BROBO GROUP©

PRODUCT AND MAINTENANCE MANUAL

OHS SERIES METAL SAWS

MODEL No. S315D, S350D, S400B / Serial No's. C 29680~

▲*Bench Mount Unit*

Floor Mount Unit ▲

YOUR BROBO DISTRIBUTOR IS:

OPERATING MANUAL FOR BROBO GROUP MANUAL METAL CUTTING SAWS

TECHNICAL SPECIFICATION

STANDARD BLADE SIZES

Outer Diameter (∅ mm)	Thickness (mm)	Bore Size (mm)	Number of Teeth
315	2.5	40	160
350 (*)	2.5	40	180
400	3.0	40	220

TABLE 1. *Standard Blade Sizes*

(*) ***Recommendation***

BLADE SELECTION CHART

	Material Outer Diameter (∅ mm)	Wall Thickness (mm)	Blade Diameter (∅ mm) & Number of Teeth		
			315	**350**	**400**
HOLLOW CROSS-SECTION	20	1	320	350	400
		2	240	280	340
		3	180	220	240
	40	1	320	250	400
		2	220	260	280
		3	160	180	200
		4	140	160	180
	50	1	320	350	400
		2	220	280	300
		3	180	200	220
		4	160	180	200
		5	140	160	180
	80	1	300	320	360
		2	200	220	240
		3	200	200	220
		4	160	180	180
		5	140	160	180
	100	1	300	300	340
		2	220	200	220
		3	200	180	180
		4	160	140	160
		5	140	120	140
	120	1		300	340
		2		200	220
		3		180	180
		4		160	160
		5		120	140
SOLID SECTIONS	10		280	280	300
	20		160	200	240
	30		140	160	200
	40		120	140	140
	50		80	100	120
	60			80	100

TABLE 2. Blade Selection Chart

NOTE - CHART GUIDE ONLY

*This chart is issued as a **guide only**. Many other factors would attribute to the cutting performance of both the saw blade and the cutting saw machine. BROBO GROUP Pty. Ltd. will not accept any responsibility for the blade selection and/or machine breakages or unsatisfactory cutting performance of both the blade and/or the machine as a direct result of the selection.*

Blade Type: AISI M-Z High-Speed Steel (62-64 HRC, Hollow Ground)

Blue-oxide coated for:

- Greater durability,
- Better coolant conveyance to the cutting edge,
- Reduces galling or "pick-up" on sides of the blade,
- Reduces brittleness of the steel.

Tooth Form: Bevelled on alternate sides - up to 180 teeth, or
High-rolling, low-finishing teeth, "triple-chip" - above 180 teeth

Drive Pin Holes (Qty. × ∅ × PCD): *S315 & S350 Series* 2 × 8mm × 55mm
S400 Series 2 × 10.5mm × 64mm

Worm Gear Drive Ratio (S315/S350/S400): 1:33 Reduction No of Starts (Shaft) : No. Teeth (Wormwheel)
Sound Level (dBA): 85 - 90 dB (A) Maximum

MOTOR SPECIFICATIONS

Motor Type (Hz)	Phase	Voltage (V)	RPM	Kilowatt (kW)
50Hz Power Supply	1	240	1430	1.7
50Hz Power Supply	3	415	1420 / 2680	1.5 / 2.2
50Hz Power Supply	3	415	650 / 1350	1.1 / 1.5
60Hz Power Supply	1	230	1700	1.7
60Hz Power Supply	3	220	850 / 1700	1.1 / 1.5
60Hz Power Supply	3	440	850 / 1700	1.5 / 2.2
60Hz Power Supply	3	220	1700 / 3400	1.1 / 1.5

TABLE 3. Motor Specifications

BLADE SPINDLE RPM

Motor Type			BLADE SPEEDS					
			S315		S350		S400	
Frequency (Hz)	Phase	RPM	RPM	m/min	RPM	m/min	RPM	m/min
50	3	650	21	20	21	23	21	27
	1 / 3	1350/1420	42	40	42	47	42	53
	3	2680	85	80	85	93	85	106
			RPM	ft. /min	RPM	ft. /min	RPM	ft. /min
60 (USA)	3	850	26	84	26	93	26	106
	1 / 3	1700	52	168	52	186	52	212
	3	3400	103	334	103	370	103	424

TABLE 4. Blade Spindle RPM

VICE CLAMPS

	Manual Vice
Clamping Range (mm)	0 - 135 (145mm w/o wear plates)
Air Requirements:	
Air Consumption (L):	
Clamp Working Pressure (kPa):	
Maximum Pressure (kPa):	
Pneumatic Stroke (mm):	
Clamping Force (N):	

TABLE 5. Vice Clamps

CUTTING RANGE

Cross-Sectional Profile	Angle	Cutting Range (mm)					
		S315		S350		S400	
○	90°	95	3 6/8"	115	4 4/8"	130	5 1/8"
	45°	95	3 6/8"	110	4 3/8"	120	4 6/8"
□	90°	85 × 85	3 3/8" × 3 3/8"	100 × 100	3 7/8" × 3 7/8"	110 × 110	4 3/8" × 4 3/8"
	45°	80 × 80	3 1/8" × 3 1/8"	85 × 85	3 3/8" × 3 3/8"	95 × 95	3 6/8" × 3 6/8"
▭	90°	80 × 100	3 1/8" × 3 7/8"	85 × 135	3 3/8" × 5 3/8"	100 × 135	3 7/8" × 5 3/8"
	45°	80 × 80	3 1/8" × 3 1/8"	85 × 95	3 3/8" × 3 6/8"	100 × 95	3 7/8" × 3 6/8"

TABLE 6. Cutting range

Note: The above values are based on a full-size blade. The capacities will reduce accordingly when a worn blade is resharpened.

DIMENSIONAL SPECIFICATIONS

Base Dimensions (L × W): 550mm × 660mm

Table Working Height: 968 mm

Saw Height: 1917 mm

SAW WEIGHT

	Un-Packed Weight (kg)		Packed Weight (kg)	
S315/S350/S400 Saw Unit	136kg	(300lb.)	150kg	(330lb.)
Coolant Tank Complete	17kg	(42lb.)	17kg	(42lb.)
Sheet Metal Stand S315/S350/S400	28kg	(62lb.)	28kg	(62lb.)
Manual Vice Unit	25kg	(55lb.)	25kg	(55lb.)

TABLE 7. Saw Weigh

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 S315/S350/S400 Series Metal Cutting 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 (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 Metal Cutting Saw Unit*

PLEASE OBSERVE & FOLLOW THE INSTALLATION INSTRUCTIONS ON PAGE 7

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 Handle
3) 1 × Service Kit (Hexagon wrenches 5”, 10” & 14”)
4) 1 × Operating Manual

B. OPTIONAL ACCESSORIES

Part Number	Description
9311270	Standard Adjustable Length Stop (600mm)
9501450 9501470	‘*Brobo-Rule*’ Series Manual Micro-Adjustment Length Stop ▪ Available in 3.0m or 6.0m lengths ▪ Field Kit includes rail, tape, micro-stop & extension arm.
9501210	Roller Conveyor ▪ 68 Kg Steel Rollers ▪ 3000mm x 305mm ▪ 150mm pitch
9311060 9301950	Manual Mechanical Vice Clamp Manual Mechanical Dual Arm Vice Clamp
9501740	Fabricated Sheet Metal Stand
9301450	Floor Stand, Angle Iron
9301400	Trigger ‘Deadman” Switch
9501640	S350D & S400B Brobolube
-	Additional Blade(s) - *Custom to Client Requirements*

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℃ to +50℃.*
- *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. 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 provided. For added stability, it is strongly recommended that the machine stand is fastened to the floor by using loxins (not provided). When positioning & fastening the unit, please refer to the hole locations shown in *Figure 2*.

BENCH MODELS *(Fig. 2.1 & 2.2)*

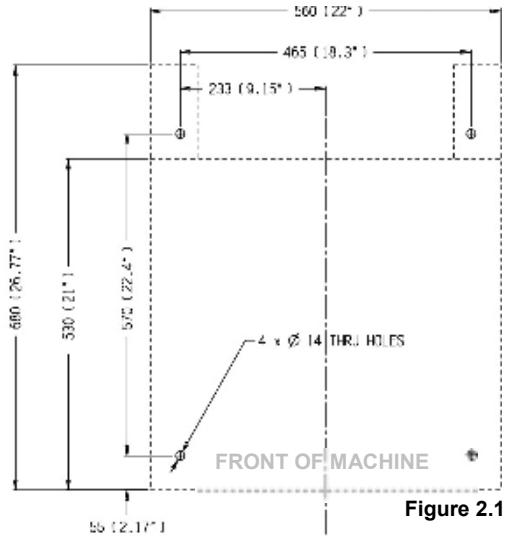


Figure 2.1

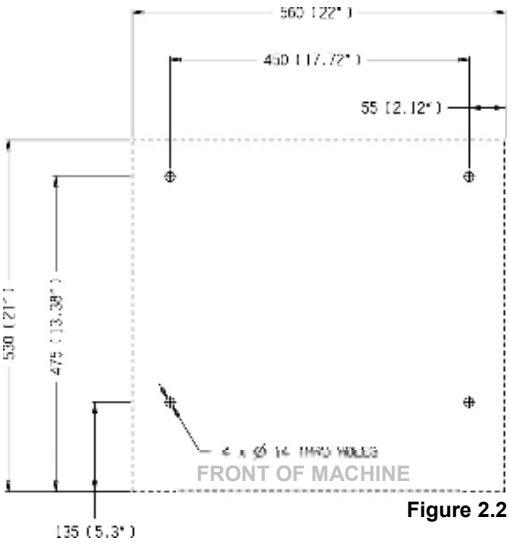


Figure 2.2

FLOOR MODELS *(Fig. 2.3 & 2.4)*

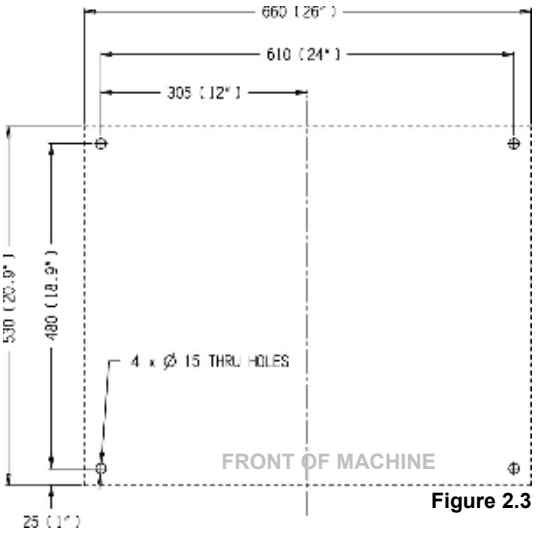


Figure 2.3

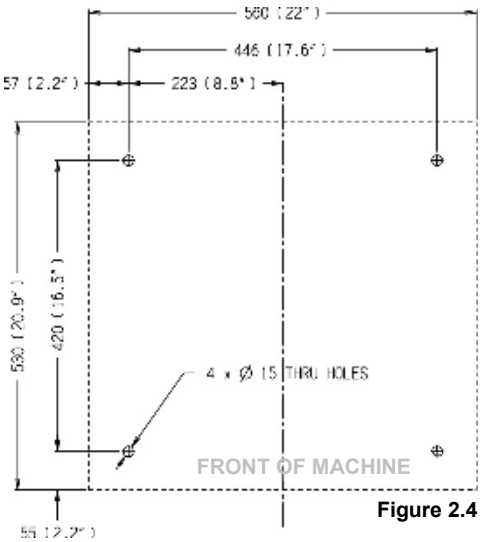


Figure 2.4

Figure 2. *Anchoring Hole Locations*

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

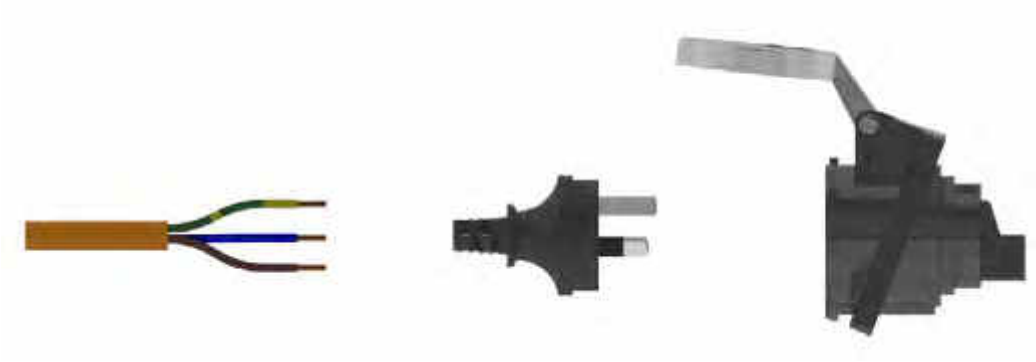


Figure 3.1 Connection 3 pins – 1 Phase

b) **Three phase machines** should be fitted with a suitable, approved **four pin plugs** (i.e. three phase & earthing - **not provided**)

Active = Brown, White. Dark Blue
Earth = Green/Yellow

VOLTAGE
415V/3PH/10A min

MAIN VOLTAGE
415V/3PH

Figure 3.2 Connection for "4-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 by rotating the control switch located on the saw head assembly as shown in *Figure 4* below.

Figure 4. *Main Control Switch*

3) Check that the motor is operating in the correct direction, that is the blade is rotating downwards & into the direction of the vice clamps.
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.

Brobo Group S315/S350/S400 Series Metal Cutting Saw *is now ready for use.*
Chapter 3 provides a detailed description of the various features of the saw & its operating cycles

CHAPTER 2 - Safety & Accident Prevention

The ***Brobo Group*** ***S315/S350/S400 Series Metal Cutting 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 ***BW S315/S350/S400 Series Metal Cutting Saw*** is specifically designed to cut ferrous & 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 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 metal saw, fitted with a ***180-tooth blade*** (supplied as standard by ***Brobo Group***) 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.

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 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 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.

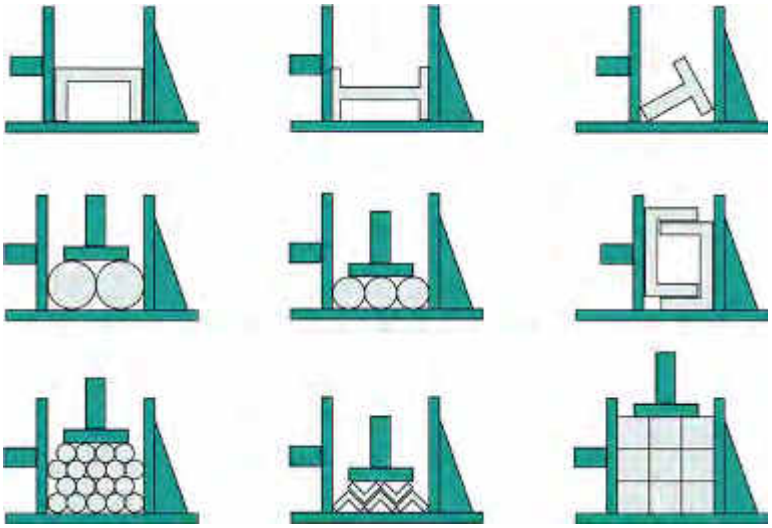


Figure A. *Correct Clamping of Cutting Specimens*

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 (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 ***BW S315/S350/S400 Series Metal Cutting 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

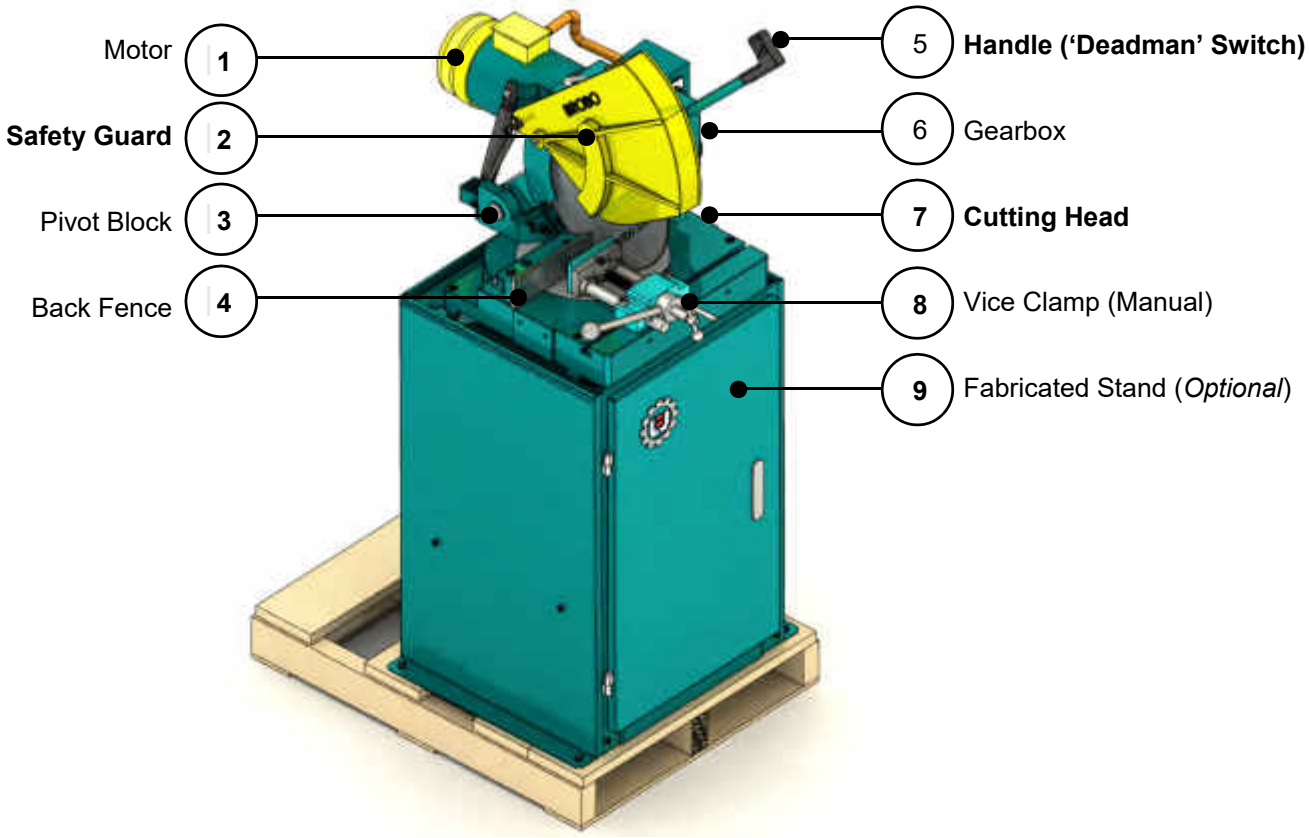
MACHINE SAFETY

- *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 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



3.1.1. 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.

3.1.2. Saw Safety Guard

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.

Figure 6. *Saw Safety Guard*

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

Although comes as a standard, the saw handle can be installed with a Dead Man' type trigger switch enabled instant switching at the operator's control. This particular configuration allows for increased efficiency & safety.

Figure 7. *Saw Handle with "Dead Man" Trigger Switch*

3.1.4. Main Power Standby & Speed Selector Switch

The rotary Main power switch also serves as the speed selector switch. When the speed is selected the saw is set to "STANDBY" mode. The "STANDBY" lamp illuminates to provide a warning to personnel the saw is at the ready. AT any time the "Dead Man" trigger is activated the saw will run.

Figure 8. *Standby Lamp*

3.1.5. Manual Vice Clamp

The manual vice clamp lever allows speedy clamping of material with ergonomically designed clamp lock.

Figure 9. *Manual Vice Clamp*

3.2. Preparation for Operation

The following procedure is recommended for the correct cutting using the ***BW S315/S350/S400 Series Metal Cutting Saw.***

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) To adjust the angle of the cutting surface, if necessary, loosen the 2 bolts, as shown in *Figure 10*. Fine-tune the angle required, then replace & re-tighten the 2 bolts.

3) 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).

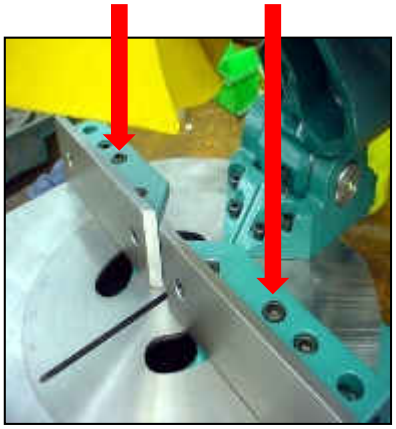


Figure 10. *Angular Adjustment Bolts*

4) 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.

5) 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.*

6) To initiate the cutting process, either turn the switch to **1** or **2** settings or press the **START** buttons.
   - Vice jaws automatically close & apply clamping pressure.
   - Position blade to commence cutting through component & 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

7) The machine is ready for the next cutting cycle.

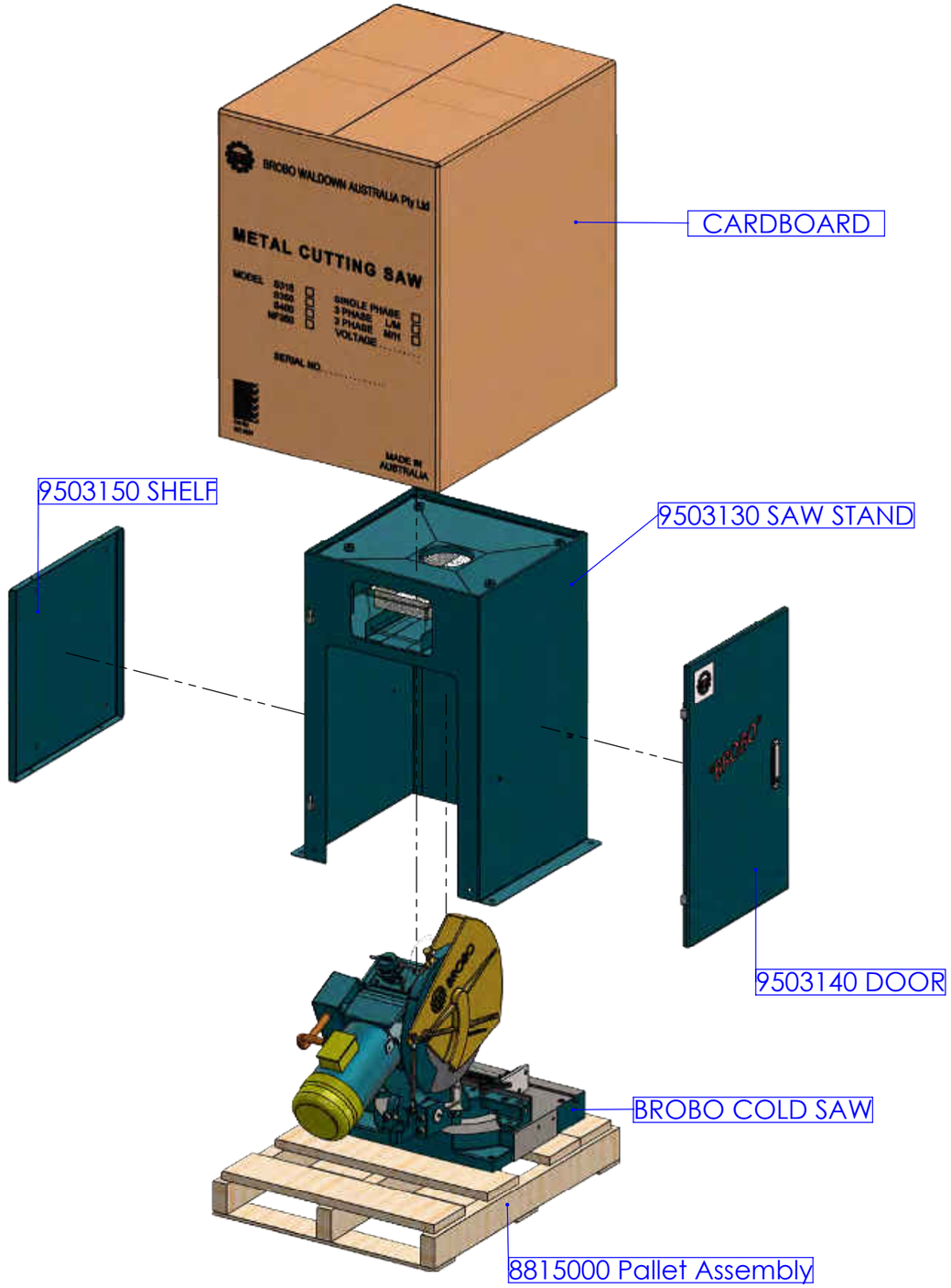
WARNING - BLADE JAMMING

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.

