



# LF110

## OPERATORS MANUAL

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# Safety precautions

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## Know the machine

This machine should only be used by an operator fully trained in its use.

Read these operating instructions carefully. Learn the operation, limitations and potential hazards of using your butt fusion machine.

Report anything that doesn't look right, sound right, smell right, feel right, or is in any way different from what you expect, or that you think may be unsafe.

## Avoid dangerous environments

The equipment is not explosion proof. Never carry out butt fusion in a gaseous or combustible atmosphere.

## Electrical safety

Use only a qualified electrician to carry out electrical maintenance work.

Connect electrical components only to a voltage source that corresponds to that marked on the components.

Do not operate the electrical equipment in damp or wet locations.

Prevent electric shock by correctly grounding electrical components. The green (or green/yellow) conductor in the electric cable is the grounding wire and should never be connected to a live terminal. The use of earth leakage protection with portable electric tools is essential and must be provided by the user.

## Heater

The heater is supplied with a short extension cord that will melt through if allowed to contact the hot plate. The factory supplied cord has a high melting point outer sheath that will delay, but will not prevent, the inevitable life threatening situation that could occur.

Always use an earth leakage safety device in any circuit connected to the heater.

Never use a standard appliance cord with low melting point PVC sheath.

Never stand the heater plate such that the temperature controller handle is vertically above the hot plate.

## Facer

The facing machine is powerful and the cutting blades are sharp. To prevent serious injury the facer should only be operated when it is securely located in the pipe cutting position.

Because of the nature of the machine it is not practical to guard the operational area. Do not attempt to remove shavings from the cutting area while the facer is running.

## Wear appropriate apparel

The heater is very hot and should be handled carefully. Wear gloves to prevent burns.

Remove loose clothing or jewellery to prevent injury from these items being dragged into moving parts.

## Hydraulic pressure

Remember that a sudden hydraulic oil leak can cause serious injury, or even death if the pressure is high enough. Do not search for oil leaks with the fingers because a fine jet of pressurised oil could penetrate the skin causing serious injury. Use a piece of cardboard to test for leaks under pressure.

Avoid spraying oil into eyes when bleeding air from the system by wearing safety glasses and keeping the face clear of the area.

Any body parts caught in the machine when the hydraulics are operated will be crushed. Keep fingers, arms, etc, well clear of the clamp area.

## Maintain equipment carefully

The machine has moving parts and/or parts that may deteriorate with age and require maintenance. Regular inspection is recommended. For best results keep all machine components clean and properly maintained. Always disconnect the power when adjusting, servicing or changing accessories. Repair or replace damaged electric cords.

## Transporting the machine

Dixon equipment supplied with wheels is not designed for on-road towing. Any attempt to do so could result in machine damage and/or personal injury. Transportation should be by truck or similar, with the unit well secured.

It is particularly important to ensure that heater plate non-stick surfaces are protected from damage during transportation.



# Butt Welding Equipment Limited Warranty

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- 1) Subject to the terms below, Dixon Industries Pty Ltd (“**Company**”) warrants to repair or replace at its option ex-works Adelaide any product manufactured or repaired by it within 2 years from the date of shipment which are found to be defective due to either faulty workmanship or use of faulty materials, provided that such defective product is returned to the Company’s works at the customer’s expense, unless otherwise agreed.
- 2) This warranty is limited solely to products manufactured or repaired by the Company. Products not manufactured by the Company (such as pumps, gauges, motors, switches, etc.) are not covered by this warranty. In relation to a repair, this warranty is limited to the Company’s cost of parts and labour to remedy a defective repair.
- 3) This warranty does not apply to any product that has been damaged by accident, misuse, neglect, use of an electrical power supply that is incompatible with the design specifications of the product or repair or alteration of the product by anyone other than the Company.
- 4) A warranty claim must be made to the Company in writing within 14 days of the first occurrence of the event or condition on which the claim is based. The claim must include proof of purchase and a detailed statement of the manner in which the product has been used and the event or condition occurred. The Company’s decision to admit or refuse any warranty claim shall be binding.
- 5) Replacement parts provided to the customer before the right to a warranty claim is accepted by the Company will be invoiced at the full cost of the parts, including applicable taxes and freight charges. If a warranty claim is accepted, the cost of any replacement parts covered by the warranty claim which have been so invoiced will be credited to the customer.
- 6) All costs of returning product to the customer shall be paid by the customer.
- 7) Other than provided in this warranty, the Company excludes any other responsibility or liability whatever to the maximum extent permitted by law including liability for breach of contract, negligence or incidental, consequential, indirect or special damages including without limitation, interruption to use of the product or any other plant or equipment.



# LF110 manual hydraulic butt welder.



### Machine Description

The **FUSIONMASTER**® LF110 is designed for welding polyethylene pipe and fittings up to 110mm.

The standard machine is supplied with two pipe clamps and a narrow fittings clamp, each of three segments. A second fittings clamp is optional and can be added for welding fitting to fitting.

The butt fusion unit is compact, light and strong with heat treated aluminium alloy clamps mounted on stainless steel guide shafts. All mild steel machine components are zinc plated for maximum corrosion protection. It is ideal for bench or floor operation, or wherever space to manoeuvre is limited.

### Machine Specification

Main clamp bore	110mm
Length overall	260mm
Width overall	250mm
Height overall	350mm

(See machine assembly drawing BF1100AO-MAN.)

### Heater Plate

The 750 watt, 240v. aluminium heater plate has a cast in circular element ensuring uniform heat distribution across the 115mm effective heating diameter.

Heater temperature is controlled by an adjustable solid state controller. LED's indicate when power is on, and a dial thermometer indicates internal plate temperature. (Refer later section on heater technology.) It takes less than 10 minutes to heat up to working temperature from 20°C.

Replaceable non-stick cloths are used to cover the heater surfaces to prevent hot plastic adhesion. The cloths are held in place by "snap rings" that enable quick and easy field repair if the surface is damaged.

The detachable 1.8m, 7.5 amp electric cord has a melt resisting outer sheath for protection against short periods of accidental contact with the heater.

(See heater assembly drawing BF1101AO-MAN.)

### Facer

Joint preparation time is fast using the lightweight facing head powered by a Hitachi electric drill (700 watt, 240v). The cutter self aligns to always produce parallel pipe joint faces. The motor provides adequate torque and speed to process pipes quickly. When not in use, both the facer and heater plate are stored in a protective floor stand.

The facer has one blade on each cutting face, and is capable of facing pipe down to 32mm od or 28mm id.

(See facer assembly drawing BF1102AO-MAN.)

### Reducing Liners

Clamp liners for the LF110 can be supplied to suit metric or imperial pipe or fittings.

(See drawing BF1109A0.)

### Accessory Case

The LF110 is supplied in kit form in a fitted steel carrying case which holds the welding machine, heater plate, facer, and a heater/facer stand. The carry case can also accommodate six sets of reducing liners.

### Component Weights

Butt machine	7.2kg
Heater plate	2.1kg
Facer	3.0kg
Heater stand	2.5kg
Loaded accessory case (540x300x320mm)	27.0kg

Portable power requirement is 2kva, 240V, single phase.

