BROBO GROUP©

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Certified System
Quality
ISO 9001

PRODUCT & MAINTENANCE MANUAL

MANUAL MITER SAW

MODEL No. TNF110

YOUR BROBO DISTRIBUTOR IS:

OPERATING MANUAL FOR BROBO GROUP MANUAL MITER SAW

TECHNICAL SPECIFICATION

CHAPTER 1 - Installation of the Machine

1.1. Unpacking & Handling the Machine

WARNING – HEAD HEAVY MACHINES

The metal sawing machines are heaviest where the saw heads are fitted & as such, care must be taken while relocating or moving the machines.

Upon receiving the ***Brobo Group TNF110 Manual Miter Saw,*** the machine should be standing upright & positioned centrally on top of a wooden pallet. While the machine is situated on the pallet, position the forklift arms under the pallet between the runners, keeping in mind that the machine is **head heavy**. Move the entire unit to an accessible area as close as possible to the final location.

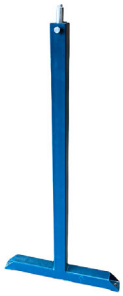
Carefully remove the wooden frame surrounding the saw unit. (Once completed, proceed by elevating the machine away from the pallet base using a sling harness wrapped around the cutting head of the saw. Ensure that the floor is as level as possible before finally positioning the machine to the desired location.

1.2. Parts Checklist

Along with the saw unit, check that the following accessories, packed "loose", are included as follows:

STANDARD ACCESSORIES

1. Saw Blade x1
2. TNF Conveyor x1
3. TNF Conveyor with Length Stop x1
4. TNF Stand x2
5. Mounting Brackets x2



1.3. Minimum Requirements

For the machine to function correctly, the room in which the saw unit is to be installed must be in the vicinity of, & satisfy the following conditions:

- *240/415V Power Supply*
- *Working Pressure - Not less than 600kPa (6 Bar) & no greater than 900kPa (9 Bar)*
- *Ambient Temperature - From -10°C to +50°C.*
- *Relative Humidity: Not more than 90%.*
- *Lighting: More than 500 LUX.*

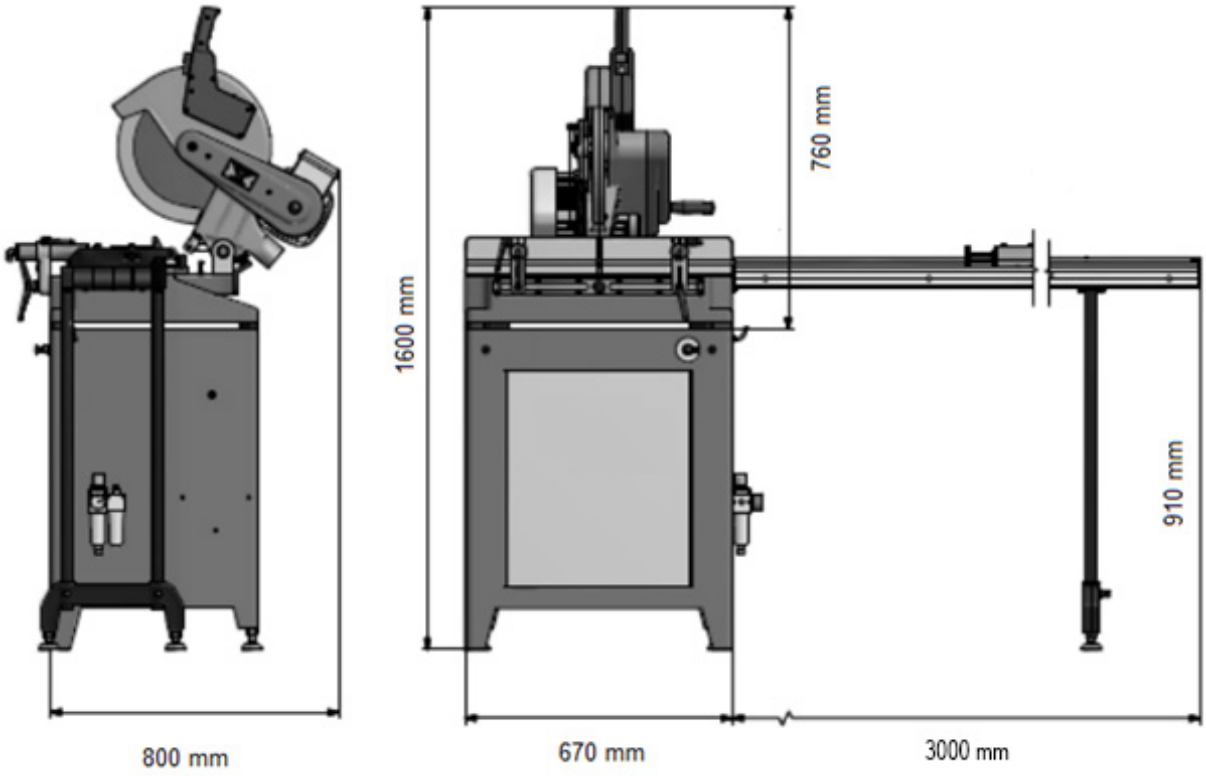
WARNING – OPERATING VOLTAGE VARIATION

Each saw model has an inbuilt safety system to protect it against voltage variations. However, for the machine to perform efficiently, ensure that the saw unit operates within ±10% limits of the recommended voltage of the motor.