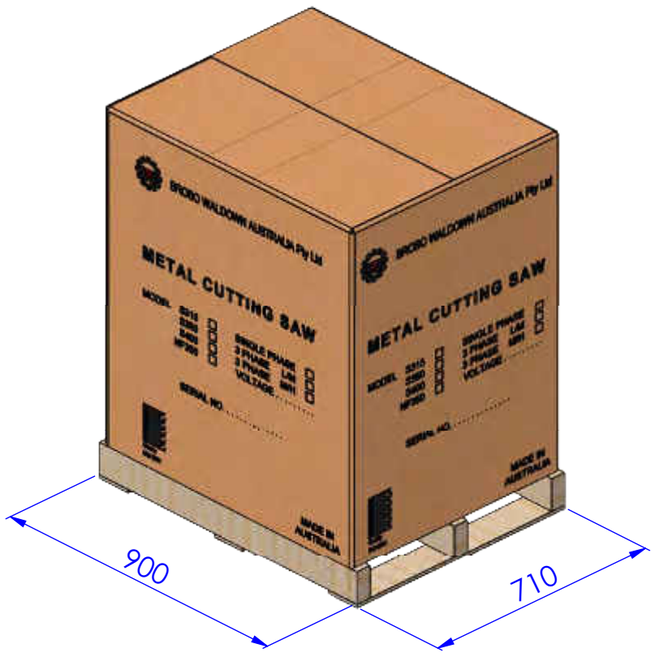
3.3. Operation Recommendations

- 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.
- Do not allow the machine's gearbox to run idle in the upright position for more than ***3 minutes*** otherwise, damage can occur to the drive system.
- The rate of feed affects the quality of the final cut & blade life. This varies also by the material & cross-sectional dimensions. When cutting stainless steel or high carbon steel (***Brinell hardness above 200***), the slowest speed machine should be used together with a cobalt type high-speed steel blade.
- 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***. Thus, it is recommended that slower speeds be used for hard & tough materials & higher speeds for soft, ductile materials. Note that for non-ferrous materials such as brass, copper, aluminium etc. require much faster speeds than provided on this machine. If these are the majority of materials cut, a *Brobo NF Series* machine should be considered.

CHAPTER 4 - Drawings, Layouts, Assembly & Spare Parts


BROBO WALDOWN AUSTRALIA Pty Ltd
METAL CUTTING SAW
MODEL S315 S350 S400 NF350
SINGLE PHASE
3 PHASE L/M
3 PHASE M/H
VOLTAGE
SERIAL NO
MADE IN AUSTRALIA
CARDBOARD
9503150 SHELF
9503130 SAW STAND
9503140 DOOR
BROBO COLD SAW
8815000 Pallet Assembly


BROBO WALDOWN AUSTRALIA Pty Ltd
METAL CUTTING SAW
MODEL S315 S350 S400 NF350
SINGLE PHASE
3 PHASE L/M
3 PHASE M/H
VOLTAGE
SERIAL NO
MADE IN AUSTRALIA
1052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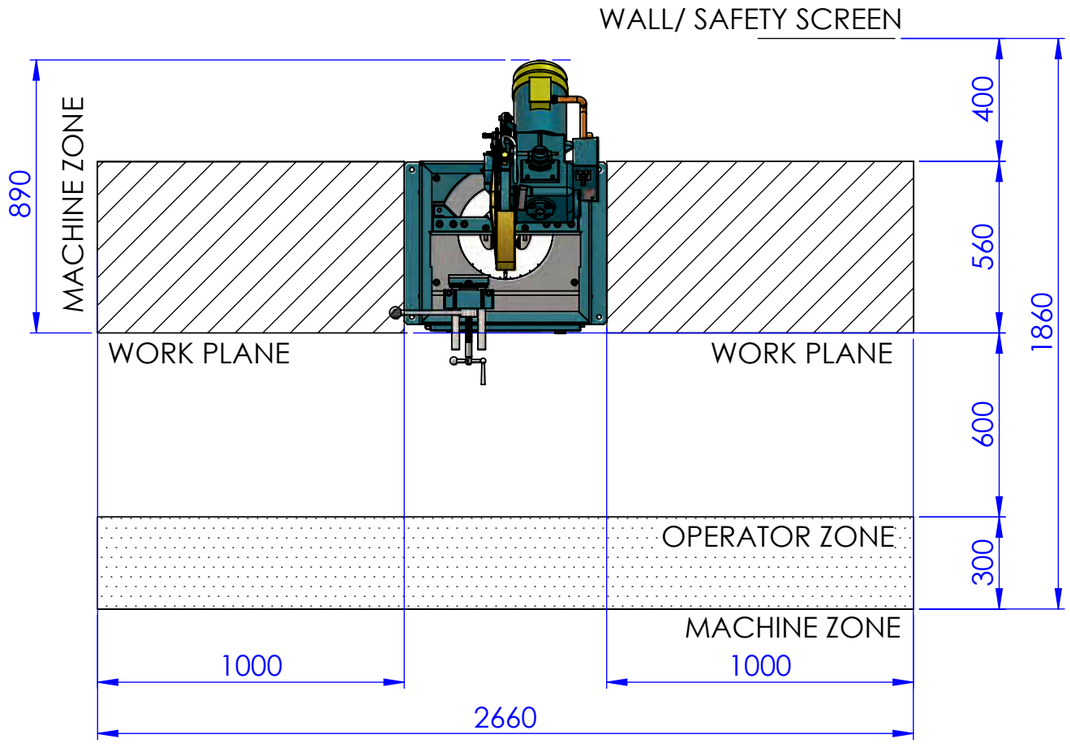
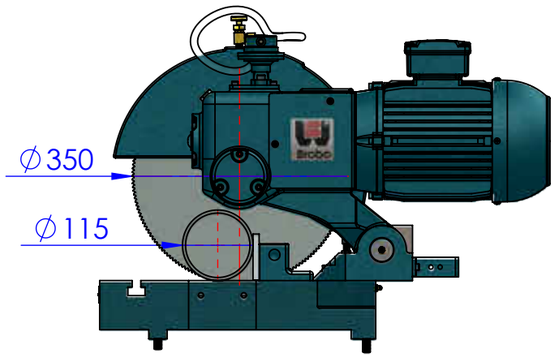
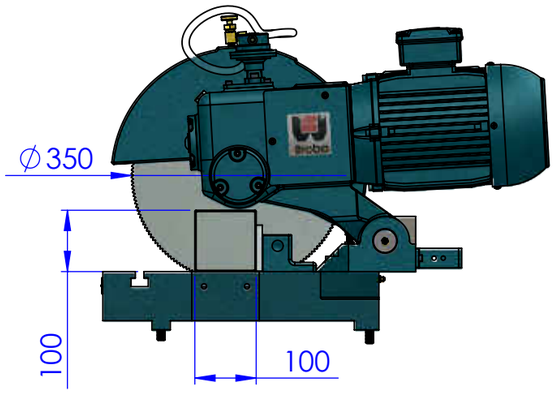
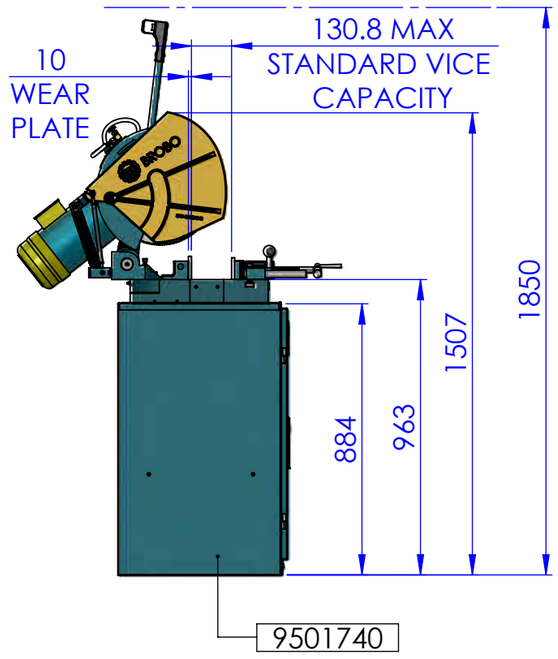


SAFE WORKING ZONE

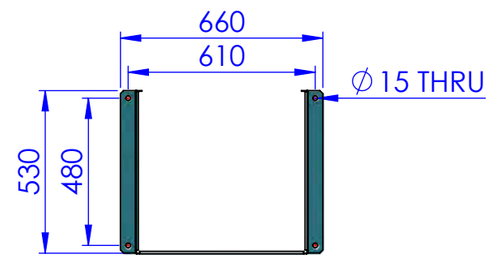




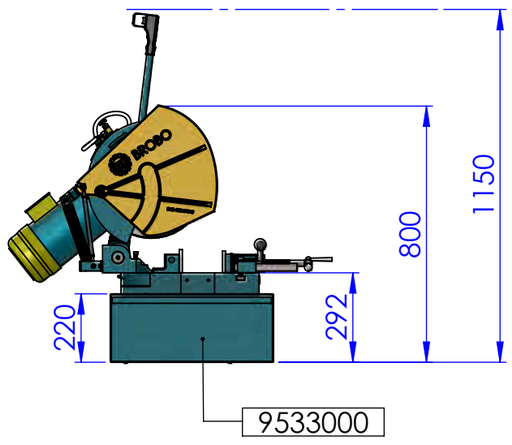
S350 CUTTING CAPACITY



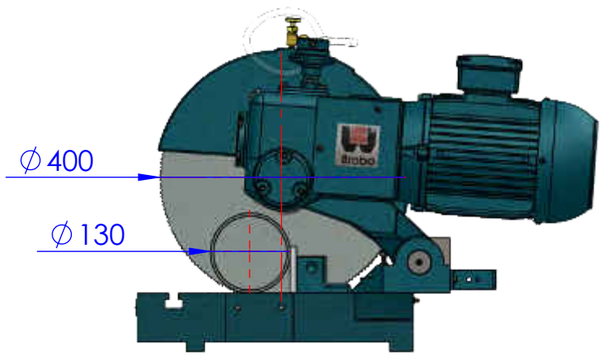
INTEGRATED STAND

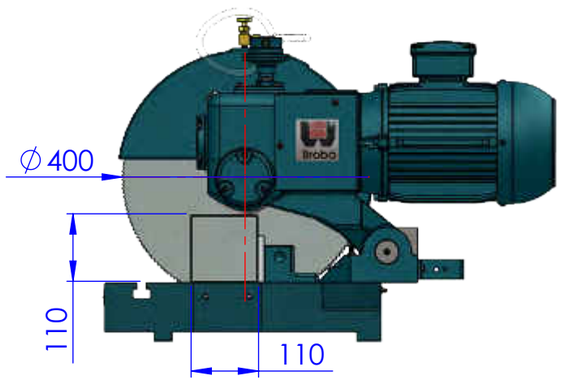


ANCHORING HOLE LOCATION
FLOOR MODEL



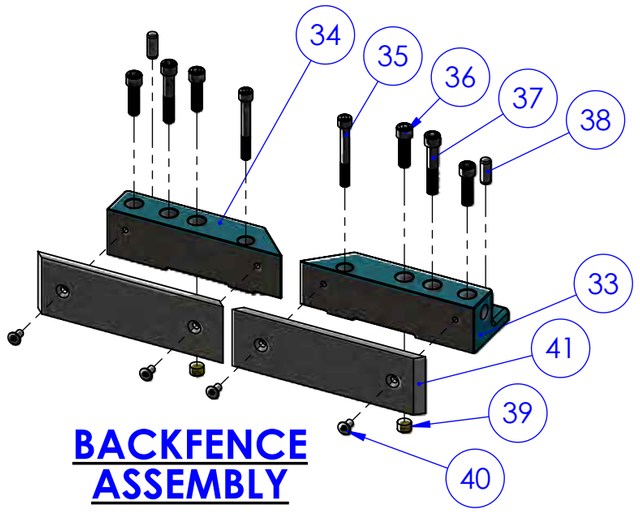
BENCH MOUNTED





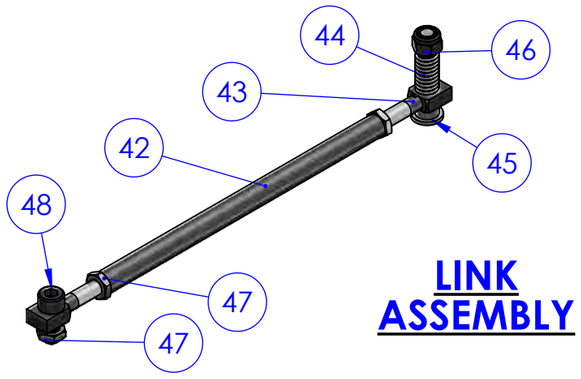
S400 CUTTING CAPACITY

ITEM NO.	PART NUMBER	DESCRIPTION	
33	9332060	Back Fence RH	1
34	9332070	Back Fence LH	1
35	8705210	Socket Head Cap Screw M10x80	2
36	8705250	Socket Head Cap Screw M12x40	4
37	8705280	Socket Head Cap Screw M12x65	2
38	8715140	Dowel Pin ⌀12x30	2
39	9304220	Locking Pad ⌀15.9 x 9.5 (Brass)	2
40	8705380	Flat Countersink M8x16	4
41	9514280	Wear Plate 10mm	2

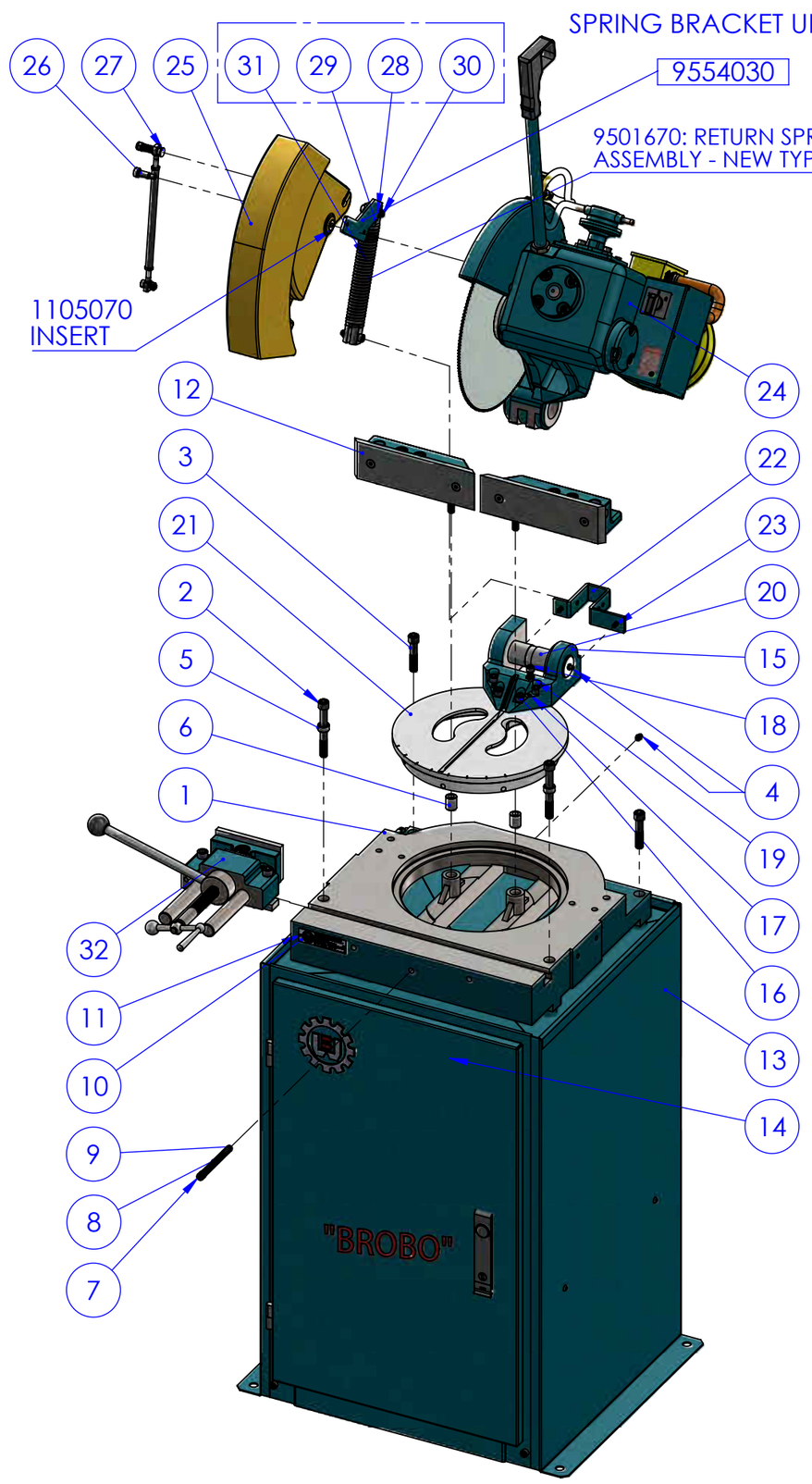


BACKFENCE ASSEMBLY

ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
42	9544010	Lower Link 190mm	1
43	9504350	Swing Bolt Hole 8mm	2
44	9305150	Saw Compression Spring	1
45	9314690	Socket Head Shoulder Screw M8x50	1
46	8735160	Nylon Nut Lock M8	1
47	8715210	Hex Lock Nut	3
48	8705120	Socket Head Cap Screw M8x20	1

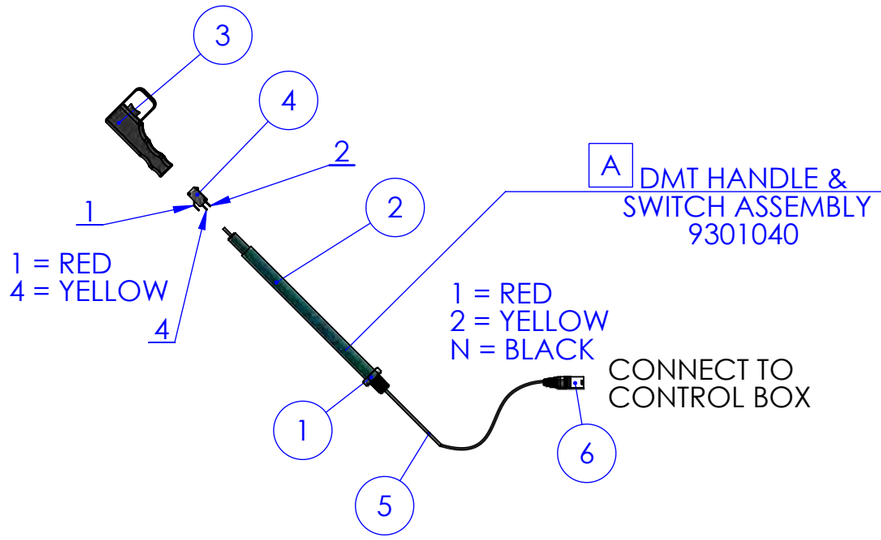


LINK ASSEMBLY

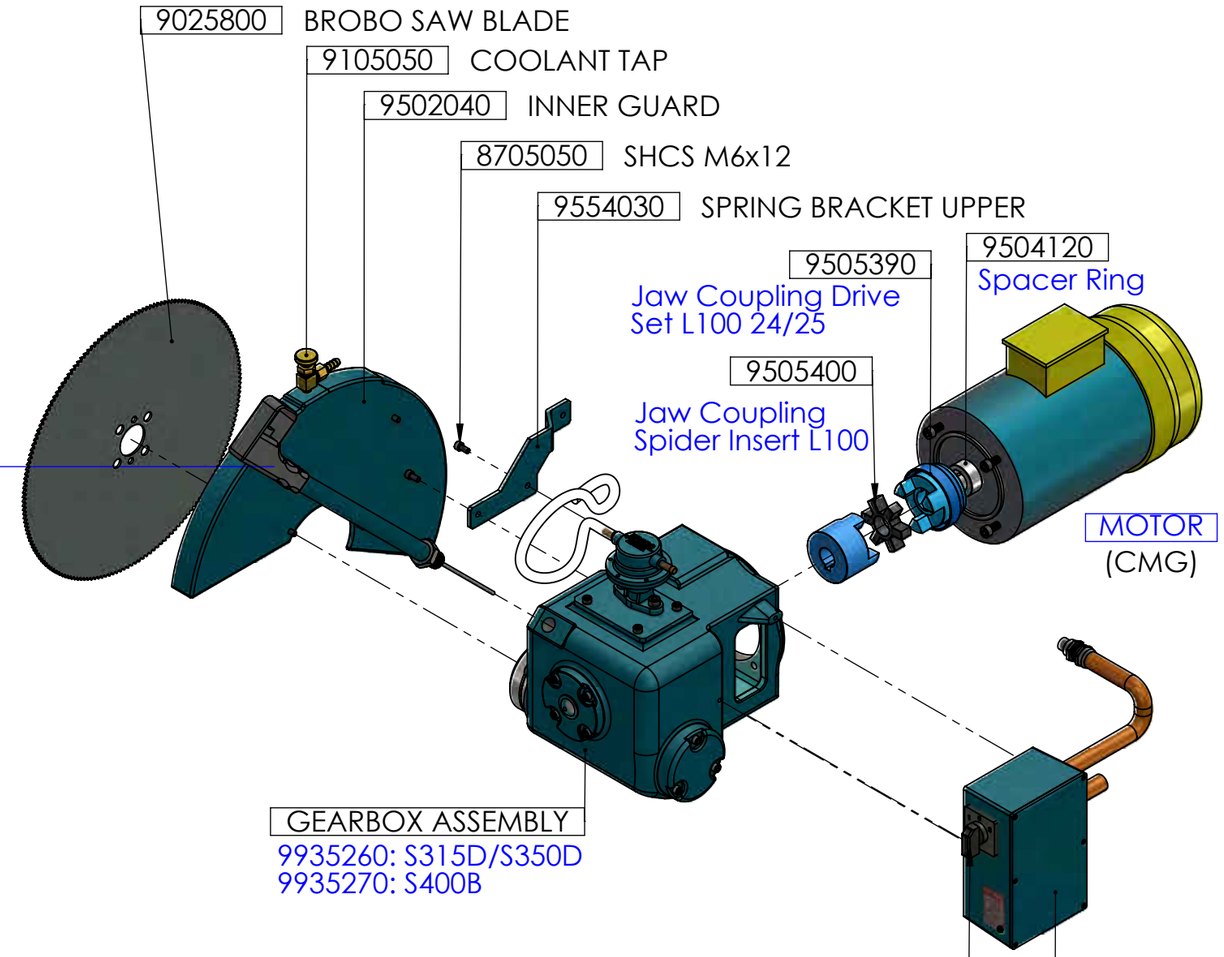


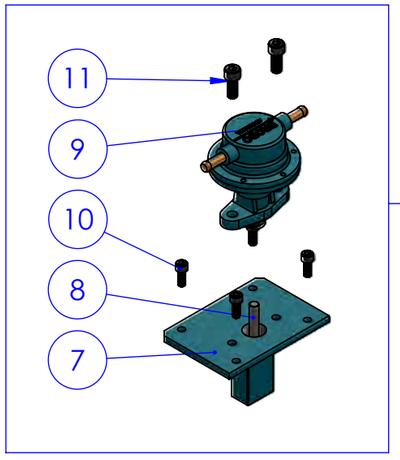
ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	9312000	Clamping Table (Original)	1
2	8705300	Socket Head Cap Screw M12x100	2
3	8705270	Socket Head Cap Screw M12x60	2
4	9305110	Grease Nipple M8x1.25	3
5	9301430	Clamping Table Bush	2
6	9304770	Hollow Dowel	2
7	8715810	Socket Set Screw M12x16	1
8	9315000	Spring 9.5 x 1.6 x 110 L	1
9	9324180	Pin Lock 10	1
10	1065100	Brobo Name Plate	1
11	8715730	Drive Pin	2
12	BFA	Back Fence Assembly	1
13	9501740	Stand/Tank Assembly	1
14	9311110	Coolant Tank Assembly	1
15	9512030	Pivot Block (Manual Saw M6)	1
16	8725500	Socket Head Cap Screw M10x35	4
17	8725540	Roll Pin 6x40	2
18	8705140	Socket Head Cap Screw M8x35	1
19	8715210	Hex Thin Lock Nut M8	1
20	9304030	Pivot Shaft	1
21	9312020	Rotary Table	1
22	9324270	Spring Bracket Lower	1
23	8705060	Socket Head Cap Screw M6x16	2
24	S350D	Gearbox Assembly (Manual)	1
25	9542050	Saw Outer Guard	1
26	8705440	Socket Head Shoulder Screw M10x40	1
27	9501300	Link Assembly	1
28	8715210	Hex Lock Nut	2
29	9502120	Spring Clevis	2
30	8705140	Socket Head Cap Screw M8x35	2
31	9315080	Spring	1
32	9311060	Vice Standard	1

ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	9305140	Hex Thin Nut M20x1.5	1
2	9104010	Deadman Swing Handle	1
3	9105040	Deadman Trigger	1
4	5000250	Micro Switch (EMAS #L5K13PUM211)	1
5	9301030	Cable White	1
6	9615490	3 PIN XLR Line Plugs AC3MM PD5302	1



A DMT HANDLE & SWITCH ASSEMBLY 9301040

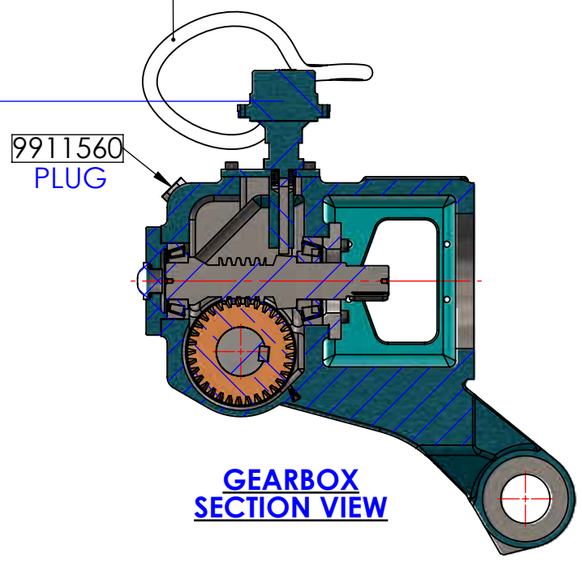




PUMP UPGRADE KIT
9501660

9505030 NYLON HOSE KIT

9911560
PLUG



GEARBOX SECTION VIEW

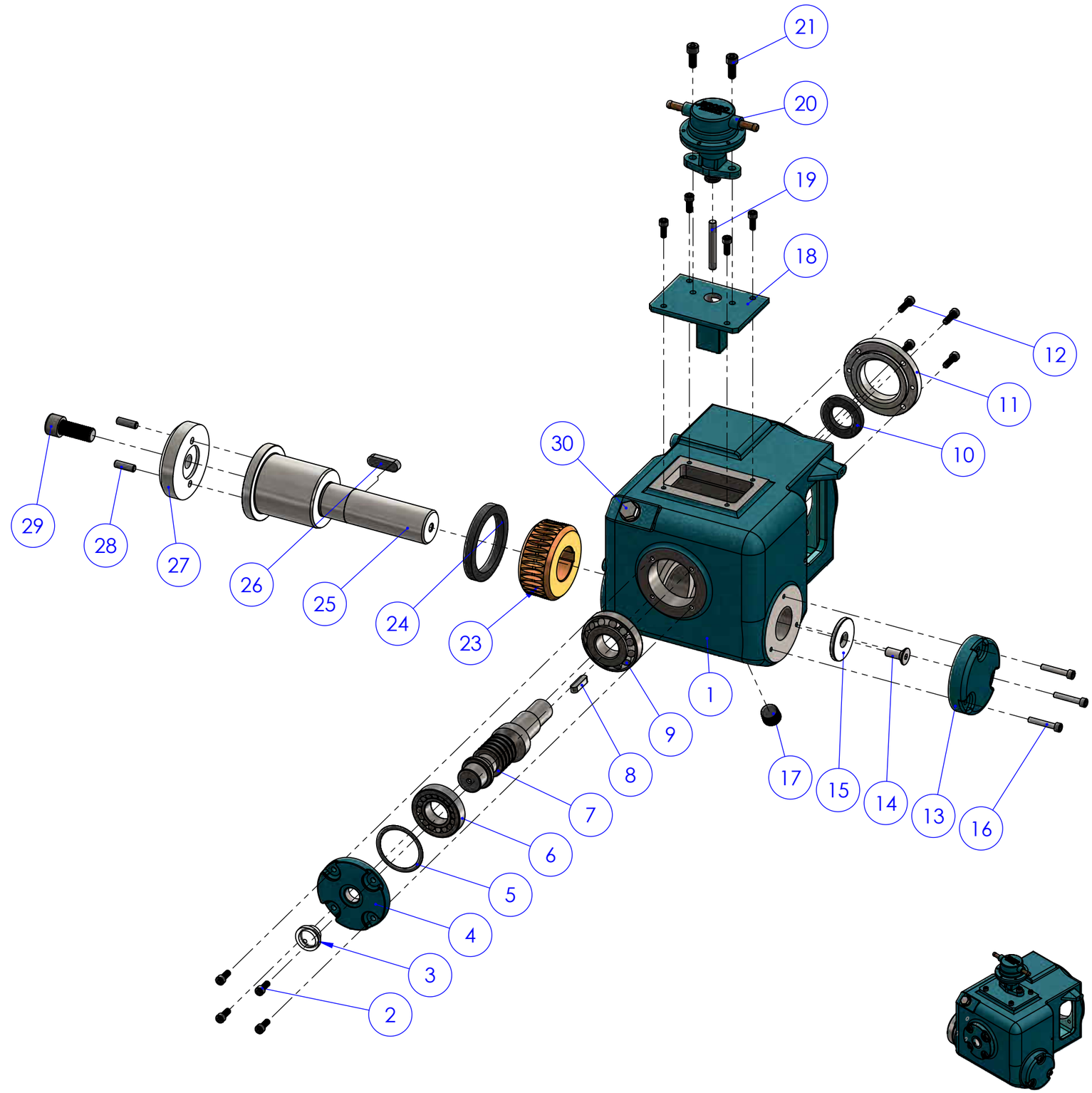
ITEM NO.	PART NUMBER	DESCRIPTION	
7	9324070	Pump Mounting Plate	1
8	9304017	Pin - Coolant Pump	1
9	9405450	Coolant Pump	1
10	8705060	Socket Head Cap Screw M6x16	4
11	8705120	Socket Head Cap Screw M8x20	2

TRIGGER SWITCH

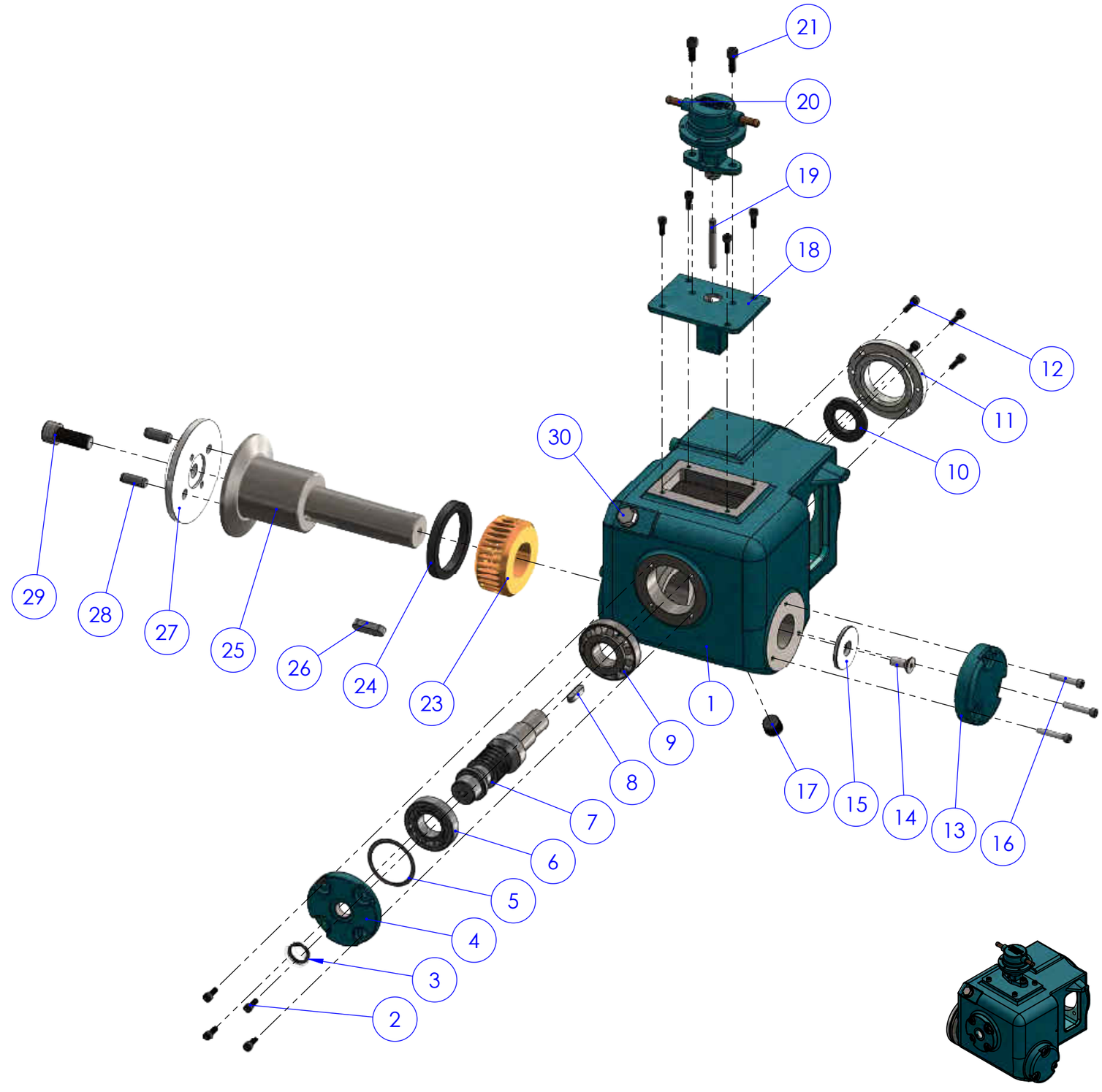
FIELD KIT = A + B

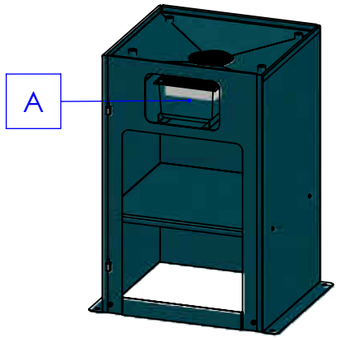
9301800: SINGLE PHASE
9301810: 3 PHASE

ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	9512000	Saw Gearbox	1
2	8705060	Socket Head Cap Screw M6x16	8
3	9405010	Oil Sight Window with Flat Gasket	1
4	9302120	Front Cover Plate	1
5	9305070	Shim 50x60x0.05	1
6	9305020	Front Taper Roller Bearing 30x62x17.25 (30206)	1
7	9314000	Worm Shaft	1
8	9304430	Key Wormshaft 7x8x31	1
9	9305030	Rear Taper Roller Bearing 30x72x20.75 (30306)	1
10	9315040	Oil Seal 52x30x7 (TC12495)	1
11	9312100	Retainer Ring	1
12	8705070	Socket Head Cap Screw M6x20	4
13	9302110	Side Cover Plate	1
14	8705420	Flat Socket Head Cap Screw M10x25	1
15	9304130	Retainer Washer 55x10	1
16	8705090	Socket Head Cap Screw M6x35	3
17	9315090	Sum Plug 1/2" NPT	1
18	9324070	Pump Mounting Plate	1
19	9304017	Pin - Coolant Pump	1
20	9405450	Coolant Pump	1
21	8705120	Socket Head Cap Screw M8x20	2
22	9505030	Nylon Hose Kit 8mm	1
23	9314050	WormWheel	1
24	9305010	Double Seal 90x70x10	1
25	9504080	Main Spindle S315.S350	1
26	9314420	Key - Main Spindle	1
27	9504090	Spindle Counter Plate (S315D, S350D)	1
28	8715080	Dowel Pin 8x25	2
29	8735090	Retaining Screw M16x40 (LEFT HAND Threaded)	1
30	9911560	M20 Plug	1



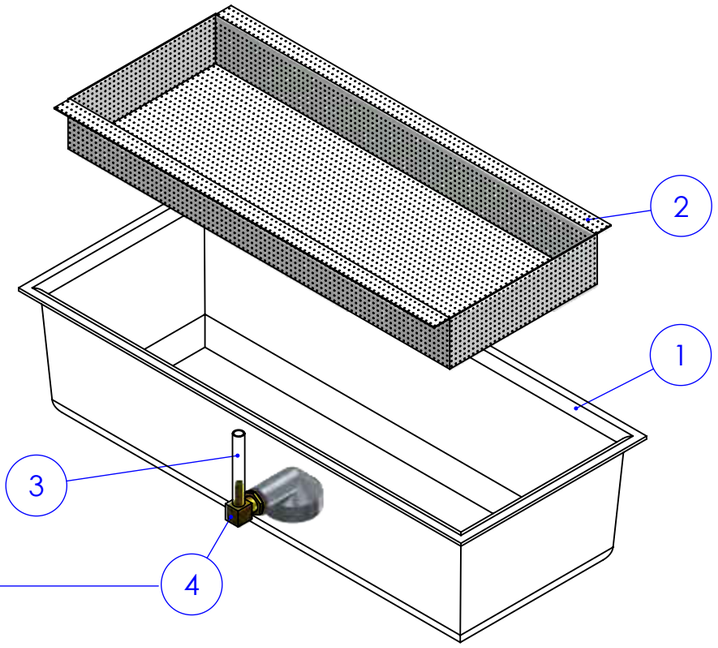
ITEM NO.	PART NO.	DESCRIPTION	QTY.
1	9512000	Saw Gearbox	1
2	8705060	Socket Head Cap Screw M6x16	8
3	9405010	Oil Sight Window with Flat Gasket	1
4	9302120	Front Cover Plate	1
5	9305070	Shim 50x60x0.05	1
6	9305020	Front Taper Roller Bearing 30x62x17.25 (30206)	1
7	9314000	Worm Shaft	1
8	9304430	Key Wormshaft 7x8x31	1
9	9305030	Rear Taper Roller Bearing 30x72x20.75 (30306)	1
10	9315040	Oil Seal 52x30x7 (TC12495)	1
11	9312100	Retainer Ring	1
12	8705070	Socket Head Cap Screw M6x20	4
13	9302110	Side Cover Plate	1
14	8705420	Flat Socket Head Cap Screw M10x25	1
15	9304130	Retainer Washer 55x10	1
16	8705090	Socket Head Cap Screw M6x35	3
17	9315090	Sum Plug 1/2" NPT	1
18	9324070	Pump Mounting Plate	1
19	9304017	Pin - Coolant Pump	1
20	9405450	Coolant Pump	1
21	8705120	Socket Head Cap Screw M8x20	2
22	9505030	Nylon Hose Kit 8mm	1
23	9314050	WormWheel	1
24	9305010	Double Seal 90x70x10	1
25	9814010	Main Spindle S400	1
26	9314420	Key - Main Spindle	1
27	9824000	Spindle Counter Plate S400	1
28	8715140	**Dowel Pin ⌀12x30**	2
29	8735090	Retaining Screw M16x40 (LEFT HAND Threaded)	1
30	9911560	M20 Plug	1



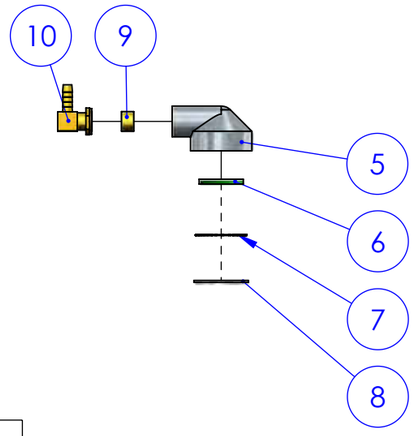


COOLANT TANK LOCATION

ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	9505540	Coolant Tank (Plastic)	1
2	9523040	Chip Basket	1
3	9504170	Plastic Clear Tube ID ⌀8	1
4	9523050	Suction Head - Filter Assembly	1

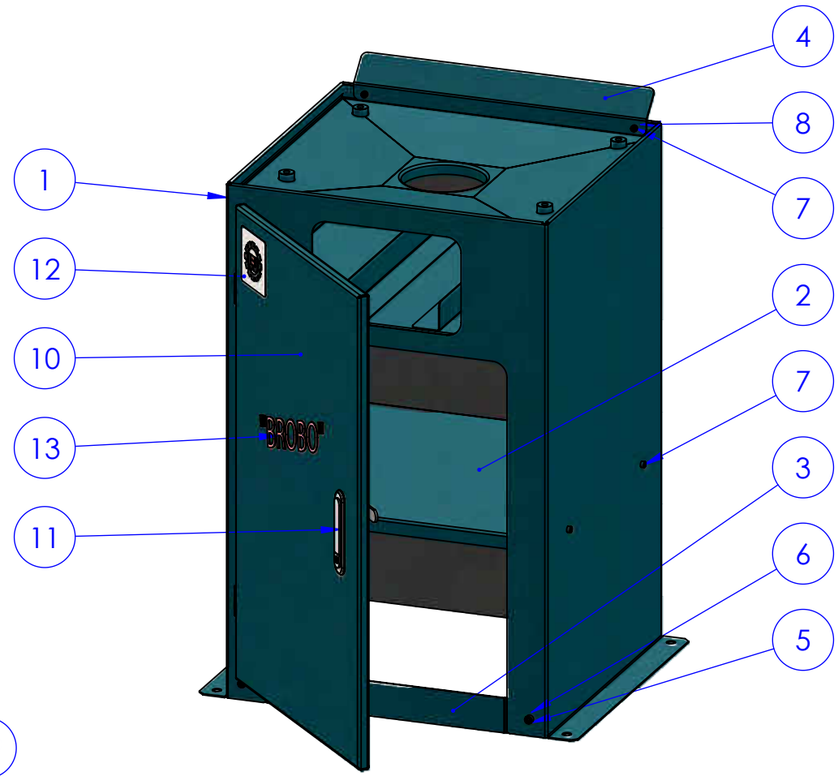


A **COOLANT TANK ASSEMBLY**

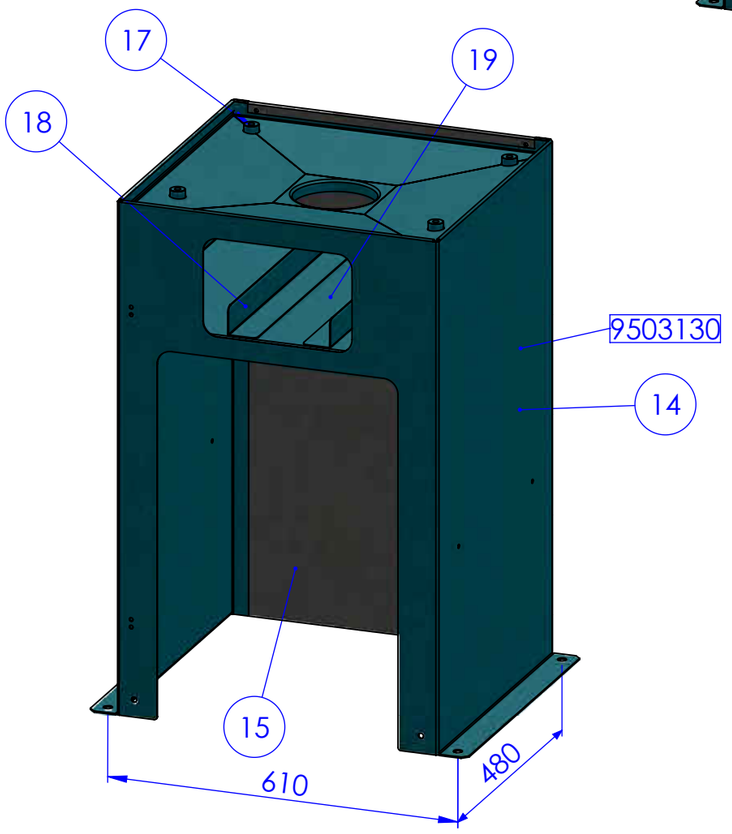


B **SUCTION HEAD ASSEMBLY**

SUCTION HEAD ASSEMBLY(9523050)			
ITEM NO.	PART NO.	DESCRIPTION	QTY.
5	9302220	Suction Head	1
6	9505005	GREEN FILTER	1
7	9503060	Filtering Disc	1
8	1005230	CIrclip Internal ⌀42	1
9	9305970	Reducing Bush 1/4" - 3/8"	1
10	9505460	Elbow SIngle Barbed 5/16T x 1/4 BSP	1