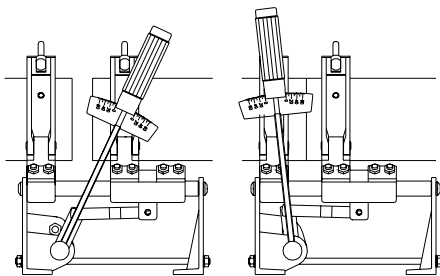
## Using the LF110

### Preparation

- Connect only to a 240v power source. Ensure the output of any portable generator used is 240V +/- 20V and 50hz to protect the electronic temperature controller from electrical damage.
- Clean and/or replace the non-stick cloths. Clean the plate before every weld with clean dry paper or cotton cloth - never use synthetic materials that may melt.
- Check, and if necessary adjust the heater surface temperature.
- Check the facer cutting action (the shaving thickness should be 0.25-0.35mm).
- Install the correct reducing liners for the pipe to be welded.
- When joining coiled pipe the welding clamp set should be secured to a solid immovable base such as a work bench.
- Clean each pipe end and the cutter blades before facing.
- Pre-determine the weld force and times required.

### Pipe Alignment

Clamp the pipe into place with 20 mm of pipe extending from the clamps into the operating zone, and tighten the clamp wing nuts securely. Using the lever, move the pipe ends together and check for alignment.

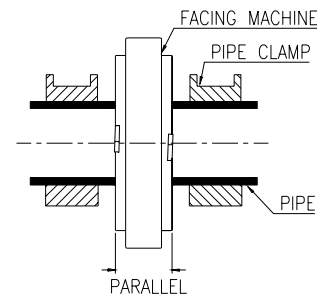


Adjust out any misalignment by loosening the clamps and rotating the pipes, and/or using packers as necessary. Re-tighten the clamp wing nuts securely to prevent pipe movement during facing and fusion.

### Facing

Using the lever, move the pipe ends apart and place the facing machine between the pipe faces. Start the facer rotating. Move the pipe ends into contact with the facer and apply the minimum pressure to achieve cutting until a continuous shaving of plastic is simultaneously produced from both sides of the facer. Move the pipe

away from the facer before stopping facer rotation to prevent any step forming on the pipe face. Switch off the drill.



### Caution:

**Take care not to overload the facer by applying excessive lever force.**

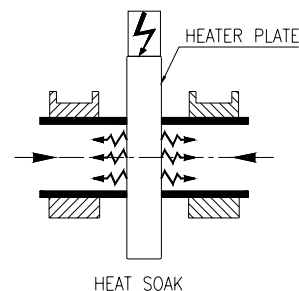
### Check Alignment

Remove the facer and clear away all plastic cuttings without contaminating the pipe ends. Do not touch the cut surface or reclean it. Re-check pipe alignment (maximum misalignment  $\pm 10\%$  of wall thickness) as this is extremely important in obtaining uniform heating and minimising stresses in the finished joint.

If the alignment is unacceptable repeat the facing operation. Always reface if it becomes necessary to rotate the pipe in the clamps after initial facing.

### Heating Cycle

Check the heater plate is at the required temperature before every joint. Place the heater plate between the pipe faces. Move the pipe faces until they touch the heater.



By applying a force to the lever arm, pressure is transmitted to the pipe joint area. Maintain the lever force until a continuous bead is formed around the circumference of both pipes. This commences the heat soak period.

Then reduce the lever force so the pipe face is just kept in contact with the heater plate (ie under almost no pressure) for the remainder of the heat soak period. Failing to reduce pressure forces hot plastic out of the joint zone and can lead to a "cold joint".

On completion of heat soak time, reverse the carriage direction to "crack" the melted pipe away from the heater plate, and move the heater plate out of the weld zone as quickly as possible.

The unique non-stick cloths allow a "peeling off" action as the pipe is cracked away, minimising adhesion of the melted pipe to the heater.

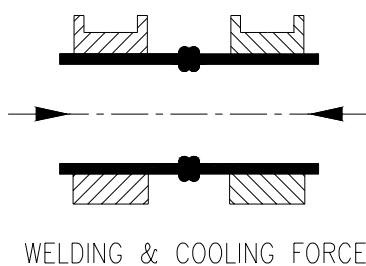
Remove the heater plate and replace it in the floor stand.

### Caution:

**Do not allow the heater plate to slide across the pipe ends and distort the melted surface. Do not contaminate the melted surface in any way.**

### Fusion Cycle

Bring the hot pipe faces into contact with each other within seconds to minimise heat loss from the weld zone. This must be done gently so excess melt is not forced from the weld zone. Gradually increase the force on the lever arm to force a bead of plastic out of the weld zone. Roll the bead over until it just touches the pipe. An indication of expected bead size is given in a later table



Shrinkage will occur as the weld cools so it is important to manually maintain force on the lever until the bead becomes firm. Then lock the lever wing nut to maintain force, holding the pipe in the clamps and under pressure until the weld/cooling time is complete.

### Weld Quality Check

Inspect the uniformity of the bead size inside and out, top and bottom of the pipe. (See section on weld failure trouble-shooting.)

## Maintenance - daily checks

1. Keep the machine and accessories clean and free of dust and grease. Do not lubricate the slide rails.
2. Check the temperature of a number of points on the surface of both sides of the heater plate. Readings should be within a 20°C range, (say 210-230°C).
3. Check for damage to electric cords.
4. Replace non-stick cloths if damaged in way of the weld area.
5. Facing blades should be sharp and have defect free cutting edges to provide continuous swarf of uniform thickness. Sharpen or replace cutter blades if blunt or chipped.
6. If using a portable generator, ensure its output is 240v +/- 20v and 50hz, to protect the electronic temperature controller from permanent damage.

## Maintenance - periodic

In addition to the daily checks, the following should be carried out before commencing each new project, or after 250 operating hours.

### General

Check the clamp guide shafts are not bent.

### Heater

1. Heater surfaces should be flat, smooth and free of dents or gouges. Dress as necessary.
2. Heaters with non-stick cloths have a vent machined in the edge of the casting to prevent air being trapped under the cloth. This vent should always be kept clear.

### Facer drive

1. Access the facer drive assembly by removing the securing screw from the facer plate and removing the plate.
2. Inspect the worm and worm wheel assembly for wear. If replacement is deemed necessary, replace as a complete assembly.
3. Inspect the worm shaft needle thrust bearing for damage and replace if necessary.



# LF110 manual hydraulic butt welder.

4. Clean out and regrease sparingly with a high pressure grease eg Shell EP2. Do not use molybdenum disulphide, graphite grease or similar as these may run and cause joint contamination.
5. Replace felt dust seals as required.

## Blade sharpening

If blunt, the high grade tool steel blades may be sharpened with a die grinder. Shim the cutter blades if they are sharp, but shavings are too thin.

If chipped or damaged, the blades should be replaced.

## Heater Temperature adjustment

The temperature setting of the heater is adjusted by turning the screw in the end of the heater handle, clockwise for higher temperature, and anticlockwise for lower temperature. About one degree of turn equals one degree of temperature. Always allow several minutes for the plate temperature to stabilise after making any adjustment.

The controller has an operating range of 180°C to 260°C. It is factory set to 220°C.

## Heater failure

1. If the heater does not power up it could be due either to failure of the temperature controller or failure of the element pad.
2. However always first test the power supply and the power cord with some other appliance to ensure those items are not at fault.

