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Quality  
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## **PRODUCT AND MAINTENANCE MANUAL**

### **MANUAL NON-FERROUS CUTTING SAW**

MODEL No. TNF 115 (SERIES 2)



**YOUR BROBO DISTRIBUTOR IS:**

- 
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# **OPERATING MANUAL FOR BROBO GROUP MANUAL NON-FERROUS CUTTING SAW TNF115**

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# TECHNICAL SPECIFICATION

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## STANDARD FEATURES

- Mitering 45° left, straight 90° & 45° right with rapid adjustment bumpers
- 45° Compound Mitering
- Automatic Lubrication
- Vertical & horizontal pneumatic clamping
- 400mm TCT blade
- Two feed roller conveyors (3m long each).
- 3m Adjustable length stop
- Trigger Switch (DMT) to activate the machine

## BLADE SIZES

Blade Type:	TCT	Tungsten Carbide-Tipped
Blade RPM:	r	3190 rpm
Blade RPM Max		4800 rpm
Blade Diameter	D	400 mm
Bore	d	30 mm
Tooth Width	S	3.6mm
Body Thickness	s	2.8mm
Tooth Geometry:	TFZ N	Triple chip tooth alternating with flat tooth with negative hook angle
Number of Teeth	z	120

## CHARACTERISTICS:

Cutting of aluminium profiles & mouldings, plastic boards, brass  
Suitable for angle cutting & cross cutting

## MOTOR

Power:	1.5 kW	
Rpm	2800 rpm	
V	Single Phase, 240V	<b>TNF115-240</b>
	3 Phase, 415V	<b>TNF115-415</b>



## PNEUMATIC

Air pressure	6-8 bar
Air Consumption	2.2 l/min

## DIMENSIONAL SPECIFICATIONS

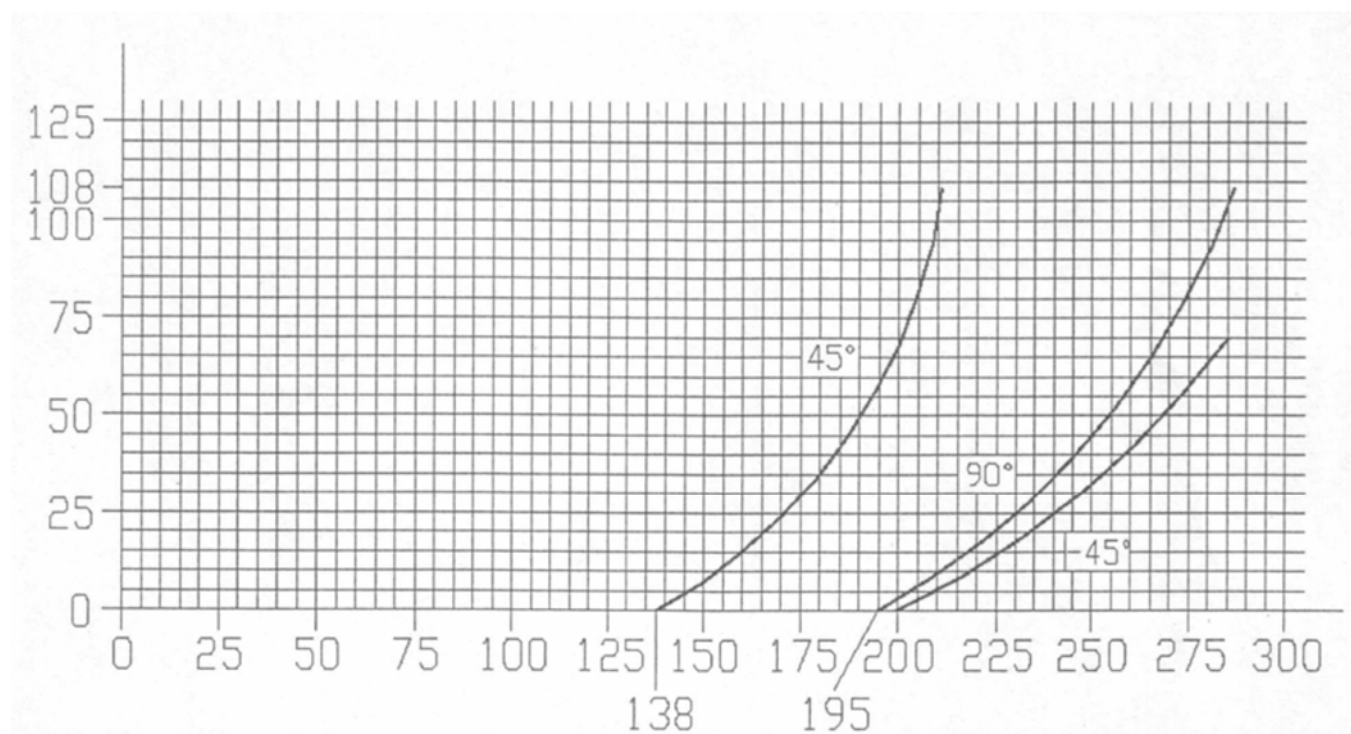
Base Dimensions	670 mm x 540 mm
Table Working Height	870 mm
Dimensions	L x W x H
Packaged	L x W x H
Roller Conveyor	




670 x 850 x 1700 mm  
1140 x 1140 x 1700 mm  
300 x 30 x 20 mm

## WEIGHT

m	167 Kg
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## CUTTING RANGE CHART



	90°	100 mm
	45°	100 mm
	90°	100 mm
	45°	100 mm
	90°	100 x 190 mm
	45°	100 x 130 mm

# CHAPTER 1 - Installation of the Machine

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## 1.1. Unpacking & Handling the Machine

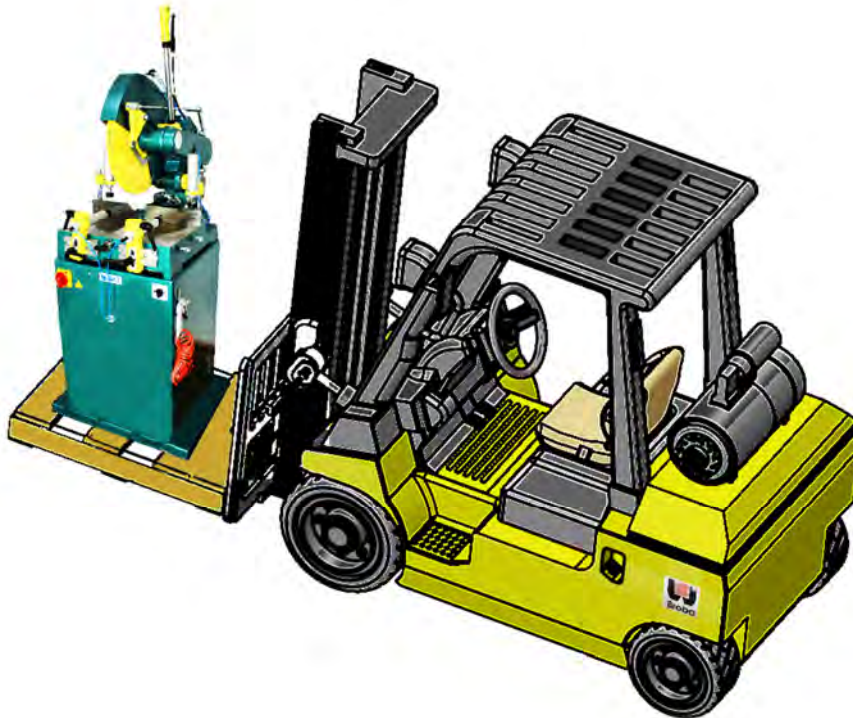


### **WARNING – HEAD HEAVY MACHINES**

*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 TNF115 Series 2**, 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 (Figure 1). 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.



**FIGURE 1.** *Handling of Cutting Saw Unit*

## 1.2. Parts Checklist

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

### A. STANDARD ACCESSORIES

- 1) 1 × Saw Blade
- 2) 1 × Operating Manual

### B. OPTIONAL ACCESSORIES

Part Number	Description
9311270	Standard Adjustable Length Stop (600mm)
9501450 9501470	' <i>Brobo-Rule</i> ' Series Manual Micro-Adjustment Length Stop <ul style="list-style-type: none"><li>▪ Available in 3.0m or 6.0m lengths</li><li>▪ Field Kit includes rail, tape, micro-stop &amp; extension arm.</li></ul>
9501210	Roller Conveyor <ul style="list-style-type: none"><li>▪ 68 Kg Steel Rollers</li><li>▪ 3000mm x 305mm</li><li>▪ 150mm pitch</li></ul>
9504320	Adjustable Stand (610mm – 1016mm)
9540330	Stand V Type Roller
9540340	Stand Flat Roller
-	Additional Blade(s) - <i>Custom to Client Requirements</i>

## 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:

- *415/240V Power Supply*
- *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  $\pm 10\%$  limits of the recommended voltage of the motor.*

## 1.4. Anchoring the Saw

Prior to anchoring the saw unit, take into considerations the requirements mentioned in *Section 1.3* & *Section 2.2*, & other aspects regarding the usage of the machine such as accessibility to cut parts & safe access for the operator. The base of the fabricated stand (if applicable), in which the saw head rests on, is anchored to the floor by 4 × M12 bolts. For added stability, it is strongly recommended that the machine stand is fastened to the floor by using loxins (not provided).