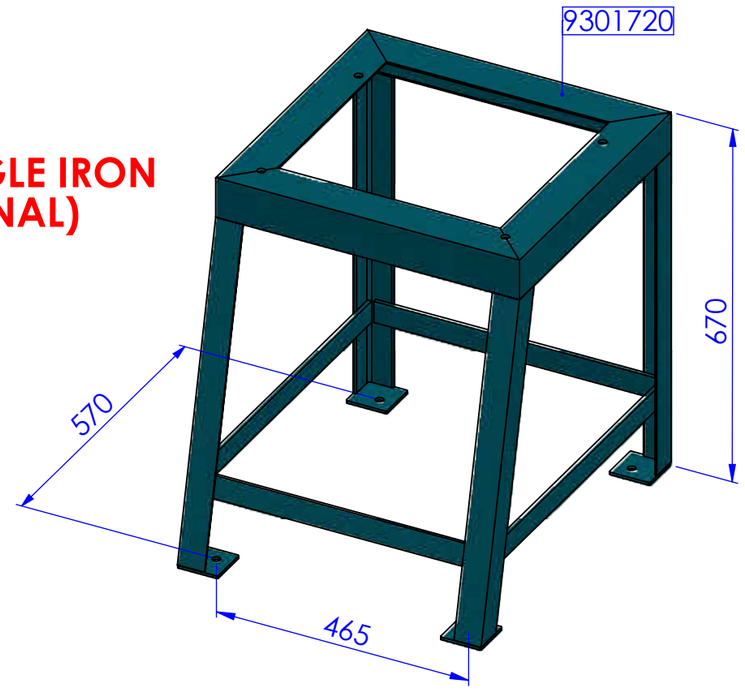


ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	9503130	Sheetmetal Stand	1
2	9503150	Saw Stand Shelf	1
3	9503160	Stand Brace	1
4	9503130.C08	Cover	1
5	8705120	Socket Head Cap Screw M8x20	2
6	8705720	Hex Nut M8	2
7	8705060	Socket Head Cap Screw M6x16	6
8	8705750	Hex Nut M6	6
9	9505017	Hinge	2
10	9503140	Saw Stand Door	1
11	9505016	Saw Stand Swing Handle (Latch Included)	1
12	8115080	Brobo Logo 65	1
13	9505018	"BROBO" Large	1

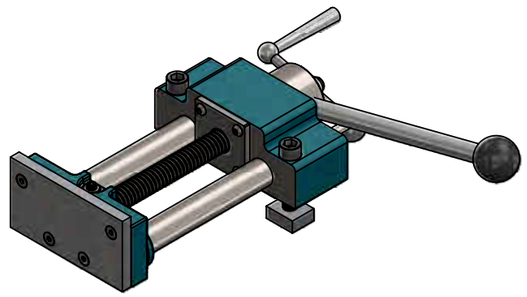


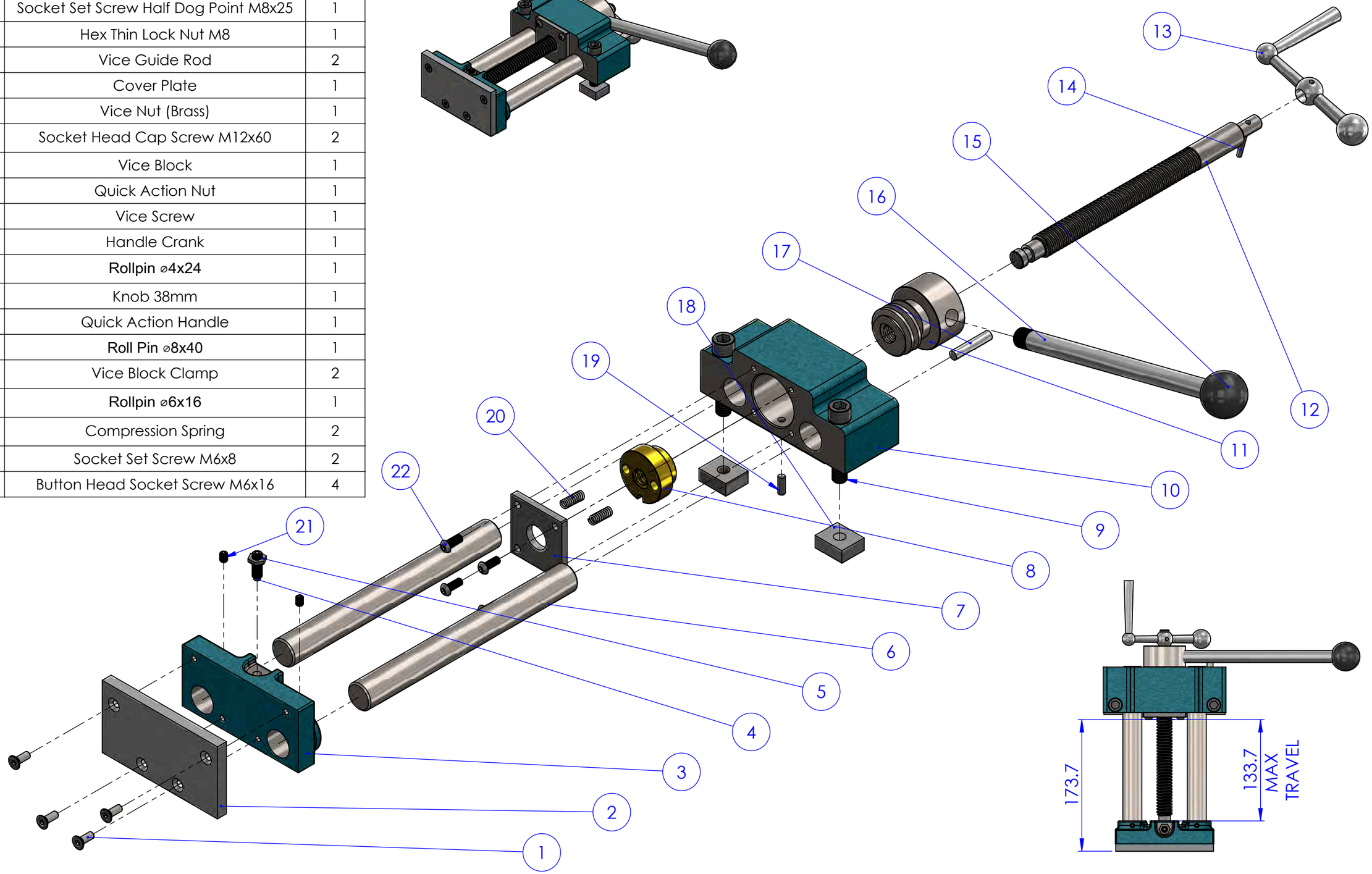
9503130 SHEETMETAL STAND			
ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
14	9503130.C01	Front	1
15	9503130.C02	Back	1
16	9503130.C03	Top	1
17	9503130.C04	Rod	4
18	9503130.C05	Bended Equal Angle 1.6x50x515	2
19	9503150	Saw Stand Shelf	1

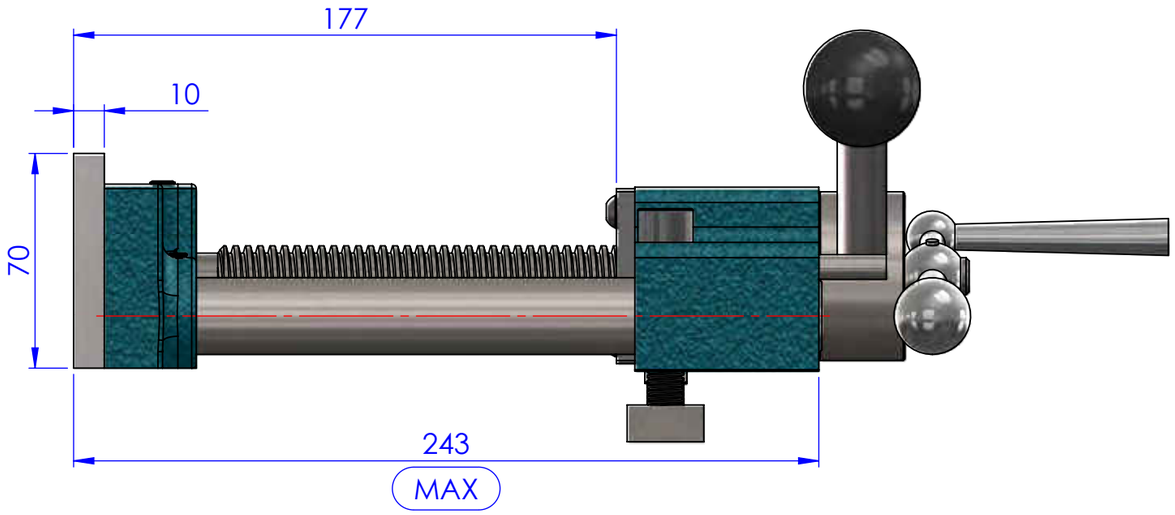
STAND ANGLE IRON (OPTIONAL)



ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	8705340	Flat Socket Head Cap Screw M6x16	4
2	9314100	Jaw Pad (Front)	1
3	9312090	Vice Jaw	1
4	8705500	Socket Set Screw Half Dog Point M8x25	1
5	8715210	Hex Thin Lock Nut M8	1
6	9304080	Vice Guide Rod	2
7	9304160	Cover Plate	1
8	9304120	Vice Nut (Brass)	1
9	8705270	Socket Head Cap Screw M12x60	2
10	9312050	Vice Block	1
11	9304170	Quick Action Nut	1
12	9314020	Vice Screw	1
13	9301440	Handle Crank	1
14	8705940	Rollpin ⌀4x24	1
15	1045020	Knob 38mm	1
16	9314090	Quick Action Handle	1
17	8735380	Roll Pin ⌀8x40	1
18	9314280	Vice Block Clamp	2
19	8705980	Rollpin ⌀6x16	1
20	9405090	Compression Spring	2
21	8705460	Socket Set Screw M6x8	2
22	8726100	Button Head Socket Screw M6x16	4



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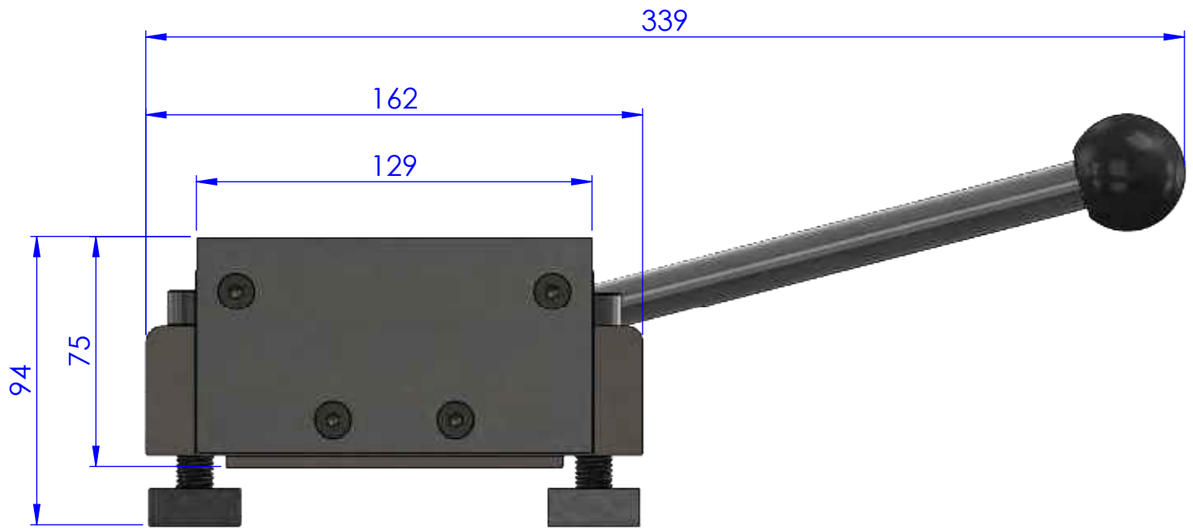
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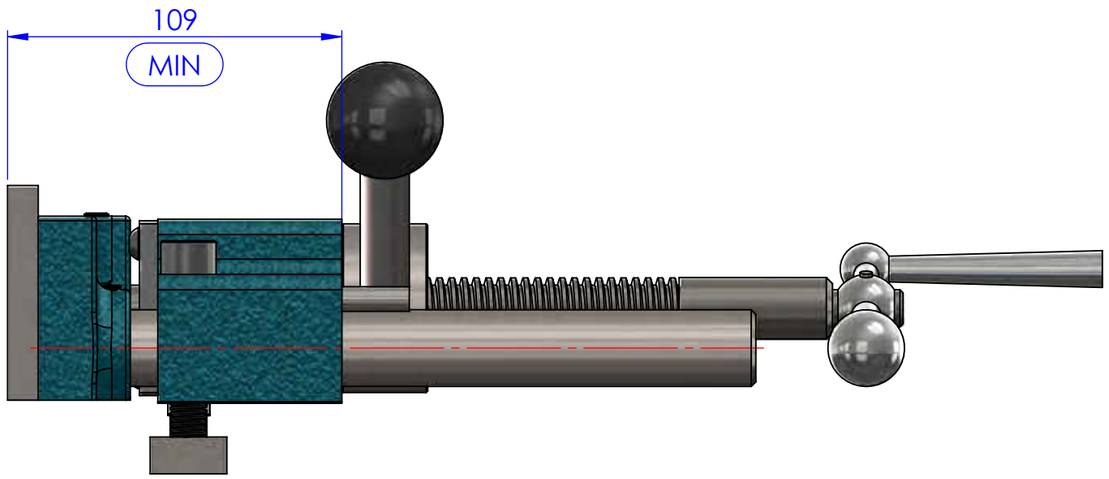
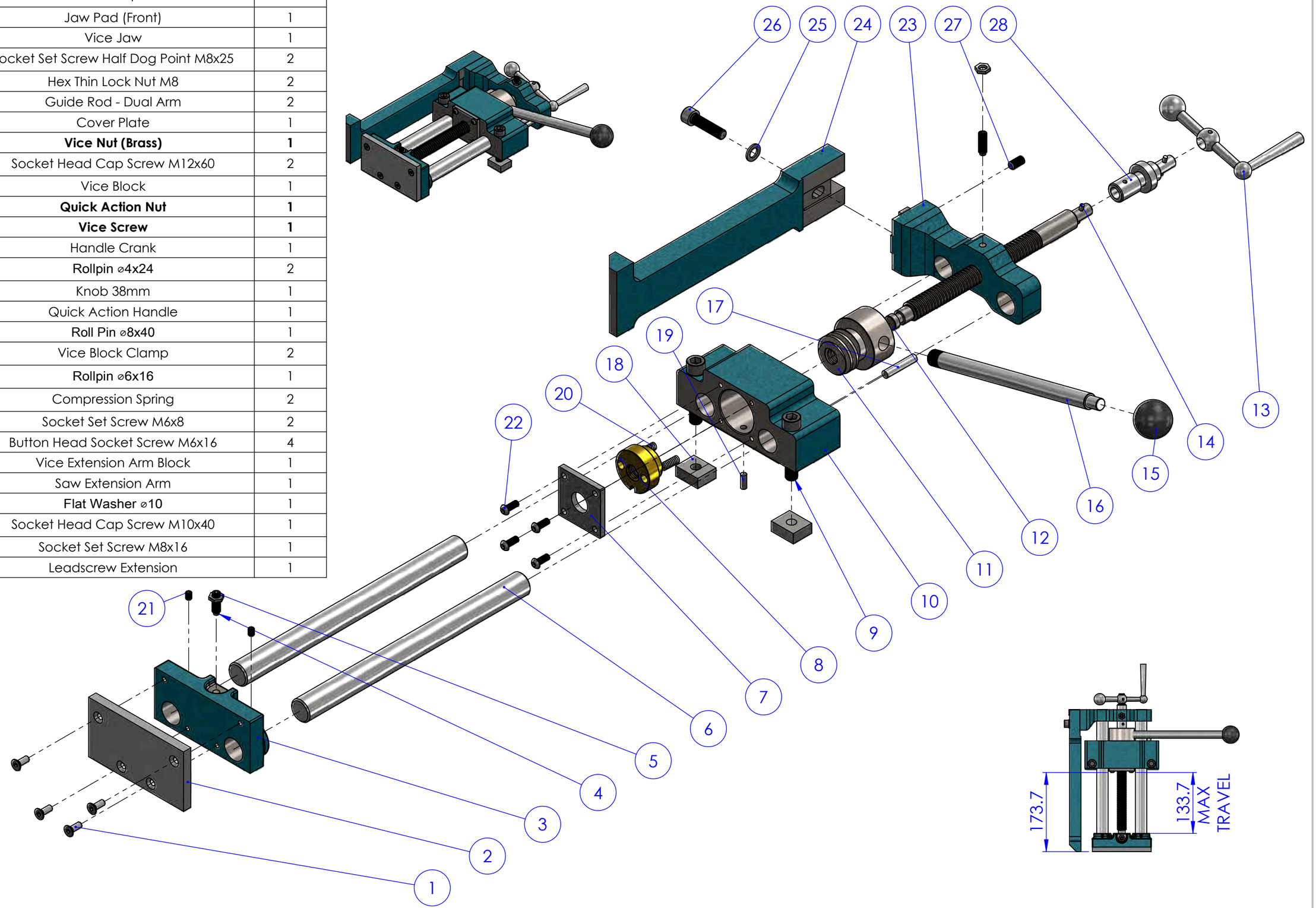
94
75

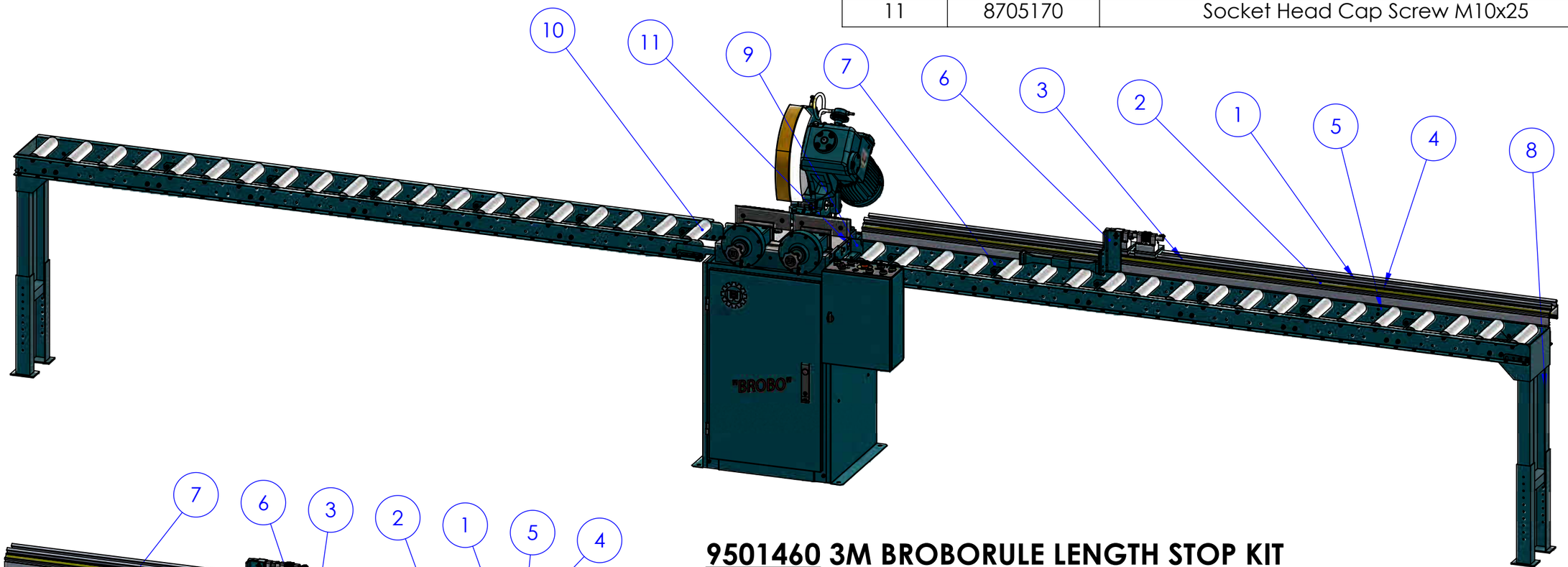

109
MIN

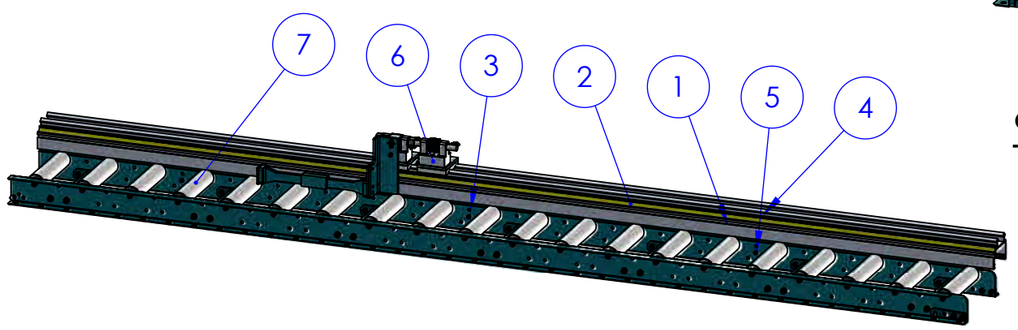
ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	8705340	Flat Socket Head Cap Screw M6x16	4
2	9314100	Jaw Pad (Front)	1
3	9312090	Vice Jaw	1
4	8705500	Socket Set Screw Half Dog Point M8x25	2
5	8715210	Hex Thin Lock Nut M8	2
6	9304016	Guide Rod - Dual Arm	2
7	9304160	Cover Plate	1
8	**9304120**	**Vice Nut (Brass)**	**1**
9	8705270	Socket Head Cap Screw M12x60	2
10	9312050	Vice Block	1
11	**9304170**	**Quick Action Nut**	**1**
12	**9314020**	**Vice Screw**	**1**
13	9301440	Handle Crank	1
14	8705940	Rollpin ⌀4x24	2
15	1045020	Knob 38mm	1
16	9314090	Quick Action Handle	1
17	8735380	Roll Pin ⌀8x40	1
18	9314280	Vice Block Clamp	2
19	8705980	Rollpin ⌀6x16	1
20	9405090	Compression Spring	2
21	8705460	Socket Set Screw M6x8	2
22	8726100	Button Head Socket Screw M6x16	4
23	9302260	Vice Extension Arm Block	1
24	9302250	Saw Extension Arm	1
25	8725470	Flat Washer ⌀10	1
26	8725960	Socket Head Cap Screw M10x40	1
27	8705490	Socket Set Screw M8x16	1
28	9304015	Leadscrew Extension	1



OPTIONAL

BOM Table			
ITEM NO.	**PART NUMBER**	**DESCRIPTION**	**QTY.**
1	9505910	Carriage Track 3.0 Metre	1
2	9505940	Measuring Tape 5Mx19	1
3	9512110	Angle Bracket	3
4	8705570	Button Head Cap Screw M8x40	3
5	8705580	Hex Head Screw M8x40	3
6	9501560	Mirco Flip Included Arm	1
7	9501210	Brobo 68 Kg Conveyor Roller 3000x305x150mm Pitch	2
8	9504320	Adjuststable Stand 610 - 1016 mm	2
9	9501240	Mounting Bracket Conveyor RH	1
10	9501250	Mounting Bracket Conveyor LH	1
11	8705170	Socket Head Cap Screw M10x25	4





