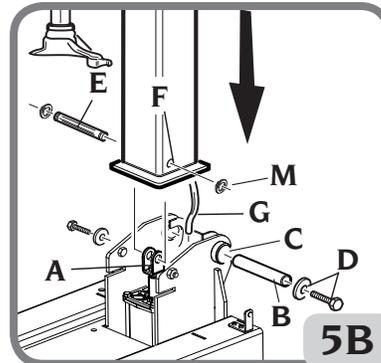
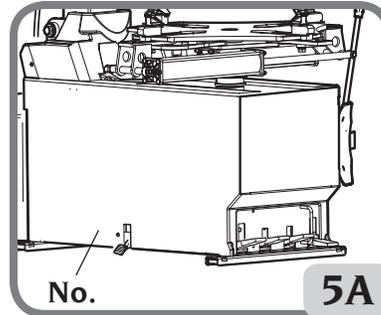
- 1 body
- 2 head (with internal tank for ProLine 124)
- 3 included



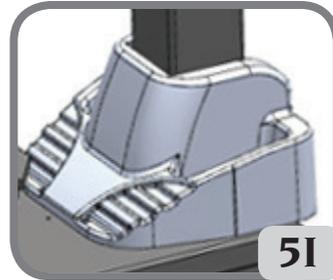
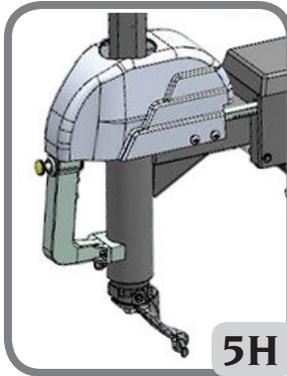
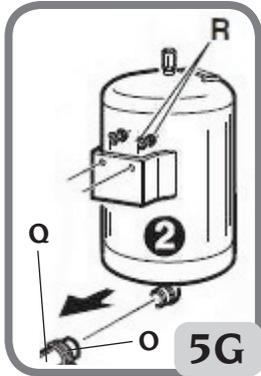
4. MOUNTING

ProLine 321 - 324

- Remove the side cover (fig.5A).
- Insert the air hose G (fig. 5B) into hole A behind the pole tilting cylinder.
- Insert hose G1 (Fig. 5C) into the rear connection (**Proline 324**)
- Apply pin B into hole C and fasten (tightening torque 70Nm) with screws and washers D (Fig. 5A).
- Insert pin E into hole F and into the U-bolt of the pole tilting cylinder, and fasten with Circlip M (Fig. 5A).
- Connect pipe G (Fig. 5D) to the intermediate union connected to the pole lifting tap H (**Proline 321**).
- Adjust the position from both sides of the column. The clearance between the screw head and the side of the column must be 0.03 mm (fig.5E) and tighten the screws
- Undo the screw of the spring stop knob and insert the spring contained in the packaging. Fasten the knob using the previously unscrewed screw. (fig.5F).
- Fit the hose connector of tank 2 into hose Q, fasten the tank 2 to the machine with nuts and washers R, and tighten the clamp O onto the hose Q (fig. 5G) (T.I. version only).



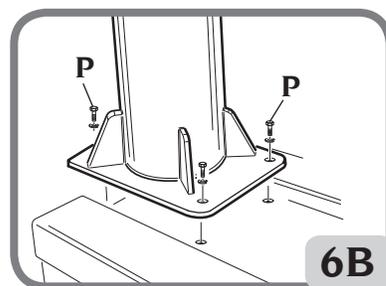
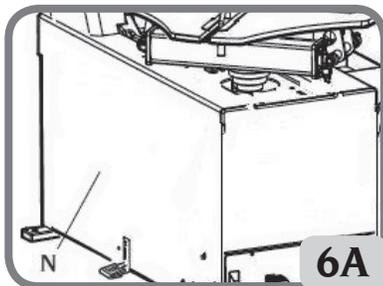
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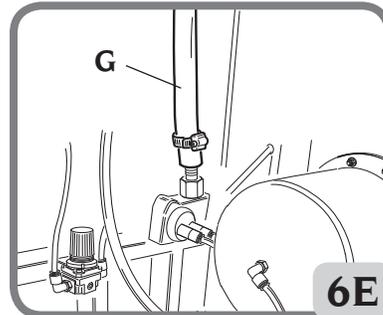
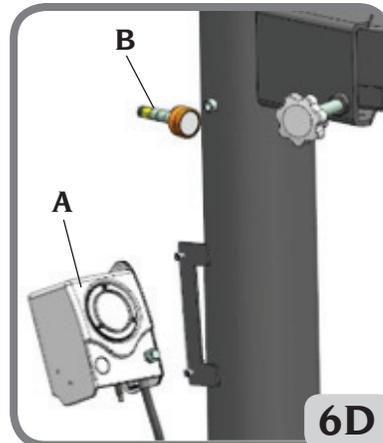


- Fit the head guard (Fig. 5H) fasten with screws and washers.
- Fit the pole guard (Fig. 5I) fasten with screws and washers.
- Install the inflation pressure gauge box on the pole (Fig. 5L).
- Tilting adjustment (Fig. 5M): the speed of the pole tilting must be adjusted not higher than 0.71 rad/s. After many tilting cycles over time, it may be necessary to re-calibrate. Adjust valves A on the cylinder, by turning them clockwise the speed decreases, while counter-clockwise it increases.
- Refit the side cover N (Fig. 5A).

ProLine 124 - 221

- Remove the side cover N (Fig. 6A).



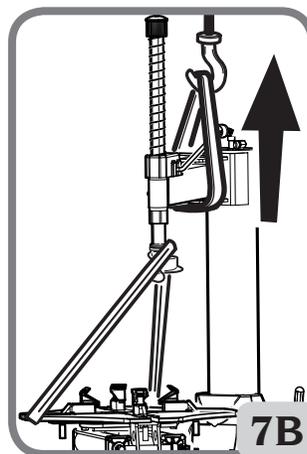
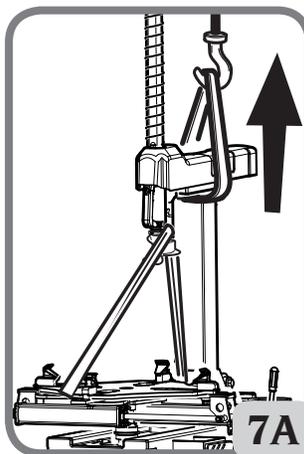


- Mount the pole using screws P (Fig.6B), use tightening torque 70 Nm.
- Undo the screw of the spring stop knob and insert the spring contained in the packaging. Fasten the knob using the previously unscrewed screw. (fig.6C).
- Install the inflation pressure gauge box on the pole (A, Fig. 6D).
- Fit the safety valve (B, Fig. 6D).
- Connect pipe G to the valve (Fig.6E)
- Refit the side cover N (Fig. 6A).

5. LIFTING/HANDLING

In order to remove the machine from the pallet, hook it as shown in figures 7A and 7B.

This lifting point must be used whenever you need to change the position of the machine. Do not attempt to move the machine until it has been disconnected from the power and pneumatic supply networks.



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5.1 INSTALLATION AREA

WARNING

Install the machine in compliance with all the applicable safety standards, including, but not limited to, those issued by OSHA.

CAUTION

IMPORTANT: for the correct and safe operation of the equipment, the ambient lighting level should be at least 300 lux.

CAUTION

IMPORTANT: Do not install the machine outdoors. It is designed to be used in closed, covered areas.

DANGER

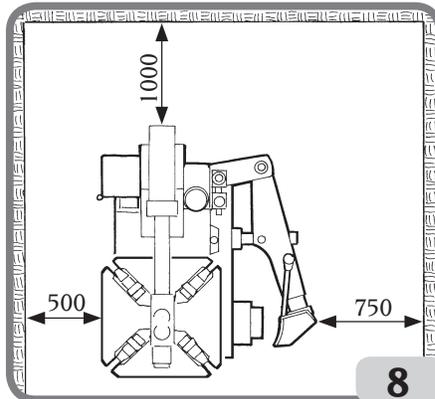
RISK OF EXPLOSION OR FIRE. Do not use the machine in areas that could be exposed to inflammable vapours (petrol, paint solvents, etc.).
Do not install the machine in a narrow area or position it below floor level.

Install the tyre changer in the chosen work position, complying with the minimum clearances shown in **fig.8**.

The support surface must have a load-bearing capacity of at least 1000 kg/m².

Ambient working conditions

- Relative humidity 30% ÷ 95% without condensation.
- Temperature 0°C ÷ 50°C.



WARNING

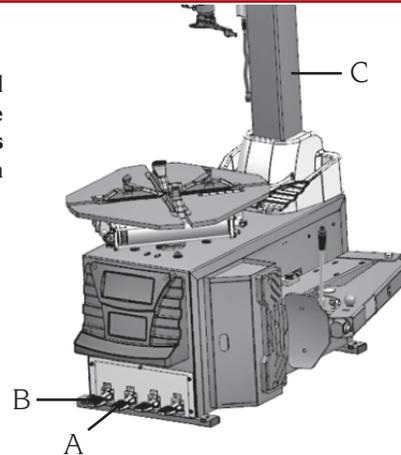
Whenever the machine is disconnected from the pneumatic line for long periods, before restoring the pneumatic supply, check the configuration of the pedals as shown below.



DANGER

Before proceeding with the electrical and pneumatic connection and whenever the electrical and pneumatic power supply is restored, make sure that the machine is in the configuration described below:

- pedal A COMPLETELY LOW (turntable E closed).
- pedal B COMPLETELY LOW (pole C not tilted).



6. DESCRIPTION OF THE MACHINE

The machine is an electro-pneumatically operated tyre changer.

It works on all types of whole rims with channel, with weights and dimensions as described in the TECHNICAL DATA section.

The machine is solidly constructed. It operates with the wheel in a vertical position for bead breaking and in a horizontal position for mounting and demounting tyres. All machine movements are controlled by the operator by means of the pedals.

Each machine carries a plate Fig. 9 reporting its identification data and some technical data.

As well as the manufacturer's details, it indicates:

Mod. - Machine model;

V - Power supply voltage in Volts;

A - Input voltage in Amperes;

kW - Absorbed power in kW;

Hz - Frequency in Hz;

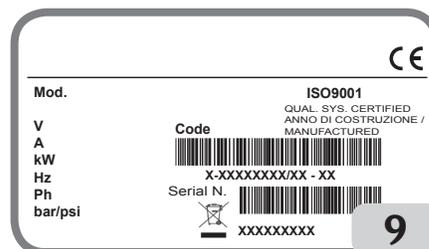
Ph - Number of phases;

bar/psi - Operating pressure in bar and/or psi;

Serial No. - machine serial number;

ISO 9001 - company Quality System Certification;

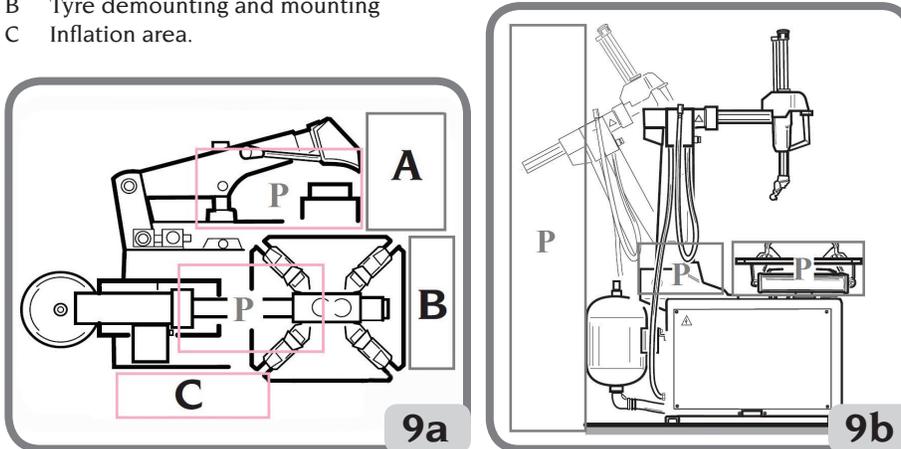
CE - CE marking.



6.1. OPERATOR POSITION

The figures 9a and 9b show the operator's positions and the relevant hazardous areas (P) during the various work phases:

- A Bead breaking
- B Tyre demounting and mounting
- C Inflation area.



WARNING

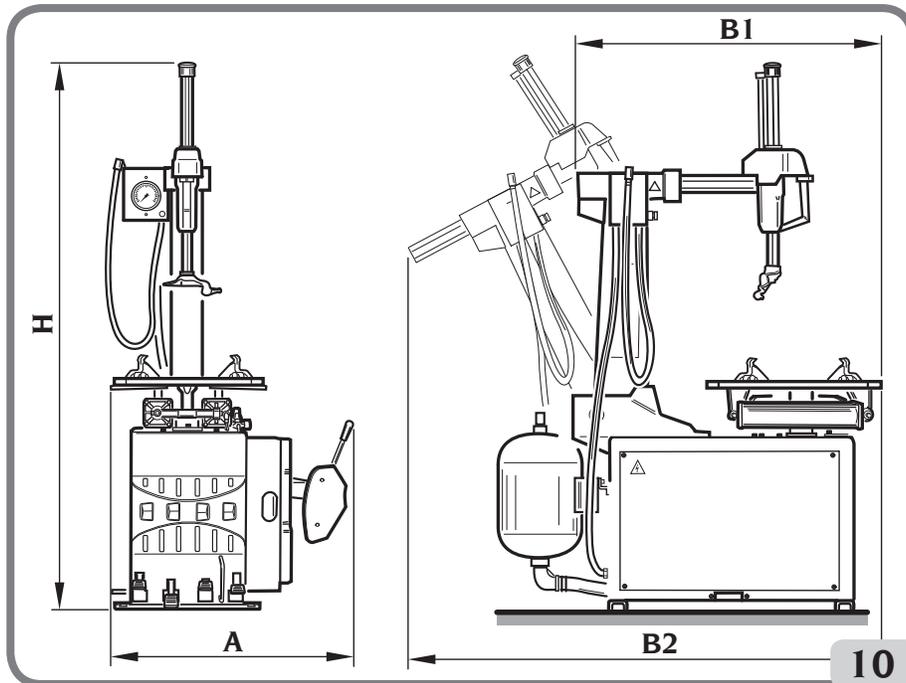
Before removing the machine from the pallet, make sure the items shown below have been removed.

WARNING

RISK OF INJURY DUE TO CRUSHING. The column tilting and the self-centring clamp opening/closing operation must be performed from working position B (fig.9a), keeping hands away from machine moving parts.

7. OVERALL DIMENSIONS (mm)

Maximum length	A = 1200
Minimum width	B1 = 1250
Maximum width	B2 = 1700
Maximum height	H = 2020



8. MAIN WORKING ELEMENTS OF THE MACHINE

WARNING

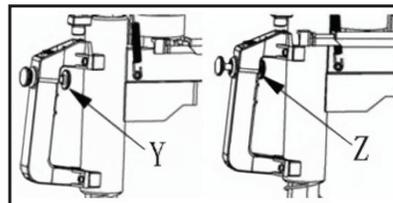
Learn your machine: knowing exactly how the machine works is the best way to guarantee safety and machine performance.

Learn the function and layout of all controls.

Carefully check that all controls on the machine are working properly.