## Required Working Area

It is recommended that A & B is more than 1.5m

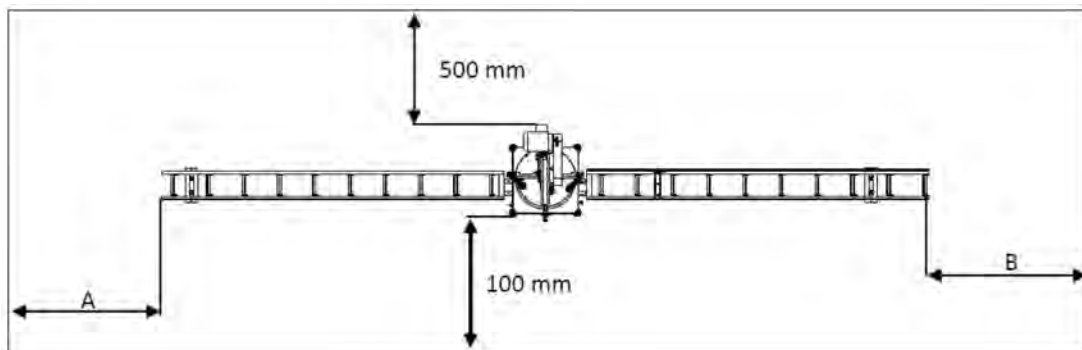


Figure 2. Saw TNF115 S2 Length Stop with Conveyor

## 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**.

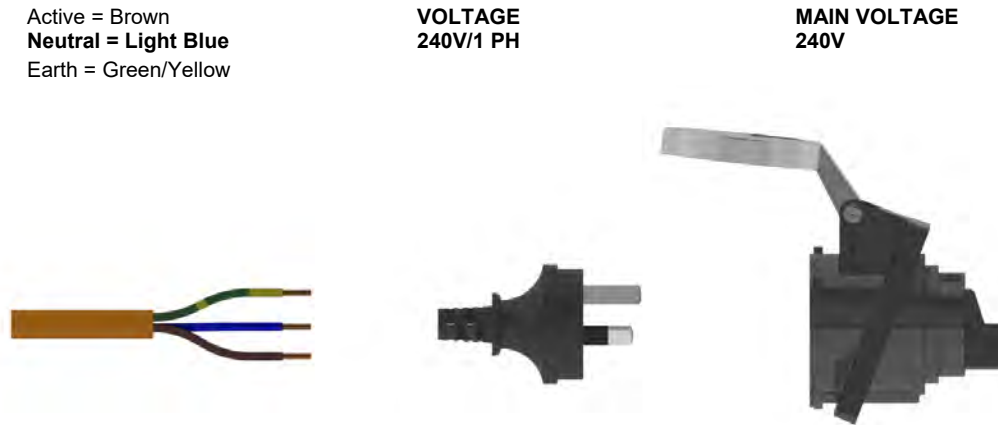


Figure 3.1 Connection 3 pins – 1 Phase

- b) **Three phase machines**

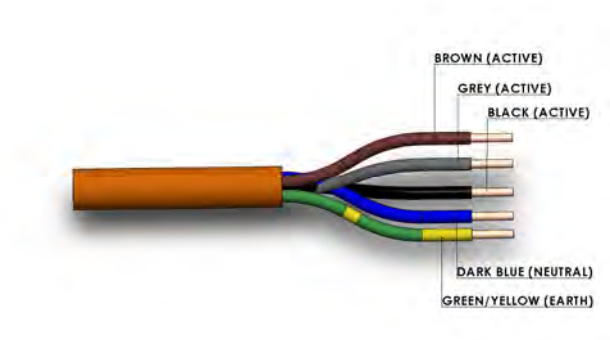


Figure 3.2 Connection for “5-CORE” Wire System with Neutral – 3 Phase

- 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.



## CHAPTER 2 - Safety & Accident Prevention

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The **Brobo Group TNF115 Series 2** 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 TNF115 Series 2** 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 for 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 or 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

The saw needs to be connected to the air supply via the regulator located at the back right hand side of the cabinet prior to operating the saw.

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 prevent 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.**

### Position of the Operator

The user controlling the machine saw operations must be positioned as shown in *figure 5* below.



**Figure 5. Correct Position for Operating Saw Unit**

### 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 as clean as possible.**

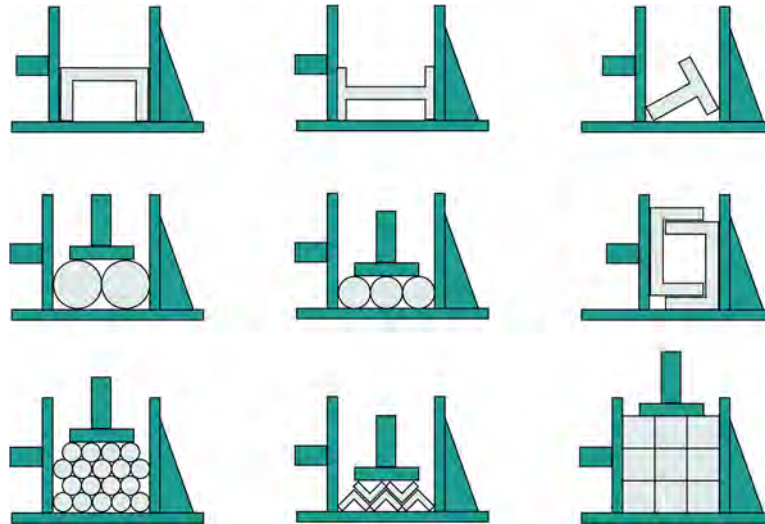
Remove equipment, tools or any other objects from the cutting zone.



**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 (Please refer to section 5.1 *Changing the Blade*).



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 TNF115 Series 2**, 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 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

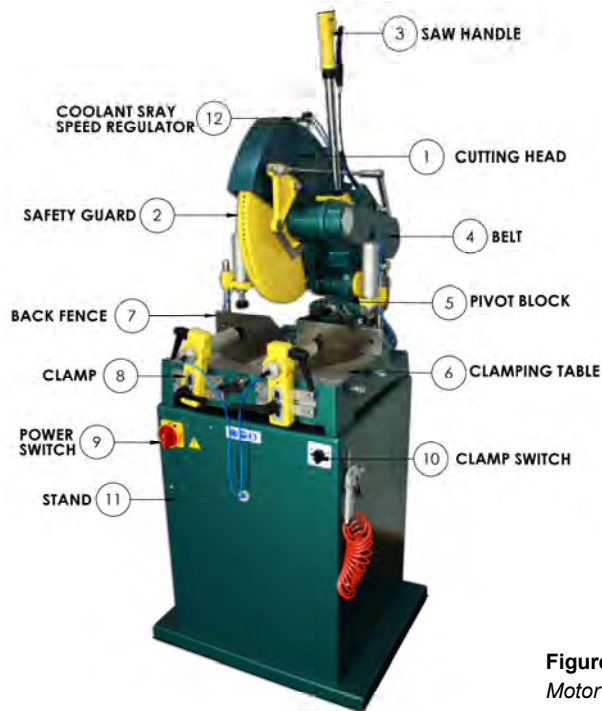


Figure 6. Main Function  
Motor Location (dark blue)

### 3.1.1. Cutting Head

As the name suggests, the cutting head is the focal area where most of the specimen cutting takes place. Thus, correct saw blade selection such as size, number of teeth & tooth pitch are all critical factors that determine the overall performance & quality of the final cuts. In addition, the use of correct saw blade provides minimum burr to the workpiece while maximising the safety to the operator during each cutting procedure.

***To adjust cutting table angles by pulling the quick release knob at middle of the clamping table***

### 3.1.2. Saw Safety Guard & Locking System

The primary purpose of the saw safety guard is to protect the user from the spinning blade. It also functions as a safety device to protect the operator from any broken tooth, swarf or high-velocity particles that might be dislodged by the cutting process.

*During the use of the machine do not remove the guard & make sure that they are in correct working order.*

The saw is held in the safety rest position by a locking system & assisted back to its rest position by a return spring



Figure 7. Saw Safety Guard & Locking System

### 3.1.3. Saw Handle (with 'Dead Man' Trigger Switch)

In the rest position (with the arm lifted) the blade is completely covered by the yellow guard which can be activated for cutting by pulling the release handle & lowering the head.



Figure 8. Saw Handle with "Dead Man" Trigger Switch

### 3.1.4. Power Switch & Clamp Switch

Power Switch turns on & off power supply.  
Turn the knob clockwise to ON position to turn on the machine



Figure 9. Power Switch  
(Currently at Off position)

Clamp Switch to activate the clammer to secure the movement of the workpiece. Turn the knob clockwise to clamp the workpiece



Figure 10. Clamp Switch

### 3.1.5. Pneumatic Vice Clamps

Pneumatic Vice Clamps use air-actuated cylinders to operate the clamping action. They are ideal for quick clamping in repetitive production operations, and yet are portable & economical to use on short run jobs with temporary fixturing.

Clamp Adjustment: Adjustment is done by first releasing the levers & then moving the cylinder holders to the left or right or moving the cylinders backwards & forwards. The cylinders & the holders themselves move independently from each other.



Figure 11. Vice Clamp



### 3.2. Preparation for Operation

The following procedure is recommended for the correct cutting using the **Brobo Group TNF115 Series 2**



#### **WARNING – SAFETY GEAR**

*Protective clothing, safety glasses and gloves should **always** be worn while loading parts, operating the machine, or undertaking any maintenance work on the saw.*

### **PROCEDURE**

Using a non-flammable & toxic free solvent, clean the machine to remove any corrosion protective coating prior to use.