1.4. Working Area Requirement

Ensure safe work area away from clutter, combustible materials, sufficient lighting. The saw to be secured on firm weight bearing surface. Floor to be level and with non-slip properties.

Allow minimum **600mm** around the machine for safe access to the plant for operation, cleaning, maintenance, inspection and emergency evacuation.



1.5. Connection to Power Source

Before connecting the machine to the power supply, check that the socket is not connected in series with other machines. This condition is critical for the ideal operation of the saw unit.

Single & Three Phase

a) **Single phase machines** are provided with three pins, **15 amps** rated plugs & leads for connection to **240V**, **50Hz** power supply in **Australia**.

Active = Brown
Neutral = Light Blue
Earth = Green/Yellow

VOLTAGE
240V/1 PH

MAIN VOLTAGE
240V

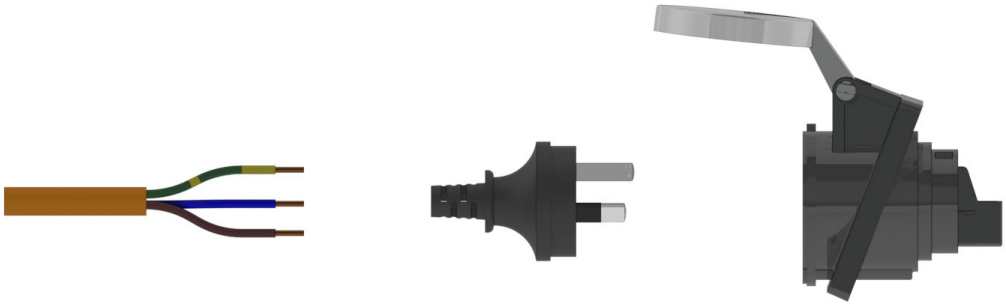


Figure 3.1 Connection 3 pins – 1 Phase

b) **Three phase machines**

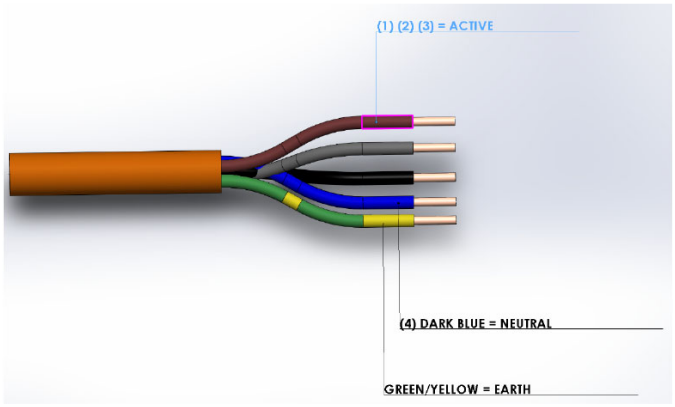


Figure 3.2 Connection for "5-CORE" Wire System with Neutral – 3 Phase

c) Check the power supplied & motor specifications before plugging in the machine. Check the terminal connection on dual voltage motor terminal box & connect it accordingly to the corresponding voltage supply.

d) If the dual motor is requested, the motor is **always** connected to the higher voltage, unless otherwise specified prior to the order being placed.

To connect the machine to the power supply, proceed as follows:

1) Insert the power plug into the socket, while ensuring that the **mains voltage is compatible** for which the saw unit is operating at.

2) Switch the saw on

3) Make sure that the saw is NOT currently in an emergency condition, whereby the EMERGENCY STOP button is depressed. If so, twist the red mushroom button until it is released & returned to the neutral state.

4) Ensure that all electrical leads & cables (including supply leads) are maintained in a good condition & away from sharp objects. All leads should be replaced if cut, sliced or damaged in any way.

CHAPTER 2 - Safety & Accident Prevention

The ***Brobo Group*** ***TNF110 Manual Miter Saw*** has been designed & manufactured in accordance with **Australian Standards**. It is ***HIGHLY RECOMMENDED*** that the instructions & warnings contained in this chapter be carefully followed for correct usage of the machine.

2.1. Operation of the Machine

The ***Brobo Group*** ***TNF110 Manual Miter Saw*** is specifically designed to cut non-ferrous metal cross sections with solid or thin-walled profiles. Other types of material & machining are not compatible for use with the specifications of the saw. ***This machine involves a high-speed blade rotation; therefore extreme caution is required when operating the device.***

The employer is responsible for instructing the personnel who, in turn, are obliged to inform the operator of any accident risks, safety devices, noise emission & accident prevention regulations provided for by national & international laws governing the use of the machine. ***The operator must be fully aware of the position & functions of all the machine's controls.***

All those concerned must strictly adhere to ALL instructions, warnings & accident prevention standards in this manual.

The following definitions are those provided for by the ***EEC DIRECTIVE ON MACHINERY No. 98/37/CE***:

- **Danger Zone -** any zone in and/or around a machine in which the presence of a person constitutes a risk to the safety & health of that person.
- **Person Exposed** - any person finding him or herself, either completely or partly in a danger zone.
- **Operator** - the person or persons are given the responsibility of installing, operating, adjusting, maintaining, cleaning, repairing, & transporting the machine.