**Caution: The following procedures should be performed by a qualified electrician.**

3. To test for element pad failure:
  - Disconnect the power supply.
  - Remove the three screws securing the heater handle to the heater bracket.
  - There are four leads running from the controller to the element pad. Pull back the two yellow sleeves to expose the element pad leads and disconnect the controller. (Do not try to remove other leads without unbolting the heater bracket from the element pad.)
  - Measure the resistance between the two element leads, which for the MV50 should be 75 ohms +/-10%. If not, the element pad casting must be replaced.

- To replace the element pad, remove the thermometer and unbolt the heater bracket and earth connector from the heater plate.
- Withdraw the temperature sensor probe with long nose pliers, pulling on the metal case, not the fine lead wires.

4. If the power supply is OK, and the element resistance is OK, it will be necessary to replace the controller handle.
5. Replacement controller are supplied with a small quantity of white heat sink compound. Apply this to the sensor probe before insertion into the sensor hole to increase thermal sensitivity.
6. Refit all parts in reverse order and ensure the yellow sleeves are put back in place to prevent short circuit.
7. Plug the power cord into the handle and switch on. The LED should light immediately, indicating power on. The new handle has been factory set to run at 220°C. After switching on, allow 15 minutes for the plate to reach a stable temperature before making any adjustments. Always allow time for the plate temperature to stabilise after making any adjustment.

## Non-stick cloth replacement

The non-stick cloths should be replaced if they become torn, contaminated or overheated.

Do not attempt to remove the cloths unless the plate temperature is less than 40°C because the snap rings will not release above this temperature. Use the following procedure.

1. Use a screw driver to lever the snap rings out of their securing grooves. This takes very little force.
2. With the plate flat, place a new cloth into position and reposition the snap ring over the cloth.
3. Push the snap ring into the groove around an arc of the plate. Hold the ring in position with one hand and with the free hand, use a piece of wood or plastic to force the snap ring completely into its groove. Never use metallic objects to force the snap rings back into position as this may result in accidental damage to the cloth.

## PE welding temperatures

The temperature range at which polyethylene pipe should be welded is 220° +/-15°C. This should be the temperature between the interface of the heater surface and the pipe material.

Temperatures greater than 240°C when coupled with long heat soak times may result in diminution of the anti-oxidants in the pipe.

Cold joints will result if the weld temperature is too low, or the heat soak time is too short, or the time between removal of the heater and butting the pipes together is too long.

*Either situation will eventually lead to joint failure*

## Heater plate temperature

Heater plate temperature displays usually indicate the internal temperature of the plate. However the actual surface temperature may vary from that displayed for a number of reasons.

- 1) The rate of heat lost from the heater surface will depend on the design of the heater plate and the type of temperature controller used. The surface temperature could be up to 25°C cooler than the thermometer indication. This variation will be greatest on cold, windy days - which is one reason for using a shelter when welding.
- 2) The temperature will change as power is being pumped into the heater. The temperature will be highest just after the power cycles off, and lowest just as it cycles back on.
- 3) The temperature is unlikely to be exactly the same at every point on the surface, and there may also be small variations from side to side, due to manufacturing tolerances.
- 4) As heat is transferred into the pipe during heat soak, the heater temperature initially falls but eventually returns to the set point. As it is the welding temperature that is important, it is recommended to check the heater surface temperature during the heat soak phase.

## Measuring surface temperature

- To ensure the temperature of the heater plate has stabilised, wait 5 minutes after the heater has reached set temperature before recording measurements.
- Take readings at several points (North, South, East, West) on both sides of the heater, at the diameter of the pipe being welded .
- If a contact probe is used it should be held in position for 3-5 seconds before the reading is taken.
- With **FUSIONMASTER®** heater plates using non-stick cloth, it is essential to use a contact probe which forces the cloth into contact with the plate. (Incorrect readings may result if the cloth system traps an insulating air layer between the cloth and the heater surface.)
- If an infra red pyrometer is used, care must be taken to ensure its emissivity is correctly calibrated for use on the non-stick cloth, AND care must be taken to ensure no air is trapped between the plate and the cloth or an incorrect reading is likely to result (see suggestion below).
- Never use an infra-red pyrometer to take a reading from a shiny aluminium surface (such as a **FUSIONMASTER®** heater without cloths, or the outer edge of a heater plate) or a gross error will result.

## Suggestion

Infra-red pyrometers are good tools for reading heater plate temperatures, but should always be used with a "spot control adapter" (Dixon part number AF000104).

The "spot control adapter" clips to the end of a Thermotwin pyrometer. When pressed square against the heater surface this correctly focuses the infra-red beam every time, and when used on **FUSIONMASTER®** heaters, it expels trapped air from beneath the non-stick cloth, ensuring consistently accurate measurements.

The butt welding method of joining polyolefin pipe requires application of a combination of appropriate temperature, time and pressure to ensure a sound weld.

Operators should take care to determine the suitability of materials for butt welding. Join only pipes and fittings made from the same raw materials, eg PE to PE, PP to PP, PVDF to PVDF, etc.

The joint area must always be protected from adverse weather conditions, eg dampness, excessive cold or heat, or strong winds, which could lead to the pipe wall developing non-uniformly heated zones.

The weld zone should be free of bending stress, free of notches or similar damage, and be free of contamination.

In the absence of an Australian Standard on butt welding, a table of welding parameters is given on the next page.

## The basic welding process

- a) Prepare the ends of the pipe or fittings to be joined so they are clean and parallel to each other.
- b) Heat the ends at pressure  $P_1$  and for time  $T_1$  to melt the plastic until a bead just forms completely around both ends.
- c) Heat soak the ends at pressure  $P_2$  and for time  $T_2$ . (Time  $T_1 + T_2$  is critical to achieving good weld quality and should never be shortened.)
- d) Remove the heater plate and bring the pipe ends gently into contact with each other within time  $T_3$ . (If  $T_3$  is too long, too much heat is lost from the weld area allowing PE recrystallization to commence prematurely.)
- e) Raise the pressure gradually to pressure  $P_3$  within time  $T_4$ . (If pressure is applied too fast it can cause too much melt to be forced out of the weld area with adverse results.)
- f) Maintain pressure at  $P_3$  for time  $T_5$  before unclamping and removing pipe from the machine. Never artificially accelerate the cooling process.

## Weld test - destructive

Cutting out and testing of trial welds is frequently required to qualify the welding machine, operator, welding parameters, pipe material, or when the consequences of failure are significant.

Tensile testing is widely used. The ratio of ductile:brittle appearance is usually indicative of weld acceptability.

## Weld failure trouble shooting



Uniform bead - correct welding.



Crack down centre of bead.

"Cold weld" signified by clean break through the middle of the weld with a smooth appearance.

Could be due to insufficient heat soak time or temperature, or changeover time too long, or excessive soak pressure, or insufficient fusion pressure, or no allowance for drag pressure, or drag pressure too great eg due to pulling pipe up a gradient.



Misalignment - maximum allowable 10% of wall thickness.

Care should also be taken to ensure pipes or fittings being joined have the same diameter and wall thickness or the probability of weld failure is significantly increased.



Bead not rolled over - pressure applied too quickly, or pressure too high.

Could be due to insufficient heat soak time or temperature, or changeover time too long, or excessive soak pressure, or insufficient fusion pressure, or no allowance for drag pressure,



Unequal bead size - difference in materials eg melt flow index.