- 1) Ensure that both the air & electric power systems are turned on, where applicable. The electrical power source must be available before any pneumatic functions will operate.
- 2) Place the cutting specimen you wish to cut into the vice clamps. Manually adjust the clamps so that the jaws are clamped firmly to the workpiece. With a pneumatic vice, manually adjust the clamps to a clearance of **3 - 7mm**. (For correct clamping of material, please refer to *section 2.3 Advice for the Operator*). **NOTE** - The vice clamps advance with an approximate **10mm pneumatic stroke** to apply a clamping pressure of 6 bar (87 psi).
- 3) Position the vice clamps & component as close to the blade as possible without interfering with the travel of the blade or guard. Vice relocation is required whenever the head angle is altered.
- 4) For pneumatic vices, set the vice clamping pressure from the pressure regulators located on the main control unit door. *If for any reason this pressure is not available on a continuous basis, the regulator on the air service unit must be set slightly below the available line pressure, & the safety low-pressure indicator valve needs to be reset to correspond with the newly available pressure. The need to change the pressure is necessary to allow for lighter materials with hollow cross sections to be cut without deforming the walls thicknesses.*
- 5) To initiate the cutting process
  - Vice jaws automatically close & apply clamping pressure.
  - Position blade to commence cutting through component, pulling the handle at Trigger Switch to cut & maintaining a constant forward feed cutting rate until the end of the stroke.
  - Return saw cutting head to the initial rest position.
  - Vice clamps release workpiece

**Note:** *The clamps must be close in order to active the saw blade*
- 6) The machine is ready for the next cutting cycle.



#### **WARNING - BLADE JAMMING**

*If the saw blade jams during a cut, engage the **EMERGENCY STOP** immediately. Remove the part, check that the blade is not damage and if need be, replace the blade.*

### **3.3. Operation Recommendations**

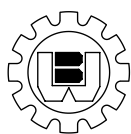
- Select the correct saw blade with the correct tooth pitch & form to suit the material to be cut to provide minimum burr & maximum blade lifespan.
- Use the smallest diameter blade & coarsest pitch that is practical within the required speed & material limitations.
- Generally, use a tooth pitch to give 2 - 4 teeth engagement with the material during cutting.
- Ensure that sufficient coolant is flowing over the cutting teeth.
- The rate of feed affects the quality of the final cut & blade life. This varies also by the material & cross-sectional dimensions.
- When manually feeding the saw head, keep in mind to maintain a steady, continuous pressure, thus **avoiding work hardening** on the cutting piece. Avoid 'forcing' the blade through the material as this might damage or break the blade.
- As a rule of thumb **the softer the component, the faster the rate of speed**. Note that for non-ferrous materials such as brass, copper, aluminium etc. require much faster speeds than Ferrous Metal Cutting Saws

## **CHAPTER 4 - Drawings, Layouts, Assembly & Spare Parts**

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**NOTE**

MINIMUM 600MM ALL  
AROUND SAFE SPACE FOR  
OPERATING ZONE



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TITLE:

**TNF 115 S2 MAIN  
DIMENSIONS**

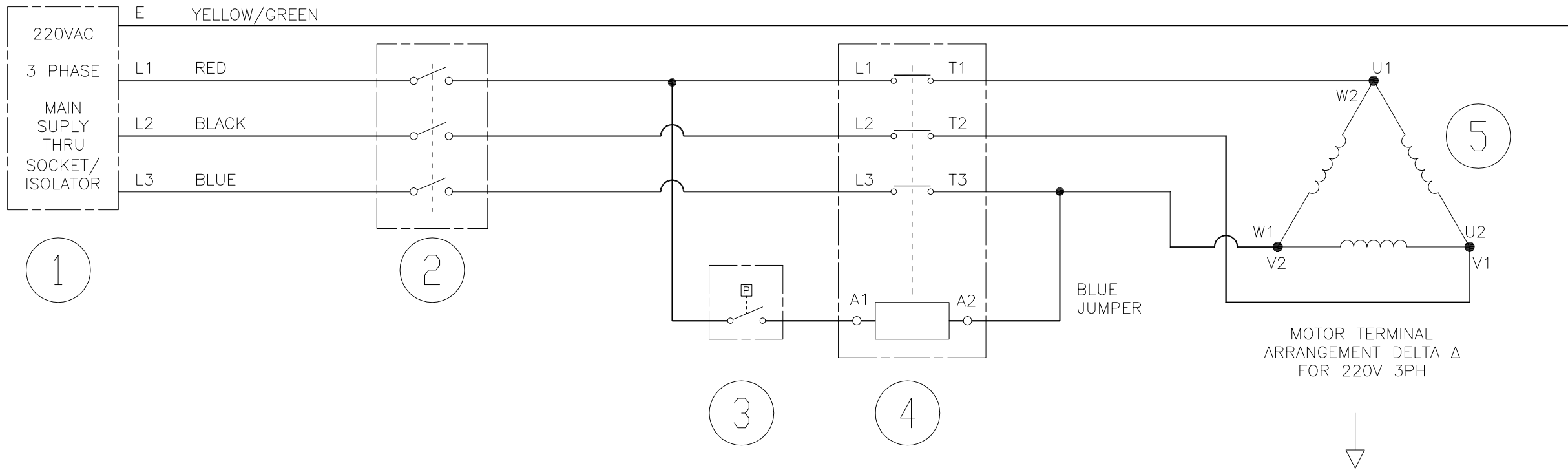
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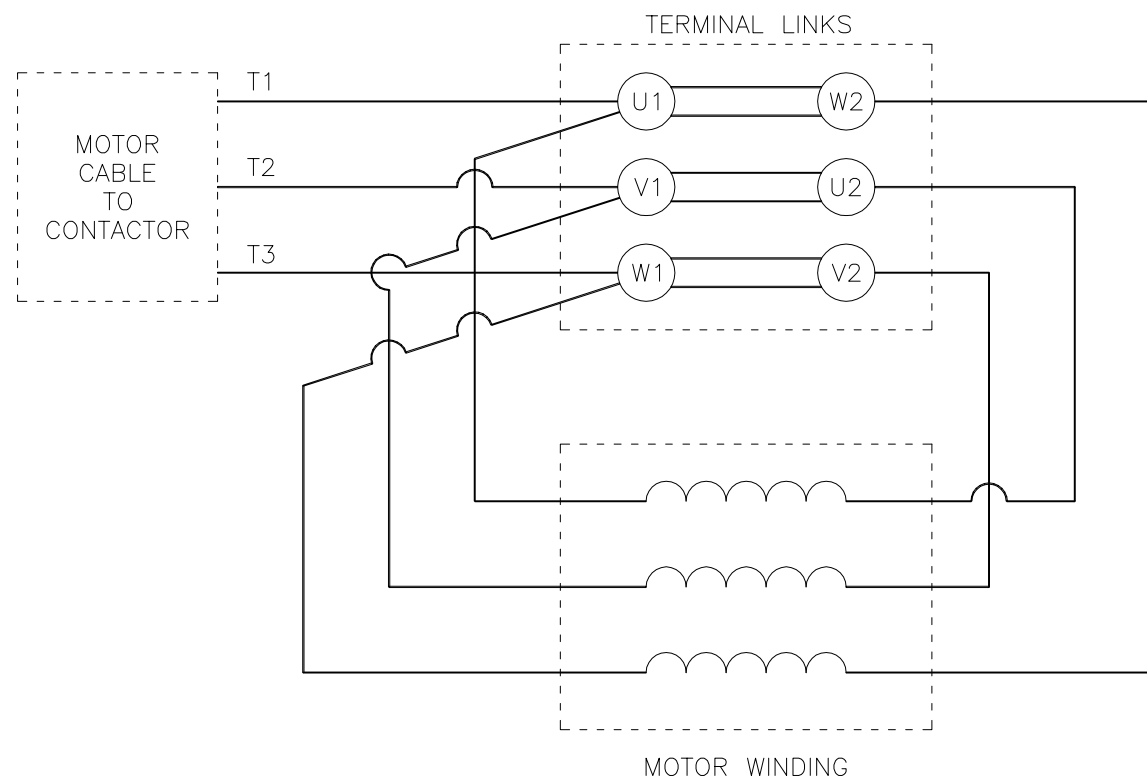
SHEET 1 OF 4



USA



1. REPLACE CONTACTOR (415 – 460V) WITH CONTACTOR (220 – 240V)
2. REMAIN THE CONNECTIONS TO CONTACTOR TERMINAL
3. ARRANGE THE LINKS ON MOTOR TO DELTA



TNF115 ELECTRICAL CIRCUIT CONVERSION  
FROM 460V TO 220V 3PH APPLICATION (USA)

LEGEND

- |   |                                  |
|---|----------------------------------|
| 1 | MAIN SUPPLY 220VAC               |
| 2 | MAIN SWITCH<br>ETN TO-2-1        |
| 3 | PRESSURE SWITCH                  |
| 4 | CONTACTOR<br>K1210<br>220 – 240V |
| 5 | MOTOR WINDING<br>(DELTA)         |

					DRAWN	
					CHECK	
					APPROVE	
0	18/12/2018	ISSUED		ANH	ENGINEER	ANH
REV	DATE	DESCRIPTION		DRA.	SIGN	
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PROJECT	TNF115 460V TO 220 3PH CONVERSION
TITLE	ELECTRICAL SCHEMATIC

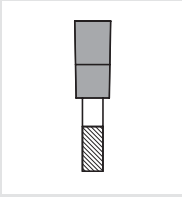
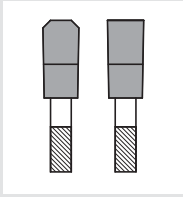
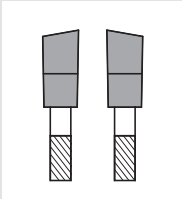
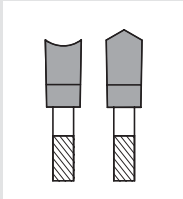
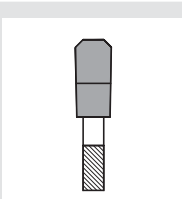
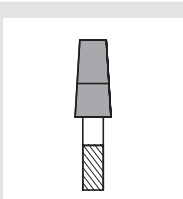