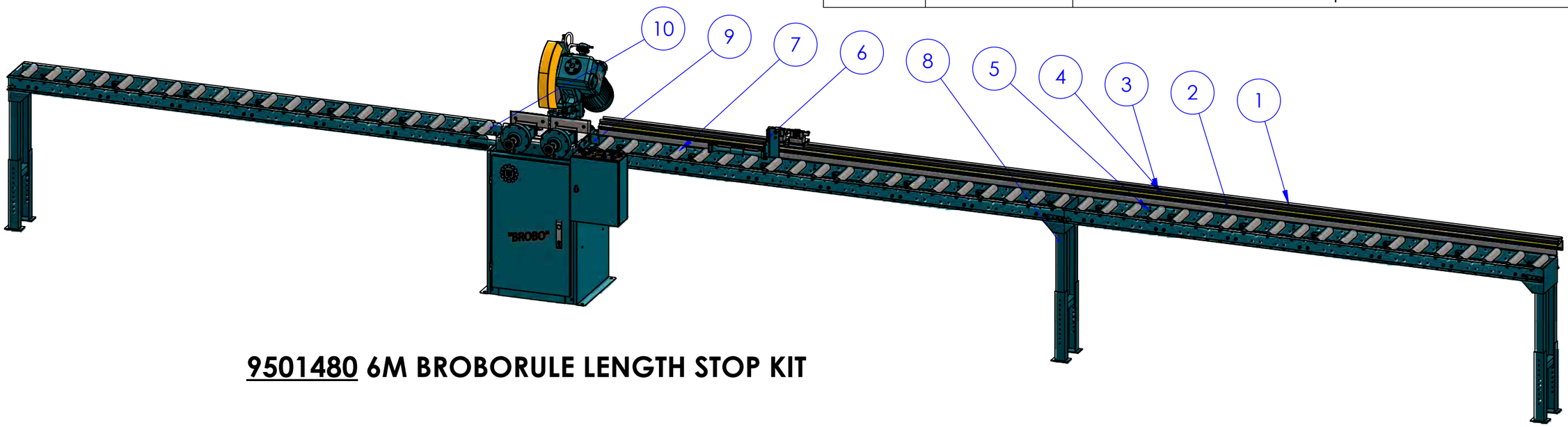
9501450 3M LENGTH STOP & CONVEYOR

9501460 3M BROBORULE LENGTH STOP KIT

ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	9505910	Carriage Track 3.0 Metre	1
2	9505940	Measuring Tape 5Mx19	1
3	9512110	Angle Bracket	3
4	8705570	Button Head Cap Screw M8x40	3
5	8705580	Hex Head Screw M8x40	3
6	9501560	Mirco Flip Included Arm	1
7	9501210	Brobo 68 Kg Conveyor Roller 3000x305x150mm Pitch	1

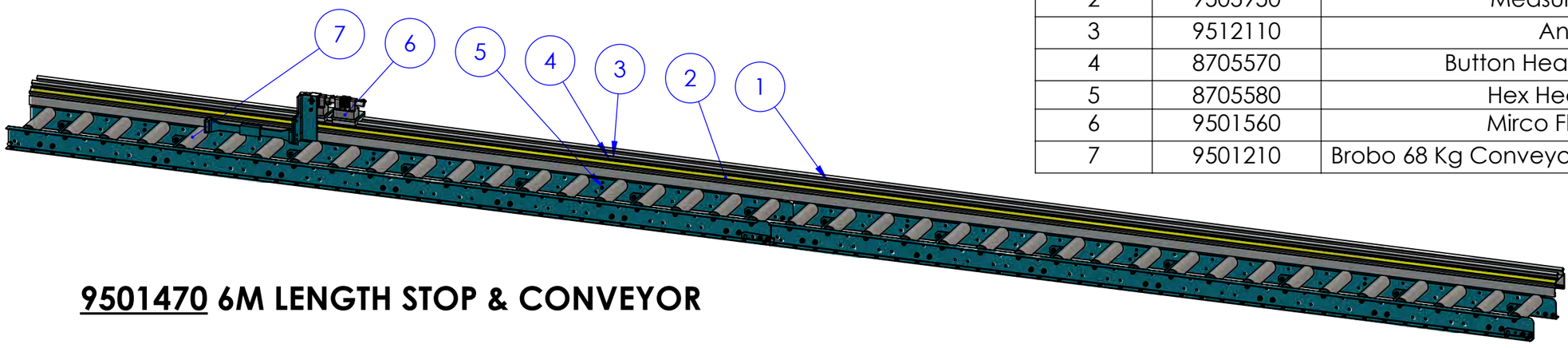
OPTIONAL

ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	9505900	Carriage Track 6.0 Metre	1
2	9505950	Measuring Tape 8Mx19	1
3	9512110	Angle Bracket	6
4	8705570	Button Head Cap Screw M8x40	6
5	8705580	Hex Head Screw M8x40	6
6	9501560	Mirco Flip Included Arm	1
7	9501210	Brobo 68 Kg Conveyor Roller 3000x305x150mm Pitch	3
8	9504320	Adjuststable Stand 610 - 1016 mm	3
9	9501240	Mounting Bracket Conveyor RH	1
10	9501250	Mounting Bracket Conveyor LH	1
11	8705170	Socket Head Cap Screw M10x25	4



9501480 6M BROBORULE LENGTH STOP KIT

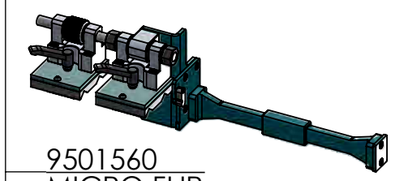
ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	9505900	Carriage Track 6.0 Metre	1
2	9505950	Measuring Tape 8Mx19	1
3	9512110	Angle Bracket	6
4	8705570	Button Head Cap Screw M8x40	6
5	8705580	Hex Head Screw M8x40	6
6	9501560	Mirco Flip Included Arm	1
7	9501210	Brobo 68 Kg Conveyor Roller 3000x305x150mm Pitch	2



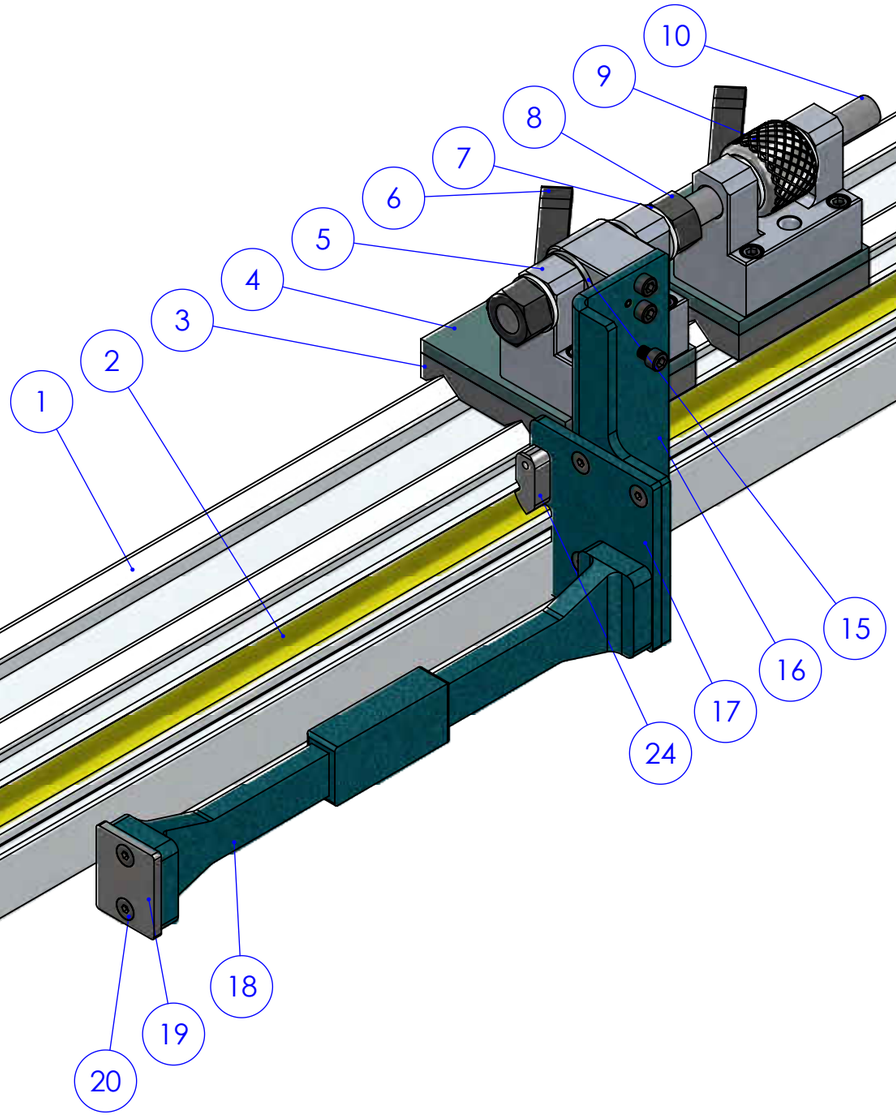
9501470 6M LENGTH STOP & CONVEYOR

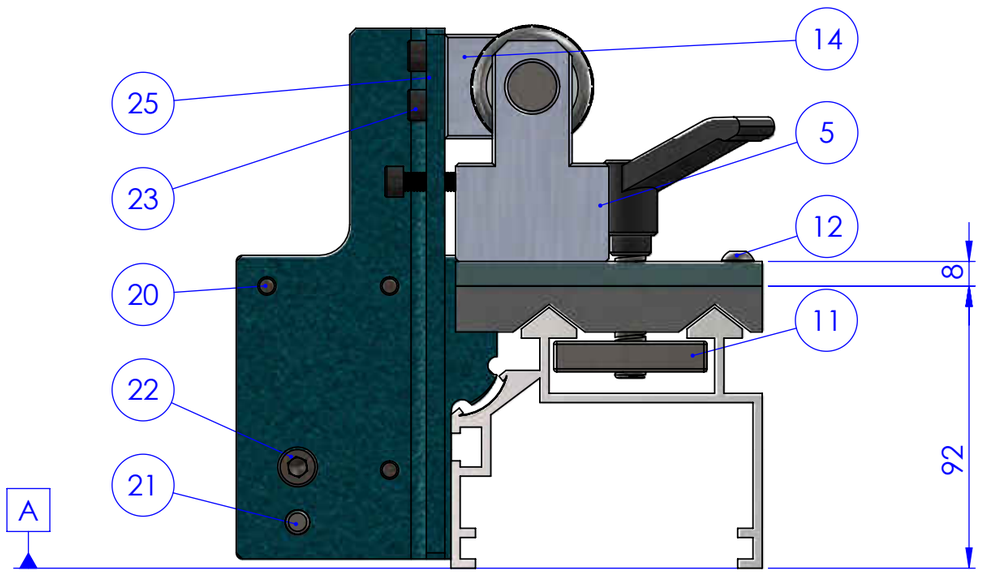
OPTIONAL

9501590			
ITEM NO.	PART NO.	DESCRIPTION	QTY.
1	9505910	Aluminium Extrusion 3m	1
2	9505940	Measuring Tape 5Mx19	1
3	9504007	Nylon Wear Strip L90x100x15	2
4	9504005	Carriage 8x90x100L	2
5	9504000	Shaf Support ⌀16	2
6	12131X	Adjustable Hand Levers M10x40	2
7	9504850	Nylon Flat Washer M16 (⌀30x ⌀17x 3)	4
8	8705750	Hex Nut M16 ZINC PLATED	2
9	9505920	Micro Stop (Thumb Nut)	1
10	8735370	Stud M16x250	1
11	9504008	Clamping Pad 50x50x10	2
12	8726100	Button Head Socket Screw M6x16	4
13	8705100	Socket Head Cap Screw M6x40	8
14	9504010	Rotation Arm	1
15	9504860	Nylon Bushes M16 (⌀19x ⌀16.1x17 + ⌀34.5x3)	2
16	9504020	Mounting Plate Shape L2	1
17	9505930	Stop Plate 99 x 85 x 6	1
18	9502100	Extension Arm Stop	1
19	9504840	Wear Plate 50x40x5	1
20	8705340	Flat Socket Head Cap Screw M6x16	5
21	8715080	Dowel Pin 8x25	1
22	8705130	Socket Head Cap Screw M8x25	1
23	8705070	Socket Head Cap Screw M6x20	3
24	9504830	45 Offset Indicator	1
25	8705930	Slotted Spring Pin 4x16	2

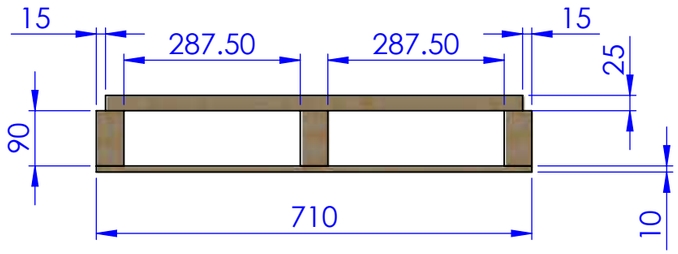


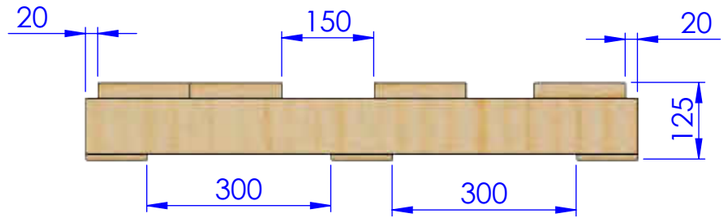
9501560
MICRO FLIP

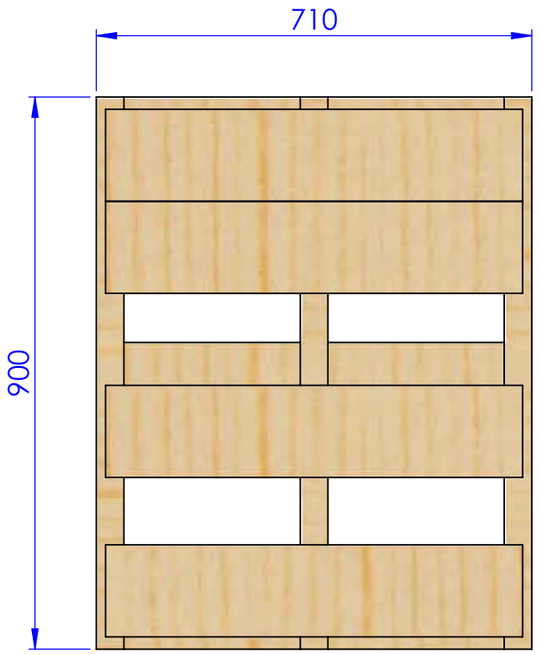


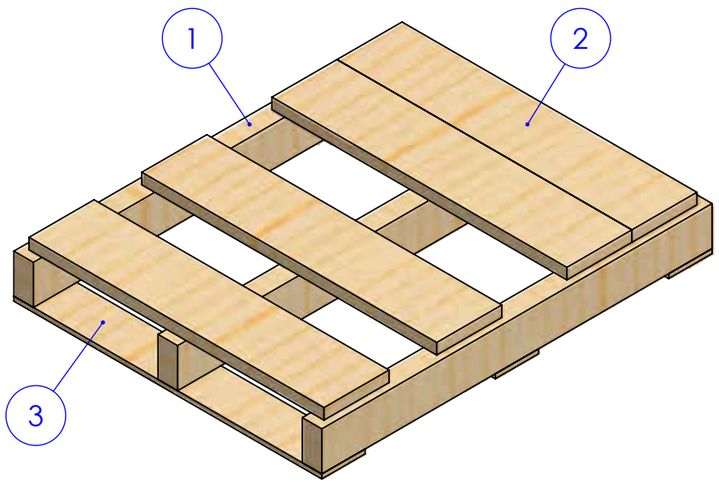


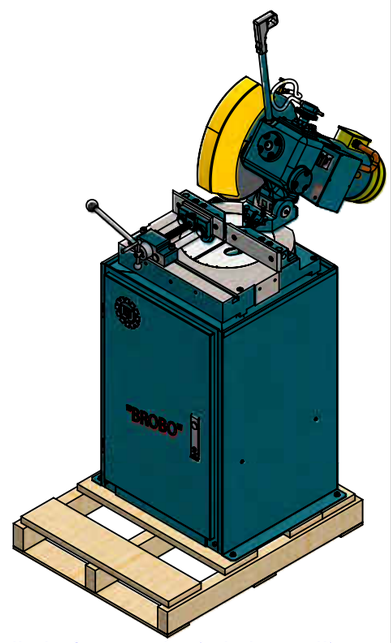
ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	W90x45x900	90x45x900	3
2	W150x25x680	150x25x680	4
3	W100x10x710	100x10x710	3



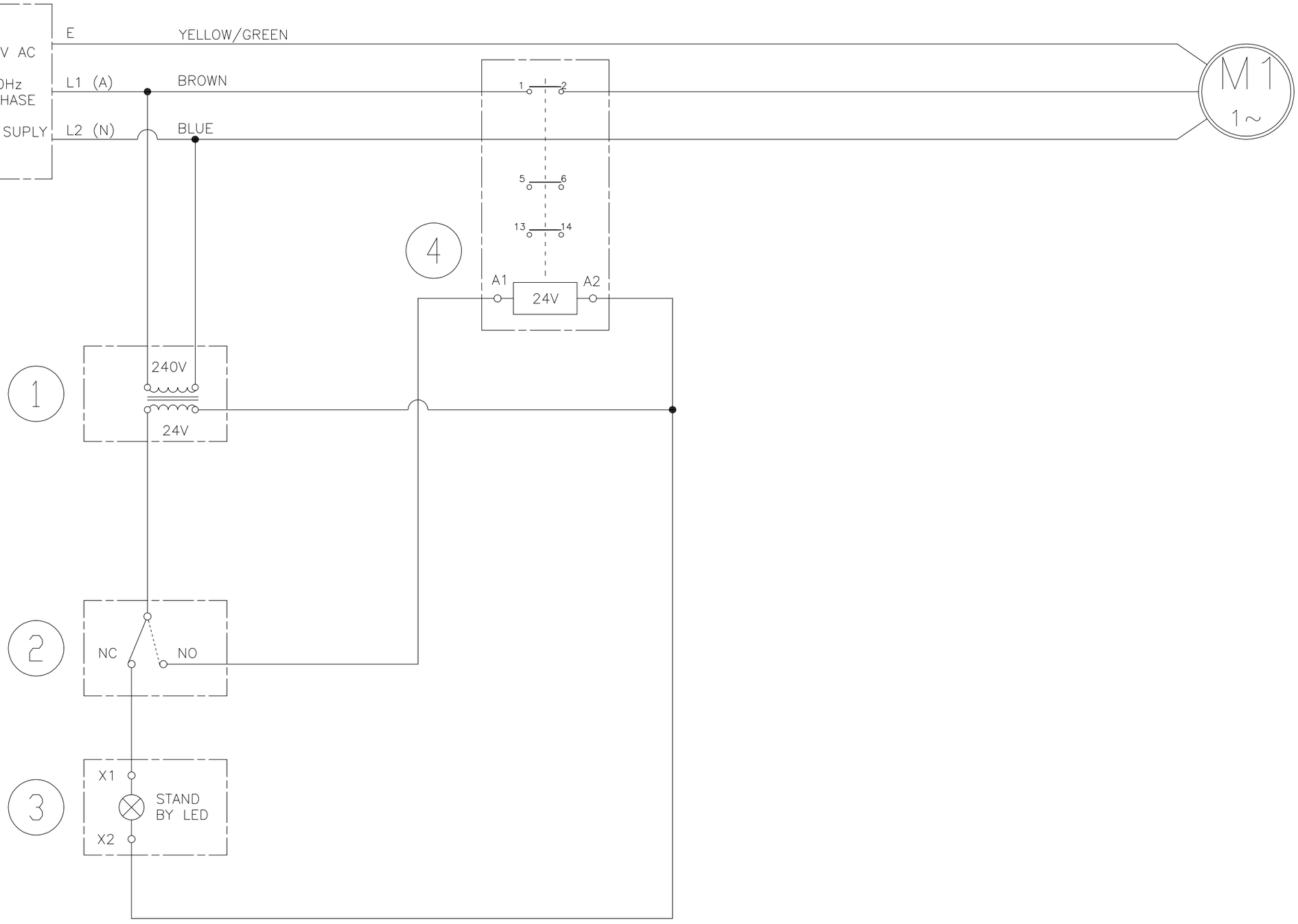








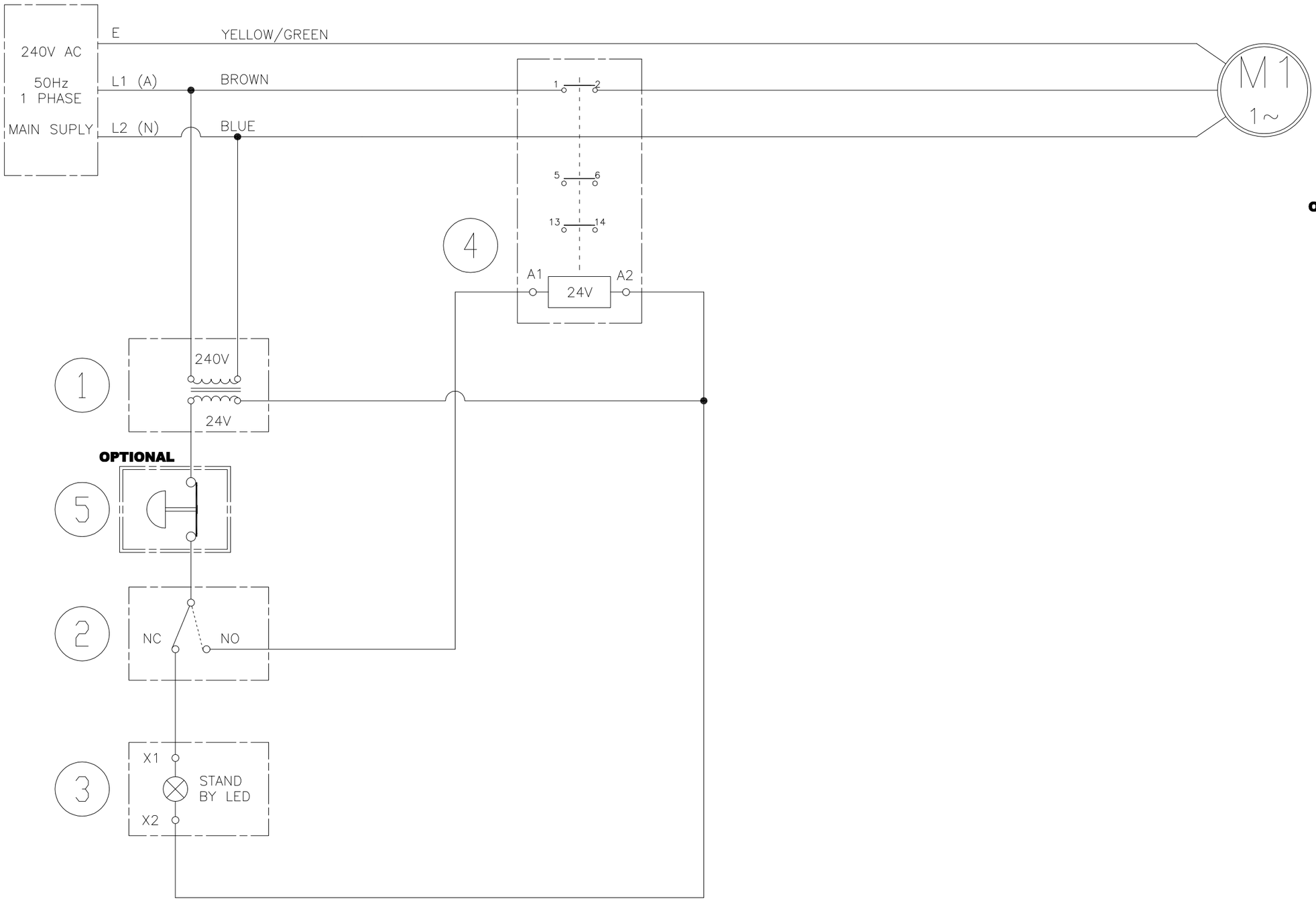
AS:4068-1993 Flat pallets for materials handling