Butt welding equipment is designed to apply the temperatures and pressures specified by the parameters. As the conditions of use of welding equipment are outside the control of Dixon Industries, no warranties are expressed or implied and no liability is assumed in connection with the use of butt welding equipment or the butt welding guidelines or parameters.

PIPA recommends using the butt fusion procedures and parameters as specified in ISO 21307. Please refer to PIPA Guideline POP003, issue 6.0, 2009 for detailed information. The section of Guideline POP003 which is relevant to this machine is reproduced below for reference.

## Disclaimer (see [www.pipa.com.au](http://www.pipa.com.au))

PIPA makes no warranty or representation regarding the information, opinions and recommendations contained in the Guidelines. Users of the Guidelines are advised to seek and rely upon their own professional advice and assessment of the matters contained in the Guidelines and not rely solely on the Guidelines in relation to any issue that may or might risk any loss.

In addition, PIPA excludes:

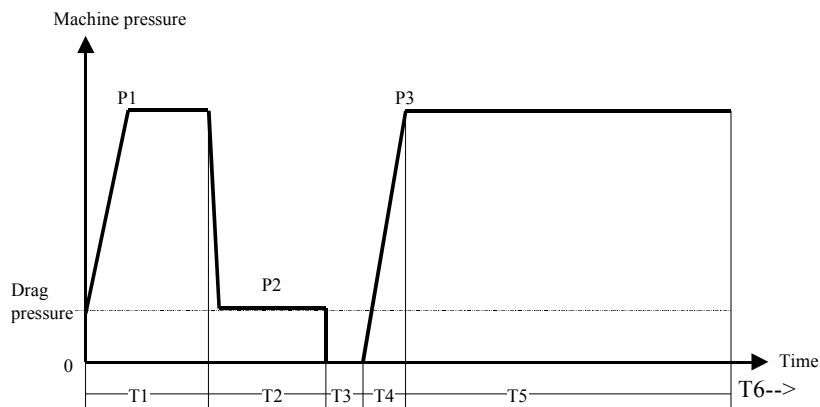
- (a) all conditions warranties and terms implied by statute general law or custom except where exclusion would contravene any statute; and
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### single pressure and low fusion

#### jointing pressure procedure

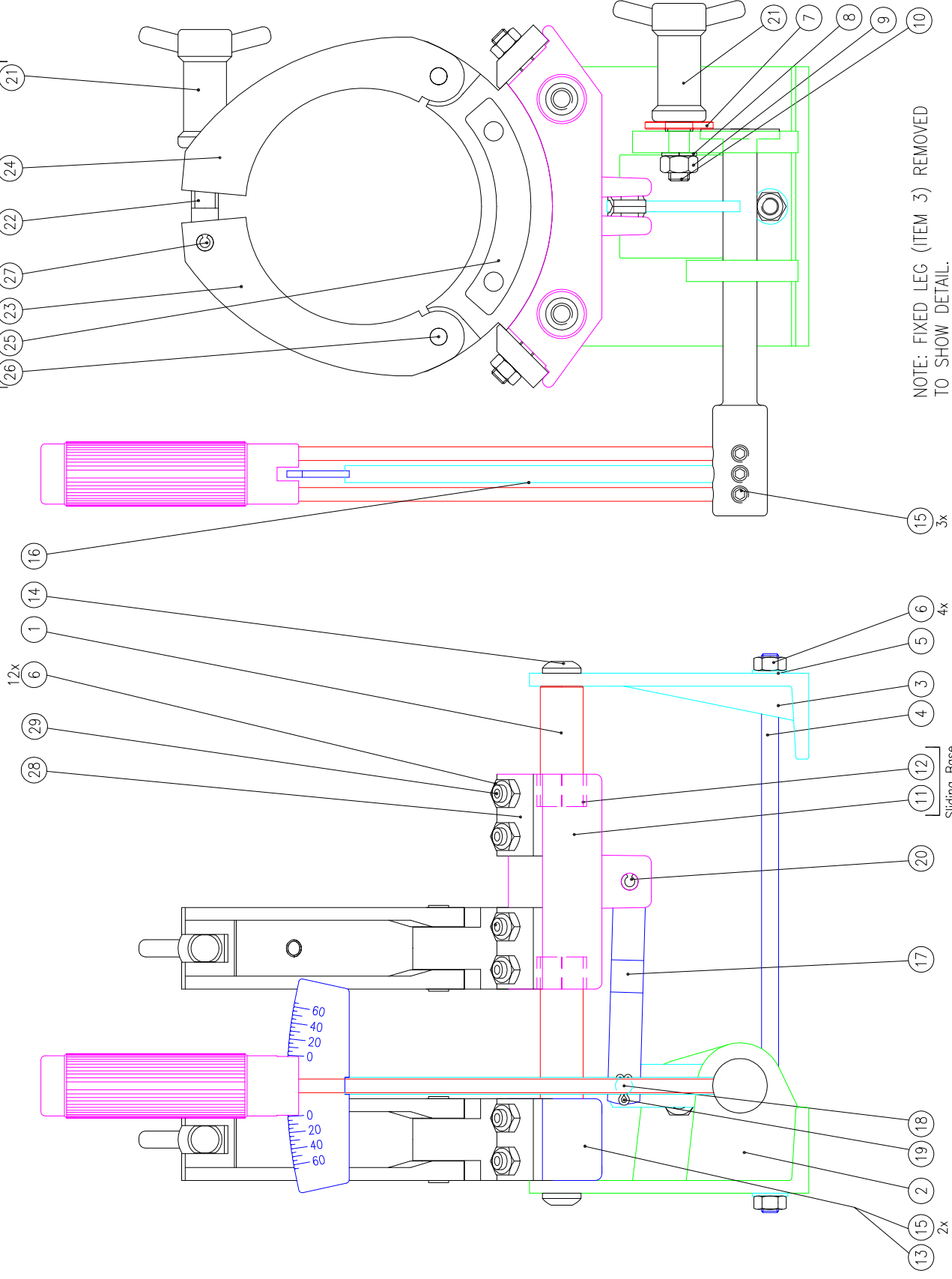
		Units	Value	Comments
Heater plate temperature		°C	200-245	
Pressure value: Bead up	P1	kPa	$170 \pm 20$	Calculate (see note 5). Always add drag pressure to calculated pressure.
Approx. bead width after bead up		mm	$0.5 + 0.1e_n$	max. 6mm.
Bead up time	T1	second		Varies with ambient conditions and pipe size.
Heat soak pressure	P2	kPa	Drag only	
Minimum heat soak time	T2	second	$(11 \pm 1) e_n$	
Maximum heater plate removal time	T3	second	$0.1e_n + 4$	
Max. time to achieve welding pressure	T4	second	$0.4e_n + 2$	
Fusion jointing pressure	P3	kPa	$170 \pm 20$	Calculate (see note 5). Always add drag pressure to calculated pressure.
Minimum cooling time in machine under pressure	T5	minute	$e_n + 3$	Time in clamps
Minimum cooling time out of machine	T6	minute	$e_n + 3$	Before "rough" handling is allowed.