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SCALE	NTS	REVISION	0
DWG NO.	E1807.TNF115.M02	SHEET	1 OF 1

# TCT Saw Blades – General Information

## Tooth Geometry of TCT Saw Blades

	FZ	flat tooth		TFZ	triple chip tooth alternating with flat tooth
	FZ N	flat tooth with negative hook angle		TFZ N	triple chip tooth alternating with flat tooth with negative hook angle
	LFZ	flat tooth with chip limiter			
	WZ	alternate top bevel		DHZ	hollow face tooth (flat tooth alternates with inverted "V" tooth)
	WZ N	alternate top bevel with negative hook angle		DHZ N	hollow face tooth (flat tooth alternates with inverted "V" tooth), negative hook angle
	LWZ	alternate top bevel with chip limiter			
	TZ	triple chip tooth		KON	conical tooth

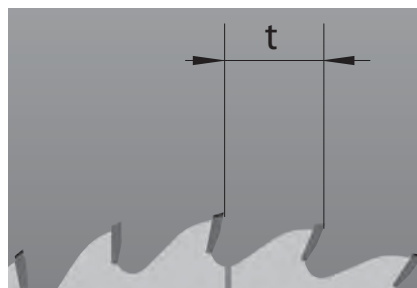


# TCT Saw Blades – General Information

Here are some useful formulas to help you calculate the correct number of teeth on saw blades:

$$t = \frac{h \times 1,45}{k}$$

$$z = \frac{D \times \pi}{t}$$



## Key:

- t [mm] – tooth pitch
- h [mm] – thickness of the work piece
- k [-] – number of teeth in cutting place (2÷3)
- z [-] – number of teeth of the saw blade
- D [mm] – sawblade diameter

These formulas are valid for cross cutting and cutting of laminated materials.

Tab. no. 1 shows the maximum RPM of circular saw blade based on the diameter of the blade. RPM referring to cutting speed 100 m/sec. These are the maximum recommended RPM by the machine producer. When exceeding this limit, the blade may lose its characteristics and danger to user may occur.

Tab. no. 1

Recommended RPM [1/min]										
ØD [mm]	Cutting speed v <sub>c</sub> [m/sec]									
	10	20	30	40	50	60	70	80	90	100
100	1910	3820	5730	7640	9550	11460	13370	15280	17190	19100
150	1270	2550	3820	5100	6370	7640	8920	10190	11500	12730
200	960	1910	2870	3820	4780	5730	6690	7640	8600	9550
250	760	1530	2290	3060	3820	4590	5350	6110	6880	7640
300	640	1270	1910	2550	3180	3820	4460	5100	5740	6370
350	550	1090	1640	2180	2730	3280	3820	4370	4900	5460
400	480	960	1430	1910	2390	2870	3340	3820	4300	4780
450	430	850	1270	1700	2120	2550	2970	3400	3820	4250
500	380	760	1150	1530	1910	2290	2680	3060	3440	3820
550	350	690	1040	1390	1740	2080	2430	2780	3120	3470
600	320	640	960	1270	1590	1910	2230	2550	2880	3180
650	290	590	880	1180	1470	1760	2060	2350	2640	2940
700	270	550	820	1090	1360	1640	1910	2180	2450	2730
750	250	510	760	1020	1270	1530	1780	2040	2290	2550
800	240	480	720	950	1190	1430	1670	1910	2150	2390

Tab. no. 1 can be efficiently used with Tab. no. 2

$$v_c = \frac{D \times \pi \times n}{1000 \times 60}$$

$$n = \frac{1000 \times 60 \times v_c}{D \times \pi}$$

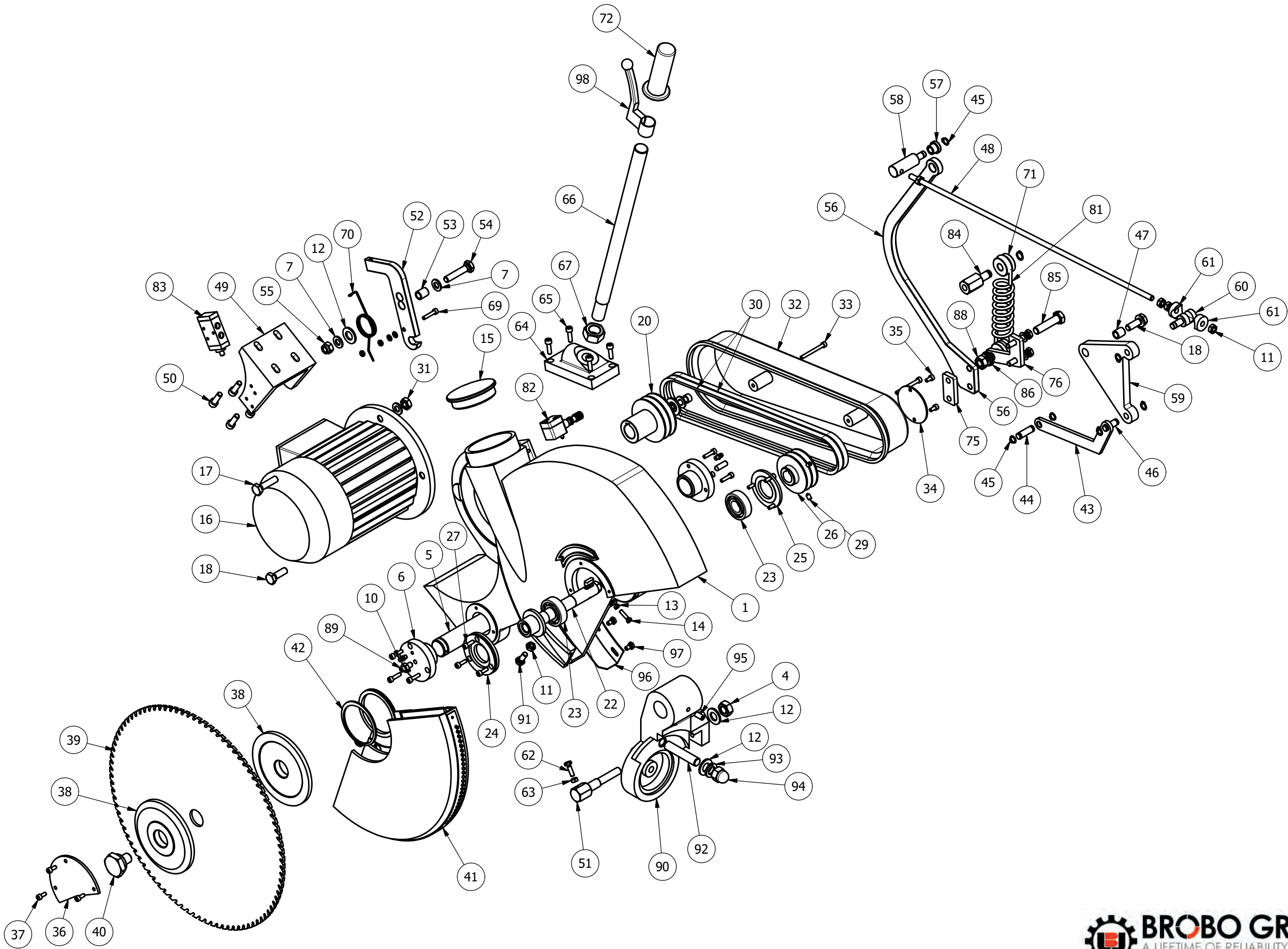
$$s = \frac{s_z \times n \times z}{1000}$$

Recommended values of feed/tooth		
Material type		Feed speed s <sub>z</sub> [mm/tooth]
Soft woods	Cutting along the grain	0,2 – 0,3
	Cutting across the grain	0,1 – 0,2
Hard woods		0,06 – 0,15
Chipboard		0,1 – 0,25
Plywood		0,05 – 0,12
Laminated boards		0,05 – 0,1
Non-ferrous metals and plastics		0,02 – 0,05