WARNING – UNAUTHORISED MODIFICATIONS/REPLACEMENTS/USE

The manufacturer declines any responsibility whatsoever, either civil of criminal, in the case of unauthorised interference or replacement of one or more parts or assemblies on the machine, or if accessories, tools & consumable materials used are different from those recommended by the manufacturer, or if the machine is inserted in a plant system & its proper function is altered.

2.1.1. Noise Level

The noise level of an idling saw has been measured to be ***below 85 dBA***. This complies with the ***Australian Occupational Health & Safety (Noise) Regulations 1992.***

Please note that peak impulse noise levels will be experienced due to variables including blade characteristics, type, & condition. This will also vary accordingly depending on the size & type of sample being cut. Under these circumstances, management should make available to the operator(s) the appropriate hearing protection equipment as prescribed under the above-stated act.

ALLUMINIUM	IN VACUM	
	Medium value of the sonorous level measured	Lmp= 75,1 dB (A)
	Value of the sonorous level in the working position measured	Lmp= 81,3 dB (A)
	Factor of environmental correction	K= 1 dB (A)
	Medium value of the correct sonorous level	Lpc= 74,1 dB (A)
	Value of sonorous level in the correct working position	Lpc= 80,3 dB (A)
	LOADED	
	Medium value of the sonorous level measured	Lmp= 86,3 dB (A)
	Value of the sonorous level in the working position measured	Lmp= 91,1 dB (A)
	Factor of environmental correction	K= 1 dB (A)
	Medium value of the correct sonorous level	Lpc= 85,3 dB (A)
	Value of sonorous level in the correct working position	Lpc= 90,1 dB (A)

2.1.2. Power Supply

The 415/240V power supply requirements for this machine are of a high level & unauthorized interference and or inadequate maintenance could result in a situation that could put the operator at risk. A ***qualified*** electrical engineer should always be assigned to maintain & repair the system.
International Protection Rating code (Ingress Protection): **IP54**

First Digit: Solid - Level 5: *Protected from limited dust ingress.*
Second Digit: Liquid – Level 4: *Protected from water spray from any direction.*

2.1.3. Compressed Air Supply

Various functions of the saw are carried out via the use of 6 bar compressed air. During these operations, situations would arise where machine parts & materials are clamped together & would potentially pose a serious safety issue to an inexperienced operator. Operators should be thoroughly instructed about these hazards.
Only a qualified electrician should carry out regular maintenance of this system.

2.2. General Requirements

Lighting
Insufficient lighting during the operation of the saw unit would constitute a safety hazard for the people concerned. For this reason, the user of the machine must provide adequate lighting in the working area to eliminate areas of shadow, whilst also preventing dazzling illumination sources
(Reference standard ***ISO 8995 - 2002 'Lighting of Indoor Workplaces'***).

Connection
Check that the power supply cables, compressed air supply (if applicable) & coolant system complies with, & are operating within the acceptable range of the saw capabilities.
Faulty, damaged or worn components must be replaced immediately.

Earthing Systems
The installation of the earthing system must comply with the requirements stated in the:
IEC Standards Part 195: Earthing & Protection Against Electric Shocks 1998.

2.3. Advice for the Operator

Protective eyewear or goggles must be worn at all times while attending & operating the metal saw.

Do not attempt to operate the machine unless all safety guards are in operation.
The guard must fully cover the blade when the head is in the uppermost position.

Ensure that ***hands & arms are kept clear of the cutting zone*** when the machine is operating.

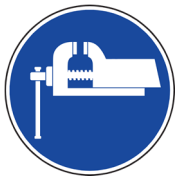
Do not wear loose clothing with long sleeves & oversized gloves, bracelets, necklaces or any other loose object that may become entangled in the machine's blade during cutting. Long hair must be tied back or placed in a hair net.

Always disconnect the power supply to the machine before carrying out any maintenance work or adjustments. This includes cases of abnormal operations of the machine.

Any maintenance work performed on the hydraulic, pneumatic or coolant systems must be carried out only after the pressure in the system has been released.

The operator ***MUST NOT*** conduct any risky operations or those not required for the cutting in course (e.g. remove swarf shavings from the machine while cutting).
Never move the saw while the machine is operating.

Always keep the workplace are as clean as possible.
Remove equipment, tools or any other objects from the cutting zone.



Support the workpiece on both sides of the machine to prevent it falling or jamming during the cutting cycle.

Ensure that the specimen being cut is secured firmly in the vice clamps & the machine has been correctly set. *Figure A* show some examples of how to correctly clamp different specimen profiles. Before commencing the cut, be sure the vice(s) is securely clamped & the machine set-up is correct.

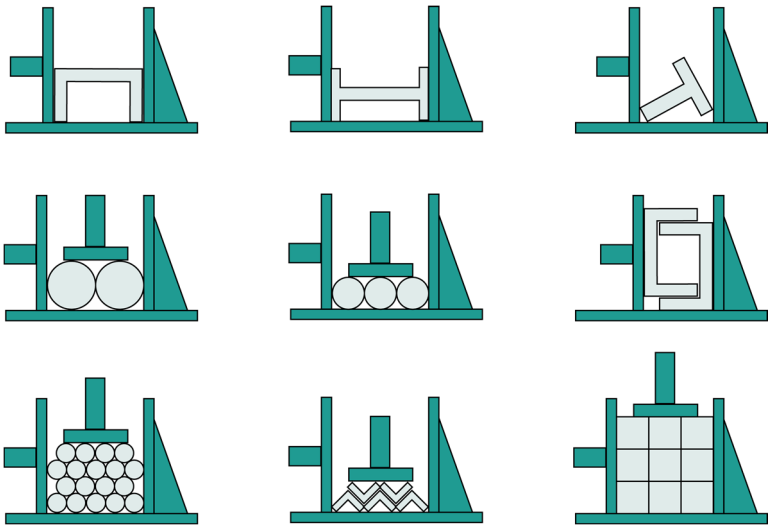
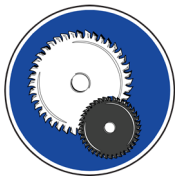
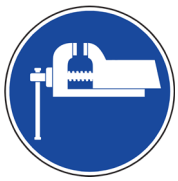