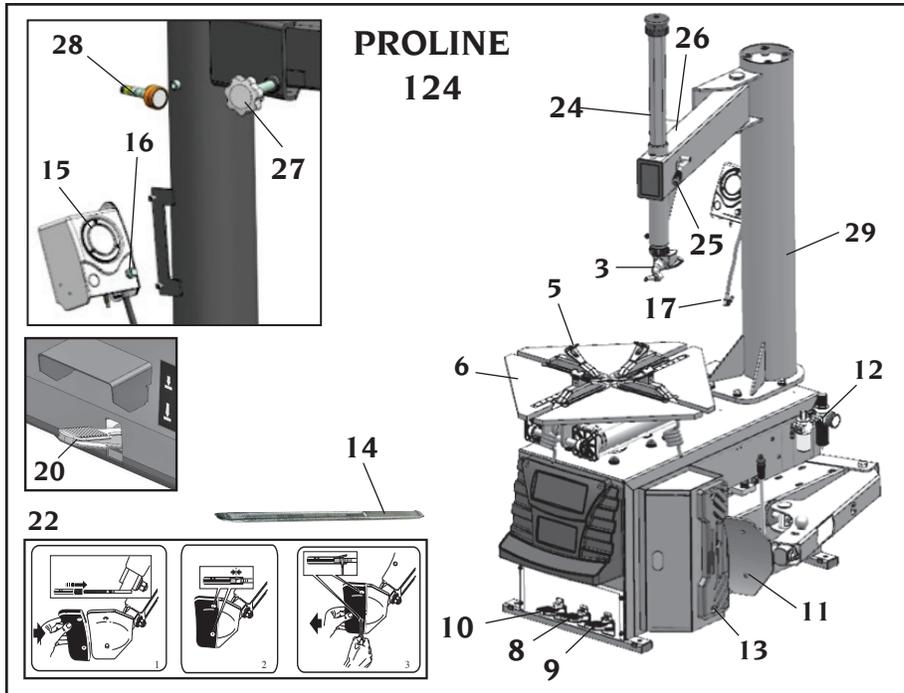
To avoid accidents and injury, the machine must be installed properly, operated correctly and serviced regularly.

- 1 Clamping handle: at 2 positions
 - Z position button for tool head and horizontal axis unlocked
 - Y position button for tool head and horizontal axis locked
- 2 Vertical and horizontal arm (to position the mounting/ demounting tool).



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- 3 Mounting/ demounting tool (to mount and demount the tyre from the rim).
- 4 Tilting movable pole.
- 5 Locking wedge (for the correct locking of the rim to the turntable).
- 6 Turntable (rotary platform supporting the wheel).
- 7 Movable pole control pedal (4) (stable two-position pedal for tilting the pole unit).
- 8 Locking wedges (5) opening and closing control pedal (stable three-position pedal for opening and closing wedges).
- 9 Bead breaker control pedal (monostable pedal to operate the bead breaker shoe (11)).
- 10 Turntable (6) rotation control pedal, two-position pedal (three-position only 2V):
 - Position 0 (stable) turntable stationary
 - Pressed downwards (unstable position), rotate clockwise.
 - Lifted (Unstable position) anticlockwise rotation.
- 11 Bead breaker shoe (movable shoe to detach the bead from the rim).
- 12 Filter Regulator + Lubricator Unit (regulates pressure, filters, removes water and lubricates the compressed air supply).
- 13 Rim rest.
- 14 Bead lifting lever (raises and positions the tyre bead on the mounting/ demounting tool).
- 15 Pressure gauge (reads the wheel pressure), (T.I. version only).
- 16 Deflation button (button to remove the extra air inside the wheel), (T.I. version only).
- 17 Doyfe connector (connector to apply to the tyre valve for inflation).
- 18 Safety relief valve (max. pressure 11 bar) (T.I. versions only).
- 19 Air tank (T.I. versions only).
- 20 Inflation pedal (T.I. versions only).
- 21 Inflation gun.
- 22 Shoe guard (option)
- 23 Vertical pole
- 24 Vertical arm (to position the mounting/demounting tool).
- 25 Vertical arm lever locking
- 26 Swivelling arm.
- 27 Swivelling arm adjustment handle.
- 28 Safety valve
- 29 Round pole



! WARNING

RISK OF EXPLOSION

With regard to the technical characteristics, warnings, maintenance and any other information about the air tank (optional), consult the relevant operator's and maintenance manual provided with the documentation of the accessory.



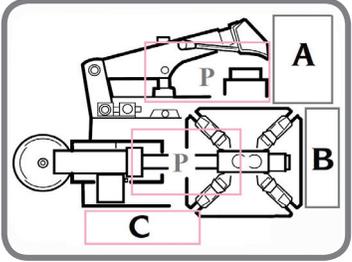
9. BASIC PROCEDURES - USE

! WARNING

RISK OF CRUSHING:
Some parts of the machine, such as demounting/mounting head, bead breaker, turntable, tilting pole, move and can create a potential crushing point.

Keep your hands and other body parts away from moving parts of the machine.

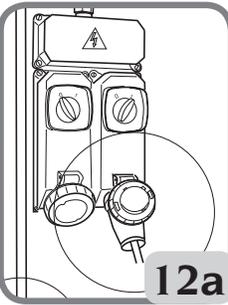
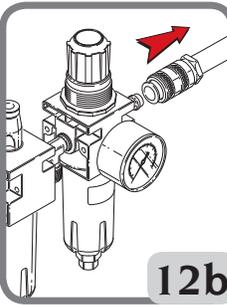
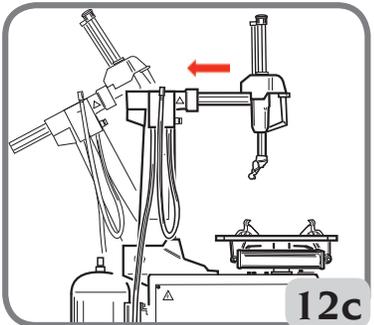
RISK OF IMPACT:
Tilting of the operating arm can create a potential risk of impact with parts of the body. The tilting operation must be performed in position B


! WARNING

AVOID ANY PHYSICAL DAMAGE
Before carrying out maintenance on the machine:

- Put the machine in a stable configuration with the horizontal axis completely retracted and the

- Disconnect the power supply plug (Fig 12a).
- Isolate the compressed air line by disconnecting the closing valve (quick release connector) (Fig. 12b.)

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WARNING

In order to prevent damage or involuntary movement of the machine, it is recommended to only use original manufacturer spare parts and accessories.

9.1. PRELIMINARY CHECKS

Check that there is a pressure of at least 8 bar on the filter regulator pressure gauge. If the pressure is below the minimum level, some machine operations may be limited or insufficient.

After the correct pressure has been restored, the machine will operate properly.

Check that the machine has been adequately connected to the electric mains and the pneumatic supply.

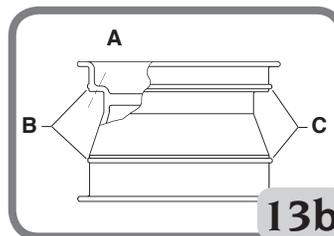
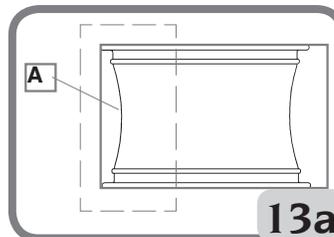
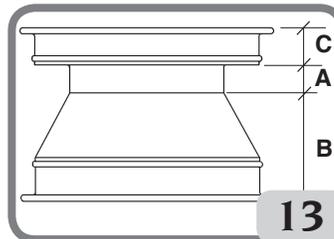
9.2. DECIDING FROM WHICH SIDE OF THE WHEEL THE TYRE MUST BE REMOVED

See Fig.13. Identify the position of channel A on the rims. Identify the greater width B and the smaller width C. The tyre must be mounted and demounted with the wheel on the turntable with the smallest width side C facing upwards.

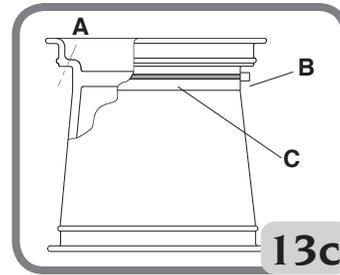
SPECIAL WHEELS

Wheels with alloy rims: some wheels with alloy rims have a minimum A rim channel or do not have any channel - **Fig. 13A**. These rims are not approved by DOT standards (Department of Transportation). The DOT initials certify that tyres comply with the safety standards adopted by the United States and Canada (these wheels cannot be sold in these markets).

High performance wheels (asymmetric curvature) - Fig. 13B some European wheels have rims with very pronounced curvature C, except in the area of the valve hole A where the curvature is less pronounced B. On these wheels the bead must first be broken in correspondence of the valve hole, on both the top and bottom sides.



Wheels with pressure sensor - Fig.13C. To work correctly on these wheels and avoid damaging the sensor (which can be incorporated in the valve, secured to the belt, glued inside the tyre, etc.) suitable mounting/demounting procedures must be observed (refer to “Approved mounting/demounting procedure for runflat and UHP tyres”).



WARNING

The TPMS device (optional accessory) can be used to check the proper operation of pressure sensor.

WARNING

Remove the old weights from the rim before starting work operations.

9.3. BEAD BREAKING

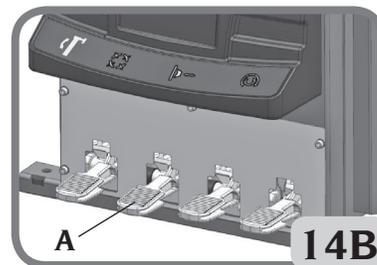
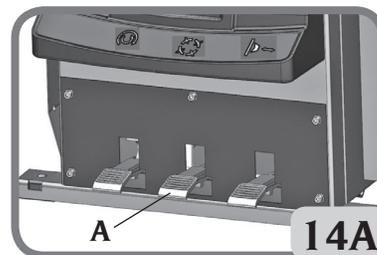
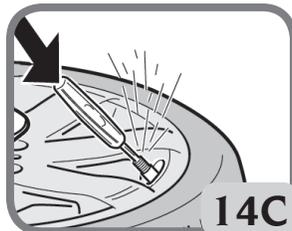
WARNING

Before bead breaking operation, completely close the turntable (locking wedges towards the centre) (A, Fig.16), keeping your hands away from moving parts.

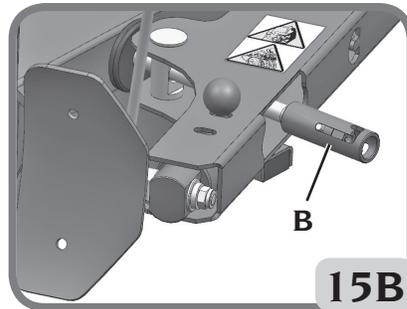
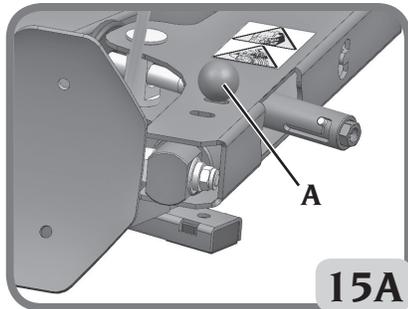


- Press pedal A (Fig. 14B ProLine 321-324 - Fig. 14A ProLine 124-221) and bring it into completely lowered configuration. In this configuration, the jaws are completely closed.

- Remove the internal valve to fully deflate the tyre (Fig. 14C).



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ProLine 124-321-324

- Adjust the shoe position using the pin (A) based on the size of the tyre (Fig. 15A).

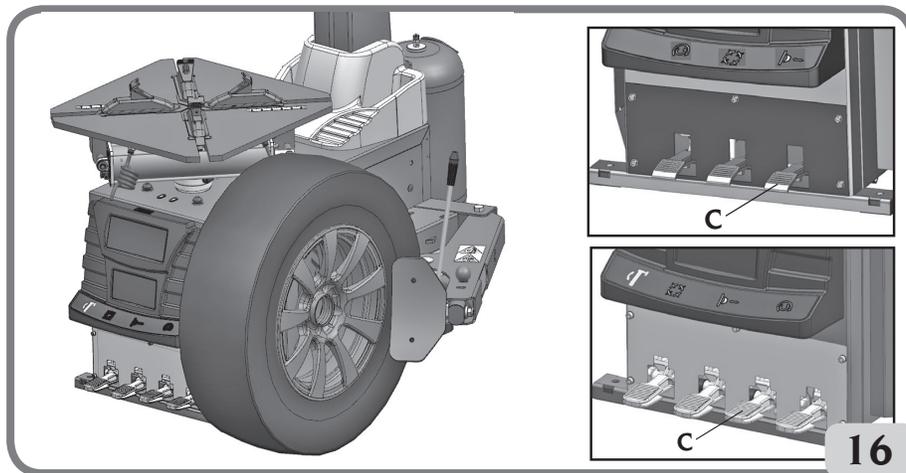
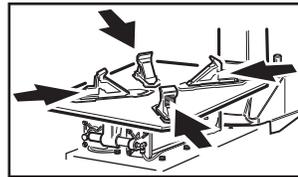
ProLine 324

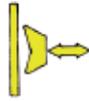
- For extremely wide wheels (over 350 mm), position the stop (B) as shown in figure 15B.

- Position the wheel as shown in fig.16 and move the bead breaker shoe near the rim edge.

WARNING

During the bead breaking operation, you are advised to keep the turntable closed (locking wedges towards the centre)





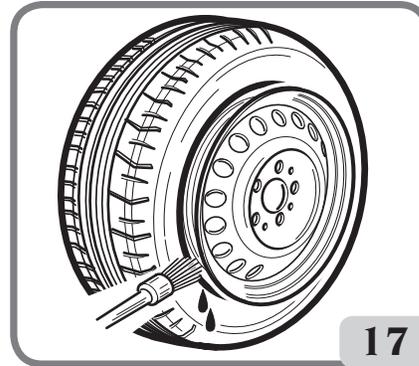
- Press the pedal (fig.16) to operate the bead breaker and detach the bead from the rim.

Repeat this operation on the other side of the wheel.

It may be necessary to break the bead at several points to free it completely.

Release the pedal to reverse the motion of the bead breaking shoe.

After detaching the beads, remove the old balancing weights.



- Thoroughly lubricate the sides of the tyre around the entire circumference of the lower and upper bead to facilitate demounting and avoid damaging the beads (fig.17).

9.4. CLAMPING THE WHEEL



WARNING

Keep your hands and other body parts away from moving parts of the machine while moving the wheel locking wedges.

WARNING

If the wheel weighs more than 10 kg, with a lifting frequency of more than 20 wheels/hour, it is recommended to use a lifting device (optional).

Only for ProLine 321 - 324:



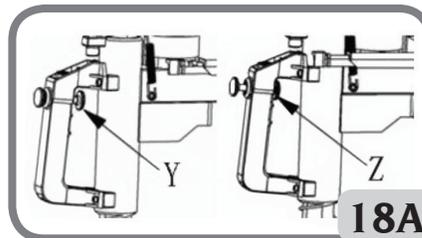
- Pull the unlocking button (position Z, Fig.18A) to position the operating arms in the "non-working" position (tool at the top and the horizontal arm completely retracted) (A Fig. 18B).



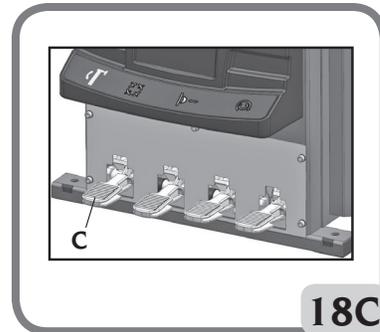
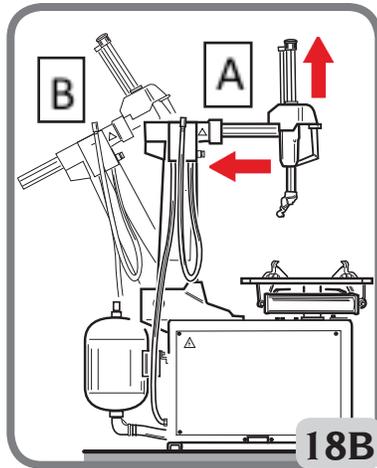
- Press button (position Y, Fig. 18A) to lock the arms into the "non-working" position.