#### Notes:

1. These parameters apply to the butt fusion of PE80 or PE100 polyethylene materials as specified in AS/NZS4131.
2. These parameters may also apply to the butt welding of PE80 to PE100. This may result in slightly different bead formation without reducing weld quality. If in doubt refer to the pipemaker.
3. Only pipes and fittings of the same diameter and wall thickness should be butt fused together.
4.  $e_n$  = mean pipe wall thickness calculated from AS4130 min/max values, rounded to the nearest mm.
5. Pressure calculation formula:  $\{\text{pipe annulus area, mm}^2\} \div \{\text{hydraulic cylinder area, mm}^2\} \times \{\text{pressure value, kPa}\}$ .  
where pipe annulus area =  $\pi (D_n - e_n) e_n$  and  $D_n$  means nominal pipe diameter.
6. Cooling times may require lengthening or shortening depending on ambient temperature.

Clamp Assembly, P.No.:BF110021, 2 Places



NOTE: FIXED LEG (ITEM 3) REMOVED TO SHOW DETAIL.

29	BF000126	SETScrew	12
28	BF110020	BRIDGE CLAMP	6
27	BF000249	SPRING PIN	2
26	BF110015	HINGE PIN	4
25	BF110022	CLAMP BASE	2
24	BF110031	CLAMP ARM	2
23	BF110032	CLAMP ARM TOGGLE	2
22	BF050008	TOGGLE BOLT	2
21	BF050028	TOGGLE NUT ASSEMBLY	3
20	BF000247	SPRING PIN	1
19	BF000167	SPLIT PIN	1
18	BF110017	CLEVIS PIN	1
17	BF110018	LINK BAR WELDMENT	1
16	BF110025A	TORQUE HANDLE ASSY	1
15	BF000122	SET SCREW	5
14	BF000153	GUIDE BAR SCREW	4
13	BF110001	FIXED BASE	1
12	BF000073	BEARING	4
11	BF110002	SLIDING BASE	1
10	BF110012	LOCKING STUD	1
9	BF000265	NUT	1
8	BF000268	WASHER SPRING	1
7	BF110013	WASHER	1
6	BF000133	NUT	16
5	BF000121	WASHER	4
4	BF110028	TIE ROD	1
3	BF110005	FIXED LEG	1
2	BF110004A	LEVER LEG ASSY	1
1	BF110003	GUIDE BAR	2
		PART No.	
		PART NAME	
		QTY	
		/KIT	

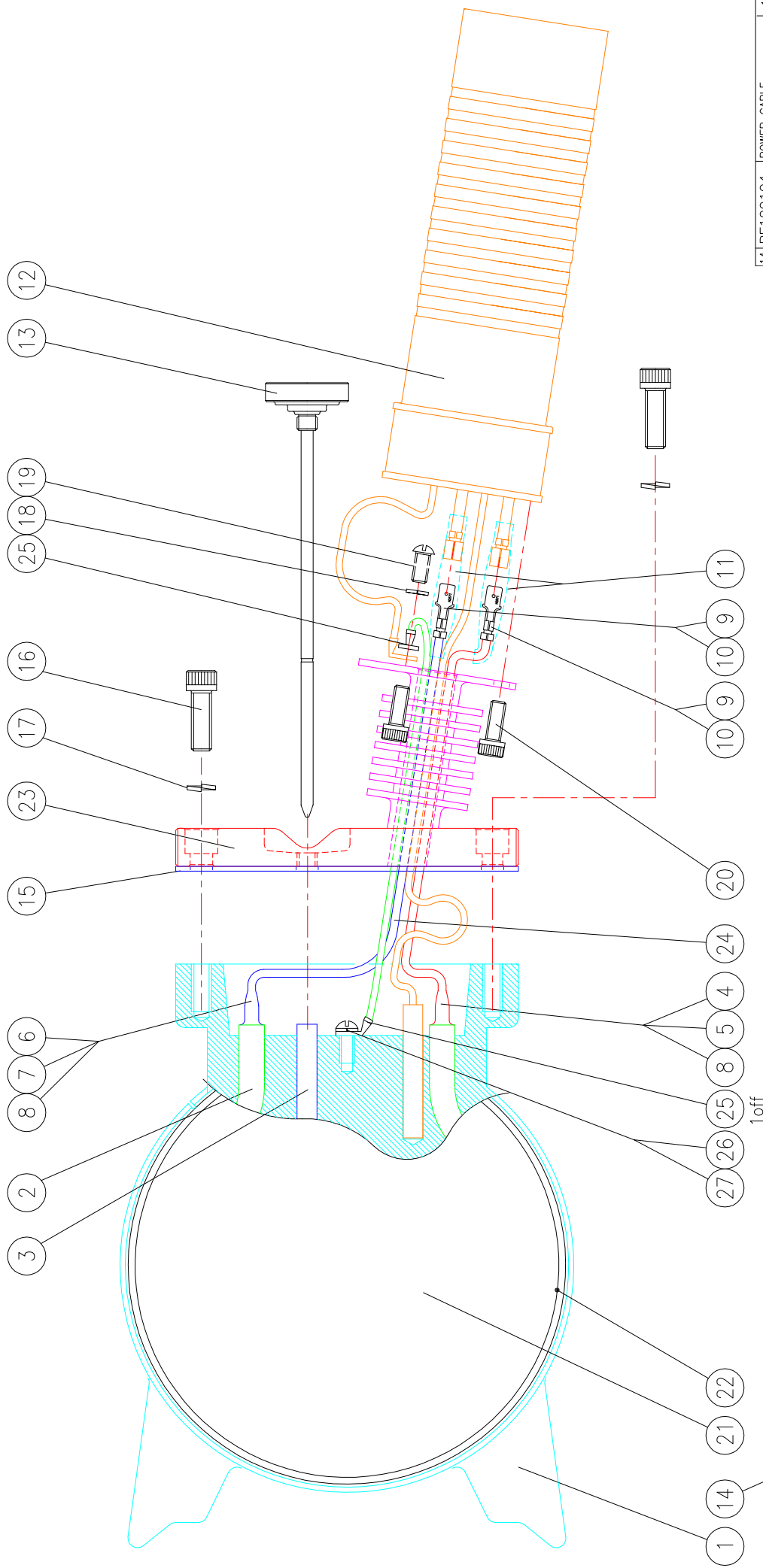


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Drawing Name:	Scale:	Net To Scale
LF110 MACHINE ASSEMBLY OPERATORS MANUAL ONLY	Drawn: SR	
CAD File: U:\DWG\Manual Dwg\LF110-MAN\BF1100A0-MAN	Date: 2/06/09	

Sliding Base Bushed, P.No.: BF110002A

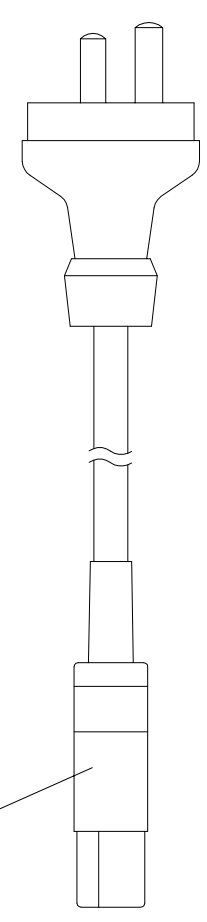
UNCONTROLLED DOCUMENT



ITEM	PART No.	PART NAME	QTY	/KIT
14	BF100104	POWER CABLE	1	
13	BF000183	THERMOMETER	1	
12	BF225102	HANDLE ASSY	1	
11	SV050117	INSULATING SLEEVE	2	
10	BF000077	ELECTRICAL CONNECTOR	2	
9	BF100124	INSULATING SLEEVE	2	
8	BF100116	CRIMP	2	
7	BF100120	INSULATING SLEEVE	1	
6	BF100115	ELECTRICAL CABLE	1	
5	BF100121	INSULATING SLEEVE	1	
4	BF100114	ELECTRICAL CABLE	1	
3	BF100118	THERMOMETER WELL	1	
2	BF100100	ELEMENT 100	1	
1	DBF10101	ELEMENT PAD CASTING	1	