Figure A. *Correct Clamping of Cutting Specimens*



Do not use cutting blades of different sizes to those recommended to the machine's specifications. Always follow safe practices & inspection procedures when installing blades.



When cutting very small specimens, ***ensure that the workpiece is not dragged behind the back fence support***, where it could get lodged behind the blade.

If the blade jams during a cut, activate the emergency stop function immediately. Do not continue forcing the blade through. This could damage the blade, the specimen or be a cause for potential injury to the operator.

Always turn off the machine before carrying out any repair work. Consult the Brobo Group Engineering Department in the country in which the machine was initially purchased.

2.4. Machine Safety Devices

This product & maintenance manual is not purely intended as a guide for the usage, operation & maintenance of the saw unit in a strict production environment; it is instead an instrument to providing information on how to use the machine correctly & safely. The following standards listed in section *2.4.1*, which are applicable to the ***Brobo Group TNF110 Manual Miter Saw***, are those specified by the EEC Committee that governs the safety of machinery, health & safety at work, personal protection & safeguarding of the work environment. In addition, the saw also complies with the Australian Standards regarding the safeguarding & general requirements for electrical equipment.

2.4.1. Reference Standards

MACHINE SAFETY

- *EEC Directive No. 98/37/CE - Machines Directive*
- *EEC Directive No. 91/368 - 94/68 - Amends sections of EEC Directive No. 98/37/CE relating to machine safety*
- *EEC Directive No. 73/23 - Low Voltage Directive*
- *AS4024.1 - 1996 - Safeguarding of Machinery*

HEALTH & SAFETY AT WORK

- *AS3100 - 2002 - General Requirements for Electrical Equipment*
- *OH. & S. 1995.81/1995 - Compliance References*
- *EEC Directive No. 80/1107; 83/477; 86/188; 88/188; 88/642 - Protection of workers against risks caused by exposure to physical, chemical & biological agents in the workplace*
- *EEC Directive No. 73/23 & Special EEC Directives No. 89/654; 89/655 - Improvements in health & safety at work*

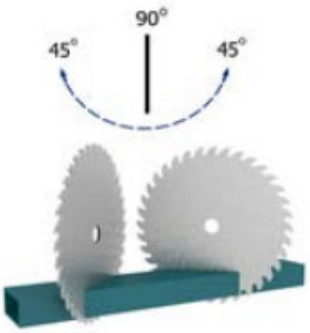
CHAPTER 3 - Main Functions & Operation of the Machine

3.1. Standard Features

- Designed for straight and angle cutting of Aluminum and PVC profiles.
- Location points at 45°-35°-22.5°-10°-0° both left and right
- Aluminum construction of the body and machine stand made of steel sheet

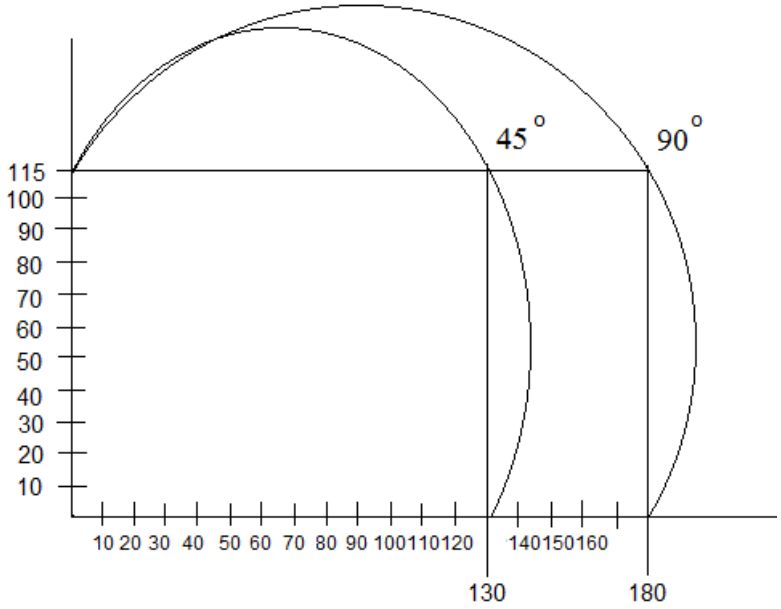
3.2. Technical Specification

Voltage	: 380 V
Frequency	: 50/60 Hz
Motor power	: 1.5 KW
Air pressure	: 6 Bar
Air consumption	: 8 lt. /min.
Saw blade external Ø diameter	: 400 mm
Saw blade internal Ø diameter	: 32 mm
Saw blade thickness	: 4 mm
Saw blade RPM	: 3000
Maximum tube cutting at 45°	: 120 mm
Maximum tube cutting at 90°	: 150 mm
Cutting angle range	: 45° - 90° - 45°
Width	: 800 mm
Length	: 670 mm
Height	: 1600 mm
Weight	: 90 kg