- Press pedal (C, Fig. 18C) to take the column into the "non-working" position (B Fig. 18B).



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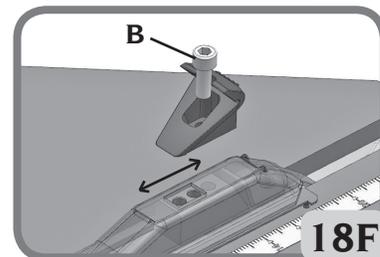
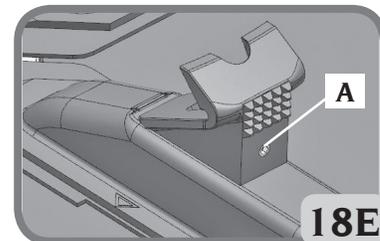
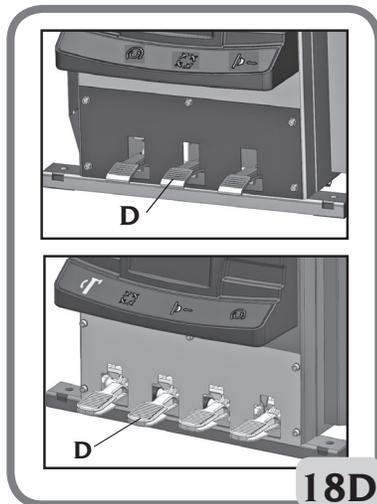


ONLY FOR PROLINE 124 E 324:

- If necessary, set the diameter range (11"→24" o 13"→27"), using the turntable jaw fixing screw:



- Press pedal D to fully open the turntable jaws (Fig. 18D).
- With the machine completely stopped and disconnected from the mains, unscrew the locking nut A, Fig. 18E and jaw fixing screw B, Fig. 18F.
- Adjust the position and tighten screw B to 50 Nm, re-tighten screw with nut A.
- Repeat the operation for all 4 jaws set to the same position, taking care not to press any command

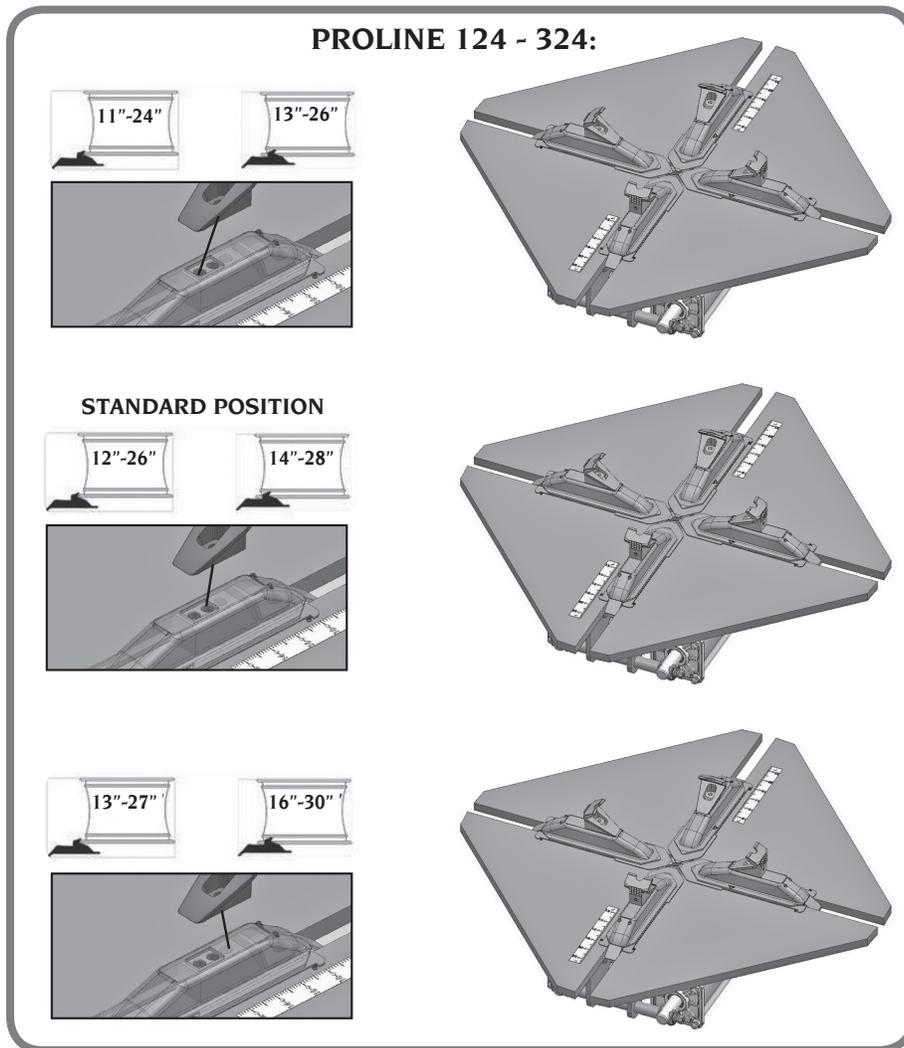


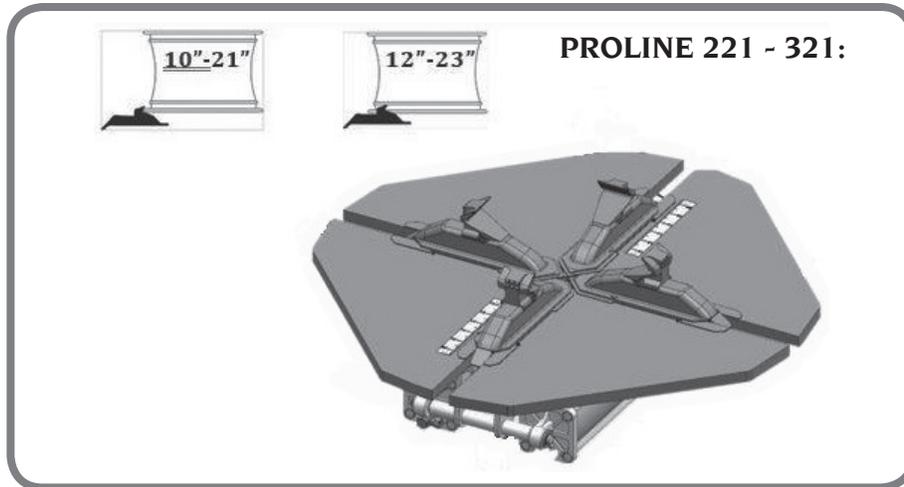
- Check that the jaws are all in the same position before demounting the wheels.

⚠ WARNING

Setting the diameter range (11"→24" or 13"→27"), using the adjustment device must be carried out with the turntable completely stopped without acting on the commands.

- Turntable jaws opening and closing is carried out by sequentially pressing the control pedal





 (Fig. 18D).

- With the jaws completely closed, lightly press the control pedal



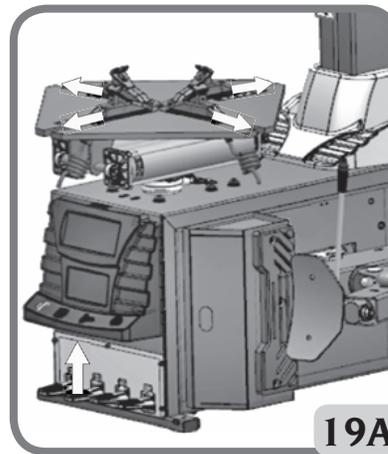
 and move it to the central position (Fig. 19a).

In this configuration, it is possible to carry out dead-man control of jaws opening and then stop them in the desired position.

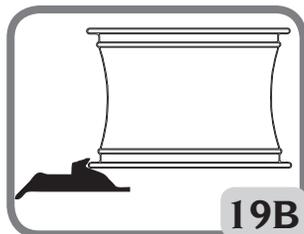
- If the rim is blocked from the outside (Fig. 19b), pre-position the locking wedges using the references of the diameters shown on the turntable and the notch on the jaw (Fig. 19c).

E.g.: Rim 18", pre-position the jaws making the notch match with value 18".

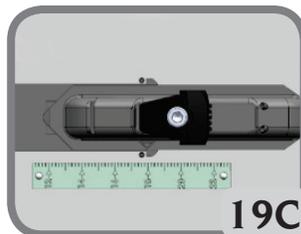
- If the rim is blocked from the inside (Fig. 19d), it



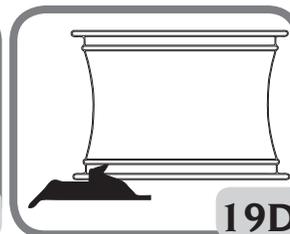
19A



19B



19C



19D

is not necessary to pre-position the locking wedges. The very shape of the wedge brings the rim to be locked into the correct position.

- Place the wheel (with the narrow shoulder of the rim facing up) on the turntable,
- Push it slightly downwards and operate



the control pedal  to lock the wheel in position (fig.20).



9.5. WHEEL demounting

9.5.a TOOL HEAD POSITIONING (ProLine 324 - ProLine 321)

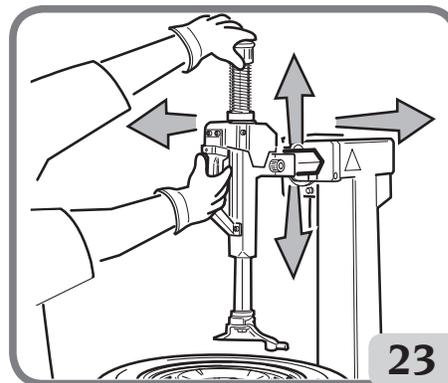
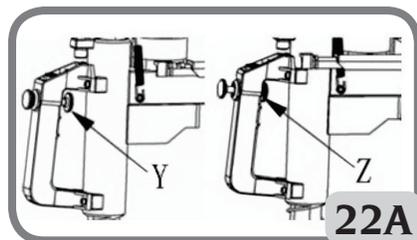
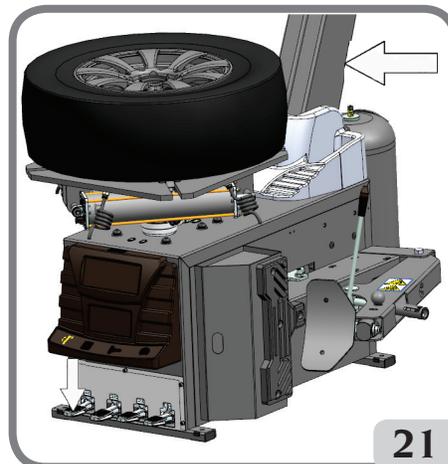


- Press the pedal  to move the column into the working position. (Fig.21).

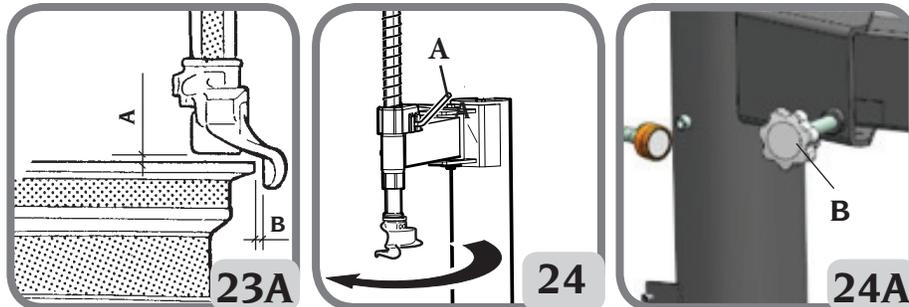
- Pull the Z position button to release the vertical and horizontal arm simultaneously (Fig. 22A).

- Move the mounting/demounting tool head against the rim edge (fig.23).

- Press the Y-position button to lock the tool head into the working position (Fig. 22A). **Important:** press the button Y to lock both the vertical and horizontal arms simultaneously while the mounting/demounting tool head goes slightly upwards moving away from the rim edge (fig. 23A).



UK



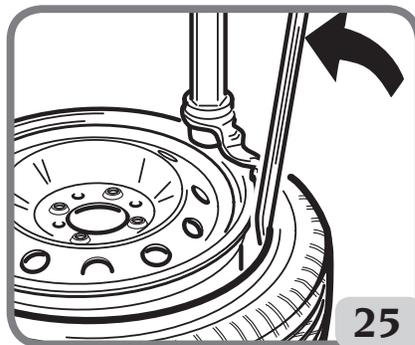
The space between the rim and the tool head will be maintained for as long as the handle is in the locking position. The operator can tilt the pole freely (e.g. when demounting wheels of the same size) without repositioning the tool head.

9.5.b TOOL HEAD POSITIONING (ProLine 124 - ProLine 221)

- Take the horizontal arm into the operating position (Fig. 24)
- Lower the vertical arm until the tool head touches the upper rim edge.
- Adjust the opening of the horizontal arm using the handwheel (B, Fig. 24A) to create the distance of about 2 mm between the tool head and the rim (B, Fig. 23A)
- Lock the vertical arm using the lever (A, Fig. 24).

9.5.c WHEEL DEMOUNTING

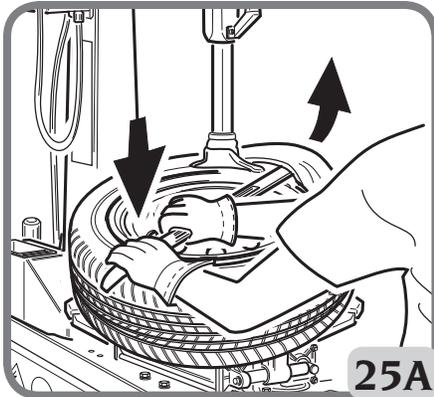
- Insert and position the bead lifting tool on the mounting tool head (fig.25).
When working with alloy rims or rims with delicate paintwork, you are advised to remove the bead lifting tool before proceeding with the demounting.



 **WARNING**

Grip the bead lifting tool firmly during use.

- Lift the upper bead above the rear part of the demounting tool head (fig.25A) and push one part of the upper bead into the rim channel by pushing downwards on the side wall of the tyre near the operator.



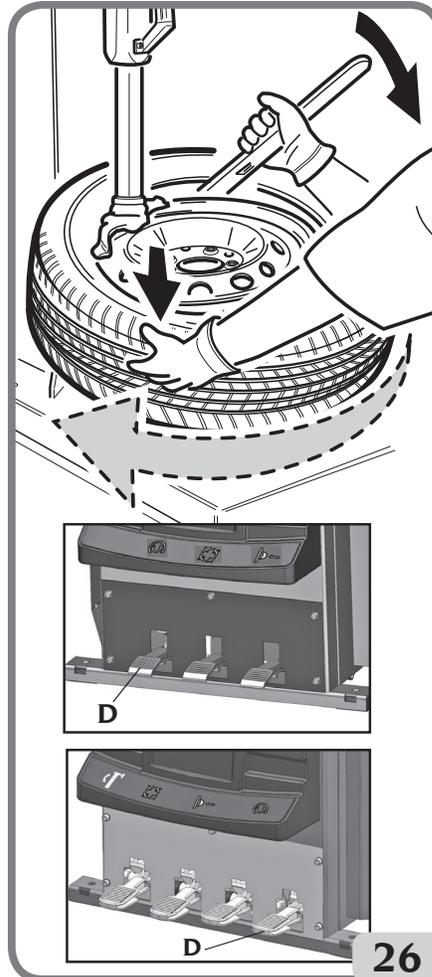
25A



- Press the turntable drive pedal , making the wheel turn clockwise. The upper bead will be automatically guided up over the rim edge (fig. 26).
- Repeat the last three points to detach the lower bead.