## Key:

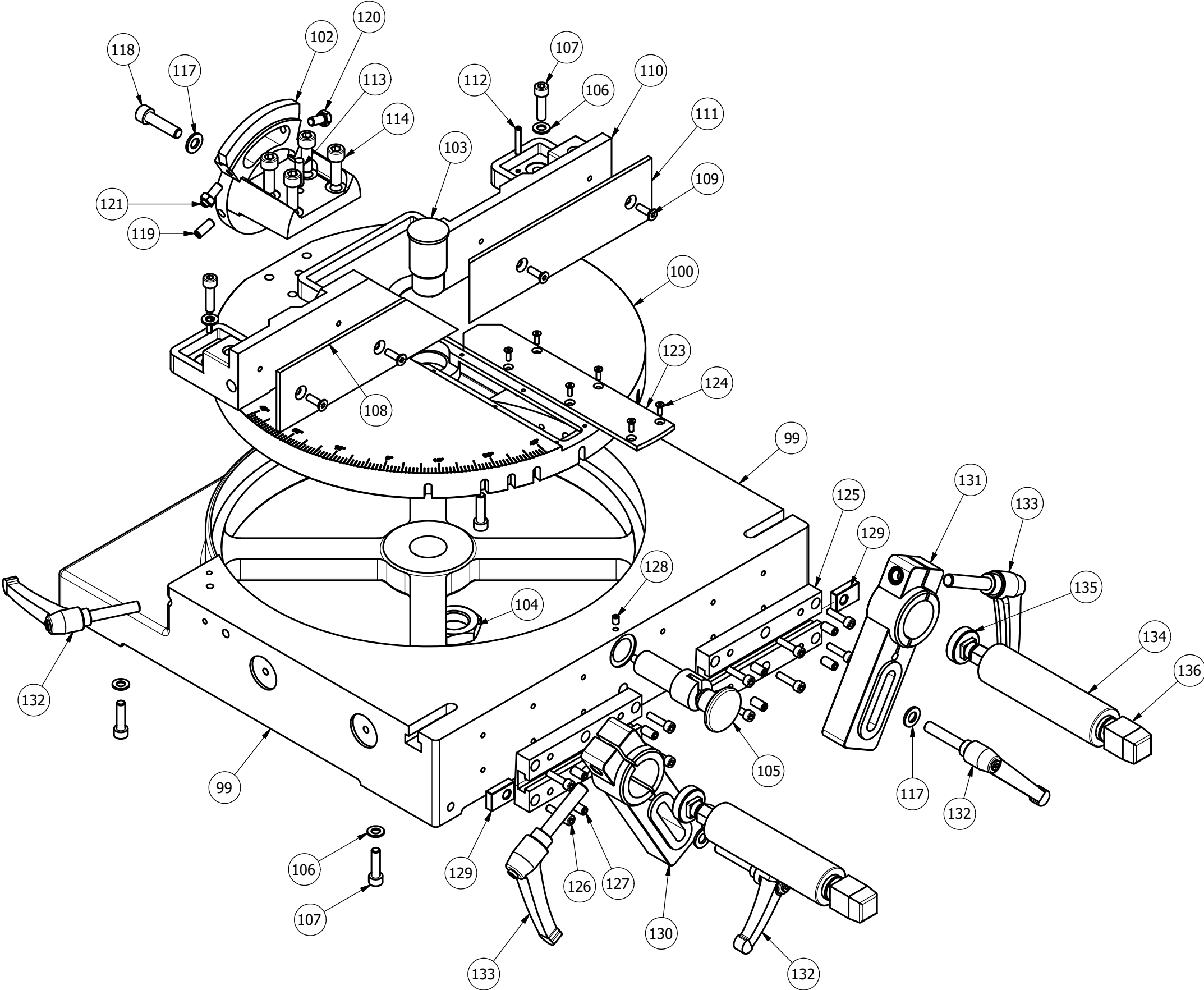
- v<sub>c</sub> [m/s] – cutting speed
- D [mm] – diameter of saw blade
- n [1/min] – recommended RPM
- s [m/min] – feed speed
- z [-] – number of teeth
- s<sub>z</sub> [mm/zub] – feed speed/tooth




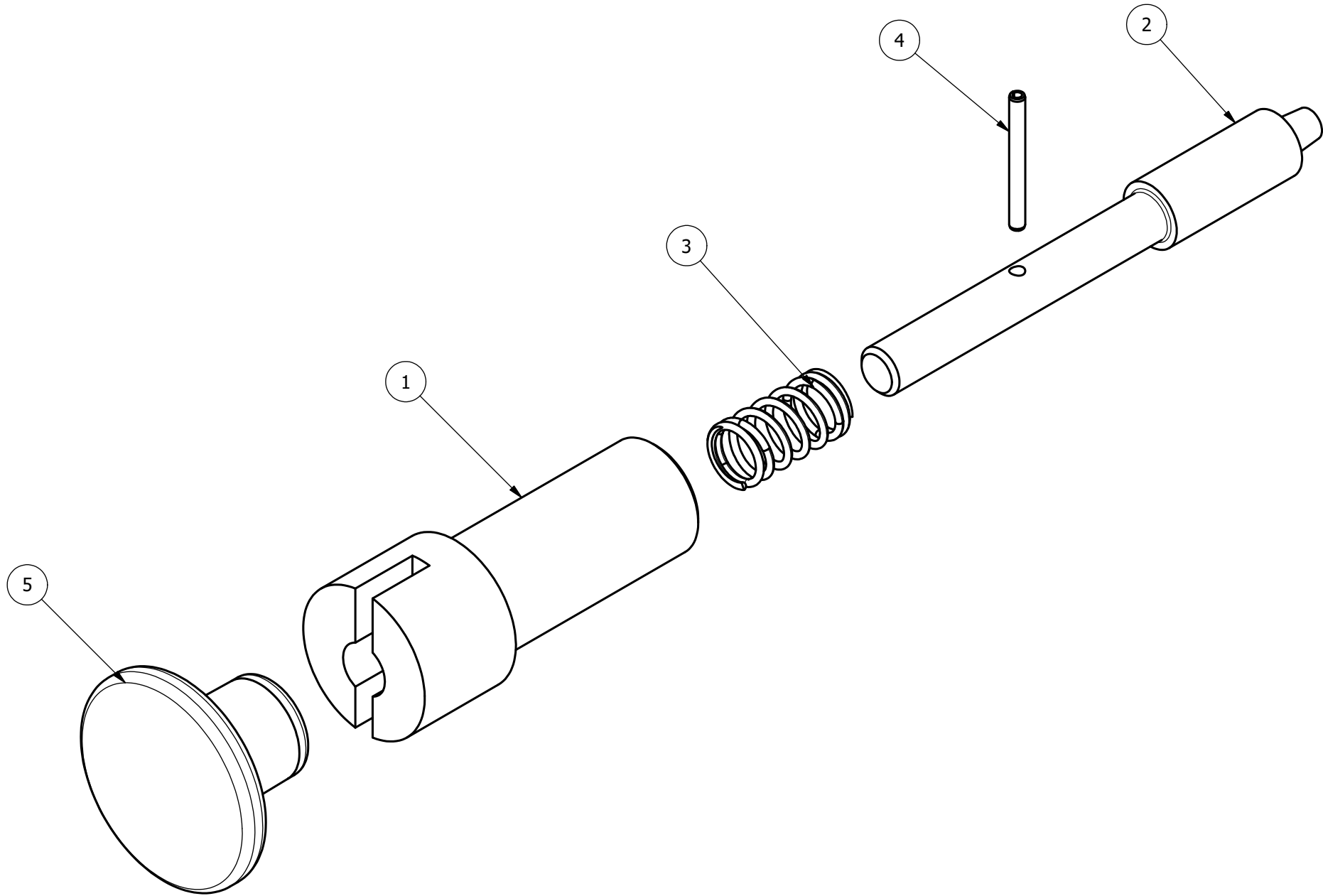




Date: 29.11.2009		Author: Bratislav		EXPLOSION VIEW					
Parts List					Parts List				
ITEM	QTY	PART NUMBER	TITLE	DESCRIPTION	ITEM	QTY	PART NUMBER	TITLE	DESCRIPTION
1	1	03M/05	SAFETY GUARD		50	4	DIN 912 - M8 x 25		Cylinder Head Cap Screw
2	2	DIN 125 - A 8,4		Washer	51	1	02-27/05	SUPPORT	
3	1	DIN 912 - M8 x 30		Cylinder Head Cap Screw	52	1	27/05	KEYHOLE	
4	1	DIN 934 - M14		Hex Nut	53	1	08-27/05	BUSH	
5	1	22-03/06	PIVOT SHAFT		54	1	DIN 933 - M10 x 50		Hex-Head Bolt
6	2	23-03/06	COVER PLATE		55	1	DIN 6924 - M10		Hex Nut
7	6	DIN 125 - A 10,5		Washer	56	1	01-26/05	BUMERANG LEVER	
8	6	DIN 912 - M5 x 20		Cylinder Head Cap Screw	57	1	04-23/05	ROLL	
10	2	DIN 71412 - AM 6 (coned short)		Lubricating Nipple, coned Type A	58	1	03-23A/05	SHAFT	
11	7	DIN 934 - M8		Hex Nut	59	1	01-22/05	LEVER	
12	3	DIN 125 - A 15		Washer	60	1	05-22/05	FORK GOUGE	
13	3	DIN 934 - M5		Hex Nut	61	2	07-26/06	WASHER	
14	1	DIN 933 - M5 x 20		Hex-Head Bolt	62	1	DIN 933 - M6 x 20		Hex-Head Bolt
15	1	36-03/06	SUPENSION COVER		63	1	DIN 934 - M6		Hex Nut
16	1	Elektromotor	MT90c2-STD-(1,5kW)-B5		64	1	01-16/05	HANDLE SUPPORT	
17	1	DIN 933 - M10 x 40		Hex-Head Bolt	65	4	DIN 912 - M6 x 20		Cylinder Head Cap Screw
18	2	DIN 933 - M10 x 30		Hex-Head Bolt	66	1	17/05	LEVER	
19	1	DIN 6885 - A 8 x 7 x 40		Parallel Key	67	1	DIN 934 - M20 x 1,5		Hex Nut
20	1	38-03/06	MOTOR PULLEY		68	2	DIN 125 - A 5,3		Washer
21	1	DIN 125 - A 17		Washer	69	1	DIN 912 - M5 x 25		Cylinder Head Cap Screw
22	1	15-03/06	SPINDLE		70	1	17-27/05	SPRING	
23	2	DIN 625 SKF - SKF 6204-2Z		Deep groove ball bearings single row with two Z shields SKF	71	2	02-30/05	ROLLER	
					72	1	04-17/05	RUBBER HANDLE	
24	1	12-03/06	SHAFT BLADE COVER		74	1	DIN 471 - 12x1		Retaining rings for shaft
25	1	08-03/06	SHAFT BLADE COVER		75	1	03-26/05	WASHER	
26	1	10-03/06	SHAFT PULLEY		76	1	05-26/05	ANGLE PLATE	
27	6	DIN 912 - M5 x 16		Cylinder Head Cap Screw	77	2	DIN 933 - M8 x 45		Hex-Head Bolt
28	1	DIN 6885 - A 6 x 6 x 18		Parallel Key	81	1	OPRUGA	SPRING	
29	2	DIN 914 - M6 x 10		Hexagon Socket Set Screw	82	1	Brizgaljka	TAP	
30	2	V-Belt			83	1	T228_32_0_1	VALVE 3/2	
31	1	DIN 934 - M10		Hex Nut	84	1	29	UPPER SUPPORT SPRINGS	
32	1	02-03/06	BELT GUARD		85	1	DIN 931-1 - M12 x 50		Hex-Head Bolt
33	2	DIN 912 - M5 x 50		Cylinder Head Cap Screw	86	1	DIN 125 - A 13		Washer
34	1	04-03/06	BELT GUARD PLATE		87	1	DIN 127 - A 12		Spring Washer
35	2	DIN 912 - M5 x 10		Cylinder Head Cap Screw	88	1	DIN 934 - M12		Hex Nut
36	1	45-03/06	SIGHT WINDOW		89	2	DIN 914 - M8 x 25		Hexagon Socket Set Screw
37	3	DIN 912 - M5 x 12		Cylinder Head Cap Screw	90	1	01-25M	BODY JOINT LEFT	
38	2	17-03/06	BLADE PLATE		91	1	DIN 933 - M8 x 20		Hex-Head Bolt
39	1	Pila	SAW BLADE 400		92	1	11-25	SCREW M14x70	
40	1	16-03/06	RETAINING SCREW (LH)		93	1	DIN 127 - A 14		Spring Washer
41	1	05/06	BLADE GUARD (INNER)		94	1	DIN 1587 - M14 - SW 21		Hexagon Domed Cap Nuts
42	1	DIN 471 - 72x2,5		Retaining rings for shaft	95	1	DIN 913 - M8 x 16		Hexagon Socket Set Screw
43	1	16-26/06	LOCKING DEVICE L SHAPE		96	1	32	PROTECTIVE SHEET HOOD	
44	1	18-26/06	LONG PIN		97	2	DIN 933 - M6 x 10		Hex-Head Bolt
45	6	DIN 471 - 10x1		Retaining rings for shaft	98	1	HANDLE BRAKE	HANDLE BRAKE	
46	1	13-26/06	SHORT PIN		<div></div>				
47	1	21-26/06	ROD LEVER						
48	1	10-23/05	LINK ROD						
49	1	01-13/05	MOTOR MOUNTING PLATE						
			MOST M			Sklop glave E-03/05			Page: 2 /2