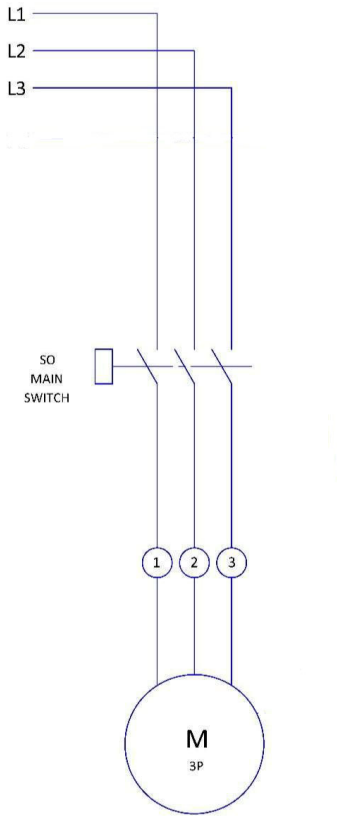
1.5 kW~3 400V 50/60Hz	3000 D/dak. RPM	D:400 d: 30/32 mm.	7 Lt/dak. Lt./min.	6-8 Bar	67x80x160 cm	90 kg

3.3. Cutting Range



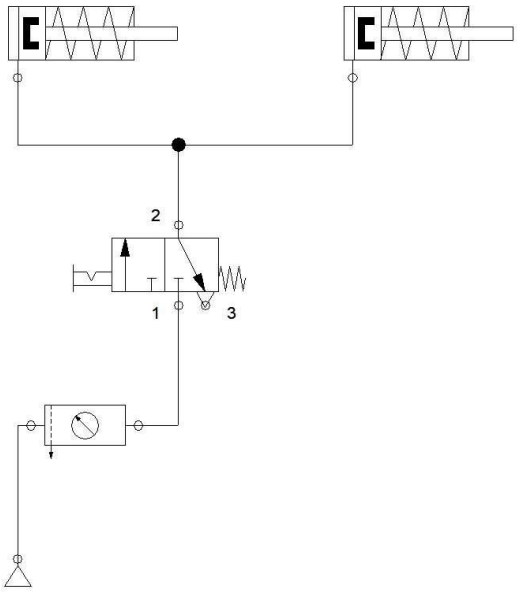
CHAPTER 4 - Drawings, Layouts, Assembly & Spare Parts

4.1. Electrical Diagram

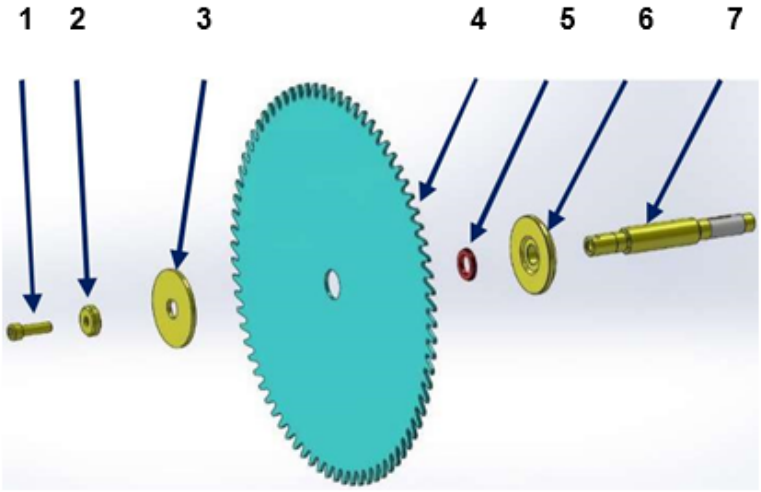


1.5 kW THREE-PHASE MOTOR

4.2. Pneumatic Diagram



4.3. Saw Blade Assembly



Part No	Part Name	QTY
1	Inbus M10x35	1
2	Washer 30x8x7	1
3	Saw Flange	1
4	Saw	1
5	Saw Washer	1
6	Coupling	1
7	Rotor Shaft	1