NOTES: If the tyre has an inner tube, after detaching the upper bead, tilt the operating arms into “non-working” position and remove the inner tube before proceeding to demount the lower bead.

The rotation of the turntable can be stopped at any time by releasing the pedal.
To rotate in the opposite direction, simply raise up the pedal.



26

- Lift the second bead manually on the head, then rotate the turntable clockwise until the tyre has been completely demounted from the rim.
- Move the operating arms to the “non-working” position.

WARNING

**If the tyre has an inner tube, after demounting the upper bead, tilt the column back and remove the inner tube before proceeding to demount the lower bead.
Turntable rotation can be stopped at any moment by releasing the drive pedal.
To rotate in the opposite direction, simply raise up the pedal.**

UK

9.6. WHEEL MOUNTING

DANGER

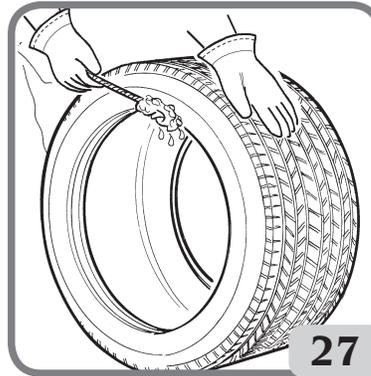
RISK OF EXPLOSION. Always check that the tyre/rim combination is correct in terms of compatibility (tubeless tyre on tubeless rim, tyre type with inner tube on rim for inner tube) and geometric dimension (shrinkage diameter, width cross section, offset and shoulder profile) before mounting.

AVOID THE RISK OF PERSONAL INJURIES OR DEATH.

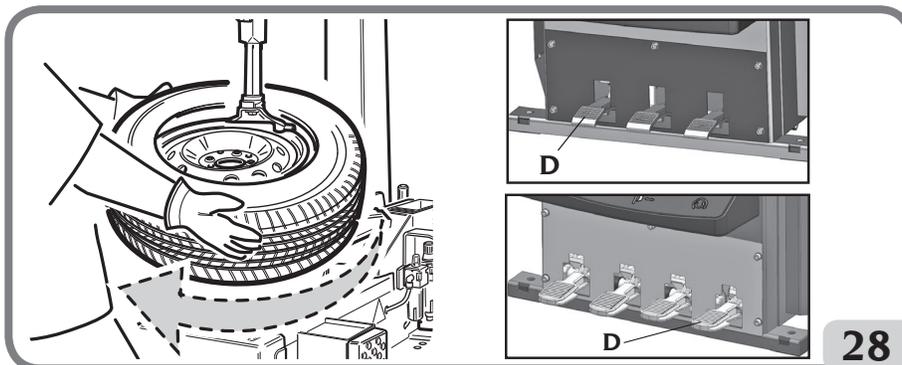
Also check that the rims are not deformed, that their fastening holes have not become oval, that they are not encrusted or rusted and that they have no sharp burrs on the valve holes.

Check that the tyre is in good condition with no signs of damage.

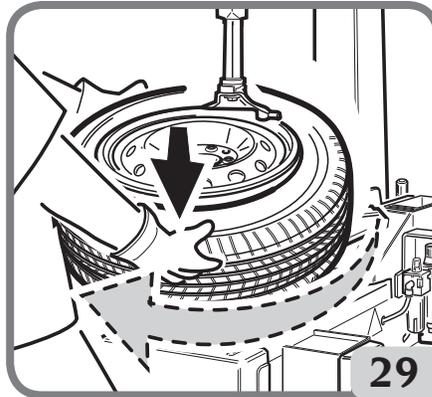
- Before you start with tyre mounting operations, lubricate the beads (fig.27).
Lubricated beads require less force to mount and are protected against damage.
- Check that the tyre is in good condition with no signs of damage.
- Adjust the tyre on the rim and take the operating arms into the working position.
- Position the bottom bead (fig.28) beneath the right hand side of the tool head.



Press the turntable control pedal (D) to rotate clockwise and mount the bead. Use the rim channel by pressing on the right wall of the tyre to reduce traction force on the bead as the wheel rotates (fig.28).



- Once you have mounted the first bead, repeat the same steps for the second bead (fig.29).
- Move the operating arms to the “non-working” position.
- release the wheel and remove it from the tyre changer.



Special tools

To make it easier to mount/demount low profile tyres, it is advised to use the *bead presser gripper* (optional accessory supplied on request).

9.7 APPROVED UHP AND RUN FLAT TYRE DEMOUNTING AND MOUNTING PROCEDURE

For a detailed description of the UHP and RUN FLAT tyre demounting/mounting procedure, please refer to the instructions in the manual developed by WDK (German Tyre Industry Association).

9.8. TYRE INFLATION

9.8.A. SAFETY INDICATIONS

	DANGER
	<ul style="list-style-type: none"> ● RISK OF EXPLOSION ● Never exceed tyre pressure recommended by tyre manufacturer. ● Always match the tyre and rim dimensions. ● Take care to avoid any damage to the tyre. ● During inflation, keep outside the vertical cylinder area occupied by the wheel.



DANGER

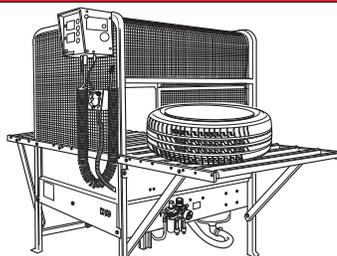
It is not permitted to use inflation devices (e.g. gun) connected to power sources outside the machine.

WARNING

Always observe national safety regulations, which can be more restrictive than this manual, according to the principle that a higher standard prevails over a lower one.

DANGER

If the tyre operating pressure, required for a certain vehicle, exceeds the value of the inflation limiting valve, it should be obtained by positioning the tyre and wheel on a suitable safety device



WARNING

Pay attention to possible injuries. Carefully read, understand and follow the instructions below.

1. Overinflated tyres can explode, producing hazardous flying debris that may result in an accident.
 2. Tyres and rims that do not have the same diameter are “mismatched”. Never attempt to mount or inflate any tyre and rim that are mismatched. For example, never mount a 16” tyre on a 16,5” rim (or vice versa). It is very dangerous. Tyres and rims that do not correspond could explode and cause accidents.
 3. Never exceed the inflation pressure for the tyre indicated by the manufacturer.
Carefully check that the air hose is well inserted in the valve.
 4. Never bring your head or other body parts close to a tyre during inflation or bead insertion operations.
- This machine is not a safety device against the possible risk of explosion of tyres, air chambers or rims.**
5. Maintain a suitable distance from the tyre changer while inflating. Do not approach it.

WARNING



This operating phase may involve noise levels of 85 dB (A). It is therefore suggested that ear protectors be worn. It is suggested to wear eye protection to prevent injury due to contact with dusts or any fragments inserted into the tyre.

DANGER

A bursting tyre can cause projections of its parts in surrounding areas with a force sufficient to cause serious injury or death.

Do not mount a tyre if its dimensions (indicated on the side) do not correspond exactly to the rim dimensions (printed inside the rim) or if the rim or the tyre is defective or damaged.

Never exceed the pressure recommended by the tyre manufacturer.

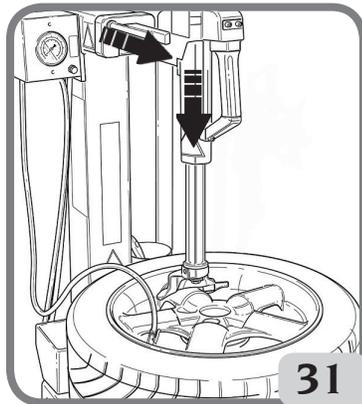
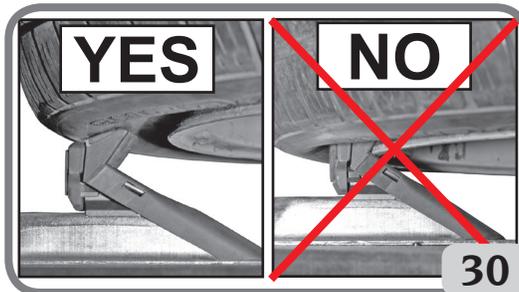
The tyre changer is not a safety device and does not prevent tyres and rims from exploding. Keep all persons not working on the machine out of the working area.

9.8.b. TYRE INFLATION

- Make sure the wheel is NOT clamped on the turntable by the centring jaws (Fig. 30).

- Move the horizontal arm to the wheel centre (all slipped off towards the operator)

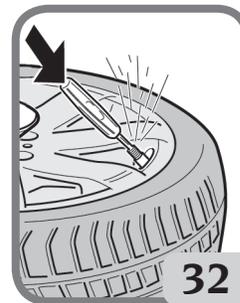
- Lower the vertical arm until it



touches the rim (fig.31), then clamp the arm in this position.

- Remove the valve core if it has not already been removed (Fig. 32).

- Connect the Doyfe connector of the inflating hose to the valve stem (Fig. 33).



UK

- Inflate the tyre with the appropriate gun or by pressing the pedal in an intermediate position (Fig. 34). Frequently check the pressure on the pressure gauge to make sure that the pressure NEVER exceeds the maximum pressure indicated by the manufacturer on the tyre.

- Disconnect inflation hose from valve rod.
- Take the operating arms to the "non -" position.
- Remove the wheel from the tyre changer.



9.8.c. SPECIAL PROCEDURE (TI VERSION)

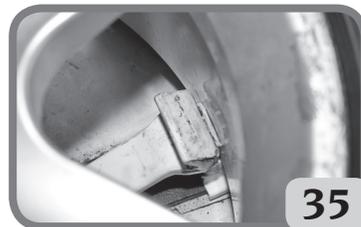
The TI version facilitates bead insertion and inflation of Tubeless tyres through the emission of a strong jet of air from the nozzles placed near the locking wedges.



WARNING

Before starting with the operations described below, make sure there is no dirt, dust or other impurities near the inflation nozzles. It is advisable to wear protective goggles.

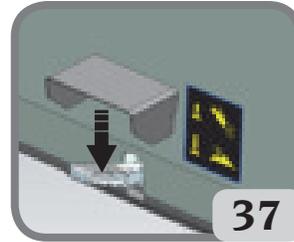
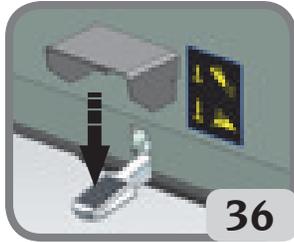
- Verify that both upper and lower tyre beads and rim bead seat have been properly lubricated with an approved mounting paste.
- Move the horizontal arm to the wheel centre (all slipped off towards the operator)
- Make sure that the wheel is clamped to the turntable from the inner side (fig.35).



- Lower the vertical arm until it touches the rim (fig.31), then clamp the arm in this position.
- Remove the valve core if it has not already been removed (Fig. 32).
- Connect the Doyfe connector of the inflating hose to the valve stem (Fig. 33).

WARNING

To increase the effectiveness of the air jets, manually lubricate and lift the lower bead before activating the nozzles.



- Fully press the inflation pedal for a short time (Fig. 36). The tyre will expand, and the beads will seat.

WARNING

To improve the operation of the tubeless tyre inflation system the line pressure must be between 8 and 10 bar.

- Unlock the wheel from the wedges.

- Move the inflation pedal into an intermediate position (Fig. 37) to inflate the tyre. Frequently check that the pressure NEVER exceeds the maximum pressure indicated by the manufacturer on the tyre.

! WARNING

Risk of explosion. During the bead insertion phase, do not exceed the maximum pressure indicated by the manufacturer

! WARNING

Operate the inflation jets only for tyre bead insertion.

Discharge the air from the pneumatic system before disconnecting the power supply or other pneumatic components. The air is accumulated in the tank for operating the bead insertion jets.

! WARNING

Operate the air jets only after making sure that the rim is correctly blocked.

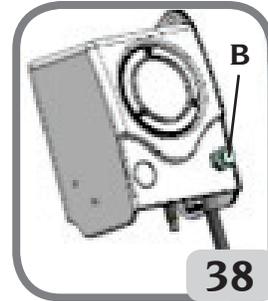
! WARNING

RISK OF EXPLOSION. Do not mount a tyre and a rim that do not have the same diameter (e.g., 16 and 1/2 inch tyre and a 16 inch rim).

UK

If the tyre is excessively inflated, the air can be released by pressing the brass manual deflation button located below the air pressure gauge (2 - Fig.38)

- Disconnect inflation hose from valve rod.
- Move the operating arms to the “non-working” position.
- Remove the wheel from the tyre changer.



10. INSTALLATION AND USE OF HELPER ACCESSORY

WARNING

The installation of the accessory on the tyre changer can only be carried out by qualified personnel authorized by the manufacturer. Installation by NON-qualified personnel does not ensure the product correct performance.

The accessory can only be installed on CORGHI tyre changer:

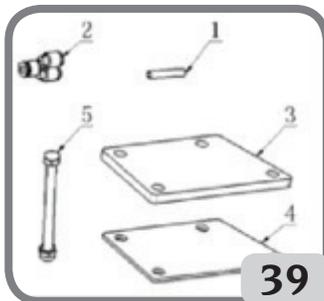
- HTB 21 exclusively on Proline 321 and 324 machine
- HTB 24 exclusively on Proline 321 and 324 machine
- HSA 21 exclusively on Proline 221 machine
- HSU 24 exclusively on Proline 124 machine

10.1. HTB 21- HTB 24

10.1.a. Installation

Open the box and check that the various parts of the device and the accessories useful for its installation are present (Fig. 39):

- 1-flexible hose Ø8
- 2-Y-connection Ø8





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- 3- upper base plate
- 4- lower base plate
- 5- M10X130 screw (nuts and flat washer) no. 4

1. Fasten the upper plate on the machine frame and align the holes (fig.40).
2. **Helper HTB21 only:** Place the plate with support foot (Fig. 40A) on the plate of Fig. 40 aligning the fastening holes.
3. Place the Helper on the base by aligning the holes.

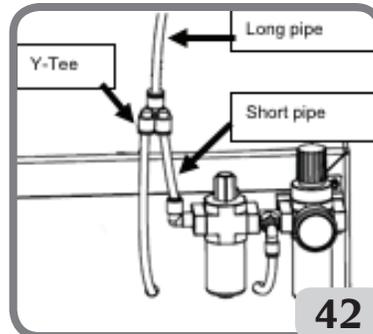
4. Add the lower plate and fasten with the supplied screws
5. Disconnect the tyre changer regulator hose, connect the Y-connector and the hose Ø8 supplied by connecting it with the Helper regulator. Connect the Y-connector with the tyre changer regulator (Fig. 42).

6. **Helper HTB24 only:** Complete the screws fastening to the vertical sidewall of the frame (fig.43).

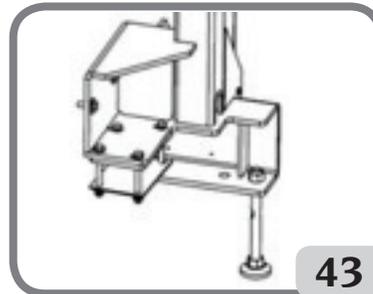
7. **Helper HTB21 only:** Complete the pressing arms fastening by connecting them with the cylinder rod and the tool box fastening (figures 44 and 45).