LEGEND

1	TRANSFORMER 240V
2	TRIGGER SWITCH
3	STAND BY LED
4	CONTACTOR 24 VAC

ELECTRICAL SCHEMATIC 1 PHASE – 1 SPEED
STANDARD MANUAL COLD SAW



LEGEND

1	TRANSFORMER 240V
2	TRIGGER SWITCH
3	STAND BY LED
4	CONTACTOR 24 VAC

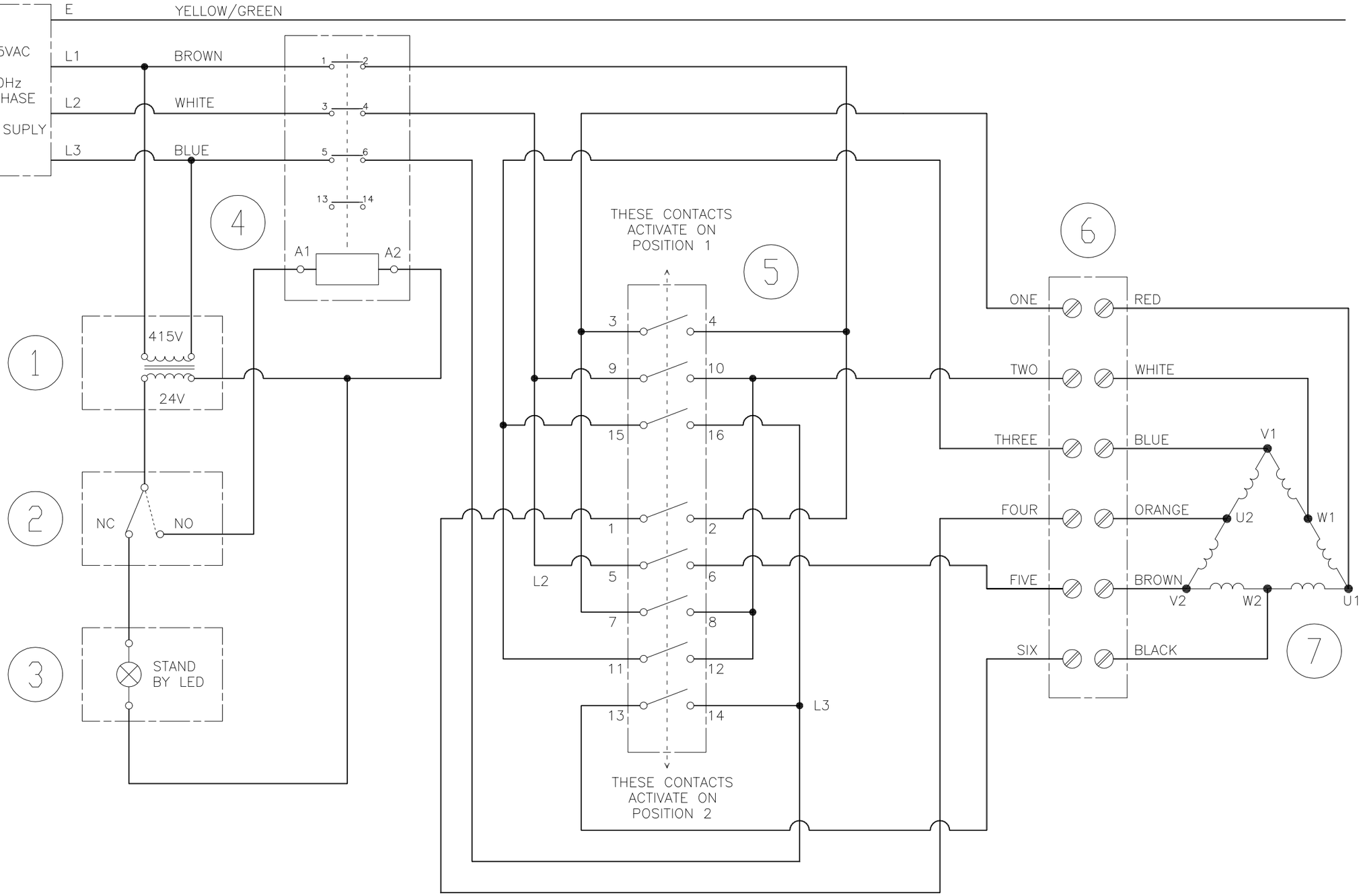
OPTIONAL

5	EMERGENCY MUSHROOM FOOTSWITCH STAYPUT TYPE

ELECTRICAL SCHEMATIC 1 PHASE – 1 SPEED (OPTIONAL SAFETY FEATURES)
STANDARD MANUAL COLD SAW

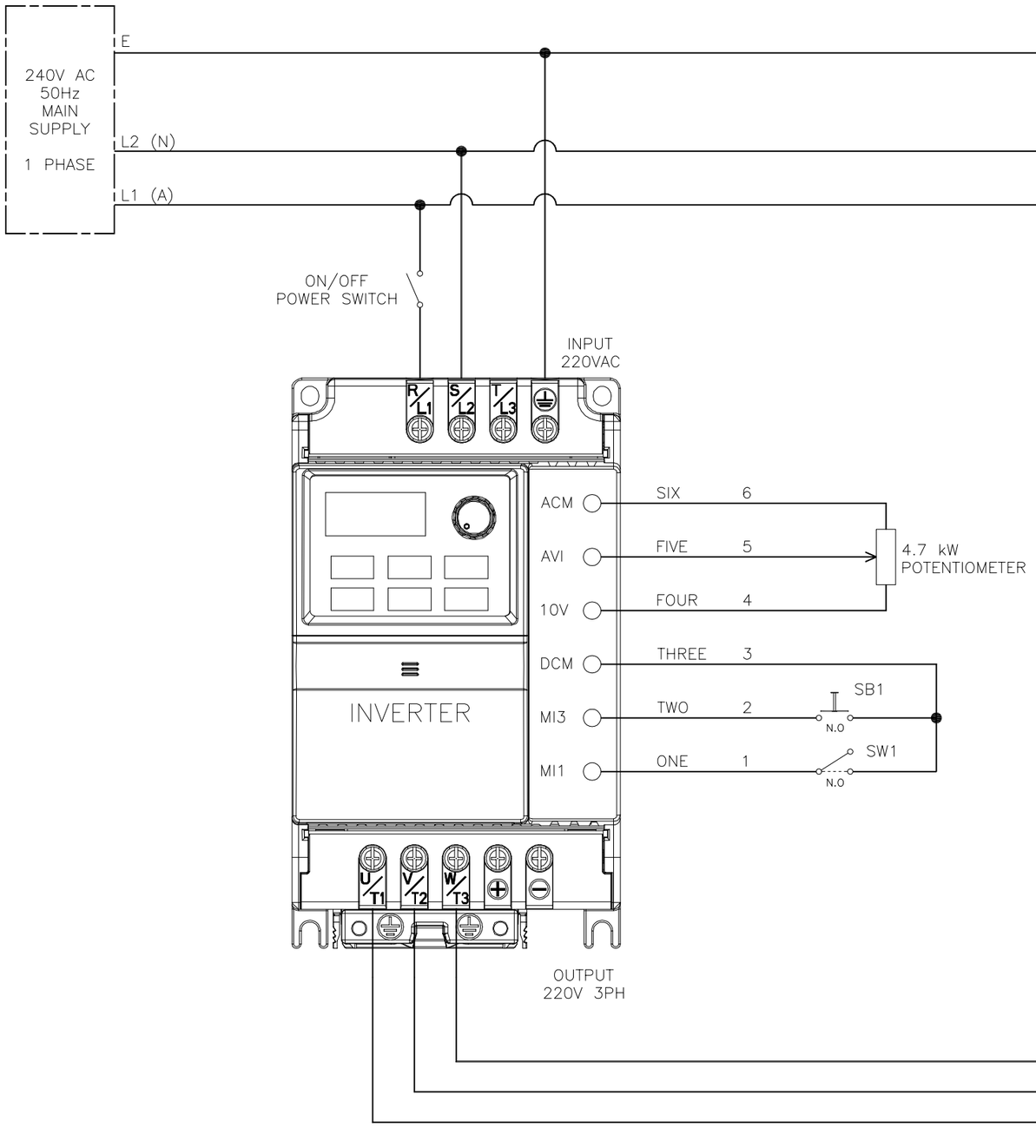
					DRAWN		PROJECT: STANDARD COLD SAW 1 PHASE 1 SPEED
					CHECK		
					APPROVE		
0	03.06.2019	ISSUED		ANH	ENGINEER	ANH	TITTLE

BROBO GROUP
Address : 8 Fowler Rd,
Dandenong VIC 3175
http://brobo.com.au



	LEGEND
1	TRANSFORMER 415/24 VAC
2	TRIGGER SWITCH
3	STAND BY LED
4	CONTACTOR 24 VAC
5	2 SPEED ROTARY SWITCH
6	MOTOR TERMINAL
7	2 SPEED MOTOR WINDING 2.2 KW

ELECTRICAL SCHEMATIC 3 PHASE – 2 SPEED
STANDARD MANUAL COLD SAW



PARAMETER DELTA	CURRENT VALUE	DESCRIPTION
00.03	1	DISPLAY OPTION
01.00	95	MAX OUTPUT FREQUENCY %
01.02	220 OR 460	MAX OUTPUT 220V OR 460V 3ϕ
01.09	3.0	ACCEL TIME 1
01.10	3.0	DECEL TIME 1
02.00	1	0 TO +10V FROM AVI
02.01	1	EXTERNAL CONTROL
04.08	5	EXTERNAL RESET (NO CONTACT)
04.12	20.0	MIN AVI FREQUENCY
07.00	7.8 OR 3.9	MOTOR RATED CURRENT [WEG] CONNECTION (Δ) OR (Y)

TECHNICAL INFORMATION

INVERTER

DELTA VFD022EL21A

- VFD022EL21A
  - VFD: VARIABLE FREQUENCY DRIVE
  - 022: APPLICABLE MOTOR CAPACITY
    - 002 : 0.25 HP (0.2kW)
    - 004 : 0.5 HP (0.4kW)
    - 007 : 1 HP (0.75KW)
    - 015 : 2 HP (1.5KW)
    - **022 : 3 HP (2.2KW)**
    - 037 : 5 HP (3.7KW)
  - EL: MAINS INPUT VOLTAGE
    - 11:115V 1PH
    - **21:230V 1PH**
    - 23:230V 3PH
    - 43:460V 3PH

MOTOR

3PH
2.2 kW
TERMINAL CONFIGURATION DELTA

SB1 RESET PUSH BUTTON

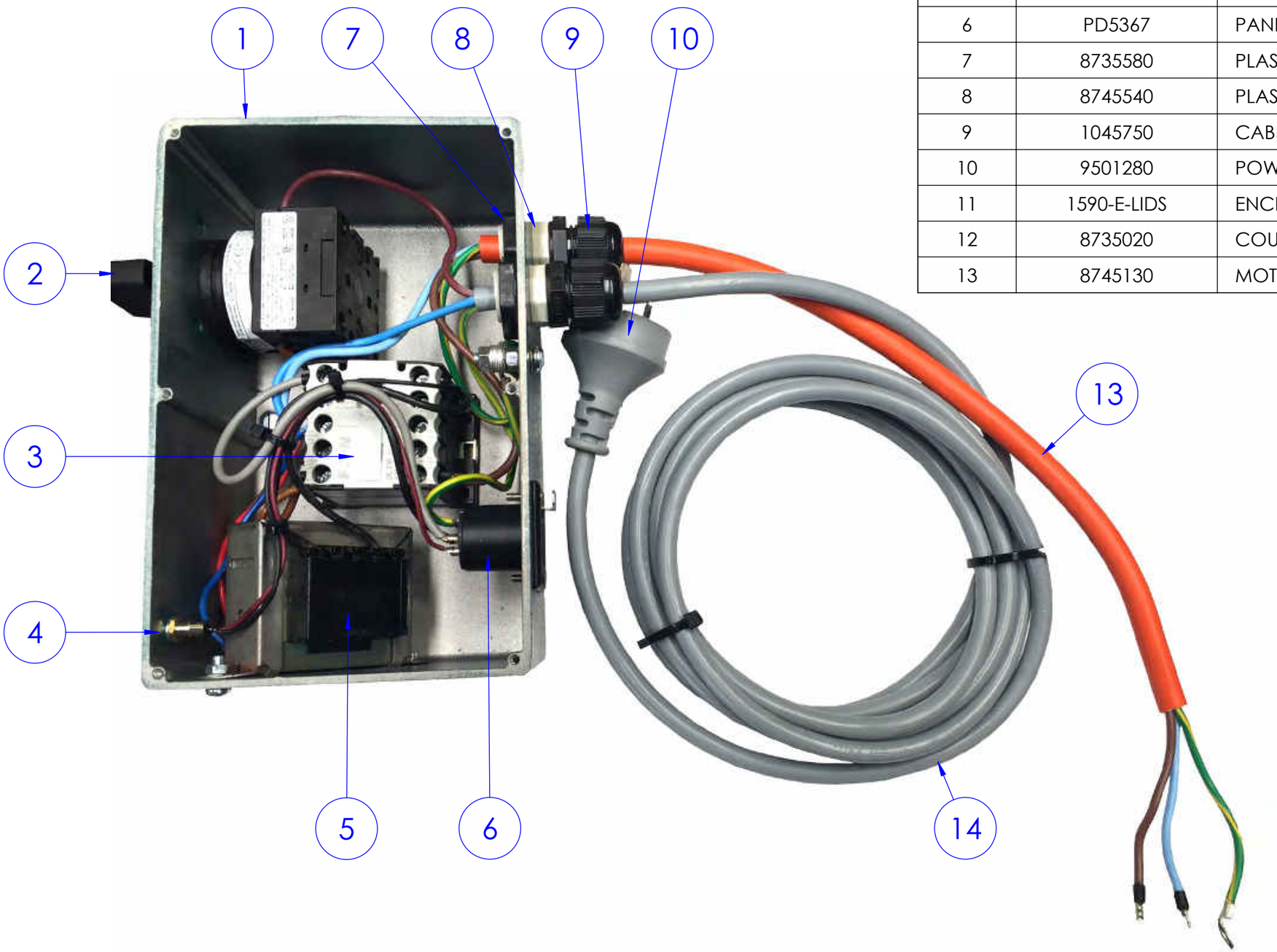
SW1 TRIGGER SWITCH

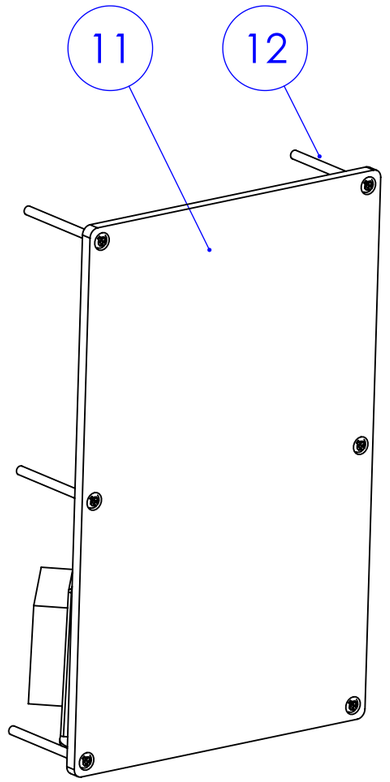
AS COLOUR CODE 1PH

ACTIVE	BROWN
NEUTRAL	LIGHT BLUE
EARTH	GREEN/YELLOW

SINGLE PHASE VARI SPEED (20–100 RPM)
COLD SAW LOCAL WIRING DIAGRAM

ITEM NO	PART NO	DESCRIPTION	QTY
1	9364810	STANDARD ENCLOSURE	1
2	3835190	MAIN SWITCH 20A EATON	1
3	9315220	CONTACTOR 24 VAC EATON	1
4	3875475	STAND BY LED 8061.924	1
5	9315190	TRANSFORMER INPUT 440/240 VAC OUTPUT 24VAC ALTRO	1
6	PD5367	PANEL SOCKET AMPHENOL	1
7	8735580	PLASTIC NUT M20	2
8	8745540	PLASTIC REDUCER M20/16 CLIPSAL 264/15M	2
9	1045750	CABLE GLAND 5mm-10mm ALCD	2
10	9501280	POWER SUPPLY PLUG/LEAD 240V/15A	1
11	1590-E-LIDS	ENCLOSURE LID	1
12	8735020	COUNTERSUNK M3x10	6
13	8745130	MOTOR SUPPLY CALBE 3 CORE 1.5mm2	1





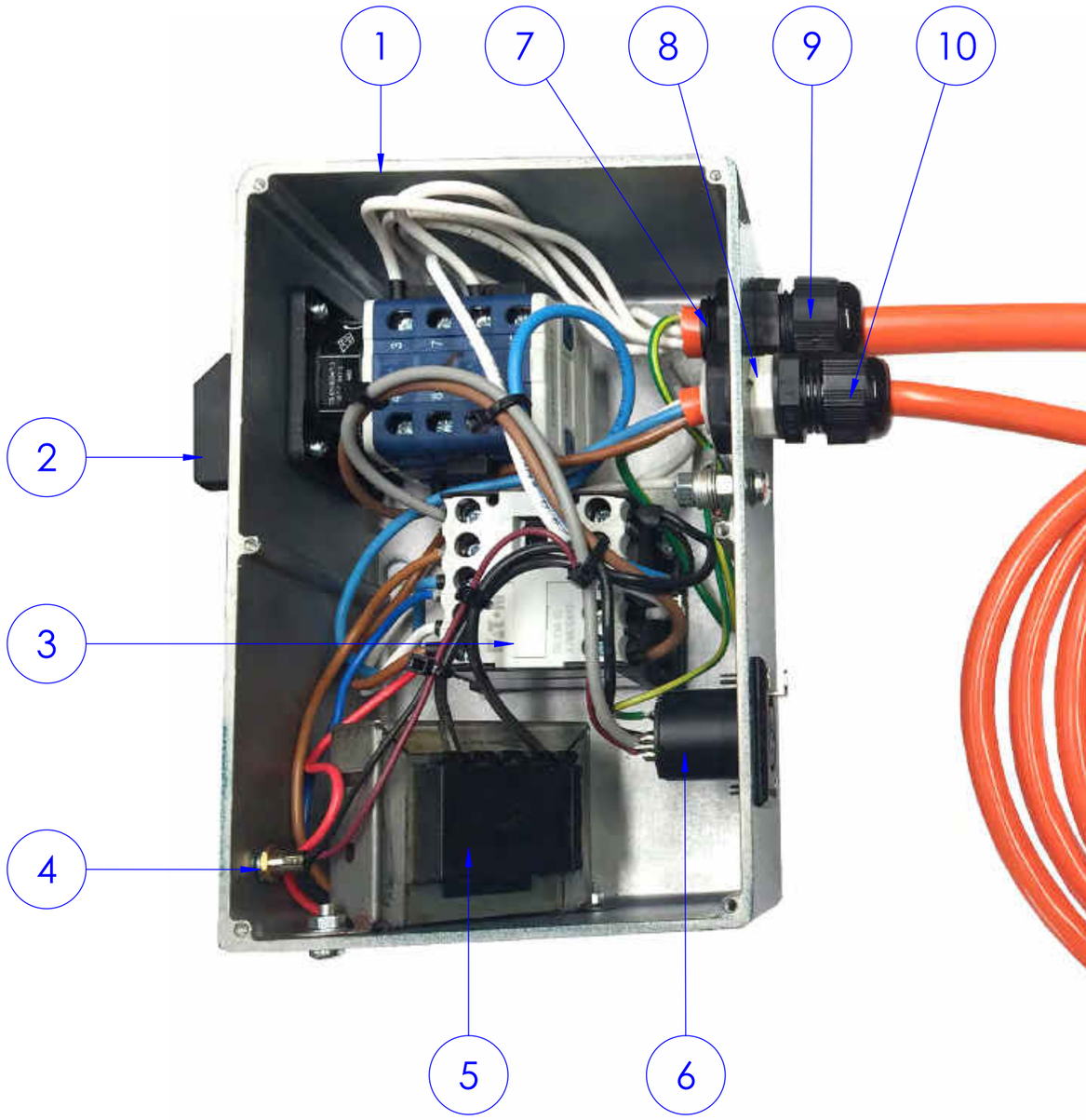
DRAWN ANH

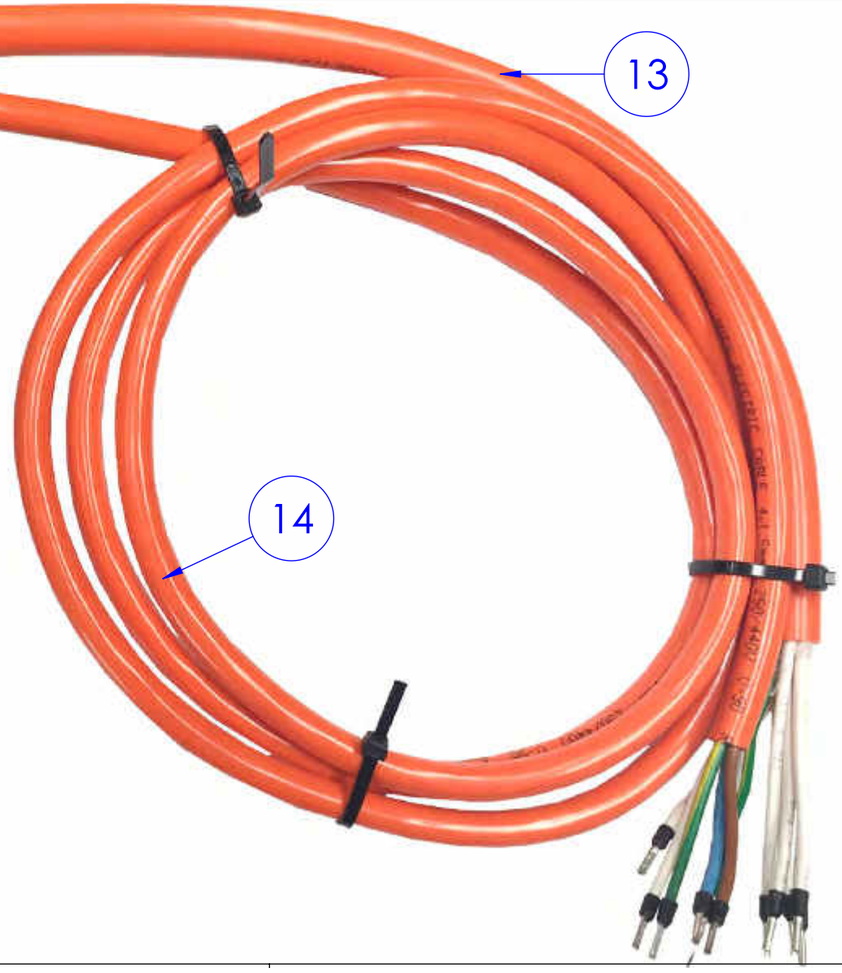
UNLESS OTHERWISE SPECIFIED:
DIMENSIONS ARE IN MILLIMETERS

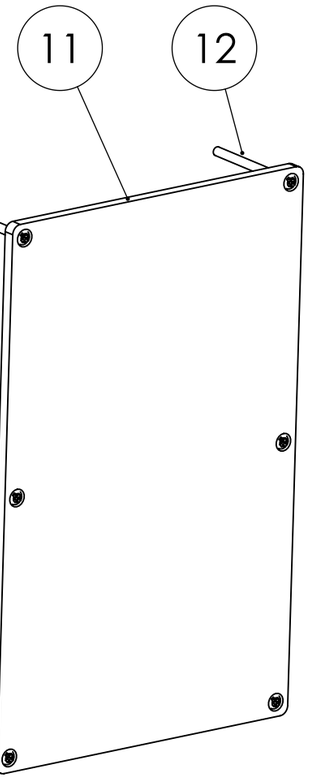
TITLE:

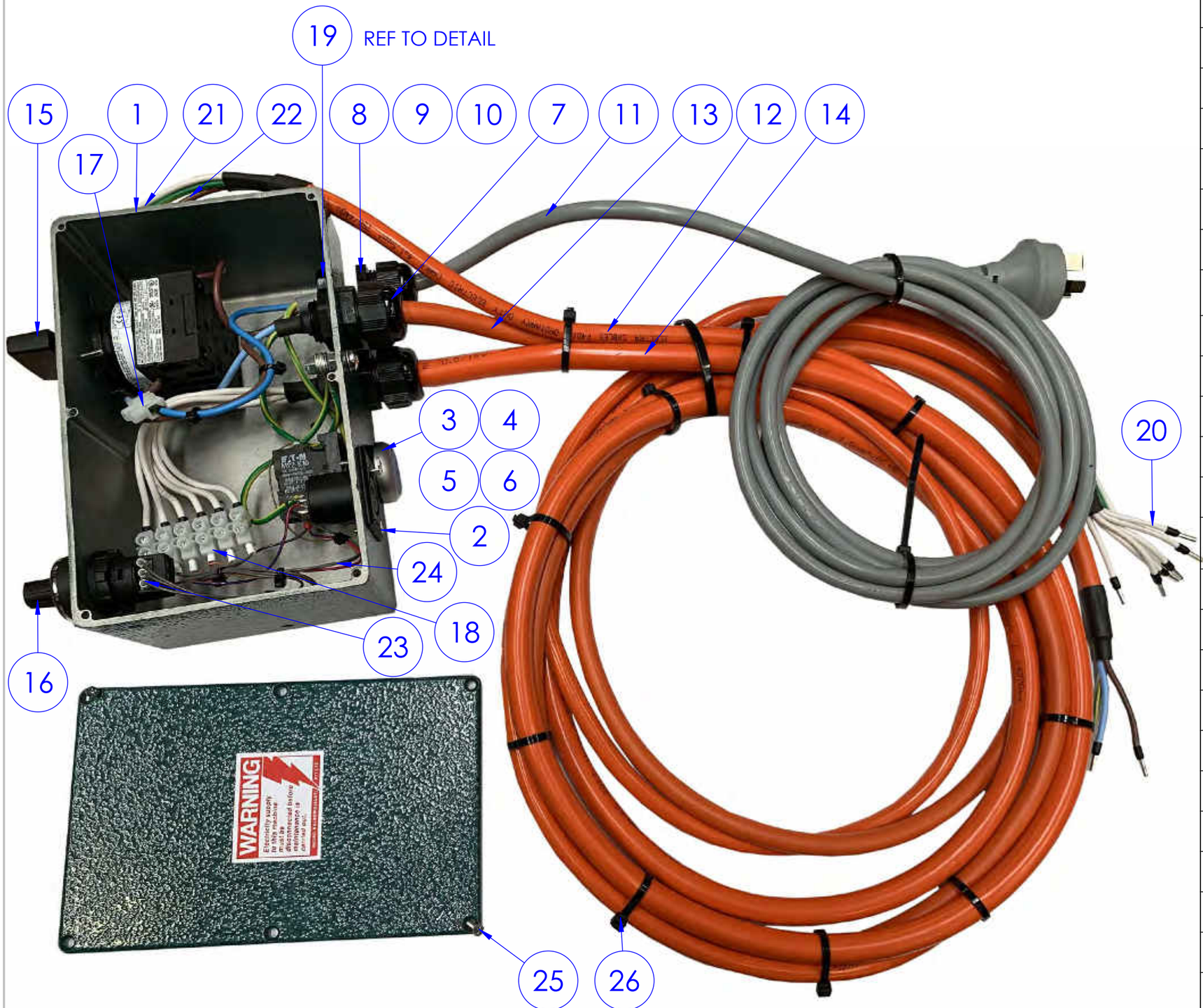
DO NOT SCALE DRAWING SCALE:1:2 REVISION 0

ITEM NO	PART NO	DESCRIPTION	QTY
1	9364810	STANDARD ENCLOSURE	1
2	9305180	MAIN SWITCH EMAS PSA020CD334S	1
3	9315220	CONTACTOR 24 VAC EATON	1
4	3875475	STAND BY LED 8061.924	1
5	9315190	TRANSFORMER INPUT 440/240 VAC OUTPUT 24VAC ALTRO	1
6	PD5367	PANEL SOCKET AMPHENOL	1
7	8735580	PLASTIC NUT M20	2
8	8745540	PLASTIC REDUCER M20/16 CLIPSAL 264/15M	2
9	9305600	CABLE GLAND 8mm-14mm ALCD, M20	1
10	1045750	CABLE GLAND 5mm-10mm ALCD	1
11	1590-E-LIDS	ENCLOSURE LID	1
12	8735020	COUNTERSUNK M3X10	6
13	8745150	MOTOR SUPPLY CALBE 6 CORE + E 1.5mm2	1
14	8745140	LINE SUPPLY CABLE 4 CORE 1.5mm2	1





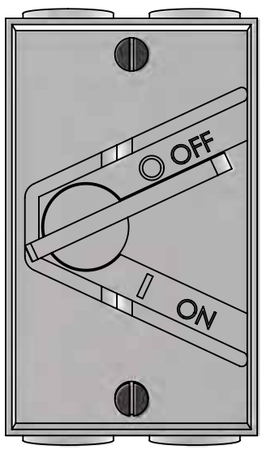




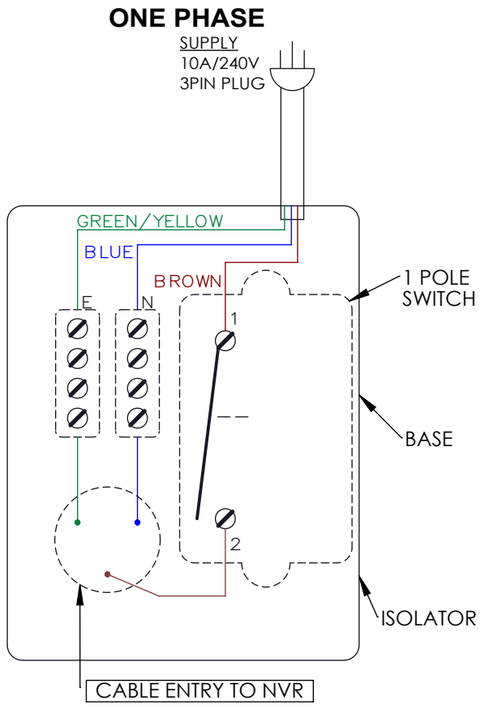
ITEM NO	PART NO	DESCRIPTION	QTY
1	9504004	ENCLOSURE	1
2	PD5367	PANEL SOCKET	1
3	9505028 (1)	RESET PUSH BUTTON	1
4	9505028 (2)	RESET DISK R	1
5	M22-A	FIXING ADAPTER	1
6	M22-K10	NO (NORMALLY OPEN) CONTACT	1
7	9305600	M20 CABLE GLAND	2
8	1045750	M16 CABLE GLAND	1
9	8745540	M20/16 PLASTIC REDUCER	1
10	8735580	M20 PLASTIC NUT	1
11	9501280	15A/240V PLUG/LEAD	1
12	8745140	4 CORE 1.5mm2 MOTOR CABLE	2.2m
13	8745290	3 CORE 1.5mm2 INVERTER SUPPLY CABLE	2.2m
14	8745150	7 CORE 1.5mm2 CABLE	2.2m
15	3835190	ON-OFF ROTARY SWITCH	1
16	9911510	10 kΩ POTENTIOMETER	1
17	8725820	DOUBLE SCREW CONNECTOR	1
18	8745370	6 TERMINAL CONNECTOR STRIP	1
19	-	EARTHING SCREW ASSEMBLY	1
20	A01582	1.5mm2 BOOT LACE PINS	1
21	8725230	⌀4 NON-INSULATED EYELET	4
22	8725210	⌀5 NON-INSULATED EYELET	4
23	AR0552	0.5mm2 BOOT LACE PINS	9
24	8745000	0.5mm2 SINGLE CORE 200m LENGTH CONTROL CABLE	6
25	8735020	COUNTERSUNK M3x10	6
26	8745180	144mm CABLE TIES	-

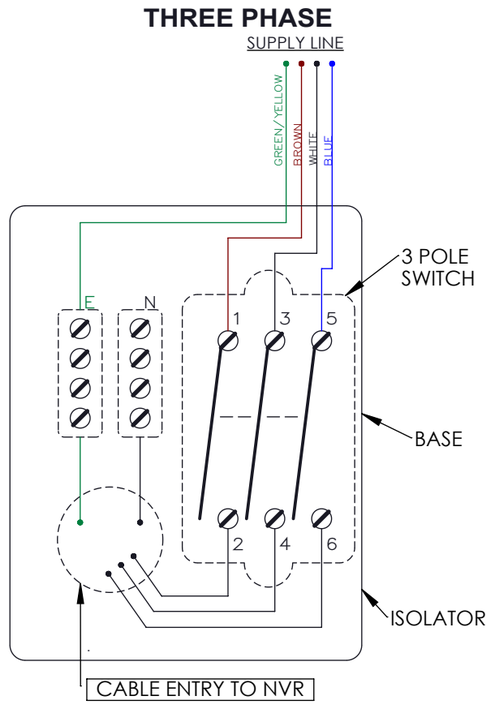
OPTIONAL

ISOLATOR: ONE PHASE



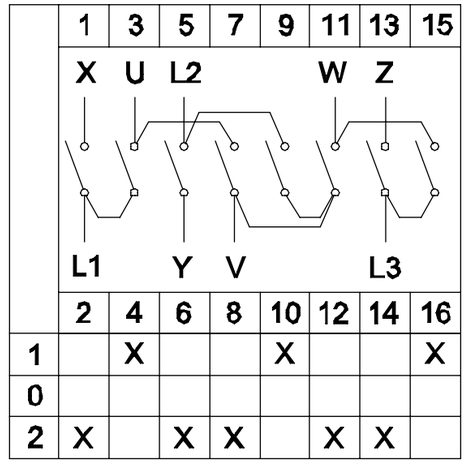
ISOLATOR: FRONT





CAM SWITCH

3835190 : 1 SPEED SWITCH 1PH
9305180: 2 SPEED SWITCH 3PH



	2	4	6	8	10	12	14	16
1		X			X			X
0								
2	X		X	X		X	X	

2 SPEED SWITCH DIAGRAM
1-0-2

COMPONENT / SCHEMATIC / WIRING DIAGRAMS FOR CONNECTION FOR 1 PHASE OR 3 PHASE CIRCUIT ISOLATOR

OPTIONAL

6mm TUBING - BLUE

4mm TUBING - WHITE

AIR INTAKE

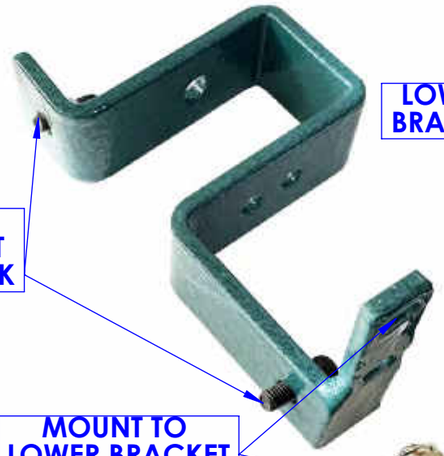
GAUGE 12 BAR

AIR FR UNIT

DOUBLE BANJO

REDUCER

TO PIVOT BLOCK



LOWER BRACKET

MOUNT TO LOWER BRACKET

CAM

ROLLER VALVE

PILOT/SPRING VALVE

SILENCER

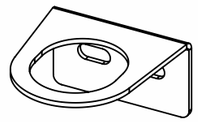
AIR VICE

OPTIONAL

TUBING - 6mm

TUBING - 4mm

BRACKET



AIR INTAKE

GAUGE 12 BAR

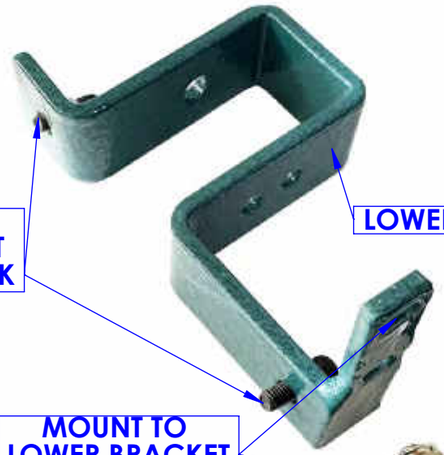
AIR FR UNIT

REDUCER

DOUBLE BANJO

CAM

TO PIVOT BLOCK



LOWER BRACKET

MOUNT TO LOWER BRACKET

ROLLER VALVE

PILOT/SPRING VALVE

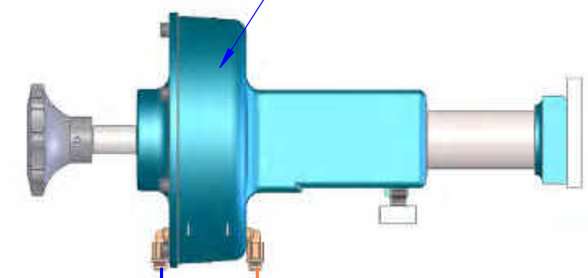
DOUBLE MALE ELBOW

SILENCER

TUBING - 6mm

PRESSURE REGULATOR (OPTION)

AIR VICE 01

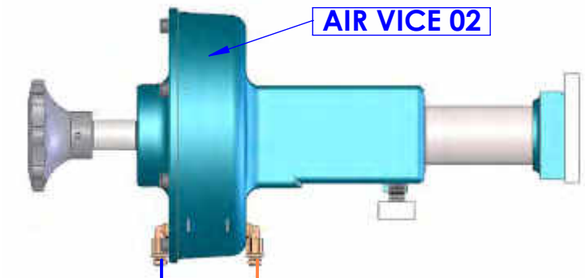


TUBING - 6mm

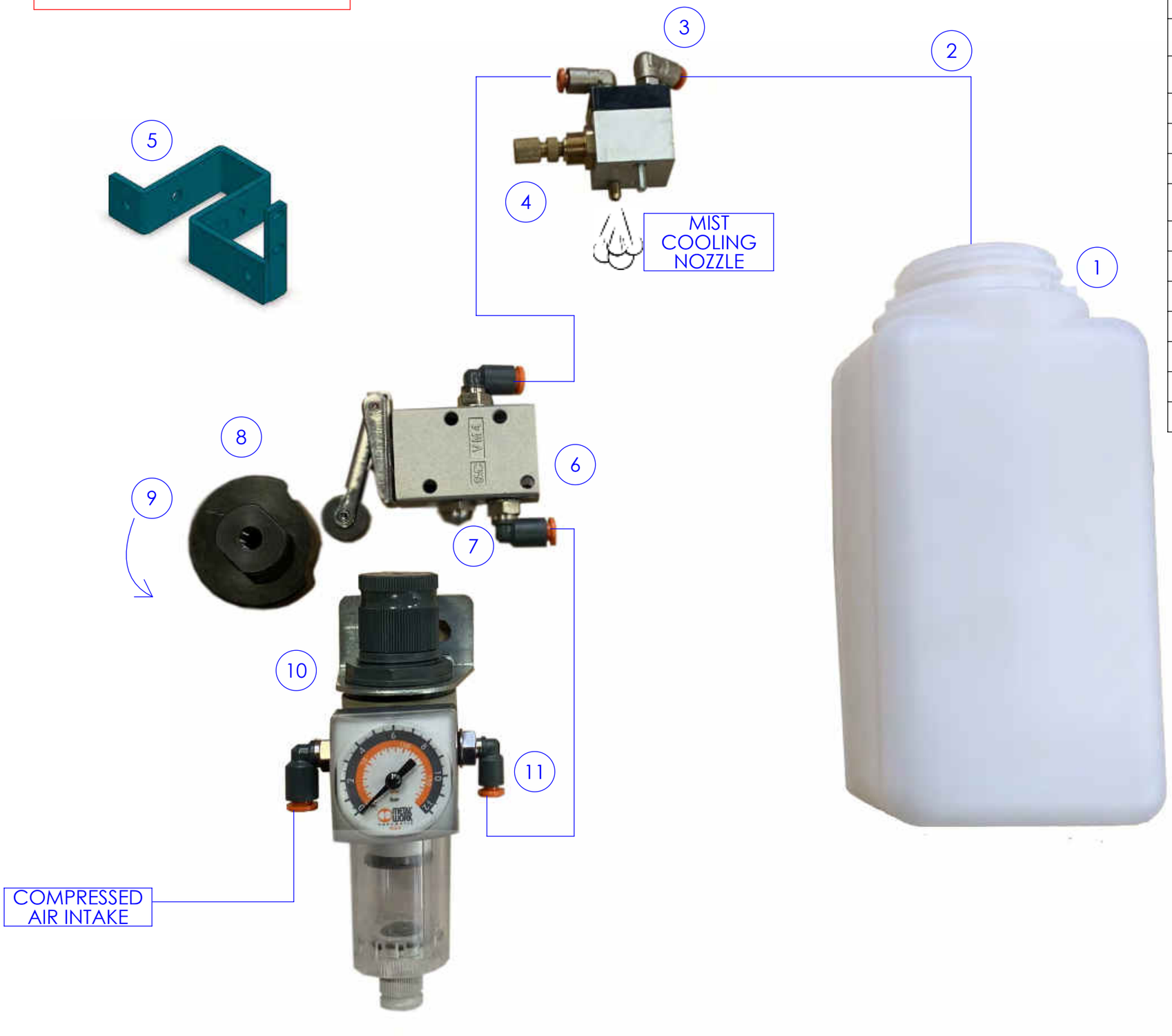
RETURN LINE

DISTRIBUTOR

AIR VICE 02



OPTIONAL



ITEM	PART NO	DESCRIPTION	QTY
1	-	Coolant Tank	1
2	9925130	Nylon Tubing 6mm	1
3	-	Special Elbow 4-4	2
4	5000140	DP2005 Spray Unit	1
5	9601510	Lower Bracket	1
6	9935240	Roller Valve VM430-01-01S	1
7	9315910	Silencer	1
8	9504510	Special Shoulder Screw	1
9	9504520	Cam	1
10	9915450	Air Service Unit	1
11	8125550	Elbow 1/8 6mm	6
12	8705690	M4 Hex Nut	6
13	8725390	Socket Head Cap Screw M4x35	6
14	8705710	M6 Hex Nut	2
15	8705060	Socket Head Cap Screw M6x16	2

BROBO GROUP ©

Certified System
Quality
ISO 9001

SPRING UPGRADE ASSEMBLY (P/N 9501680) INSTALLATION INSTRUCTIONS

The supplied spring upgrade assembly consists of:

1. 9501670 Clevis Type Spring Assembly
2. 9554030 Upper Spring Bracket

Fitment of spring upgrade assembly:

1. Remove the linkage assembly arm from the outer guard (yellow). Remove the shoulder screw holding the outer guard to the inner guard.
2. Remove the blade from the machine. Please note the blade retaining bolt is L/H Thread.
3. Remove the inner guard from the machine by removing the 3 off M6 socket head cap screws.
4. Remove the old spring.
5. Remove the upper spring bracket by removing 2 off M6 socket head cap screws.
6. Attach the new upper spring bracket using 2 off M6 socket head cap screws to the existing mounting holes.
7. Attach the new spring to the upper spring bracket.
8. Attach the new spring to the lower spring bracket. Use the hole that is closest to the centre of the pivot block.
9. Attach the inner guard and then the blade.
10. Attach the outer guard to the machine using the shoulder screw. When tightened, ensure that the outer guard is still free to pivot on the shoulder screw.
11. Attach the outer guard linkage arm. Note the upper part of the linkage arm should have the spring and eyelet of the linkage on the outside of the outer guard, and the bottom of the linkage arm should be mounted so that the eyelet is on the inner side of the lower bracket.

CHAPTER 5 - Adjustments for the Saw Unit

5.1. Changing the Blade

To replace a worn saw blade:

DANGER – ELECTROCUTION

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

1) Disengage the linkage arm that is between the guard linkage system & pivot block (at the pivot block by compressing the spring & moving the bolt through the slot).

2) Slide the saw guard up as far as possible (as if it was opening during a cutting cycle) to gain access to the spindle nose.

3) Loosen the spindle screws (LH thread), using the 14mm hexagonal wrench provided, & remove the counter plate. To loosen the spindle screw, insert the wrench (short end) into the socket head cap screw & firmly knock the wrench with the palm of your hands until the screw is loosened. If this method fails to free the screw, place a piece of timber under the blade of the machine, & loosen (or tighten) the screw while holding the saw head of the machine down (blade against the timber).

4) Remove the worn saw blade away from the spindle hub. Using a soft brush, clean the face of the spindle, counter plate & mounting faces of the blade of any dirt or swarf that was trapped by the previous cutting cycles.

5) Place the old saw blade into the new blade packaging & disposed of it safely. Carefully mount the new blade onto the spindle hub, ensuring that the blade is rotating into & towards the back fence, & replace the counter plate utilising the drive pins as guides as it passes through the pinholes on the blade.

6) Rotate blade back against the drive pins in a ***counter-clockwise*** & finger tighten the spindle screw.

7) Firmly retighten the spindle screws, ensuring that the saw blade spins uniformly & aligned parallel with the safety guard.

8) Lower the outer guards & make certain the pin of the linkage arm is re-engaged with the track on the inner guard & reconnect the guard linkage.

9) The new blade is ready for use. To check that the blade is performing correctly, carry out a sample cut on a piece of off-cut.

10) If optional devices are supplied, mount the stock support & rollers on either side of the clamping table. Normally stock should feed on the ***left to right***, but it can be feed from the ***right to left*** if required.

5.2. Adjusting the Cutting Angle

The back jaw wear plates on the ***Brobo Group S315/S350/S400 Series Metal Cutting Saw*** are typically fitted in the following manner. For angular cutting, the wear plates should be repositioned to provide the maximum support on one side & clearance on the other (*Figure 11*).

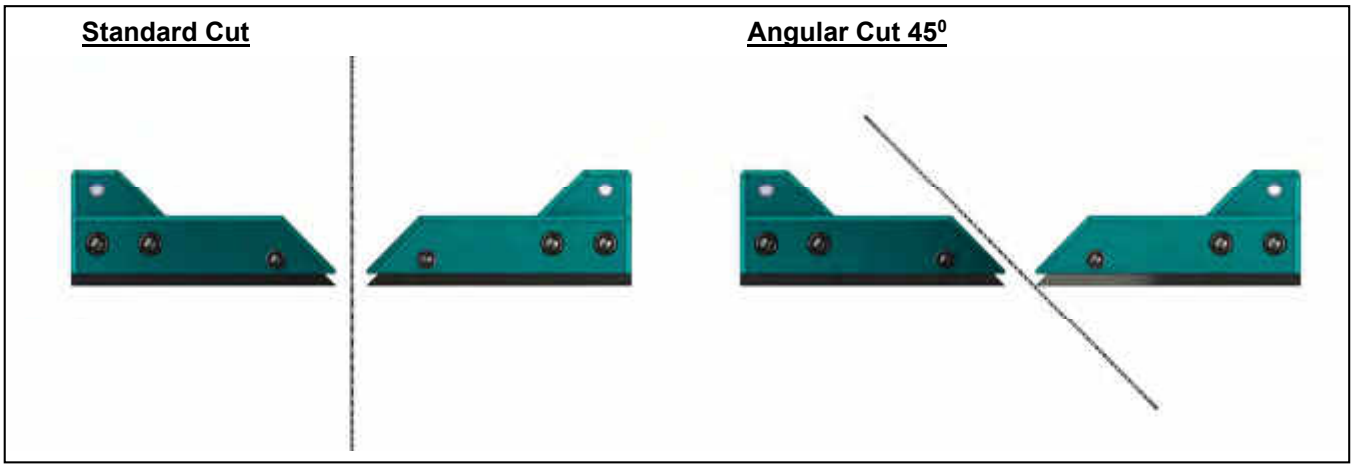


Figure 11. Angular Cut Positions

i. To adjust the angle of the cutting surface, loosen the socket head screws shown in Figure 10, located on ***the back jaw face that clamps the table***, using the hexagonal wretch provided.

ii. Fine-tune the angle required. The shot-pins have positive locations at 90° & 45° right & left. Adjust the angle on the back fence to suit.

iii. Re-tighten all the previously loosen socket head screws. The saw is now ready for use.