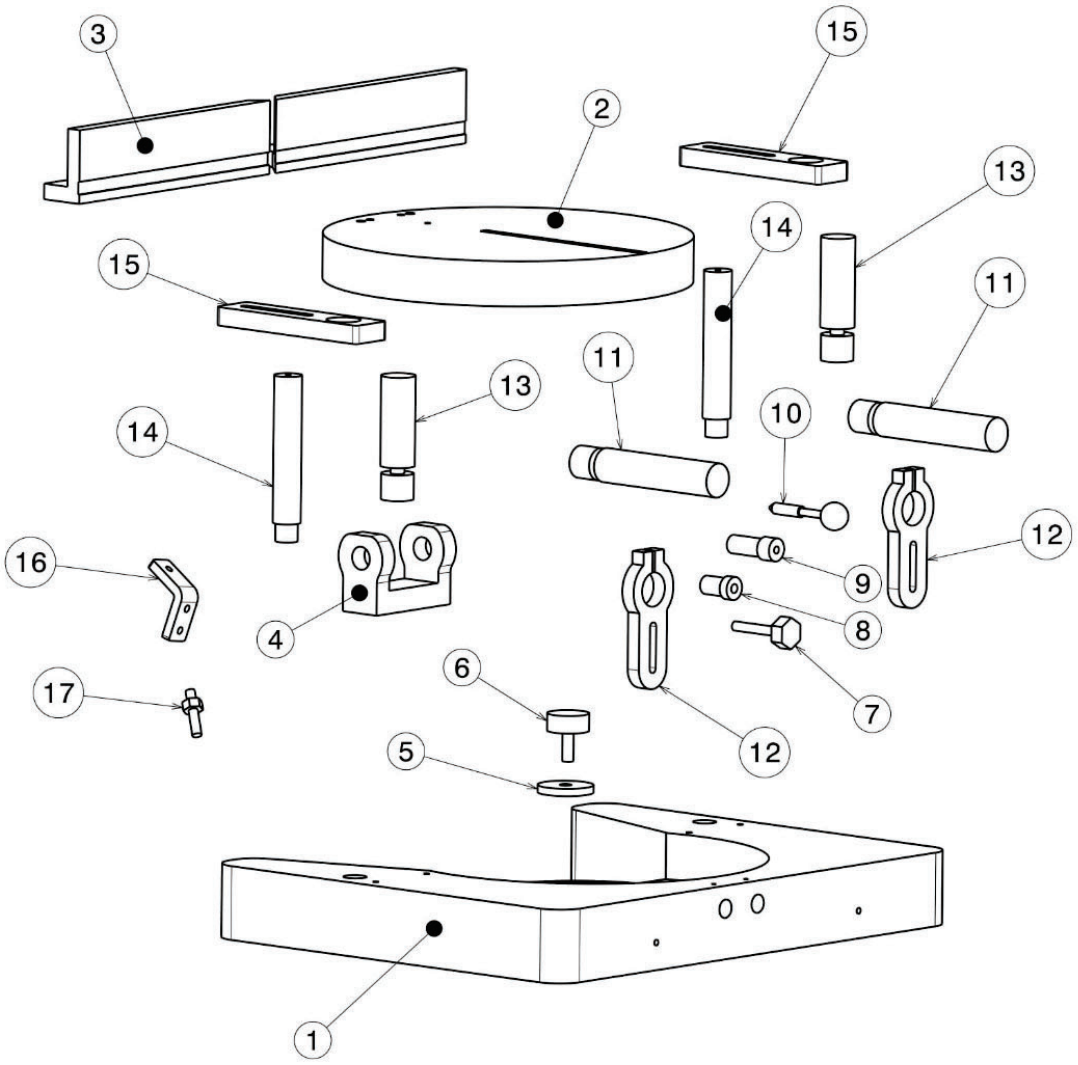
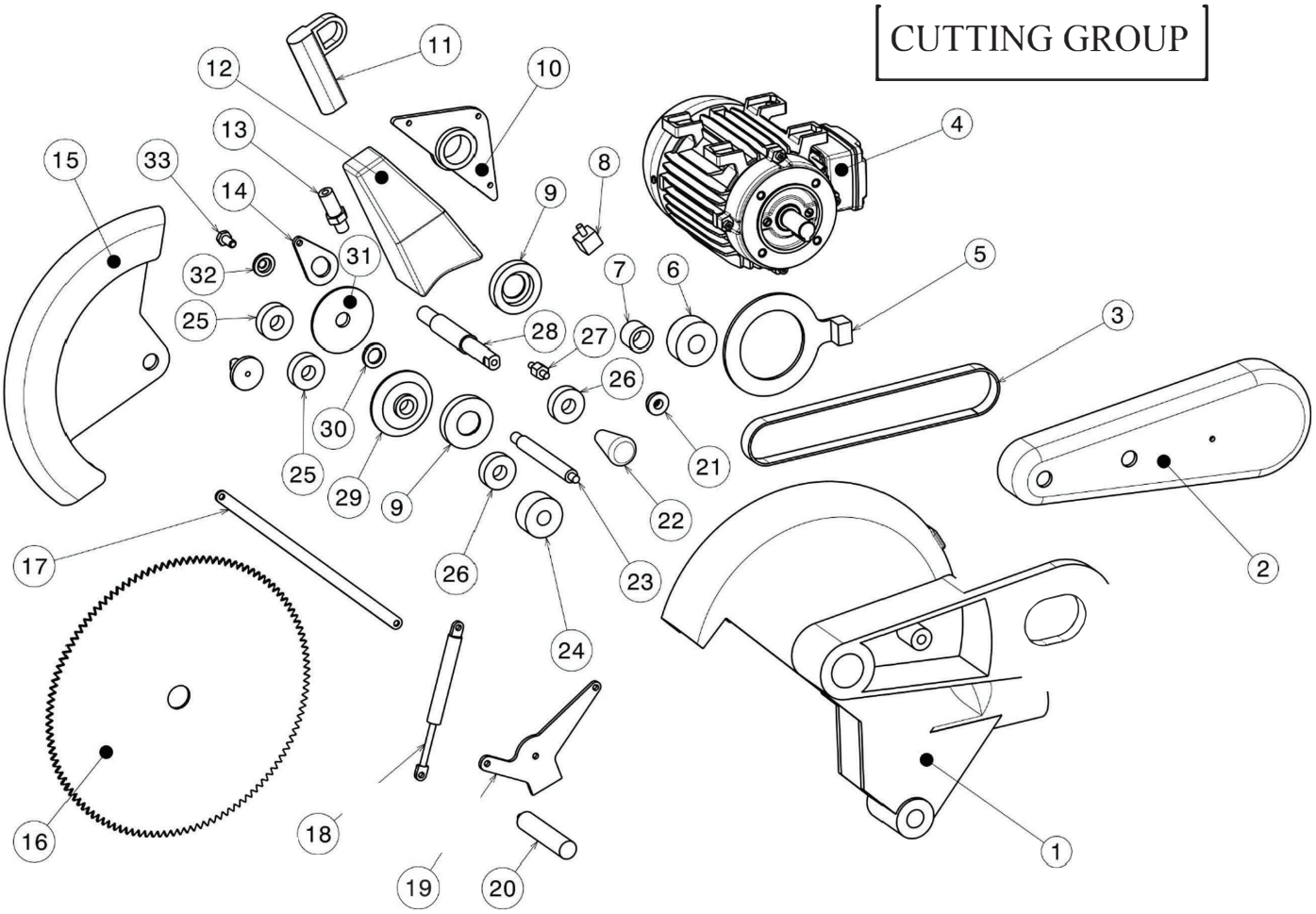