10.1.b. Calibration

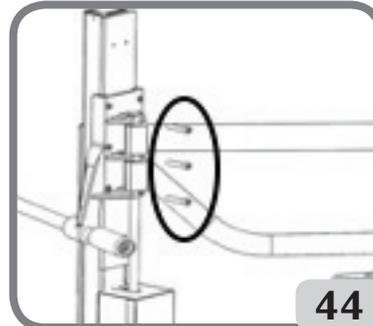
1. Lock a wheel on the turntable, take the bead presser arm into working position.
2. If the arm centring cone does not appear in the centre of the wheel, turn the fixing screws of the accessory.



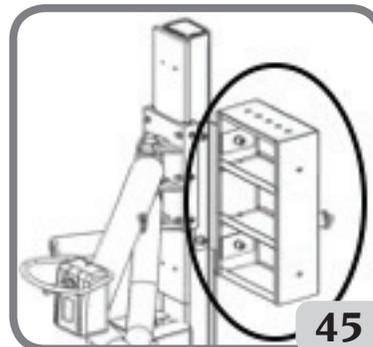
42



43



44



45

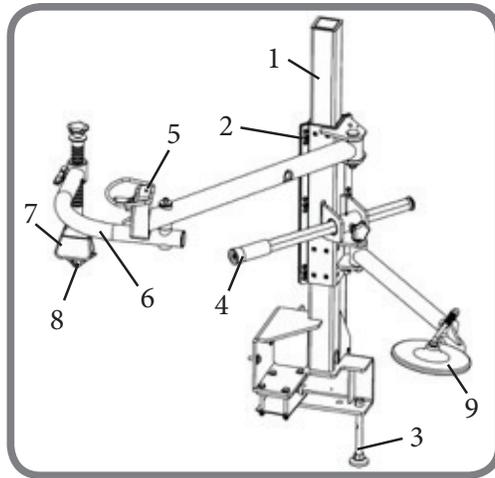
UK

9.1.c. Technical data

	HTB 21	HTB 24
Pneumatic cylinder force (at 8 bar)	6000 N	6000 N
Height	1200 mm	1700 mm
Width	1500 mm	1500 mm
Arm rotation radius	765 mm	765 mm
Presser roller min radius	270 mm	270 mm
Arm stroke	350 mm	350 mm

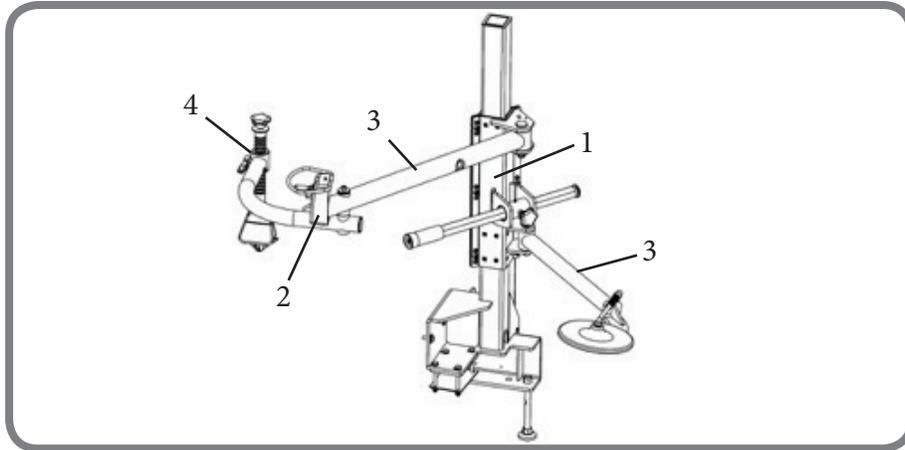
10.1.d. Functional parts

- 1- Vertical pole
- 2 - Sliding support
- 3 - Adjustable support foot
- 4 - Bead presser
- 5- Helper control
- 6- Pneumatic pressure arm
- 7- Tool
- 8. Centring tool
- 9 - Bead breaker disc



10.1.e. Labels placement

Ref.	Code		Description
1A	-		Label HTB 24
1B	-		Label HTB 21
2	-		Unlocking control plate
3	4-405458		Label, dimensions
4	462081		Label, risk of crushing



10.1.f. Tyre mounting/demounting

The lifting arms and bead pressing tool with which the accessory is equipped, are designed to help the operator during cover demounting and mounting.

Clamping

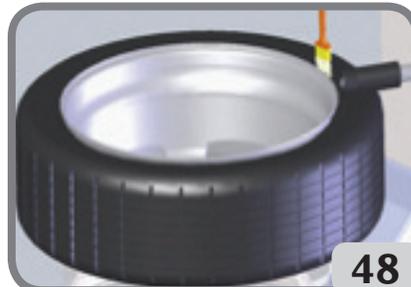
In the clamping phase of the wheel with external grip, proceed as follows:

- Arrange the jaws of the turntable at a measure slightly higher than the wheel, place the previously bead broken wheel on the turntable, place the arm with cone in the rim central hole (Fig. 46), activate the valve so as to press the wheel on the plate (Fig. 47), then clamp the wheel with the appropriate pedal.
- When working on reversed channel rims, in order to reach the rim hole, use the adjusting screw of the tool on the cone.



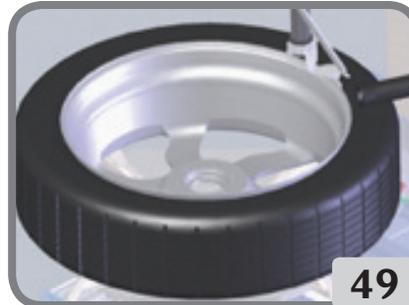
Demounting

- Remove the centring cone, tilt the pole forward and position the mounting/demounting tool. Position the rim presser roller tangent to the external diameter of the rim (Fig. 48), press the down lever until creating the necessary space between the mounting/demounting tool and the cover in order to insert the bead lift (fig. 49).



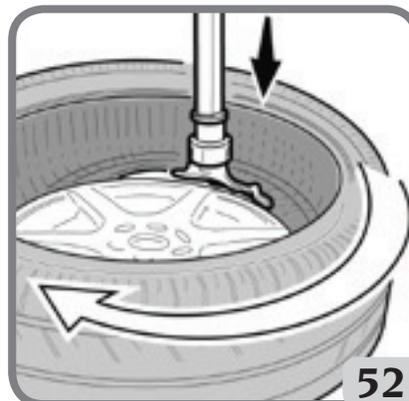
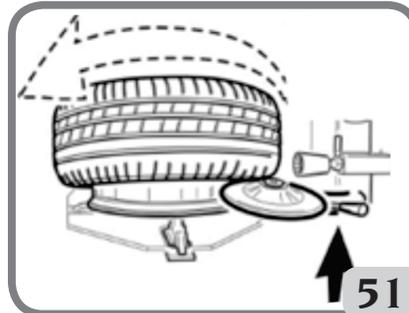
UK

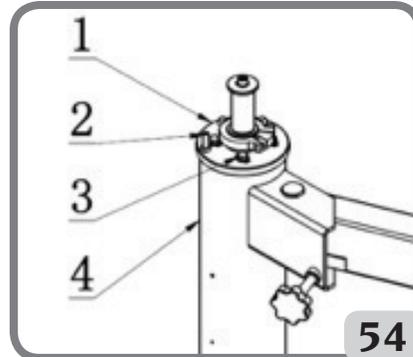
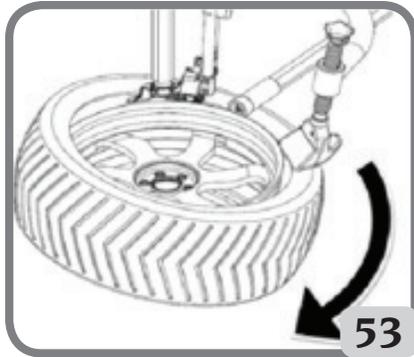
- Remove the bead presser roller, place the bead presser block in opposite position to the demounting/mounting tool, activate the lowering lever so as to insert the bead into the rim channel (fig.50).
- Load the bead over the demounting/mounting tool (Fig. 50), move the bead presser block away, press the rotation pedal and take out the first bead.
- Take the lower bead up to the upper rim edge; in some cases, even if the bead has already been broken, the bottom bead will remain in place because it has stuck to the rim.
If this occurs, use the disc, inserting it between the bottom bead and the rim (fig. 51), press the rotation pedal and lift.
- The second bead can be demounted in the traditional way, with the lever or using the bead depressor roller.
- Position the presser roller tangent to the external diameter of the rim (Fig. 51).



Fitting the tyres

- Place the tyre on the rim and tilt the pole forward, then fit the first bead (fig.52)
 - Place the top bead underneath the mounting/demounting tool, and at the same time, place the bead presser roller and the bead presser block close to the mounting/demounting tool, press the down lever until the rim clamping roller has descended below the top edge of the rim (fig.53).
 - Press the rotation pedal and mount the cover.
 - You will now see that the rim presser roller holds the bead underneath the head of the mounting/demounting tool and the bead presser block will follow the wheel as it rotates, keeping the bead inside the drop centre. This guarantees that the tyre is mounted correctly without the operator having to use his hands.
- NOTE:** stop rotation when the bead presser is next to the mounting/demounting tool.
- Press the up lever and free the wheel from the roller and from the bead presser.

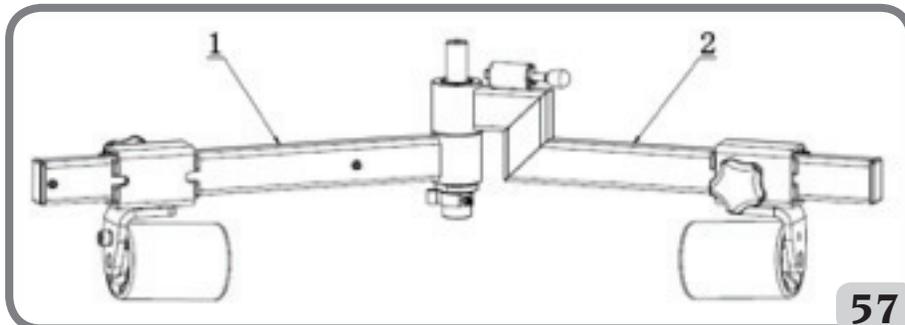
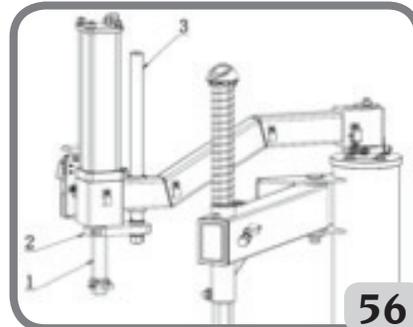
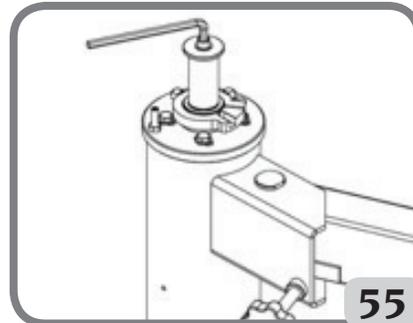




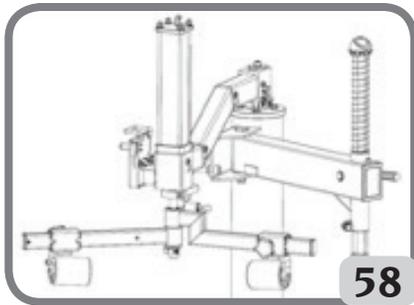
10.2. HSU 24

10.2.a. Installation

- Install the fixed base 1 (Fig. 54) on the top of the pole, install the limit switch 2 as shown in fig. 54. Install the 4 screws and M12x40 washers (do not tighten them completely)
- Remove the washer on the fixed base (fig. 55)
- Install arm 1 (Fig. 56) on the fixed base 2 and tighten with the screw and washer previously unscrewed.
- Remove the rotation shaft by releasing the retainer 2 with a wrench (Fig. 56)
- Connect rotation arm 1 (fig.57) and fixed arm 2 using the rotation shaft previously removed. Pay attention to the position of the arms when inserting the shaft into the cylinder hole and fasten as shown in fig. 58
- Fasten the control box on the main arm side



UK

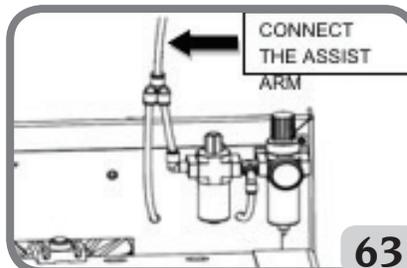
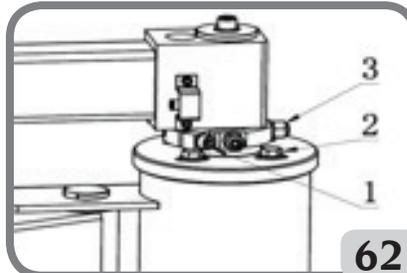
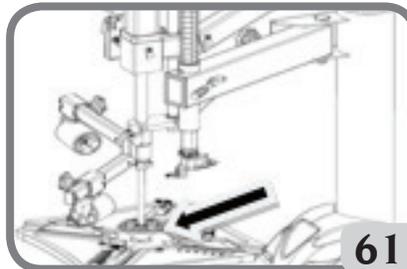
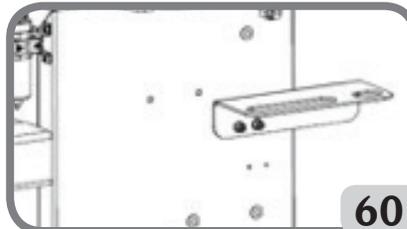
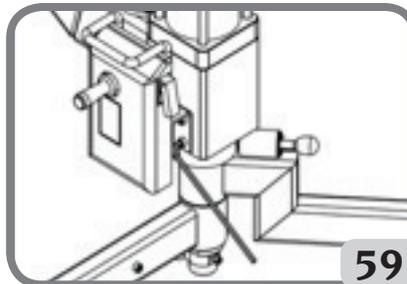


- with 4 M6x10 screws (Fig. 59)
- Install the accessory support on the back of the Tyre changer, no. 2 M8x25 screws (fig.60)
- Adjust the centring as in fig.61, install the cone and centre it with the turntable and lock the screw 1 fig.62. Then fasten the 4 screws of the fixed base 2 (fig.62) and tighten nut 3
- Install the Y-connection (fig.63)

10.2.b. Technical data

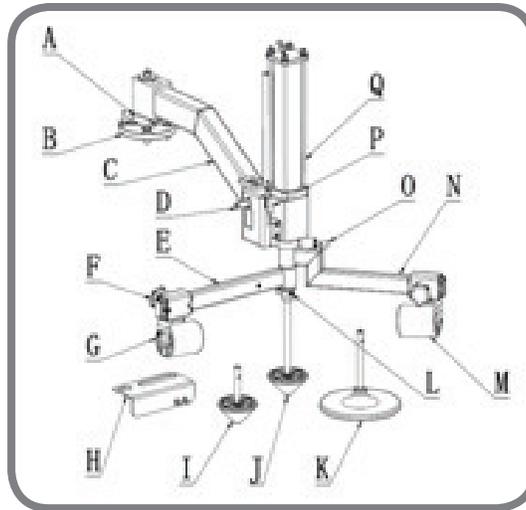
HSU24

- Pneumatic cylinder force (a 8 bar) 4000 N
- Height..... 1000 mm
- Width 1200 mm
- Presser roller max radius 360 mm
- Presser roller min radius 100 mm
- Arm stroke 320 mm