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. Refilling the Lubricator

To refill the lubricator bowl, twist the bowl anti-clockwise & slide it down to detach it from the lubricator unit (There is no need to disconnect the air supply to the unit). The unit can now be refilled to the line positioned near the top of the bowl, which is approximately 10 millimeters from the top edge of the bowl. ***Do not fill the bowl above this line,*** as the lubricator unit will not function properly.
Replace the lubricator bowl in a reverse manner by sliding the bowl upwards, ensuring that the feed tube is located inside the bowl, & twist it clockwise to lock it into position.

5.5. Adjusting the 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. There are 2 control variables available for the operator:

Air Flow (Volume) Delivery

Regulated with the tap (needle valve), this can be adjusted from initial, completely closed to fully open states. It is highly recommended that the upper end of the flow range be utilized to allow an adequate airflow to deposit & evenly distributed the lubricant onto the blade while maintaining a fine lubricant mix. If the needle valve is not open sufficiently, the air to lubricant ratio may vary & may result in a substandard distribution of lubricant to reach the blade teeth.

Lubricator Flow Rate

This controls the fluid flow rate & is adjustable via the slotted needle valve situated on top of the lubricator. The consumption of Brobolube is factory set to ***4 drops per minute***. This has been examined to produce a sufficient mix of air & lubricant, & it is recommended to use this initial setting. On this setting, approximately ***55 cubic centimeters*** (lubricator capacity) should last for ***20 hours of continuous cutting***. If for some reason the setting needs to be altered, the needle valve should be turned clockwise to reduce or anti-clockwise to increase the fluid flow respectively.

NOTE

i. 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.

ii. The amount of Lubricant (when set correctly) delivered by the lubricator is not easily visible to the naked eye. If in doubt that lubricant is being delivered, first check to see if lubricator itself is delivering droplets at its sight glass. If still unsure whether lubricant is being delivered, disconnect the supply tubing to the tap (needle valve) & hold the tube against some blotting paper for a few seconds while the lubricator is operating.

5.5.1. 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 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 CO2, 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 ***Brobo Group S315/S350/S400 Series Metal Cutting Saw*** 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 and 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 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 & 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) Observe the oil level on the gearbox. The first oil change should be performed after the initial ***60 hours of operation*** & ***500 hours of operation*** thereafter. Use BROBO Gearbox Oil - ISO VG 220 viscosity, conforming to AGMA 5EP, US Steel 224 or API GL-2 specifications to which 3% colloidal molybdenum disulphide has been added. Refilling point is situated in the handle bar mounting threaded hole. The required quantity to refill is 800 ml for the S315/S350/400 gearboxes.
Gearbox oil is available from BROBO GROUP Pty. Ltd. in 2 Litre packs (Part No. **9501090**).

3) Change coolant as required, or whenever the coolant starts to get dirty or emits a stale odour. The coolant compensation tank should be checked regularly. Coolant level would expect to naturally decrease over time due to natural evaporation. Use premium quality coolants such as CoolTech 500 or SlideTech 68.
Coolant is available from BROBO GROUP Pty. Ltd. in 2 liter & 20-liter packs (Part No. **9301570** & **9501080**): Concentrate, Ratio 1:20

4) 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.

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.

9) Test that the blade is at right angles to the workpiece back fence.
If not, contact Brobo Group engineering department.

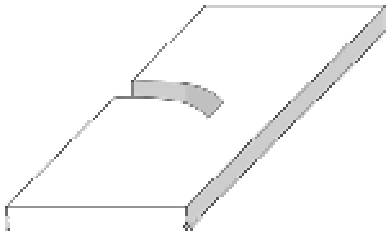
10) Check that the 0° notch on the fixed worktable is aligned with the graduation on the turntable. If not, adjust as described in Section 5.2.

11) Examined that the precision of the 15°, 30°, 45° left & right stops are correct & accurate. If they are not adjusted properly, proceed as described in Section 5.2.

12) 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 - Troubleshoot

7.1. 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, with reference to *Section 5.1 Changing the Blade.*
	The angularity of blade to workpiece back fence & vice clamps	Adjust the position of the blade so that it is at right angles to the workpiece back fence using the 0° notch as a reference; set the stops at 45° left & right using the method described in *Section 5.2 Adjusting the Cutting Angle.*
	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 within 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; check that the lubricant/coolant fluid conforms to those specified in *Section 6.3 General Maintenance of Function Components.*
	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 normalising 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 are 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.
		Reduce cutting pressure
	Cutting pressure to high	Check the coolant level & clean piping & nozzles
	Insufficient coolant	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.
	The non-homogenous material being cut	
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

7.2. General Troubleshooting

Below lists of some of the most commonly identified problems associated with the ***BW S315/S350/S400 Series Metal Cutting Saw*** & the recommended troubleshooting procedures to undertake to rectify the situations. If the solutions provided do not resolve the problem, or the problem identified differs from those listed, ***immediately*** contact Brobo Group engineering department.

PROBLEM IDENTIFIED	DIAGNOSIS	SOLUTIONS
Spindle motor will not rotate	Electrical power supply not connected	Ensure that the main power cable is plugged in & switched on. Check the phases, cables, plugs, & sockets for loose connection. Also, check that the motor connections are in place.
	Loose contactors	Verify that the contractors are not loose. If contacts are short-circuited, contact Brobo Group engineering department immediately
	Motor burnt out	Check that it has not burnt out, that it turns freely & there is no moisture in the main electrical unit. The winding can be rewound or replaced
	Blown fuses	Examine that the fuses are intact & fitted correctly, otherwise replace or tighten the fuse holders
Machine open slowly or not at all	Hydraulic oil level & pressure system	Check for any leaks present within the catchment unit. Top up the with coolant as recommended in *Section 6.3 General Maintenance of Functioning Components*
Coolant system not operational	Blocked coolant tubing	Check that it is not kinked, severed or blocked. Flush out any blockages

7.2.1. APPENDIX - RISK/HAZARD ASSESSMENT

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SAI GLOBAL

Hazard Type	Hazard Identification	Hazard Assessment	Hazard Management Strategies (Recommended for the Purchasing / Buyer / User)
Mechanical	Cutting/Severing	Low/Med	▪ Keep machine correctly guarded & operational at all times. ▪ Keep & clear of rotating blade when cutting.
	Entanglement	Low	▪ Do not wear loose jewelry, clothing or items that might get caught in the saw. ▪ Always keep the work area free of unnecessary objects or tools.
	Puncturing	Low	▪ Wear protective gloves when handling and /or changing the blades. ▪ The power source is to be isolated prior to opening electrical enclosures.
Electrical	Electrocution	Low	▪ Remove the power supply when any maintenance and/or repairs are to be undertaken. ▪ The power source is to be isolated prior to opening electrical enclosures.
Thermal	Burn	Low	▪ Under normal working conditions, the gearbox can become hot thus, do not touch. ▪ Be careful when handling workpiece after cutting, as it might be very hot.
Noise	-	Low	▪ Under no load testing, the noise level measured is below 85 dB (A). ▪ If the noise level becomes too high during a cutting cycle, stop the process & inspect for the problem, if any are present.
Substance	-	Low	▪ Care must be taken as some coolants may be harmful or cause allergic reactions. Please read the labels carefully. ▪ Keep the work area clean & regularly remove excess coolant, oils, & other impurities.
Hazardous Events	Unexpected Start-Up	Low	▪ During a power failure, turn the machine off. ▪ If the problem persists, please contact Brobo Group engineering department.
	Failure of Control System	Low	▪ If the ON/OFF switch fails, isolate the machine at the power source. ▪ Ensure that no fuses are blown & that all electrical circuitry are operating within normal parameters.
Additional Hazards	Operator Error	Low	▪ Ensure blades, clamps & materials are correctly secured.
	Impact	Low	▪ Wear safety glasses at all times during cutting cycle.

MACHINE TYPE: _____

SERIAL NO.: _____

RECEIVING COMPANY: _____ (SAFETY OFFICER)

APRIL 2009

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SCOPE

A risk assessment program of plant items was commenced on behalf of Brobo Pty. Ltd. Dandenong South during March 2009. The assessment was commissioned by Mr. David Golic. Plant items assessed were located within the manufacturing facility located at 66-68 Williams Rd. Plant assets inspected were as per the Operating Manual for the OHS Series S315, 350, 400 S SCV Metal Cutting Saws, Sn's. C29680~.
As far as practicable, risks have been assessed against relevant Australian Standards, the Code of Practice for Plant No. 19, 1 July 1995. The Risk Assessments are completed under the "Generic" classification as defined by the Code.

METHOD

Hazard
Parts, accessories, components or other items together with the likely use, materials used as part of the process, cleaning procedures & maintenance procedures are some of the items given due consideration as to the likelihood of presenting Health & Safety risks to personnel. These items identified as hazards are described under the heading of "Hazard". ***The Hazard listed in column 1 of the Risk Assessment.***

RISK
The level of the Risk associated with each Hazard is based on AS 4360 Risk Management, consistent with Worksafe Victoria guidelines.
The qualitative measures are:

6	**Catastrophic (multiple deaths, loss over $1,000,000)**
5	**Disaster (single death, loss to $1,000,000)**
4	**Very serious (Permanent disability, loss to $1,000,000)**
3	**Serious (extensive medical treatment required, lost time >7 days, loss to $500,000)**
2	**Substantial (medical treatment, lost time <7 days**
1	**Minor (first aid treatment, lost time < 1 day)**

RISK CATEGORY MATRICES

Consequence: **Catastrophic** 6		Exposure					
		1 Very Rare	2 Rare	3 Infrequent	4 Occasional	5 Frequent	6 Continuous
Probability	6 Almost Certain	V	V	V	V	V	V
	5 Quite possible	H	V	V	V	V	V
	4 Unusual but possible	S	H	V	V	V	V
	3 Remotely Possible	M	S	H	H	V	V
	2 Conceivable	L	M	S	S	H	V
	1 Practically Impossible	L	L	L	L	M	S

Consequence: **Disaster** 5		Exposure					
		1 Very Rare	2 Rare	3 Infrequent	4 Occasional	5 Frequent	6 Continuous
Probability	6 Almost Certain	H	V	V	V	V	V
	5 Quite possible	S	H	V	V	V	V
	4 Unusual but possible	M	S	H	V	V	V
	3 Remotely Possible	L	M	S	S	H	V
	2 Conceivable	L	L	M	M	S	H
	1 Practically Impossible	L	L	L	L	L	M

Consequence: **Very Serious** 4		Exposure					
		1 Very Rare	2 Rare	3 Infrequent	4 Occasional	5 Frequent	6 Continuous
Probability	6 Almost Certain	S	H	V	V	V	V
	5 Quite possible	M	S	H	V	V	V
	4 Unusual but possible	L	M	S	H	V	V
	3 Remotely Possible	L	L	M	M	S	H
	2 Conceivable	L	L	L	L	M	S
	1 Practically Impossible	L	L	L	L	L	L

RISK CATEGORY MATRICES (CONTINUED)

Consequence: **Serious** 3		Exposure					
		1 Very Rare	2 Rare	3 Infrequent	4 Occasional	5 Frequent	6 Continuous
Probability	6 Almost Certain	M	S	H	V	V	V
	5 Quite possible	M	M	S	H	V	V
	4 Unusual but possible	L	M	M	S	H	V
	3 Remotely Possible	L	L	L	M	M	S
	2 Conceivable	L	L	L	L	M	M
	1 Practically Impossible	L	L	L	L	L	L

Consequence: **Substantial** 2		Exposure					
		1 Very Rare	2 Rare	3 Infrequent	4 Occasional	5 Frequent	6 Continuous
Probability	6 Almost Certain	L	M	S	H	V	V
	5 Quite possible	L	L	M	S	H	H
	4 Unusual but possible	L	L	L	M	M	S
	3 Remotely Possible	L	L	L	L	L	M
	2 Conceivable	L	L	L	L	L	L
	1 Practically Impossible	L	L	L	L	L	L

Consequence: **Minor** 1		Exposure					
		1 Very Rare	2 Rare	3 Infrequent	4 Occasional	5 Frequent	6 Continuous
Probability	6 Almost Certain	L	L	L	L	M	S
	5 Quite possible	L	L	L	L	L	M
	4 Unusual but possible	L	L	L	L	L	L
	3 Remotely Possible	L	L	L	L	L	L
	2 Conceivable	L	L	L	L	L	L
	1 Practically Impossible	L	L	L	L	L	L

In some instances, consideration is given to the possibility that, due to circumstances, there is a possibility that a "minor" incident, due to complications may escalate into a "serious" or even "disasterous" injury.

The Risk level score calculation is shown included in column 3 of the Risk Assessment.

RISK SCORE CALCULATIONS

The risk score is a factored in the following order:

Consequence (1 to 6)	Probability (1 to 6)	Exposure (1 to 6)
1 being the lowest consequence	1 being a lowest probability	1 being lowest exposure

Below is an example of the method used to calculate the risk scores with the aid of the Matrices.

Sample: Risk Assessment table excerpt.

Hazard	Risk	Score	Control Recommendation	Action Taken Yes / No	Re-Score
Rotating blade in reach of the operator at the normal workstation of the shift.	**Severing injury risks** RISK SCORE: 6:5:4	V			

• Consequence Very Serious 4 • (Permanent disability, loss to $1,000,000)	• Probability Quite Possible 5 Quite possible	• Exposure Frequent 5 Frequent	• Code V

The risk score calculation shall be indicated as follows 4:5:5= V

Code	Risk Level	Suggested action
V	Very High	Immediate cessation of work, isolation of the area and corrective action required
H	High	Immediate corrective action required
S	Substantial	Should receive attention within a specified time
M	Moderate	Should be dealt with within specified time but not an emergency
L	Low	Risk is acceptable

CONTROL RECOMMENDATIONS

The Plant auditors pool from their experience in the particular field to offer the most practical cost-effective & readily available Risk controls available to be introduced for each item.

CONTROL STANDARD

Controls are recommended based on minimum standards established in Regulations, Codes & Australian Standards where applicable.

RE-SCORE

The Re-Score column provides an indication of the anticipated extent of the proposed Risk management. This figure is only indicative & can only be ascertained once the actual control is introduced & evaluated & reviewed by a subsequent Risk Assessment.

TERMS OF REFERENCE

The Risk Assessment shall be conducted by a competent assessor; the assessor shall take into account :

- **The actual use of the plant**
- **Constructive comments & input from operators**
- **Appointed employee OHS representative group**
- **State of Knowledge of the type of Plant**
- **Applicable Australian Standards.**

FOLLOW UP

This report has been prepared in an easy to use format. The “Action Taken” column should be completed as each item is addressed. The person responsible should initial the “Ref” column.

All risk controls introduced as a result of this report need to be reviewed for quality & performance depending on the severity of the risk control. A review schedule must be introduced that will enable management & the responsible people to evaluate the performance & the quality of the controls. They also need to be able to determine if any further risks have been created as a result of the introduced control.

HAZARD, RISK, CONTROL REPORT

Make: Brobo Cold Cut Saw Model: S /SCV 315A/D, 350/D, 400/B
MANUFACTURERS' SERIAL NO GROUP C29680~

HAZARD	RISK	SCORE	CONTROL	ACTION TAKEN Y / /N	RE- SCORE
415/240 Volt Main power supply.	Inability to isolate power supply during cleaning or maintenance, injury risk, electric shock, electrocution risk to operator or repair personnel. Failure of circuit protection to activate in the event of metallic frames becoming live. **RISK SCORE: 5:4:4**	V	**Introduce "Plug lockout caliper system" to isolation and "lockout" / "tagout" procedure to site maintenance procedures. Attach site maintenance procedures to site safety induction policy & induction for maintenance personnel. Include item to "Test & Tag" AS / NZS 3760 periodic test register. Carry out insulation leakage tests to all hazardous voltage, mains power electric components and associated metalwork. Check earth continuity/resistance to all metal frames and attachments. Provide or repair earth points as necessary in accordance with AS 3000 & AS/NZ 3760**		**5:2:3=M**
415/240 volt power supply.	Electric shocks, burns, electrocution risks. **RISK SCORE: 6:5:4**	V	**Fit "DANGEROUS VOLTAGE," and or ISO international symbol signs to all access covers over dangerous voltage areas of the unit. Adequate warning of dangerous voltages within must be provided at all areas.**		**6:1:2=L**
Standby operation of the saw.	Accidental operation of saw during servicing, setup or adjustment. Severing, cutting, electrical shock injury risks. **RISK SCORE: 4:3:4**	M	**Fit "STAND BY" warning indicator circuit and tell tale lamp to saw in proximity to "ON / OFF" switch.**		**4:3:2=L**
Plant maintenance.	Unauthorized and untrained personnel carrying out plant maintenance, personnel injuries. Risk Score: 5:4:4	V	**Introduce "No unauthorized personnel to carry out maintenance to plant" policy to site induction training.**		**5:2:2=L**

HAZARD	RISK	SCORE	CONTROL	ACTION TAKEN Y / N	RE- SCORE
Emergency stop system.	In the ability of the operator to shut down the plant in the event of an emergency. Noncompliance with Plant regulations and AS 4024. Striking, crushing injury risks. Electric shock risks, electrocutions risks. **RISK SCORE: 5:4:4**	**V**	**Fit red colored lockdown type mushroom head emergency stop button with identification and operating instruction signs, "PUSH TO STOP" located in the immediate proximity to normal operator workstations. (Operator must be able to activate emergency stop from all control stations and normal work positions. Emergency stop equipment circuitry must be "fail-safe" & comply with AS 1543, AS 4024 & AS 3000. The wiring of the emergency stop system must comply with AS 4024.1 Section 6.3.7.1 Alternatively, fit foot operated / kick type emergency stop system, and fit identification and function sign.**		**5:1:3=L**
Operation controls.	The accidental operation, incorrect use of the plant. Noncompliance with Plant regulations and Australian Standards. **RISK SCORE: 4:5:5**	**V**	**Fit identification, a function operating and direction signs to all controls, including function and direction indication ie. "ON / OFF", "SLOW / FAST" in accordance with R 306.1 of the Plant regulations. Signs must be permanent and indelible in accordance with AS 1319.**		**4:1:2=L**
Unauthorised use of the plant.	Cutting injuries, eye injuries, severing risks. **RISK SCORE: 4:3:4**	**M**	**Fit "ONLY TRAINED EMPLOYEES TO OPERATE THIS ITEM OF PLANT AT ANY TIME" place sign in visible location.**		**4:3:2=L**
Flying chip particles and machine debris.	Eye injuries, eye damage. **RISK SCORE: 5:5:3**	**V**	**Fit eye protection sign to plant unit base frame in a location visible to control station, alternatively include. Mandatory eye protection P.P.E requirements to site induction with appropriate signs at entry points to the machine shop. Signage must be in accordance with AS 1319 sign No. 421 with supplementary text indicating the type of eye protection, ie. Face shield or goggles.**		**5:1:3=L**
Operating noise levels.	Hearing loss due to noise exposure. **RISK SCORE: 4:5:5**	**V**	**Fit "HEARING PROTECTION MUST BE WORN" sign in proximity to plant. Fit sign in accordance with AS 1319, sign No 425.**		**4:2:3=L**

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Plant Risk Assessment Report

HAZARD	RISK	SCORE	CONTROL	ACTION TAKEN Y / /N	RE- SCORE
Cleaning.	Crushing, striking injuries to operators, maintenance and cleaning personnel. **RISK SCORE: 6:3:5**	**V**	**Fit "DANGER HIGH VOLTAGES, QUALIFIED SERVICE PERSONNEL ONLY, SWITCH OFF AND ISOLATE PLANT AT ALL TIMES PRIOR TO CARRYING OUT ADJUSTMENTS OR CLEANING", signs in proximity to controls**		**6:2:3=S**
Airborne contaminants, dust.	Ingress of hazardous materials into lungs, respiratory illness, lung disease. **RISK SCORE: 5:3:5**	**V**	**Fit "Respirator must be worn", P.P.E. signs in accordance with AS 1319 sign number 423.**		**5:2:2=L**
Safety systems.	Severing, crushing injury risks. **RISK SCORE: 5:3:5**	**H**	**Create plant log book for each item of plant. Introduce periodic safety inspection system of all electrical, mechanical safety systems, including main power isolator, limit switches, guards, wiring and emergency stop buttons. Record all results in plant log book on a scheduled interval.**		**5:2:3=M**
Hazardous voltage supply cables, lines and equipment.	The opening of incorrect circuits during maintenance, incorrect maintenance, noncompliance with industry standards. And building code. Maintenance personnel, operator injury risks. Striking, injuries, eye injuries, burns injuries, electric shock injuries, electrocution injuries. **RISK SCORE: 5:5:3**	**V**	**Fit identification signs to all hazardous voltage circuits. Fit ISO type color-coded identification and flow direction signs to service lines and pipes in accordance with AS 1345. (All building and plant service lines, plumbing and cabling must be clearly identifiable.)**		**5:1:3=L**
Workpiece material.	Material rolling over during cutting, operator injuries, hand injuries, cutting blade breakage. **RISK SCORE: 2:4:5**	**M**	**Fit "SECURELY CLAMP ALL MATERIAL PRIOR TO CUTTING", sign in proximity to the machine.**		**2:4:3=L**
Main saw blade.	Hand injury risks, entanglement, crushing severing risk. **RISK SCORE: 3:3:4**	**M**	**Fit swing type automatic retracts & return safety guard to AS 4024 to saw blade, to prevent finger access to blade when not engaged in cutting of material (saw blade must be completely guarded when in standby, the existing guard does not adequately prevent access to saw blade while in standby position).**		**3:2:4=L**

HAZARD	RISK	SCORE	CONTROL	ACTION TAKEN Y / /N	RE- SCORE
Replacement of saw blade.	Hand injury risks, entanglement, crushing severing risk. **RISK SCORE: 3:3:4**	**M**	**Carry out "Job Safety Audit" on the procedure, write "Safe Work Procedure" accordingly, display S.W.P. in proximity to the machine.**		**3:2:4=L**
Workpiece loading and unloading to saw bench.	Manual handling injury risk. Hand injury risks, muscle strains, back injury risks, crushing injury risks. **RISK SCORE: 3:4:5**	**H**	**Carry out "Job Safety Audit" on the procedure to suit handling of materials onto the machine, write "Safe Work Procedure" accordingly, display S.W.P. in proximity to the machine. Introduce "no lift policy" to safety induction training.**		**3:4:5=M**
Cutting coolant.	Poisoning, injury risk, **RISK SCORE: 3:2:4**	**L**	**Fit safety instruction signs in accordance with cutting lubricant manufacturers' M.S.D.S. Display M.S.D.S for all chemicals on display board.**		**3:1:4= L**
Stability of Saw pedestal / Stand.	The collapse of pedestal/stand during use. Operator injuries, plant damage. **RISK SCORE: 4:4:4**	**H**	**Securely fasten base of the pedestal to the floor with dyna-bolts or similar / Fit on a suitable pedestal.**		