ITEM	PART No.	PART NAME	QTY	/KIT
27	BF000228	SPRING WASHER	1	
26	BF000221	EARTH SCREW	1	
25	BF000080	ELECTRICAL CONNECTOR	2	
24	BF100105	EARTH WIRE	1	
23	BF100105	MOUNTING BRACKET	1	
22	BF100112	SNAP RING - PAIR	1	
21	BF100110	PTFE CLOTH - PAIR	1	
20	BF000226	HANDLE MTG. SCREW	3	
19	BF000286	EARTH SCREW	1	
18	BF000287	SPRING WASHER	1	
17	BF000233	SPRING WASHER	2	
16	BF000232	PLATE MTG. SCREW	2	
15	BF100108	GASKET	1	

ITEM	PART No.	PART NAME	QTY	/KIT
27	BF000228	SPRING WASHER	1	
26	BF000221	EARTH SCREW	1	
25	BF000080	ELECTRICAL CONNECTOR	2	
24	BF100105	EARTH WIRE	1	
23	BF100105	MOUNTING BRACKET	1	
22	BF100112	SNAP RING - PAIR	1	
21	BF100110	PTFE CLOTH - PAIR	1	
20	BF000226	HANDLE MTG. SCREW	3	
19	BF000286	EARTH SCREW	1	
18	BF000287	SPRING WASHER	1	
17	BF000233	SPRING WASHER	2	
16	BF000232	PLATE MTG. SCREW	2	
15	BF100108	GASKET	1	

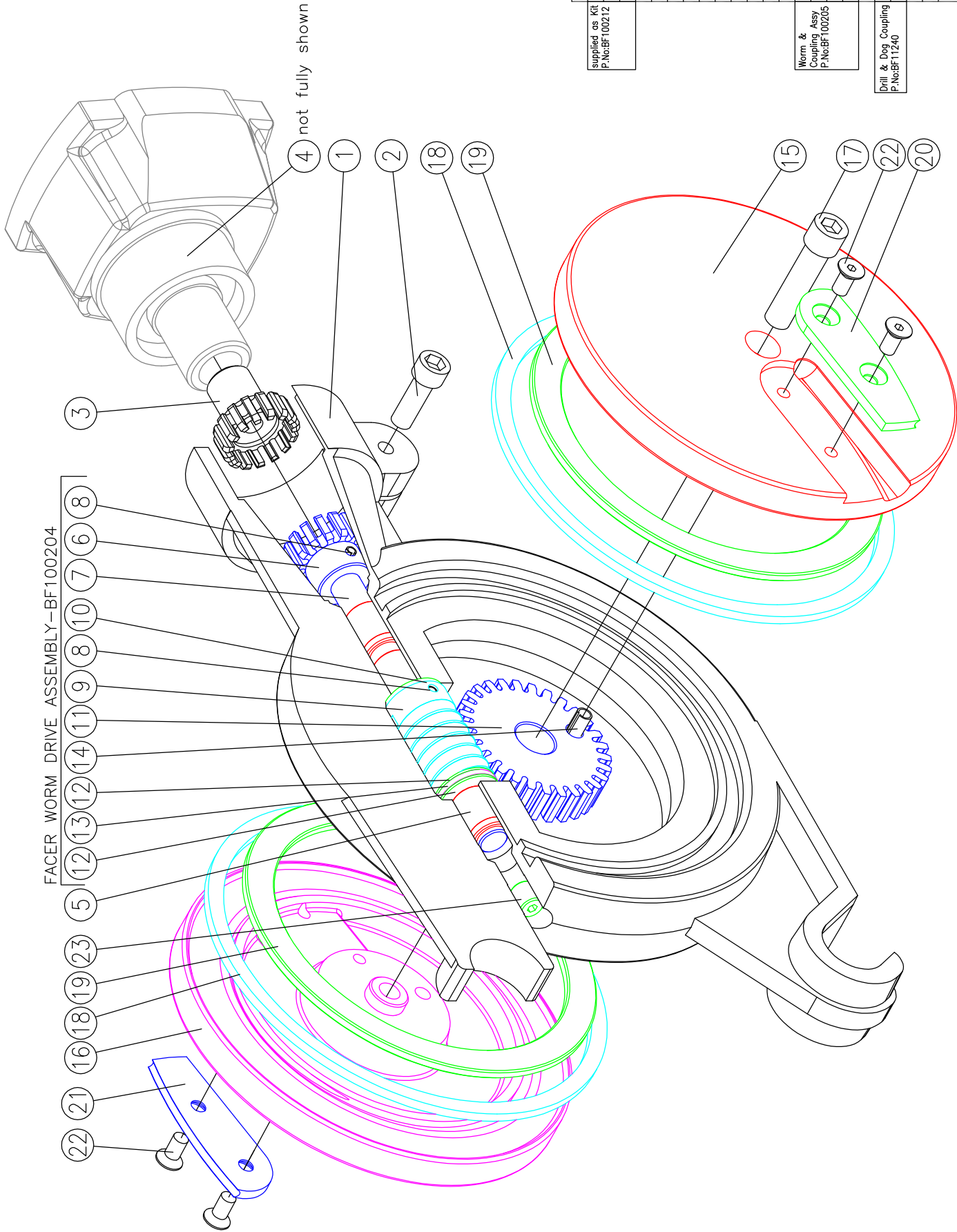


NOTE: ASSEMBLY SHOWN EXPLODED FOR CLARITY,  
ELECTRICAL CABLE LENGTHS SHOWN MAY NOT BE TO SCALE.

Drawing Name: LF110 HEATER PLATE ASSEMBLY OPERATORS MANUAL ONLY  
 Scale: Net To Scale  
 Drawn: SR  
 Date: 2/06/09  
 CAD File: U:\DWG\Manual Dwg\LF110-MAN\BF1101A0-MAN

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FACER WORM DRIVE ASSEMBLY-BF100204