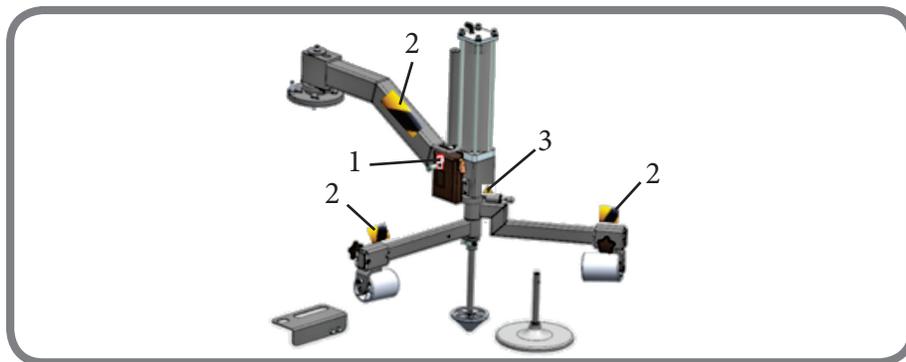
10.2.c. Functional parts

- A- Locking ring
- B- Fastener base
- C- Rotating arm
- D- Control valve
- E- Rotating presser arm
- F- Clamping handle
- G- Presser roller
- H- Accessories fastening
- I- Short cone
- J- Long cone
- K- Bead lift disc
- L. Locking pin
- M- Presser roller
- N- Presser arm
- O- Rotation release pin
- P- Control valve
- Q- Cylinder



10.2.d. Labels placement

Ref.	Code		Description
1	-		Unlocking control plate
2	4-405458		Label, dimensions
3	462081		Label, risk of crushing

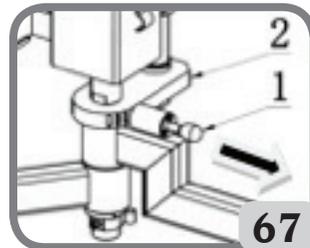




10.2.e. Tyre mounting/demounting

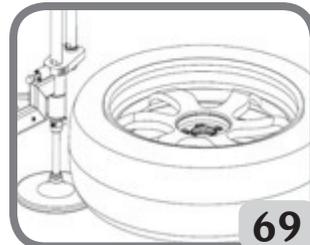
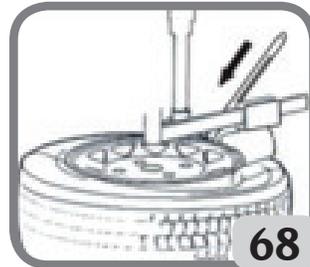
Operation:

- The main rotation arm has the automatic centring function. The main rotation arm can lock automatically when the bead presser is moved to the centre.
- Press the control valve to release the lock.



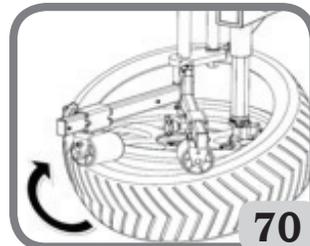
Demounting:

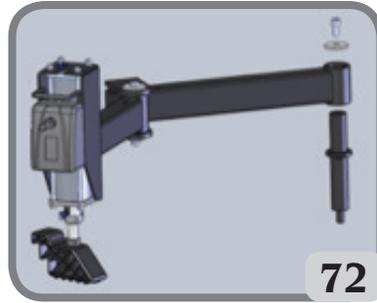
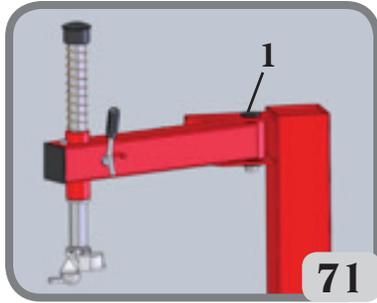
- Open the arms and rollers more than the rim diameter of 2-3 mm and place the wheel and tyre assembly on the turntable, choose the correct cone (fig.64) and rotate the arm to the centre by locking it (fig.65) pressing the cylinder control downwards.
- Lock the assembly by acting on the pedal of the turntable (fig.66). Unlock the arm from the assembly by acting on the control and remove the cone.
- Lock the rotation of the arms in the desired position (fig.67), press the bead with the roller and use the lever to lift the bead (fig.68).
- Mount the bead lifting disc to help during removal (fig.69).



Mounting:

- Check correct tyre-rim match-mounting.
- Mount the lower side of the tyre manually by acting on the cover.
- Adjust the position of the tool head on the rim and block, adjust the distance of the rollers over the rim (1-2 mm) and press the rollers downwards for 5-7 cm beyond the top edge of the rim.
- Act on the turntable rotation pedal until complete bead insertion (fig.70).

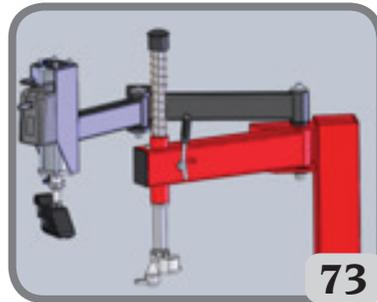




10.3. HSA 21

10.3.a. Installation

- Remove the swivelling arm fixing pin on the tyre changer (1, Fig. 71)
- Install the new double pin with washer and nut (Fig. 72)
- Install the presser arm in the upper part with washer and nut (Fig. 73)
- Connect air supply hose.



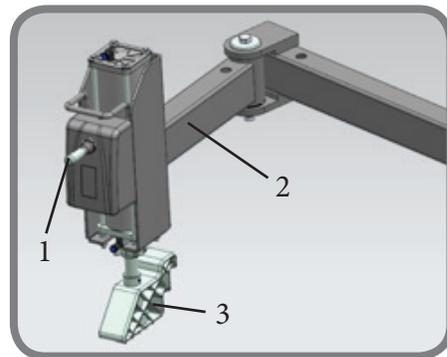
10.3.b. Technical data

HSA21

- Pneumatic cylinder force (at 8 bar) 3000 N
- Height.....330 mm
- Arm rotation radius.....800 mm
- Arm stroke230 mm

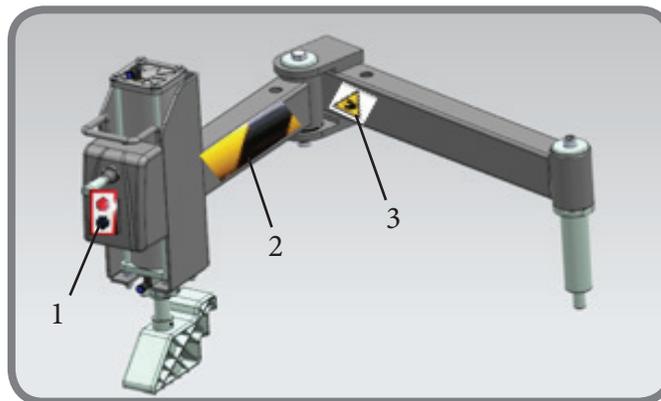
10.3.c. Functional parts

- 1- Helper control
- 2- Pneumatic pressure arm
- 3- Tool



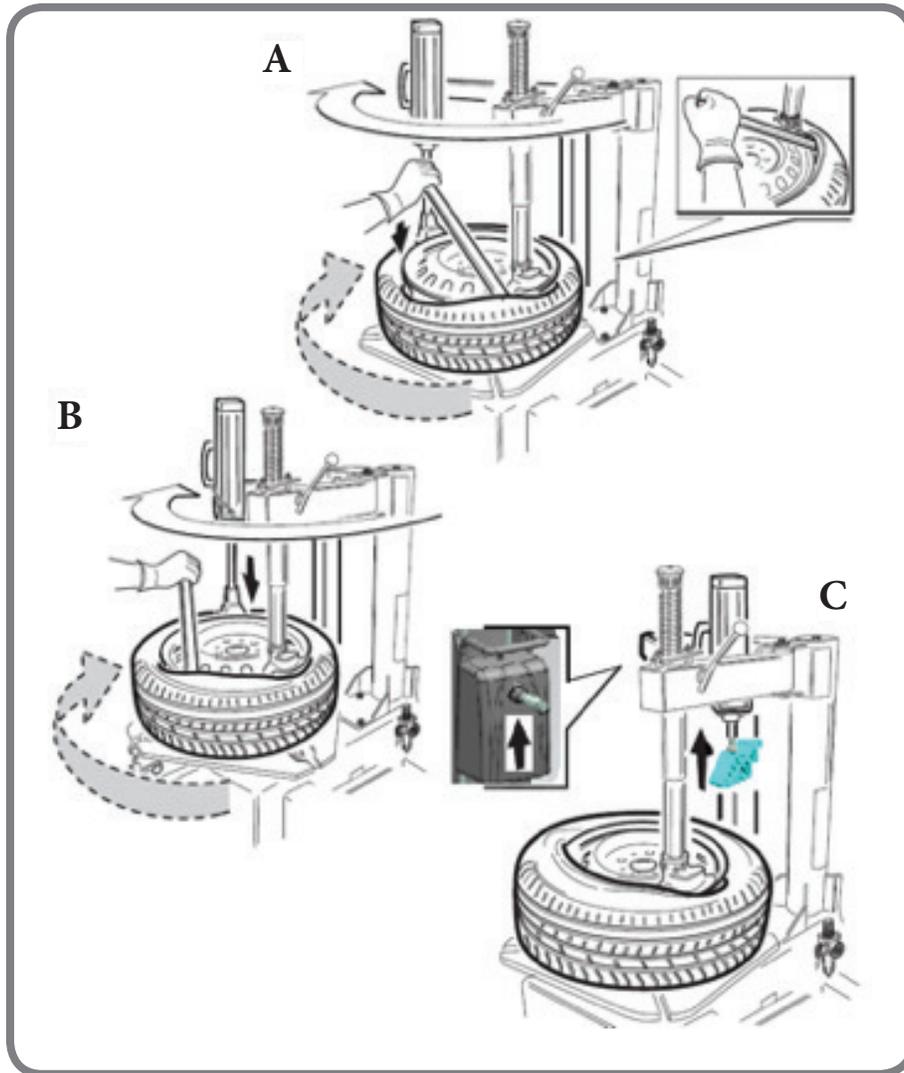
10.3.d. Labels placement

Ref.	Code		Description
1	-		Unlocking control plate
2	4-405458		Label, dimensions
3	462081		Label, risk of crushing

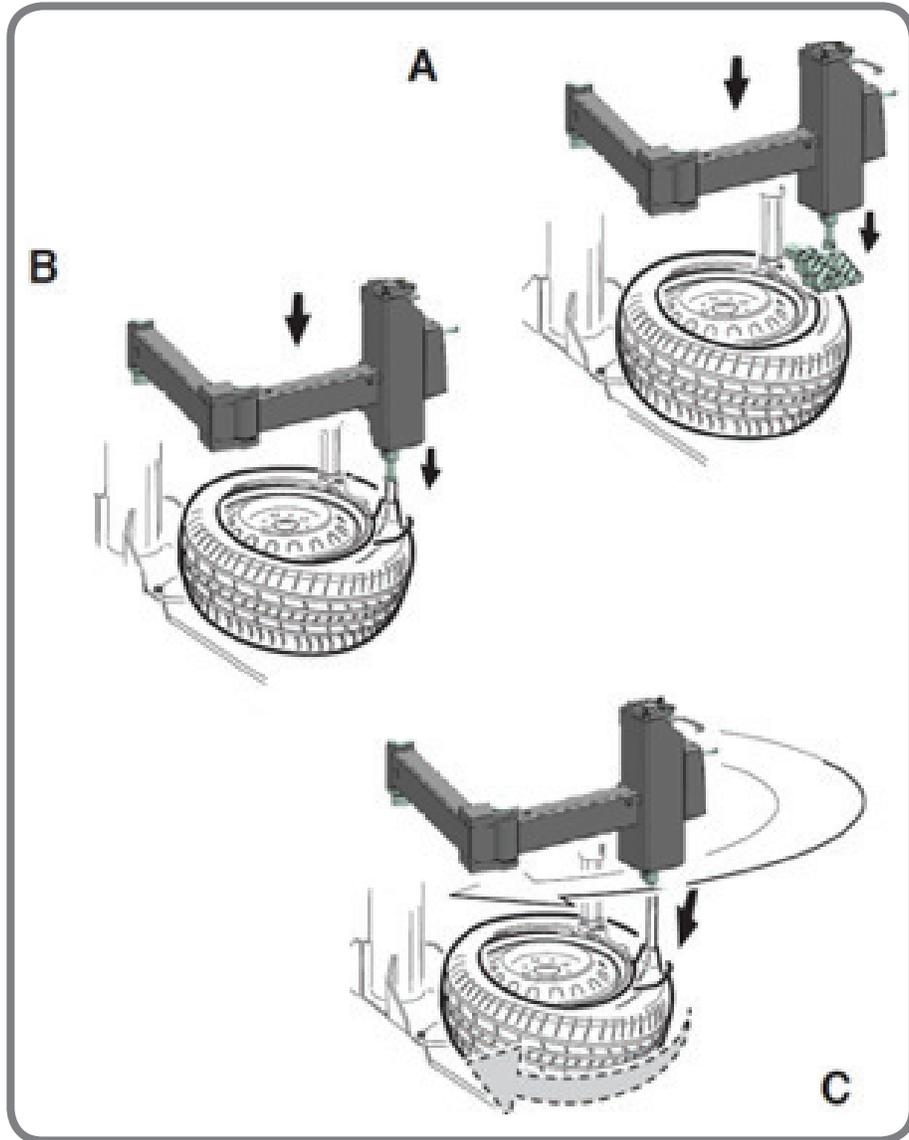


10.3.e. Tyre mounting/demounting

Demounting



Mounting



11. TROUBLESHOOTING

WARNING

The information below and the booklet “spare parts” do not authorise the user to operate on the machine in case of malfunction. They provide the technical support centre with accurate information so as to reduce intervention times. Any intervention on the machine or on the system must be performed by qualified and authorised personnel.

Turntable does not turn

Lack of power supply.

- Check mains voltage presence.
- Check the state of fuses.
- Check the state of the differential and/or magneto-thermal circuit breaker.
- Check cable connections in the plug.

The motor is not running:

- Check the microswitches of the pedal unit (only for motor inverter)
- Check the motor rotation control of the pedal unit
- Replace the inverter board (only for motor inverter).
- Replace the motor.

Belt broken.

- Replace the belt.

Reduction gear clamped:

- Replace the reduction gear

Turntable does not rotate in either direction

Control faulty.

- Replace the inverter.
- Check the microswitches of the pedal unit (only for motor inverter)
- Replace the inverter board (only for motor inverter).

Reduction gear clamped.

- Replace the reduction gear.

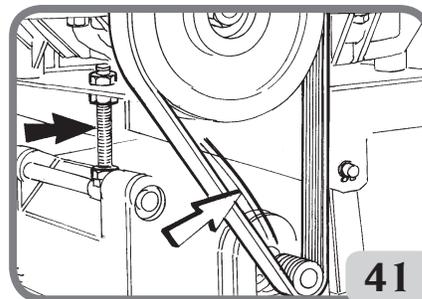
Gear unit noisy. The turntable makes a 1/3 of a turn and then stops

Reduction gear is seizing.

- Replace the reduction gear.

Turntable stops under strain, but the motor is running

Insufficient belt tension.



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- ➔ Adjust belt tension (fig.41) or replace it.

Turntable fails to clamp rims

Faulty turntable cylinder.

- ➔ Replace the turntable cylinder.

Tips of locking wedges are worn.

- ➔ Replace the locking wedges.

Control pedals do not return to their position

Pedal return spring broken.

- ➔ Replace the spring.