Date: 29.11.2009		Author: Bratislav		EXPLOSION VIEW			
Parts List							
ITEM	QTY	PART NUMBER	TITLE	DESCRIPTION			
99	1	02/05	CLAMPING TALBE				
100	1	13-01/06	ROTARY TABLE				
102	1	02-25/06	TILT ADJUSTMENT SUPPORT				
103	1	14-01/06	CENTER SHAFT				
104	1	15-01/06	NUT M30x2				
105	1	23/06	QUICK RELEASE KNOB				
106	6	DIN 125 - A 8,4		Washer			
107	6	DIN 912 - M8 x 30		Cylinder Head Cap Screw			
108	1	04-01/06	WEAR PLATE (LH)				
109	4	DIN 7991 - M6 x 20		Countersunk Screw			
110	1	02-01/06	BACK FENCE				
111	1	03-01/06	WEAR PLATE (RH)				
112	2	ISO 8752 - 5 x 30		Spring-Type Straight Pin			
113	1	ISO 8734 - 8 x 30 - A		Parallel Pin			
114	4	DIN 912 - M10 x 30		Cylinder Head Cap Screw			
117	3	DIN 125 - A 10,5		Washer			
118	1	DIN 912 - M10 x 40		Cylinder Head Cap Screw			
119	1	DIN 913 - M8 x 20		Hexagon Socket Set Screw			
120	2	DIN 934 - M8		Hex Nut			
121	2	DIN 913 - M8 x 25		Hexagon Socket Set Screw			
123	1	16-01/06	INSERT				
124	6	DIN 7991 - M4 x 12		Countersunk Screw			
125	2	01-18-01A/06	CLAMP HOLDER SUPPORT				
126	12	DIN 912 - M6 x 25		Cylinder Head Cap Screw			
127	8	DIN 913 - M8 x 16		Hexagon Socket Set Screw			
128	1	DIN 913 - M6 x 8		Hexagon Socket Set Screw			
129	2	27-01/06	SQUARE SCREW NUT M10				
130	1	18-01A/06	CYLINDER HOLDER (L)				
131	1	18-02A/06	CYLINDER HOLDER (R)				
132	3	Ručica M10X50	HANDLE				
133	2	Ručica M12X55	HANDLE				
134	2	Cilindar PA35P80	CLAMP CYLINDER				
135	2	Stezni čep	CLAMP PAD				
136	2	Blokator 11_044_4	BLOCKER				
							
			MOST M			Sklop suporta E-02/05	Page: 2 /2



## Parts List

ITEM	QTY	PART NUMBER	TITLE	DESCRIPTION
1	1	03-23/06	CAM	
2	1	01-23/06		
3	1	Opruga šnapera	SPRING	
4	1	ISO 8752 - 3 x 30		Spring-Type Straight Pin
5	1	Ručka M10	HANDLE	



DRG/PART No.

306220

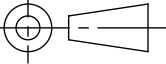
DO NOT SCALE

COMMERCIAL STOCK SIZES  
EXCEPTED AND UNLESS  
OTHERWISE NOTED  
TOLERANCES ON  
DIMENSIONS ARE:  
  
METRIC  
  
Size To Mach. Cast\*  
6 mm ± 0.1 ± 0.5  
30 mm ± 0.2 ± 1.0  
100 mm ± 0.3 ± 1.5  
300 mm ± 0.5 ± 2.0  
1000 mm ± 0.6 ± 3.0  
2000 mm ± 1.2 ± 5.0  
  
\* INCLUDES STRUCTURAL  
STEEL WORK.  
  
REMOVE ALL BURRS AND  
SHARP EDGES BY 0.3 x 45°  
UNLESS OTHERWISE STATED  
  
SURFACE FINISH


	Roughness Value	
	Met Umm	Grade No.
ROUGH	50	N12
	25	N11
	12.5	N10
	6.3	N9
MED	3.2	N8
FINE	1.6	N7
S FINE	0.8	N6
POLISH	0.4	N5
LAP	0.2	N4
	0.1	N3
	0.05	N2
	0.025	N1

DRAWING PRACTICE TO  
AS 1100 - PROJECTION  
SYSTEM (UNLESS NOTED)

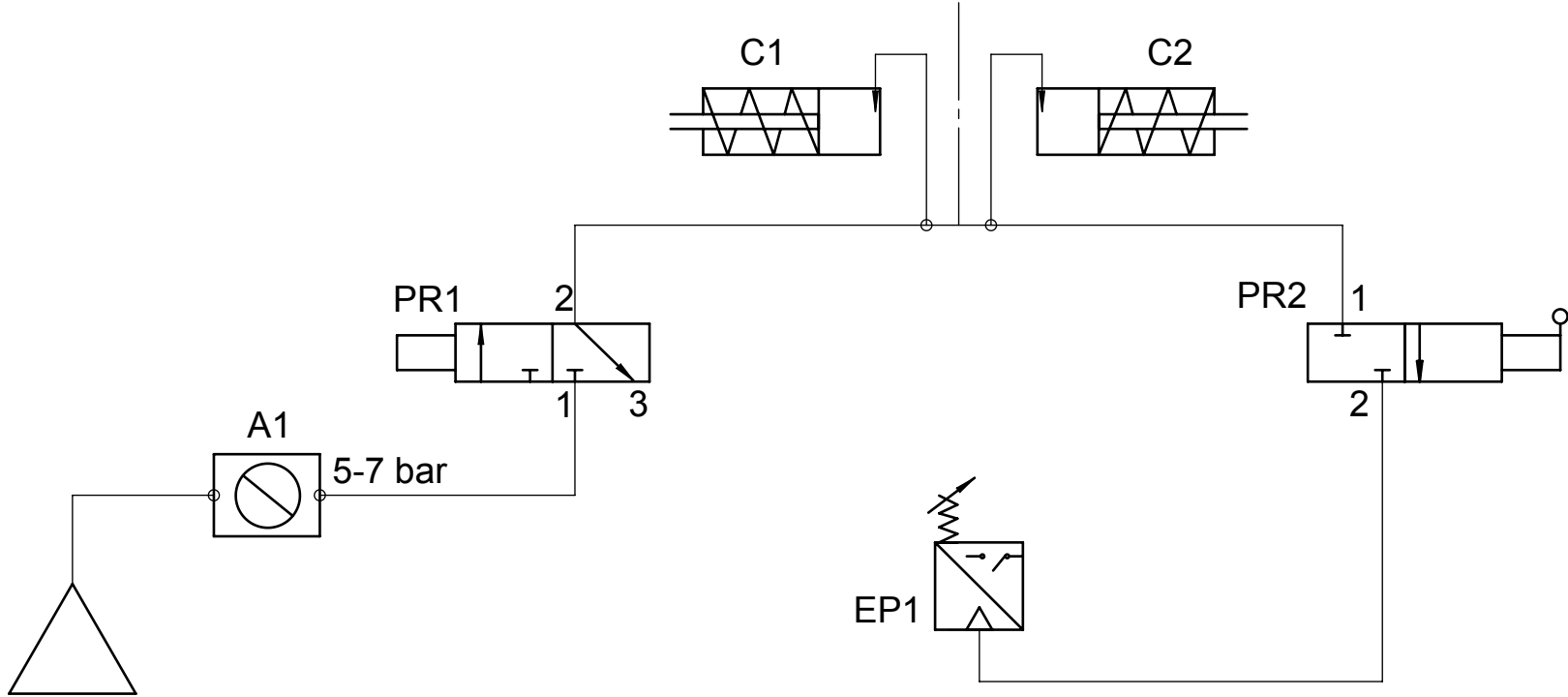
3RD  
ANGLE




ANGULARITY TOLERANCE  
< 0° 7'

 CONCENTRICITY  
0.1 mm

THIS DESIGN OR DRAWING IS  
NOT SOLD, BUT LENT AND IS  
SUBJECT TO RECALL.  
REPRODUCTIONS OF THIS  
DRAWING IN ANY MATERIAL  
FORM ARE RESERVED TO  
BROBO WALDOWN (AUST)  
Pty. Ltd.  
UNDER COPYRIGHT LAW.