23	BF000239	Set Screw	1
22	BF000217	Blade Mtg. Screw	4
21	BF100212A	Cutter Blade Tapped	1
20	BF000212B	Cutter Blade Bored	1
19	BF100218	Thrust Ring - Pair	1
18	BF100208	Felt Seal - Pair	1
17	BF000253	Cutter Plate Mtg. Screw	1
16	BF100202T	Cutter Plate Tapped	1
15	BF100202B	Cutter Plate Bored	1
14	BF000222	Spring Pin	1
13	BF000175	Needle Thrust Bearing	1
12	BF000206	Needle Thrust Washer	2
11	BF100224	Worm Wheel	1
10	BF100238	Spacer Washer	1
9	BF100222	Worm	1
8	BF000213	Spring Pin	2
7	BF100220	Worm Shaft	1
6	BF100226	Dog Coupling Fixed	1
5	BF100231	Nylon Bush	3
4	BF000722	Drill (modified)	1
3	BF110241G	Dog Coupling	1
2	BF000232	Clamp Screw	1
1	BF110201	LF110 Facer Body	1
		PART No.	PART NAME
			QTY /KIT

supplied as kit  
P.No:BF100212

Worm & Coupling Assy  
P.No:BF100205

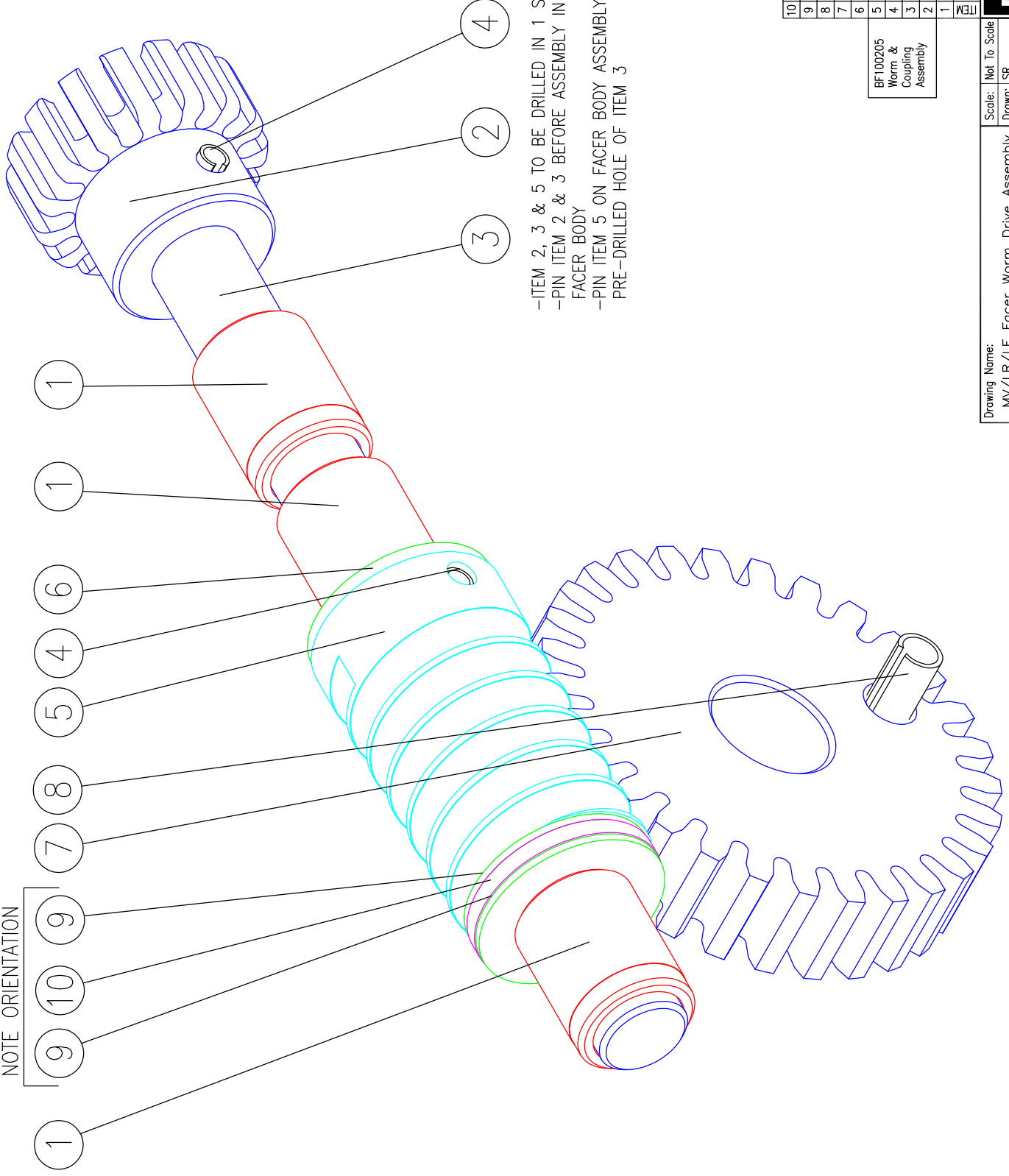
Drill & Dog Coupling  
P.No:BF11240

Drawing Name: LF110 FACER ASSEMBLY OPERATORS MANUAL ONLY  
 Scale: Not To Scale  
 Drawn: SR  
 Date: 9/12/09  
 CAD File: U:\DWG\Mech Desktop\LF110\BF110200\110200-PR0700L.dwg