Bead breaker cylinder lacks force, fails to break beads and leaks air

Silencer plugged.

- ➔ Replace the silencer

Cylinder seals worn.

- ➔ Replace the seals.
- ➔ Replace the bead breaker cylinder.

After clamping, the tool head does not rise or rises too far from rim

Clamping plate not adjusted.

- ➔ Adjust the plate.

When the pole tilts back, the vertical and horizontal arms slide to their limit stop

Faulty clamping plate.

- ➔ Replace the plate.

Clamping plate not adjusted.

- ➔ Adjust the plate.

Clamping cylinders faulty or not working.

- ➔ Replace cylinders or seals.

Lack of supply to clamping cylinders.

- ➔ Check the operation of controls and pneumatic circuit.

No air passage through valve

- ➔ Replace the valve.

Vertical arm ascends under strain

Faulty clamping plate.

- ➔ Replace the plate.

Clamping plate not adjusted.

- Adjust the plate.

Pole not tilted

Faulty pole tilting cylinder.

- Replace the pole tilting cylinder.

No air supply to cylinder.

- Replace the cock.

Air leak from the valve.

- Replace valve or pole tilting cylinder.

The pole tilts violently or too slowly

Release valve incorrect setting.

- Adjust the discharge regulators.
Hare: speed increase.
Turtle: speed reduction.

Tyre pressure gauge needle fails to return to 0

Pressure gauge faulty or damaged.

- Replace the pressure gauge.

The lubricator does not work

No oil in lubricator.

- Top up lubricator with SAE20 non-detergent oil.

Lubricator broken.

- Replace the lubricator

12. MAINTENANCE

WARNING

It is prohibited to perform any operation that changes the pre-set value of the pressure regulation valve or pressure limiter. The manufacturer declines all liability for damage resulting from tampering with such valves.

WARNING



Before making any adjustments or carrying out maintenance on the machine, disconnect the electrical and compressed air supply and make sure that all moving parts are locked in place.

UK

 **WARNING**



Do not remove or modify any component of this machine (these operations may only be carried out by technical assistance personnel).

 **WARNING**



When the machine is disconnected from the pneumatic power supply, the pneumatic actuators can remain pressurized.

 **WARNING**

Before carrying out any regular maintenance operation or topping up with lubricant, disconnect the machine from the compressed air supply line.

WARNING

The manufacturer declines all responsibility for claims resulting from the use of non-original spare parts or accessories.

- Regularly clean the machine from dirt
- Keep all guides clean and lubricated (vertical axis, horizontal axis, jaw guides)
- The purpose of the regulator filter and lubricator (FRL) unit is to filter the air, adjust the pressure and lubricate it.

The “FRL” unit supports a maximum input pressure of 16 bar and has an adjustment range between 0.5 to 10bar, this adjustment can be modified by pulling the handle to the extracted position and turning it. At the end of the adjustment, return the handle to the locked position pushing it downwards (fig.42a).

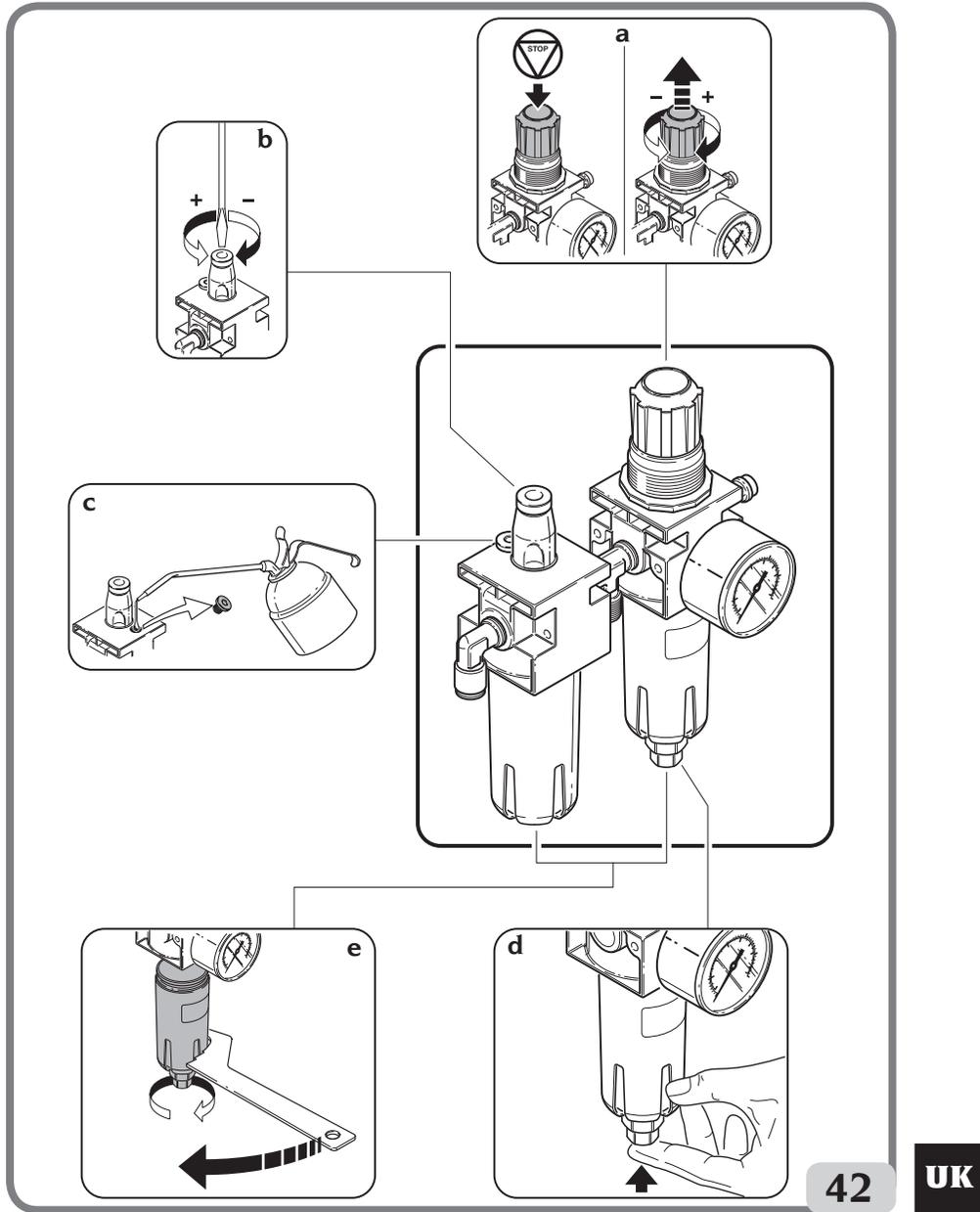
The lubricant flow rate adjustment is carried out by turning the screw on the element “L”, (fig.42b); normally this unit is pre-calibrated to a pressure of 10Bar, with SAE20 viscosity lubricant in order to make a drop of lubricant come out, which can be seen from the specific cover, every 4 times the bead breaker is operated.

Periodically check the lubricant level through the specific windows and top up as shown in fig.42c. Top up only with non-detergent SAE20 oil equal to 50cc.

The filter regulator “FR” has an automatic condensation drain system, therefore in conditions of normal use special maintenance is not required. The condensate may however be drained manually at any time (fig.42d). Normally the cups do not need to be removed, but check if this is necessary for maintenance operations after a long period of use. If a manual operation is not sufficient, use the specific key provided (fig.42e).

Clean with a dry cloth. Avoid contact with solvents.

NOTE: for oil warnings, refer to the specific chapter in the machine user manual.



WARNING

To keep the machine in optimal conditions of safety and operation, the employer must have the following periodic checks performed by the authorized service network.

Periodic checks

- a. periodic check of inflation pressure gauge every 2 years
- b. periodic check of the inflation pressure relief valve every 2 years
- c. periodic check of the regulator filter of the pneumatic supply at the machine inlet every 2 years
- d. periodic check of the functionality of all the machine controls every 2 years
- e. periodic check of the maximum pressure relief valve mounted on the tanks every 2 years
- f. check of some parts of the machine such as: safety and protection devices, parts subject to wear, parts subject to pressurized fluids (tanks, connections, pipes, etc.), electrical connections etc.

13. SCRAPPING

If the equipment is to be scrapped, sort all electrical, electronic, iron and plastic components. Dispose of the components separately in compliance with local regulations.

14. ENVIRONMENTAL INFORMATION

The disposal procedure described below only applies to equipment with the barred bin



symbol on the rating plate .

This product may contain substances that are potentially harmful to the environment and human health unless disposed of properly.

The information provided below is intended to prevent these substances from being released into the environment, and to improve the use of natural resources.

This product may contain substances that are potentially harmful to the environment and human health unless disposed of properly.

The information provided below is intended to prevent these substances from being released into the environment, and to improve the use of natural resources.

Electrical and electronic equipment must never be disposed of in the usual municipal waste but must be separately collected for proper treatment.

The barred bin symbol affixed on the product and shown in this page is meant to remind users that the product must be disposed of properly at the end of its life cycle.

This prevents the inappropriate disposal of the substances contained in this product, or the improper use of parts of this product, and the resulting hazards for the environment and human

health. It also helps to ensure that many materials contained in this product are recovered, recycled and reused.

To this end, manufacturers and dealers of electrical and electronic equipment maintain special systems for the collection and disposal of such equipment.

At the end of the product life cycle, contact your dealer for information about disposal procedures.

Upon purchase, purchasers are offered the opportunity to return their end-of-life equipment to dealer free of charge, provided that the equipment is of the same type and served the same purpose as the newly-purchased product.

Anyone disposing of the product otherwise than as described above will be liable to prosecution under the laws of the country where the product is disposed of.

We also urge you to adopt other environmental-friendly practices: recycle the internal and external packing materials which come with the product and dispose of spent batteries (installed in the product) properly.

With your help, we can reduce the amount of natural resources used to produce electrical and electronic equipment, minimise the use of landfills to dispose of old products, and improve quality of life by preventing the discharge of potentially hazardous substances into the environment.

15. INFORMATION AND WARNINGS ABOUT OIL

Disposal of waste oil

Never pour waste oil in sewers, storm drains, rivers or streams; collect and deliver it to companies authorised to collect it.

Oil spills or leaks

Contain spillages using soil, sand or other absorbent material. The contaminated zone must be degreased with solvents, avoiding the formation and stagnation of vapours, and all residual cleaning material must be disposed of in accordance with procedures as prescribed by law.

Precautions for the use of oil

- Avoid contact with skin.
- Do not allow oil mists to form or spread in the atmosphere.
- Adopt the following simple hygienic precautions:
 - avoid oil splashes (suitable clothing, protective shields on machines)
 - wash yourself frequently using soap and water; do not use cleaning products or solvents that irritate the skin or remove its natural protective oil
 - do not dry your hands using dirty or oily rags
 - change your clothes if soaked or, in any case, at the end of the work shift



- never smoke or eat with oily hands
- Adopt the following preventive and protective measures as well:
 - mineral oil resistant gloves with fleece lining
 - goggles, in case of splatters
 - mineral oil resistant aprons
 - protective shields, in case of splashes

Mineral oil: first aid instructions

- Ingestion: seek medical attention immediately and provide all characteristics of the type of oil ingested.
- Inhalation: for exposure to high concentrations of fumes or oil mist, move the affected person to the open air and seek medical attention immediately.
- Eyes: rinse with plenty of running water and seek medical attention immediately.
- Skin: wash with soap and water.

16. FIREFIGHTING EQUIPMENT TO BE USED

Refer to the table below to choose the most suitable fire extinguisher:

Dry materials

Water	YES
Foam	YES
Powder	YES*
CO ₂	YES*

Flammable liquids

Water	NO
Foam	YES
Powder	YES
CO ₂	YES

Electrical equipment

Water	NO
Foam	NO
Powder	YES
CO ₂	YES

YES* Use only if more appropriate extinguishers are not at hand or when the fire is small.



WARNING

This table contains general instructions to be used as guidelines for users. Contact the manufacturer for details of the applications of each type of extinguisher.

17. GLOSSARY

Wheel and tyre assembly

Set consisting of:

Tyre

Wheel: union of rim and disc

Inner tube (if any)

Air under pressure

I - Tyre The tyre is the main part of the complex that is in contact with the road and is therefore designed to support the internal air pressure and all other stresses arising from use.

The tyre section shows the various parts it consists of.

The tyre must:

- withstand a load,
- ensure driving power,
- steer the vehicle,
- aid handling and braking,
- aid vehicle suspension.

1 - The tread. It is the part in contact with the road while the tyre is rolling. It comprises a rubber compound and a "pattern" suitable for ensuring good resistance to abrasion and good grip in dry and wet conditions, as well as quiet operating conditions.

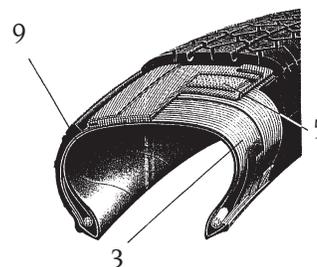
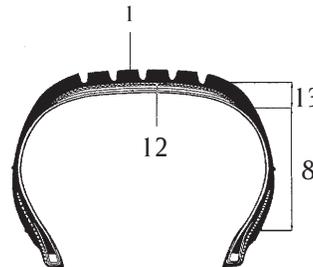
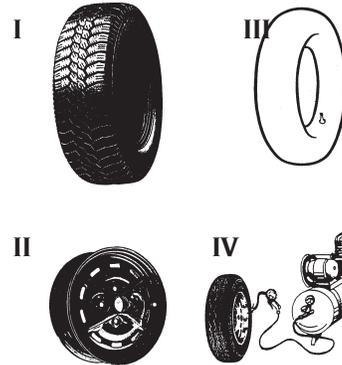
2 - Edge or bracing. It is an insert of metallic or textile fabric, placed at the outer part of the bead; it is used to protect the carcass plies from sliding against the rim.

3 - Casing. This is the resistant structure and comprises one or more layers of rubber plies. The way the plies comprising the casing are arranged give the structure its name. The following structures are possible:

Conventional: the plies are inclined and arranged so that the strands comprising a ply overlap with those of the adjacent ply. The tread, which is the part of the tyre in contact with the ground, is part of the sidewalls and so during rolling, sidewall flexure is transmitted to the tread.

Radial: the casing consists of one or more plies with the cords in radial direction.

A radial casing in itself is quite unstable. To make it stable and prevent incorrect tread movement in



the area of contact with the ground, the casing and the shim under the tread are reinforced with an annular structure, usually called a belt. The tread and sidewall work with different, independent rigidities, so during rolling, sidewall flexure is not transmitted to the tread.

4 - Side ring. This is a metal ring comprising several steel strands. The casing plies are secured to the side ring.

5 - Belt. This is a non-flexible circumferential structure comprising cross-ply at very low angles, positioned below the tread, with the aim to stabilise the casing in the footprint area.

6 - Centring band. This is a small mark that indicates the circumference of the upper part of the bead and is used as a reference to control correct tyre centring on the rim after mounting.

7 - Protective band. This is a circumferential marking in the area of the sidewall which is more exposed to accidental rubbing.

8 - Sidewall. This is the area between the shoulder and the centring band. It consists of a more or less thin layer of rubber, which protects the casing plies from lateral impact.