TABLE GROUP

NO	PART NAME	PC	ORDER
1	TABLE	1	
2	TURNTABLE	1	
3	MITER	1	
4	JOINT ALUMINIUM	1	
5	PLATE / TABLE WASHER	1	
6	CENTRING SPINDLE	1	
7	COMPRESSION SCREW	1	
8	COMPRESSION SHAFT	1	
9	ANGLE SHAFT	1	
10	ANGLE PIN	1	
11	HORIZONTAL PISTON	2	
12	CLAMP	2	
13	VERTICAL PISTON	2	
14	VERTICAL PISTON SHAFT	2	
15	UPPER CLAMP	2	
16	REAR STAND	1	
17	REAR STAND SHAFT	1	

CUTTING GROUP



NO	PART NAME	PC.	ORDER
1	MAIN HEAD	1	
2	BELT COVER	1	
3	BELT	1	
4	MOTOR	1	
5	MOTOR CONNECTION	1	
6	MOTOR PULLEY	1	
7	MOTOR SHAFT RING	1	
8	NOZZLE VALF	1	
9	BEARING COVER	2	
10	TRIANGLE CONNECTER	1	
11	TRIGGER	1	
12	TRIGGER COVER	1	
13	TRIGGER SHAFT	1	
14	MOVING ARM HOLDER	1	
15	SAFETY COVER	1	
16	SAW BLADE	1	
17	MOVING ARM	1	
18	GAS DAMPER	1	
19	GAS DAMPER ARM	1	
20	JOINT SHAFT	1	
21	MOTOR PULEY WASHER	2	
22	PLASTIC HANDLE	1	
23	PLASTIC HANDLE SHAFT	1	
24	SAW BLADE PULLEY	1	
25	TRIANGLE CONNECTER BEARING (6203)	2	
26	SAW BLADE BEARING (6204)	2	
27	GAS DAMPER CONNECTER	1	
28	SAW BLADE SHAFT	1	
29	REAR FLANSH	1	
30	SAW BLADE WASHER	1	
31	FRONT FLANSH	1	
32	FRONT FLANSH WASHER	1	
33	SAW BLADE LEFT M10 SCREW	1	

CHAPTER 5 – Maintenance & Selection of Consumables

1.1. Role of the Operator

The person operating & maintaining the ***Brobo Group TNF110*** must familiarise themselves with these instructions for their own safety & that of the others, in addition to safeguarding the production of the machine. Responsibility must be taken by the user on the general maintenance & up keeping of the unit as specified in this chapter, with particular emphasis on:

- Check to ensure that other operators of the machine always aware of and comply with the relevant safety instructions & standards as specified in *Chapter 2 - Safety & Accident Prevention*. Therefore, check that the safety devices are operational & work perfectly and that personal safety requirement is complied with.

- Ensure that the working cycle is efficient & guarantees maximum productivity, inspect the:
    - Functions of the main components of the machine
    - The sharpness of the blade & coolant flow
    - Correct working parameters for the type of material being cut

- Verify that the quality of the cut meets the requirements & the final product is free from any machining defects.

1.2. Maintenance Requirements

- All maintenance must be carried out with the power switched off & the machine in emergency stop condition.

- To guarantee for optimum operation, all spare parts must be Brobo Group originals.

- On completion of maintenance works, ensure that the replaced parts or any tools used have been removed from the machines before starting it up.

- Any behavior not in accordance with the instructions for using the machine specified in this manual may create hazards and/or safety risks for the operator.

- Therefore, read & follow all the instructions for use & maintenance of the machine, and those on the product itself.

1.3. General Maintenance of Functioning Components

The general maintenance operations that should be carried out regularly are as follows:

1) Keep the vice clamps, overall machine & path of the cutting blade free of any offcuts, accumulated swarf & coolant using compressed air or preferably thread-free cloth.

2) Change oil lubricant as required, or whenever the coolant starts to get dirty or emits a stale odour. The oil lubricant compensation tank should be checked regularly.

3) Recommended Brobolube Aluminium Cutting Oil, Part No:-
    - **9601480** Brobo Fluid – Aluminium Cutting Oil (2 Litres)
    - **9601481** Brobo Fluid – Aluminium Cutting Oil (20 Litres)

4) Lubricate the rotary table regularly (after every 40 hours of operation, or weekly) with an NLGI 2 extreme pressure grease, Shell Alvania No.1 grease or equivalent.