**A1** - PREPARATION UNIT  
**PR1** - CYLINDER SWITCH  
**C1-C2** CYLINDERS  
**PR2** - SWITCH-HANDLE  
**EP1** - ELECTRO PNEUMATIC SWITCH

Det.	Part No.	Qty.	Name & Material		Sheet	Remark
Raw Mat. #.	N/A	Drawn O.Dj.	Checked S.R.	Scale 1:1	 <b>BROBO GROUP</b> A LIFETIME OF RELIABILITY www.brobo.com.au	
Mass in kg.	N/A	Date 18.5.2015.	Date 18.5.2015.	Sub Ass'y -		
				Layout No. -		
Mat/Spec	Titled				Drg No. 306220	Revision -

DO NOT SCALE

COMMERCIAL STOCK SIZES  
EXCEPTED AND UNLESS  
OTHERWISE NOTED  
TOLERANCES ON  
DIMENSIONS ARE:  
METRIC

Size To Mach. Cast\*

6 mm  $\pm 0.1 \pm 0.5$   
30 mm  $\pm 0.2 \pm 1.0$   
100 mm  $\pm 0.3 \pm 1.5$   
300 mm  $\pm 0.5 \pm 2.0$   
1000 mm  $\pm 0.6 \pm 3.0$   
2000 mm  $\pm 1.2 \pm 5.0$

\* INCLUDES STRUCTURAL  
STEEL WORK.

REMOVE ALL BURRS AND  
SHARP EDGES BY 0.3 x 45°  
UNLESS OTHERWISE STATED

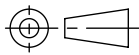
SURFACE FINISH

Roughness Value

	Met Umm	Grade No.
ROUGH	50	N12
	25	N11
MED	12.5	N10
	6.3	N9
FINE	3.2	N8
S FINE	1.6	N7
POLISH	0.8	N6
LAP	0.4	N5
	0.2	N4
	0.1	N3
	0.05	N2
	0.025	N1

DRAWING PRACTICE TO  
AS 1100 - PROJECTION  
SYSTEM (UNLESS NOTED)

3RD



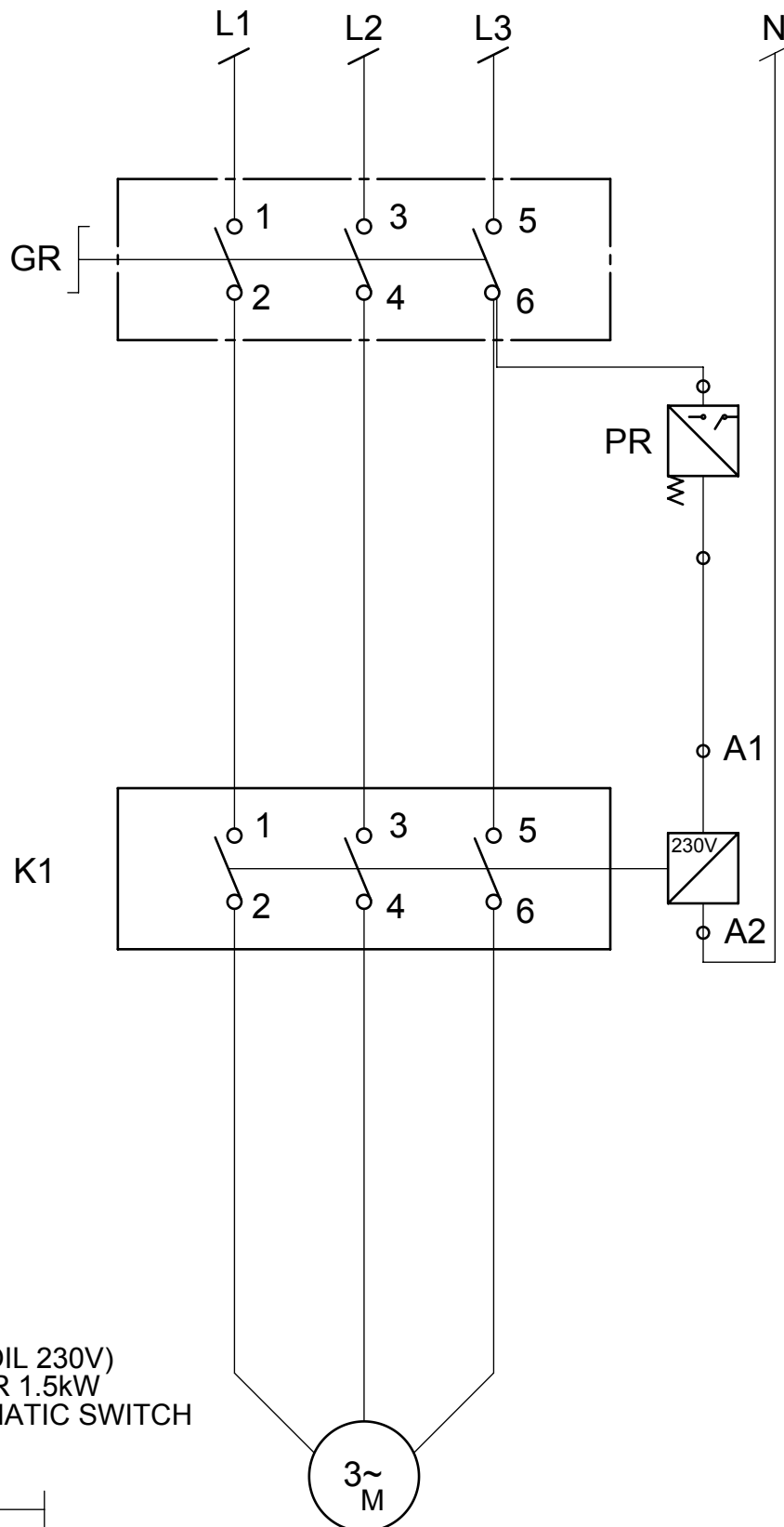
ANGLE


ANGULARITY TOLERANCE  
< 0° 7'



CONCENTRICITY  
0.1 mm

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**GR - CAM SWITCH****K1 - CONTACTOR ( COIL 230V)****3~M - 3 PHASE MOTOR 1.5kW****PR - ELECTRO PNEUMATIC SWITCH**

Det.	Part No.	Qty.	Name & Material		Sheet	Remark
Raw Mat. #.	Drawn	Checked	Scale	1:1	 <b>BROBO GROUP</b> A LIFETIME OF RELIABILITY www.brobo.com.au	
N/A	O.Dj.	S.R.	Sub Assy	-		
Mass in kg.	Date	Date	Layout No.	-		
N/A	18.5.2015.	18.5.2015.				
Mat/Spec	Titled		Drg No.		Revision	
			306221		-	



## CHAPTER 5 - Adjustments for the Saw Unit

### 5.1. Changing the Blade

To replace a worn saw blade: (figure12)



#### **DANGER – ELECTROCUTION**

*Make certain that the power to the manual saw is turned off before proceeding with changing the saw blade.*

Release the locknut (A) to release the tie rod that activates the yellow guard

- 1) Remove the rod from the pivot fixed on the connecting rod. Lift the yellow guard manually to allow to insert the 36 mm spanner in the blocking screw (B)
- 2) Remove the yellow guard (C) & remove 2 of the three fixing screws
- 3) Remove the lower blade protection cover (D) to facilitate the removal of the blade from its seat (E).
- 4) Remove the shaft cover. Insert a 17mm spanner to remove the blade counter plate screw.
- 5) Using a 36mm spanner, loosen the blade counter plate screw in a clockwise direction. Keeping in place the contrast spanner release the screw & remove the counter plate to be able to remove the blade from the shaft.

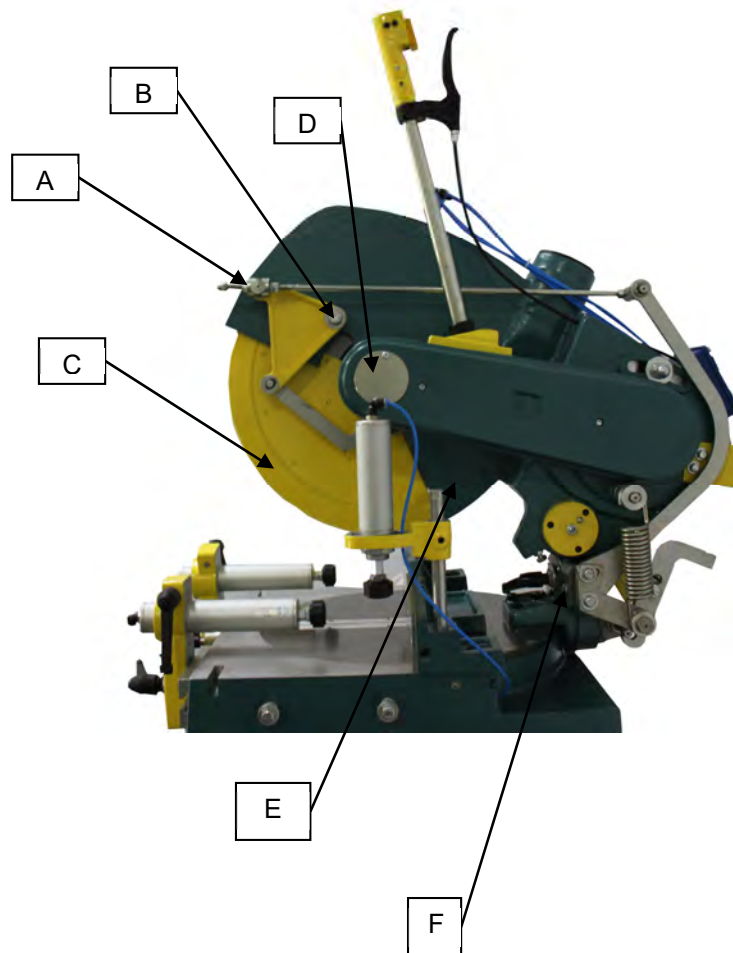


Figure 12. Adjustment the Saw



## 5.2. Adjusting the Head Tilt

- If the arm holding the saw head is at 0° position & the saw head is not perfectly perpendicular with the working table, adjust the calibration nut (*Figure 12 – F*) located on the right side of the support.
- If the 45° angle of tilting is not exact, adjust the calibration nut located on the left side of the support.