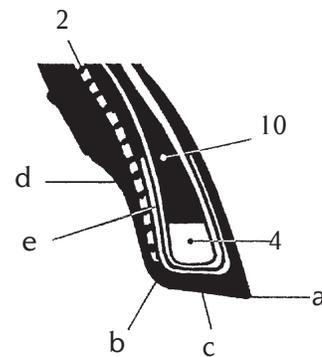
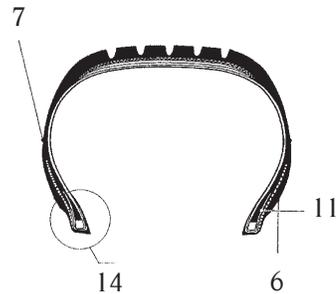
9 - Inner lining. This is a vulcanised, compound sheet, impermeable to air, inside tubeless tyres.

10 - Filling. It is a rubber profile with a triangular section, placed above the rim; it provides rigidity for the bead and gradually offsets the abrupt uneven thickness caused by the side ring.

11 - Flap. This is the part of the casing ply around the side ring and placed against the casing, to secure the ply and prevent it from slipping.

12 - Foot. This is the innermost layer of the tread in contact with the belt, or if the latter is not present (conventional tyres) with the last casing ply.

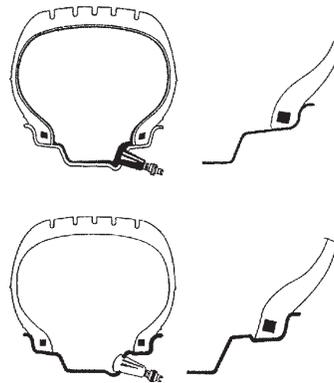
13 - Shoulder. This is the outer part of the tread, between the corner and start of the sidewall.



14 - Bead. This is the part that joins the tyre to the rim. The bead point (a) is the inner corner. The spur (b) is the inner part of the bead. The base (c) is the area resting against the rim. The groove (d) is the concave part against which the rim shoulder rests.

Tube type tyres. As a tyre has to contain pressurised air for a long period of time, an air chamber is used. The valve for inserting, maintaining, controlling and restoring pressurised air is, in this case, part of the chamber.

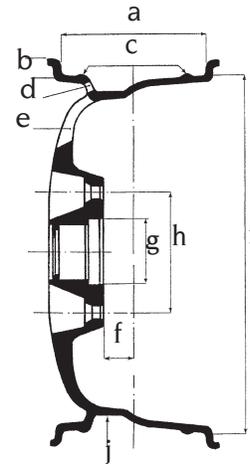
Tubeless tyres. Tubeless tyres consist of a tyre with inner sidewall lined with a thin layer of special impermeable rubber, called a **liner**. This liner helps to maintain air pressure in the casing. This type of tyres must be mounted on specific rims, on which the valve is fixed directly.



II - Rim (Wheel). The rim is the rigid metal part which connects the vehicle hub to the tyre, on a fixed but non-permanent basis.

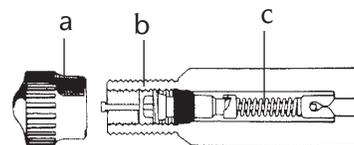
Rim profile. The rim profile is the shape of the section in contact with the tyre. It is made with different geometric shapes that serve to ensure: easy assembly of the tyre (inserting the bead into the channel); safety on the move, in terms of anchoring the bead in its seat.

When observing a section of the rim, it is possible to identify different parts that compose it: a) rim width – b) shoulder height – c) tubeless anchoring (HUMP) – d) valve hole – e) ventilation opening – f) offset – g) central hole diameter – h) connection hole centre to centre distance i) keying diameter – j) rim channel.



III - Air chamber (tube type tyres). The air chamber is a closed ring-like rubber structure with a valve, which contains pressurised air.

Valve. The valve is a mechanical device to inflate/deflate the tyre and maintain air pressure inside the air chamber (or tyre in the case of tubeless tyres). It consists of three elements: the valve closing cap (a) (to protect the internal mechanism from dust and guarantee air tightness), an internal mechanism (b) and the base (c) (the outer lining).



Tubeless Inflater. Inflation system that makes easier the inflation of tubeless tyres.

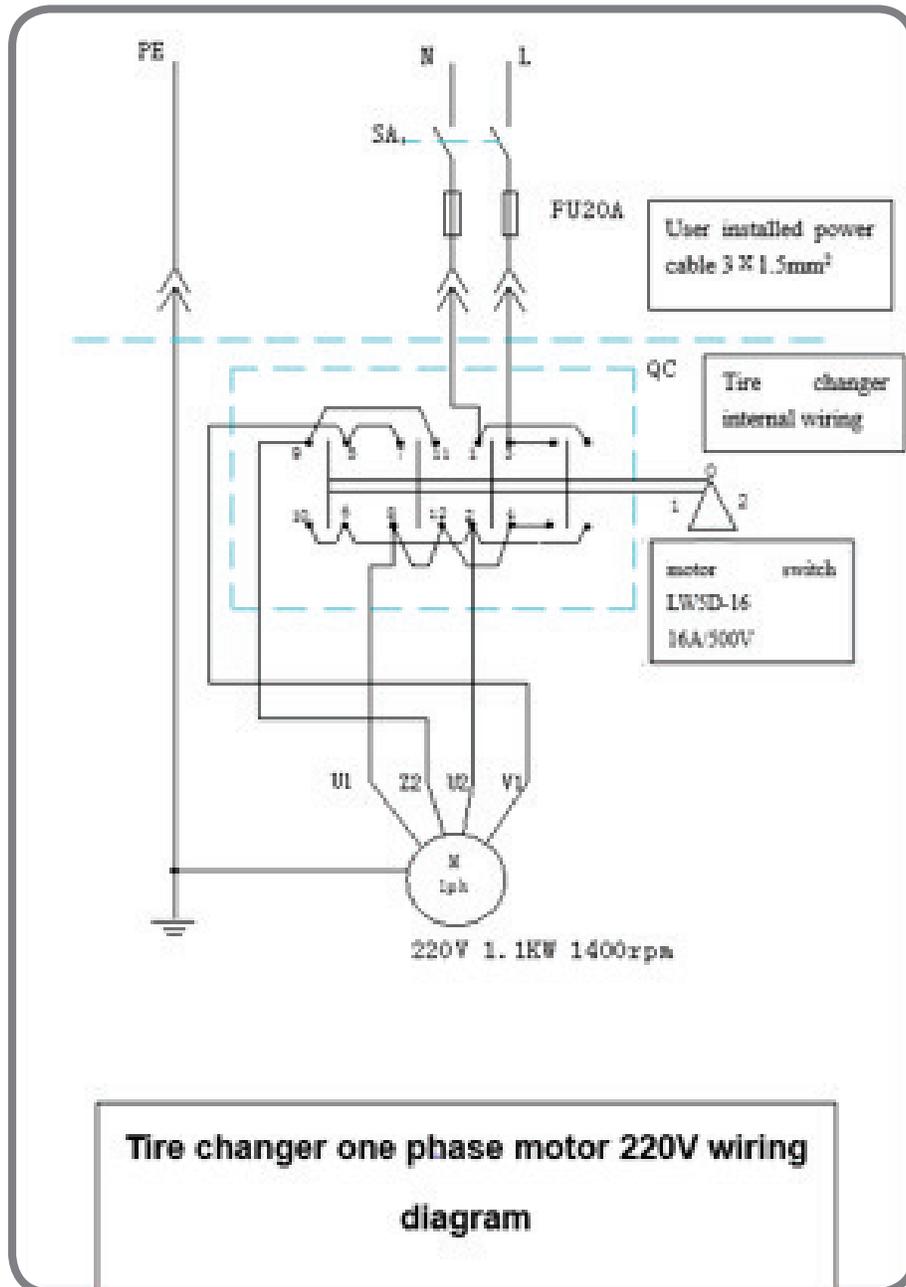
Bead insertion. Operation which takes place during inflation and ensures perfect centring between the bead and the rim edge.

Bead pressing tool. A tool intended for use when mounting the top bead. It is positioned so that it engages the shoulder of the rim and maintains the upper tyre bead inside the well. It is generally used for mounting low profile tyres.

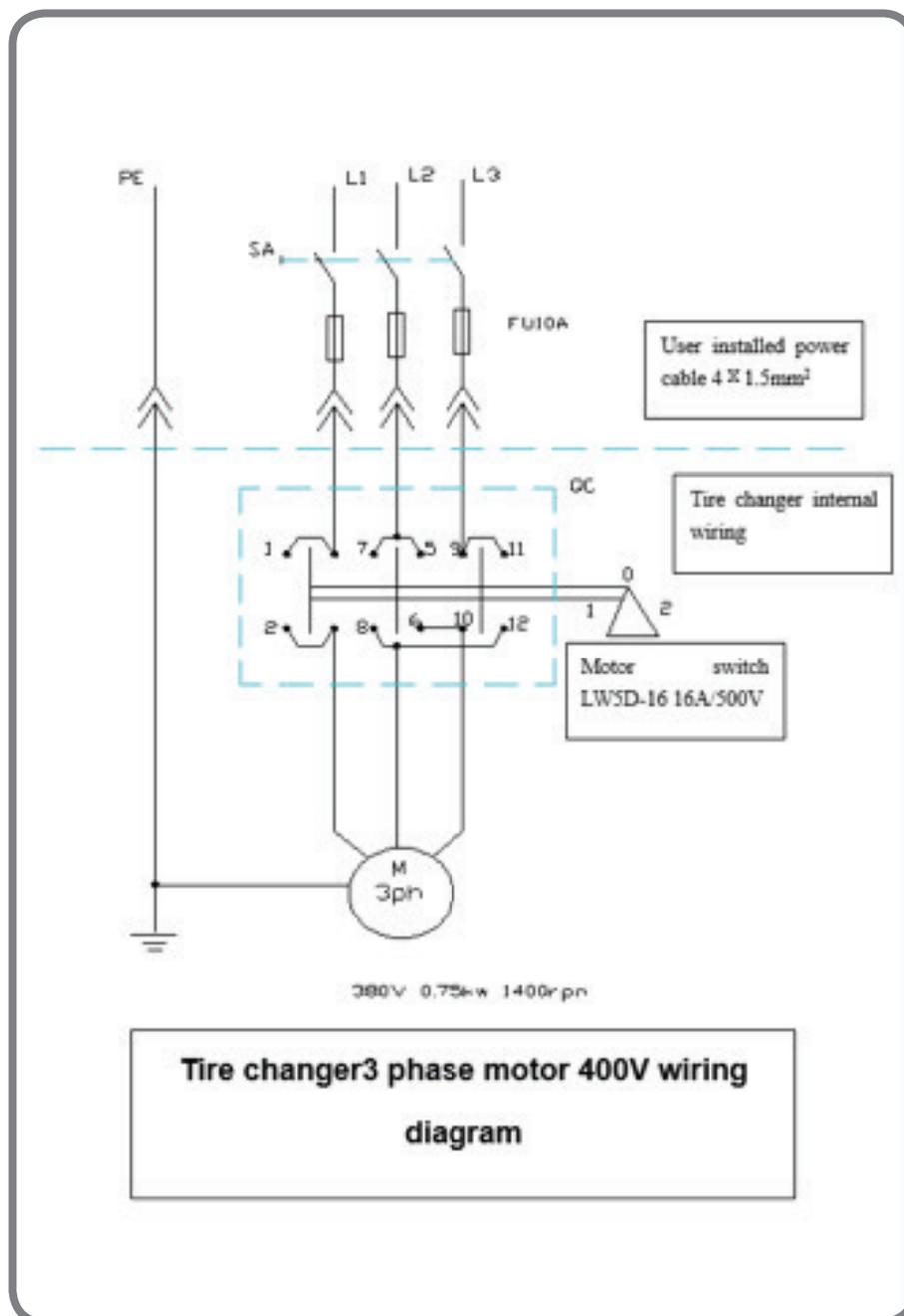
Discharge regulator. Union allowing regulation of the air flow.

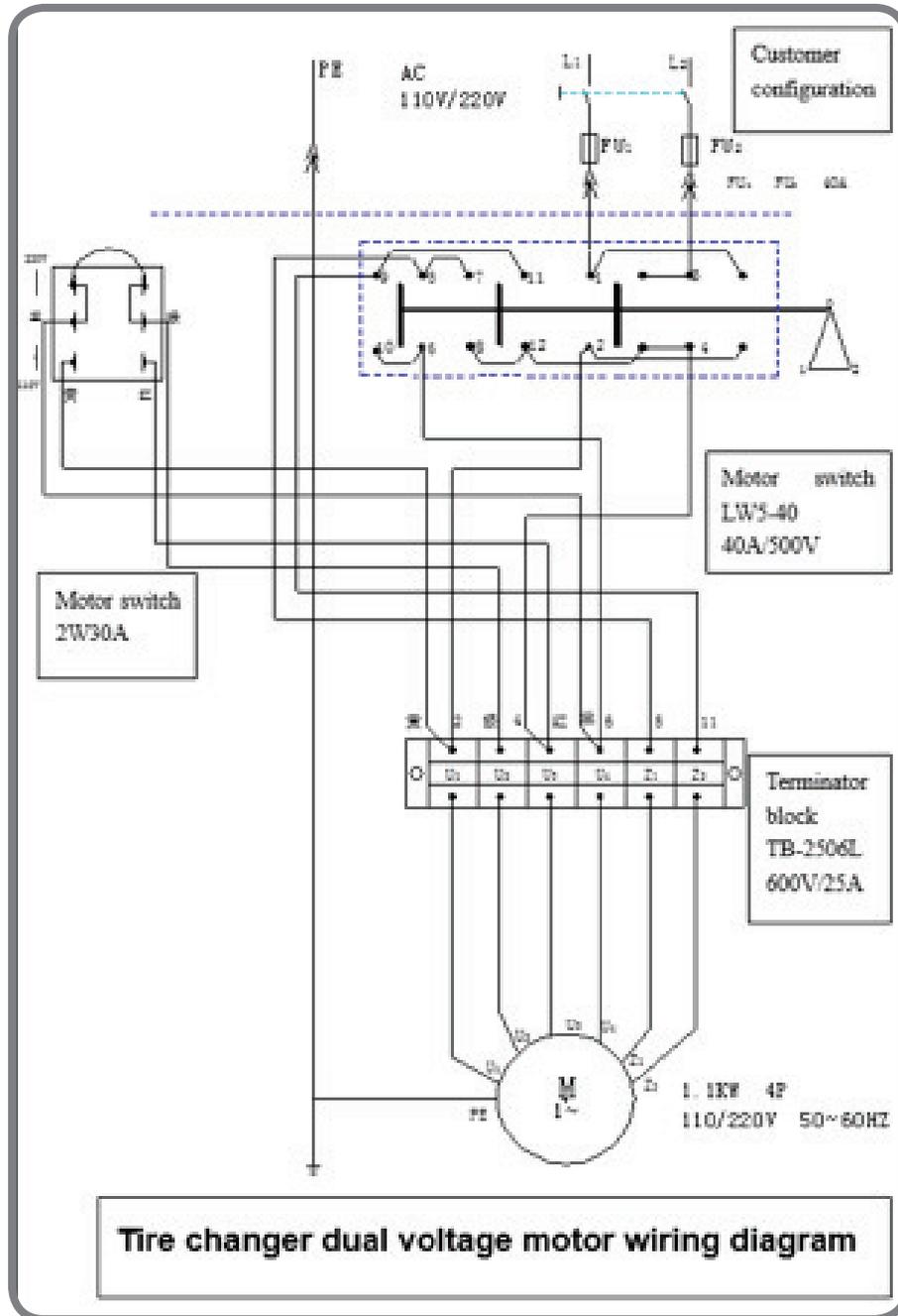
Bead breaking. Operation used to detach the bead from the rim edge.

18. GENERAL WIRING DIAGRAM



UK





Tire changer dual voltage motor wiring diagram



19. PNEUMATIC SYSTEM DIAGRAM