5) Clean the vice & lubricate any moving joints or sliding surfaces with good quality oil.

6) Clean the machine regularly & keep any unpainted surfaces lightly oiled to protect from rust & corrosion.

7) The air supply for the pneumatic air vices should be checked regularly such that it is free of any condensed water molecules & the filter should be drained frequently.

8) Ensure that the machine performs cuts perpendicular to the work surface.
If not, contact Brobo Group engineering department.

1.4. Brobolube Unit

When assembled, the Brobolube unit is a precise instrument that supplies an accurate quantity of lubricant directly to the saw blade before it contacts the workpiece.

Although the lubricator is capable of delivering a much higher flow rate of lubricant, it is suggested that you do not increase the flow rate excessively because:

- No significant increase in blade life or lubricating efficiency will be achieved (confirmed by test results).
- Excessive application of Brobolube will only result in a waste of fluid.
- The excessive application will produce swarf that will be wet (oily) & harder to clean up than dry swarf produced from the correct supply of Brobolube.

1.4.1. Lubricating Oil Precautions - Health Hazard Information

The Brobolube lubricating fluid has no known adverse health effects. "Brobolube" is non-toxic, odourless, non-flammable below approximately 350ºC, & non-corrosive, although it may affect some types of rubber. There are no traces of sulphur, chlorine, phenol or nitrates found in Brobolube. When comes into contact with skin, the oil may be removed by wiping away the excess, then washing the contaminated area with detergent & water. If the oil is utilized at high temperatures, appropriate protective apparel should be worn as the oil could cause burns to skin or eyes. If splashed by hot oil, immediately run cold water over the burn area & apply first aid burn treatment.

If the Brobolube delivery line breaks or becomes disconnected during operation, ensure that the air supply to the system is disconnected before repairing the problem.

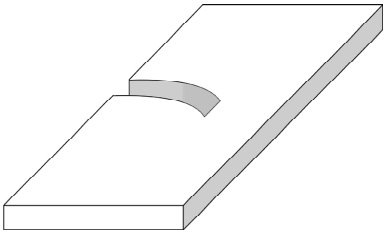
It is recommended that footwear with anti-slip soles be worn at all times. Any spills will result in potentially hazardous slippery surfaces & should be dealt with promptly to prevent physical injury resulting from falls. Do not use coarsely, combustible material like sawdust to soak up oil due to the potential risk of spontaneous combustion. Spilled oil should be transferred into non-porous containers of suitable strength. Any remaining oil should be cleaned up with sand or other non-combustible, absorbent material. Place the sand and oil mixture into containers & disposed of by an EPA approved landfill or alternatively, by a suitable non-polluting method.

In addition, rags soaked in oil should not be burned. **Do not pour oil down the drain**, which would ultimately contaminate the water supply & pollute the environment.

For firefighting purposes, either use CO2, dry chemical or foam retardant to extinguish the flames. 

CHAPTER 6 - Troubleshoot

2.1. Troubleshooting For Blade & Cutting Problems

PROBLEM IDENTIFIED	DIAGNOSIS	SOLUTIONS
Cuts produced are not at 90° and/or are not perpendicular 	Head speed too low or too high	Reduce or increase head speed respectively.
	Blade with worn teeth	Replace with a new blade.
	Blade not perpendicular to the work surface	Adjust the blade using the appropriate screws such that it is perpendicular to the work surface.
Frequent and/or excessive teeth breaking 	Broken teeth	Check the hardness of the material being cut corresponds to the capabilities of the blade.
	Incorrect lubricant/coolant fluid	Check the water & oil mixture; check that the holes and/or hose are not blocked; direct the nozzles correctly;
	Material too hard	Check the cutting speed, feed speed, blade type & parameters are correct for the particular application.
	Blade not worn incorrectly	With a new blade, it is necessary to start cutting at *half feeding speed*. After a normalizing period (cutting surface about 300cm^2 for hard materials & 1000cm^2 for softer materials), both cutting & feed speeds can be brought up to normal values.
	Blade with incorrect and/or excessive fine tooth pitch	As excessive pressure is exerted on the incorrect teeth profile, replace the blade with correct tooth pitch dimensions & profile.

	Workpiece not clamped firmly in place	Any movement of the workpiece during the cutting process can cause broken teeth; check the vice clamps, clamping jaws & clamping pressure is satisfactory.
	Excessive vibrations	Specimen vibrates in the vice; check that the vice clamps are position correctly & the clamping pressure is adequate.
Rapid teeth wear		
	Head speed too slow or too high	The blade/slide runs over the material without cutting it; increase or decrease head speed respectively.
	Cutting pressure to high	Reduce cutting pressure
	Insufficient coolant	Check the coolant level & clean piping & nozzles
	The non-homogenous material being cut	The material present may not be homogenous either on the surface, such as oxides or sand present or in sections, such as under-cooled inclusions. The variances in grain development cause the premature wearing of teeth & consequently, break as the result. Homogenise or clean these materials.
Broken blade		
	Head speed to high	Reduce head speed
	Teeth in contact with the material before commencing the cut	Always check the position of the blade before starting an initiating a new cut or job
	Insufficient coolant	Check the coolant level & clean piping & nozzles
	Excessive vibrations	Specimen vibrates in the vice; check that the vice clamps are position correctly & the clamping pressures are adequate