## 5.3. Cutting & Feeding Speeds



As previously highlights, the rate of feed largely affects the quality of the final cut. As such, the blade life is also dependent on the feed at which it is cutting the sample material - in particular, the type of material & also the cross-sectional dimensions. Thus, to extend the life of the blade, maintain a firm & steady pressure whilst allowing the blade teeth to cut at an optimum rate. **Do not force the blade through the material!** This could cause numerous problems including breaking the blade teeth, jamming the blade with the cutting part or fracturing the blade spindle.

The cutting action also generates a large amount of heat within the cutting sample due to frictional contact. Should this heat affect the material you are cutting in any way, the heat should be dissipated using the coolant system.

## 5.4. Lubrication Adjustment

On the upper part of the fixed guard a lubricator (*Figure 6 – Item 12*) is located for cooling the blade during the cutting operation. Adjusting the screw placed on the body of the lubricator it is possible to adjust the quantity of the liquid emitted. The reservoir for the lubricator liquid must not be empty.

Brobolube Fluid is recommended for lubricant oil.

Brobolube Fluid – Aluminium Oil Cutting (2 l)	9601480
Brobolube Fluid – Aluminium Oil Cutting (20 l)	9601481
Lubricator	9615680

### 5.4.1. 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 350°C, & non-corrosive, although it may affect some types of rubber. There are no traces of sulfur, 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 & 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 CO<sub>2</sub>, dry chemical or foam retardant to extinguish the flames.**



# CHAPTER 6 – Maintenance & Selection of Consumables

---

## 6.1. Role of the Operator

The person operating & maintaining the **Robbo Group TNF115 Series 2** 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 & 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 & personal safety requirements are complied with.
- Ensure that the working cycle is efficient & guarantees maximum productivity, inspect the:
  - Functions of the main components of the machine
  - 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 & that the final product is free from any machining defects.

## 6.2. 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 **Robbo 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 & those on the product itself.

## 6.3. 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) Lubricate the saw head pivot shaft & 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.
- 3) Clean the vice & lubricate any moving joints or sliding surfaces with good quality oil.
- 4) Clean the machine regularly & keep any unpainted surfaces lightly oiled to protect from rust & corrosion.

- 5) 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.
- 6) Ensure that the machine performs cuts perpendicular to the work surface.  
If not, contact **Brobo Group** engineering department.
- 7) Test that the blade is at right angles to the workpiece back fence.  
If not, contact **Brobo Group** engineering department.
- 8) Regularly empty out the swarf catcher, resting directly above the compensation tank, of any offcuts & swarf that has collected during the numerous cutting cycles.

## CHAPTER 7 - Appendix



**BROBO GROUP®**

**BROBO GROUP (AUST) PTY. LTD.**

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Website: [www.brobo.com.au](http://www.brobo.com.au)



Hazard Type	Hazard Identification	Hazard Assessment	Hazard Management Strategies (Recommended for the Purchasing / Buyer / User)
<b>Mechanical</b>	Cutting/Severing	Low/Med	<ul style="list-style-type: none"> <li>Keep machine correctly guarded &amp; operational at all times.</li> <li>Keep &amp; clear of rotating blade when cutting.</li> </ul>
	Entanglement	Low	<ul style="list-style-type: none"> <li>Do not wear loose jewelry, clothing or items that might get caught in the saw.</li> <li>Always keep the work area free of unnecessary objects or tools.</li> </ul>
	Puncturing	Low	<ul style="list-style-type: none"> <li>Wear protective gloves when handling and /or changing the blades.</li> <li>The power source is to be isolated prior to opening electrical enclosures.</li> </ul>
<b>Electrical</b>	Electrocution	Low	<ul style="list-style-type: none"> <li>Remove the power supply when any maintenance and/or repairs are to be undertaken.</li> <li>The power source is to be isolated prior to opening electrical enclosures.</li> </ul>
<b>Thermal</b>	Burn	Low	<ul style="list-style-type: none"> <li>Under normal working conditions, the gearbox can become hot thus, do not touch.</li> <li>Be careful when handling workpiece after cutting, as it might be very hot.</li> </ul>
<b>Noise</b>	-	Low	<ul style="list-style-type: none"> <li>Under no load testing, the noise level measured is below 85 dB (A).</li> <li>If the noise level becomes too high during a cutting cycle, stop the process &amp; inspect for the problem, if any are present.</li> </ul>
<b>Substance</b>	-	Low	<ul style="list-style-type: none"> <li>Care must be taken as some coolants may be harmful or cause allergic reactions. Please read the labels carefully.</li> <li>Keep the work area clean &amp; regularly remove excess coolant, oils, &amp; other impurities.</li> </ul>
<b>Hazardous Events</b>	Unexpected Start-Up	Low	<ul style="list-style-type: none"> <li>During a power failure, turn the machine off.</li> <li>If the problem persists, please contact Brobo Group engineering department.</li> </ul>
	Failure of Control System	Low	<ul style="list-style-type: none"> <li>If the ON/OFF switch fails, isolate the machine at the power source.</li> <li>Ensure that no fuses are blown &amp; that all electrical circuitry are operating within normal parameters.</li> </ul>
<b>Additional Hazards</b>	Operator Error	Low	<ul style="list-style-type: none"> <li>Ensure blades, clamps &amp; materials are correctly secured.</li> </ul>
	Impact	Low	<ul style="list-style-type: none"> <li>Wear safety glasses at all times during cutting cycle.</li> </ul>

MACHINE TYPE: \_\_\_\_\_

SERIAL NO.: \_\_\_\_\_

RECEIVING COMPANY: \_\_\_\_\_ (SAFETY OFFICER)

## **Brobo Group Warranty**

- 1.1 The supplier warrants that all goods supplied by it, shall be free from defects in materials and workmanship for a period of twenty four (24) months from the date of delivery to the Customer. ("The Warranty Period"), on the following terms and conditions.
- 1.2 The Customer shall promptly provide written particulars to the supplier on becoming aware of any defect in the goods during the Warranty Period, and shall provide the Supplier with all necessary access, facilities and information to enable the Supplier to ascertain or verify the nature and the cause of the defect and to carry out its obligations under this warranty.
- 1.3 The Supplier's obligation under this warranty is limited to repairs of the defect goods and the Supplier is under no obligation to replace the goods or refund the value of the goods to the Customer.
- 1.4 If the goods are, in the opinion of the Supplier, not defective or if any defect is attributable to any one or more of the following circumstances then the Supplier is under no obligation whatsoever to the Customer:
- 1.4.1 The use of the goods for a purpose other than that for which they were intended to be used;
  - 1.4.2 The repair, modification or alteration of the goods by any person other than the Supplier;
  - 1.4.3 Where the defect has arisen due to misuse, neglect or accident, howsoever arising;
  - 1.4.4 Where the defect has arisen due to installation of the goods which were, in the reasonable opinion of the Supplier, incorrectly carried out
  - 1.4.5 Where the goods have not been correctly stored or maintained
  - 1.4.6 Where the defect has arisen due to normal wear and tear on the goods
- 1.5 The Supplier is under no obligation under this warranty where the Customer has failed to observe the terms of payment for the goods or any other obligation imposed by the terms and conditions of this warranty.
- 1.6 In the event that the Supplier is supplying goods, which have been manufactured by third parties, the Customer shall be entitled to the benefit of any Manufacturer's Warranty in respect of such goods. The Customer acknowledges that the Supplier accepts no responsibility whatsoever for any Manufacturer's Warranty or any claim howsoever arising from the use of the goods, whether singularly or in combination with other products.
- 1.7 The Supplier shall not be liable for any indirect or consequential losses or expenses suffered by the Customer, howsoever caused.
- 1.8 Except as specifically set out herein, or in writing by way of catalogue or pamphlet or otherwise provided by the Supplier to the Customer any term, representation, condition or warranty in respect of the quality, condition or description of the goods, whether implied by statute, common law, trade usage, custom or otherwise, is hereby expressly excluded.

This warranty is given by **Brobo Group Pty Ltd**, ABN: 42 098 264 316

Address: 8 Fowler Rd, Dandenong, VIC 3175



03 9794 8751



03 9794 8792



[info@brobo.com.au](mailto:info@brobo.com.au)

This warranty is provided in addition to other rights and remedies you have under law: Our goods come with guarantees which cannot be excluded under the Australian Consumer Law. You are entitled to replacement or refund for a major failure and to compensation for other reasonably foreseeable loss or damage. You are also entitled to have the goods repaired or replaced if the goods fail to be of acceptable quality and the failure does not amount to a major failure.