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NOTE ORIENTATION

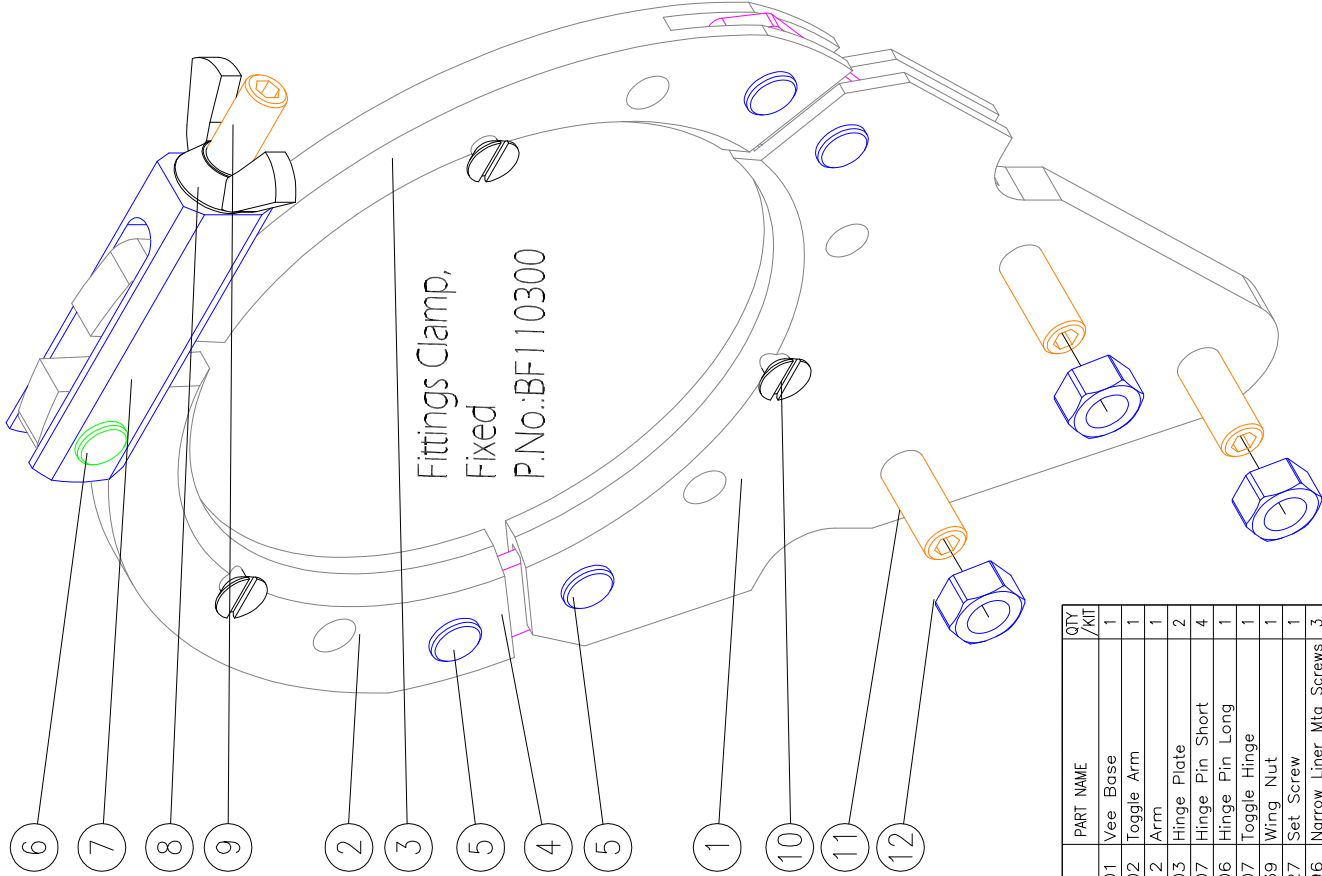


- ITEM 2, 3 & 5 TO BE DRILLED IN 1 SETUP
- PIN ITEM 2 & 3 BEFORE ASSEMBLY IN TO FACER BODY
- PIN ITEM 5 ON FACER BODY ASSEMBLY TO PRE-DRILLED HOLE OF ITEM 3

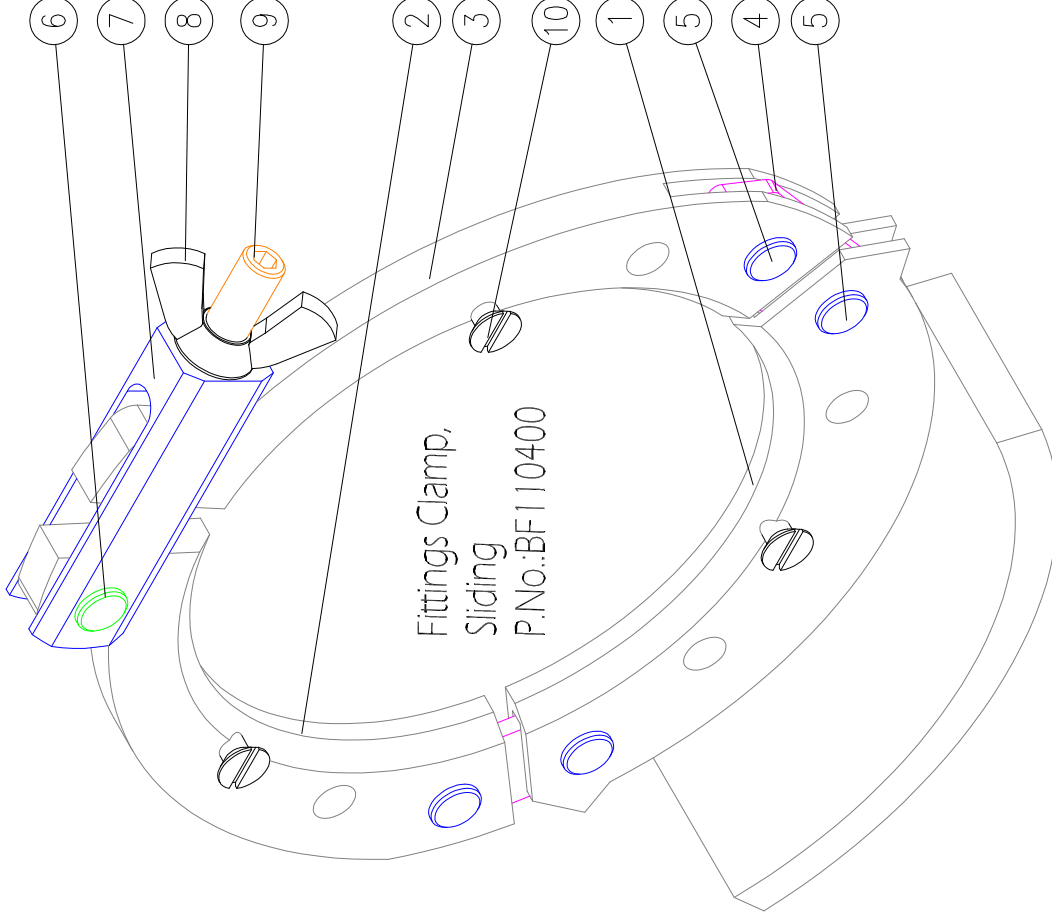
10	BF000175	Needle Thrust Bearing	1
9	BF000206	Needle Thrust Washer	2
8	BF000222	Spring Pin	1
7	BF100224	Worm Wheel	1
6	BF100238	Spacer Washer	1
5	BF100222	Worm	1
4	BF000213	Spring Pin	2
3	BF100220	Worm Shaft	1
2	BF100226	Dog Coupling Fixed	1
1	BF100231	Nylon Bush	3
ITEM	PART No.	PART NAME	QTY /KIT

BF100205	Worm & Coupling Assembly
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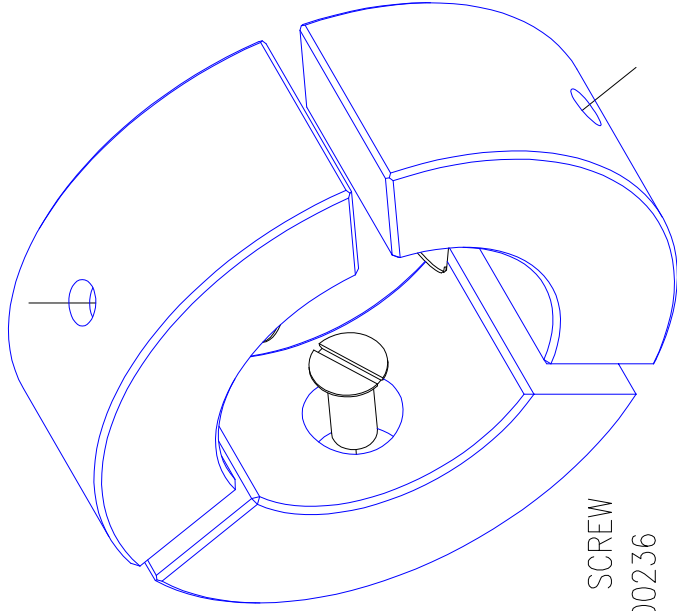
Drawing Name: MV/LR/LF Facer Worm Drive Assembly  
 OPERATORS MANUAL ONLY  
 CAD File: U:\DWG\MechDesktop\MV050\BF100204.dwg  
 Scale: Net To Scale  
 Drawn: SR  
 Date: 6/08/09  
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PART No.	PART NAME	QTY /KIT
1	BF110301 Vee Base	1
2	BF110402 Toggle Arm	1
3	BF110412 Arm	1
4	BF110403 Hinge Plate	2
5	BF110407 Hinge Pin Short	4
6	BF110406 Hinge Pin Long	1
7	BF110407 Toggle Hinge	1
8	BF000139 Wing Nut	1
9	BF000127 Set Screw	1
10	BF000096 Narrow Liner Mtg Screws	3
11	BF000124 Mounting Stud	3
12	BF000133 Mounting Nut	3



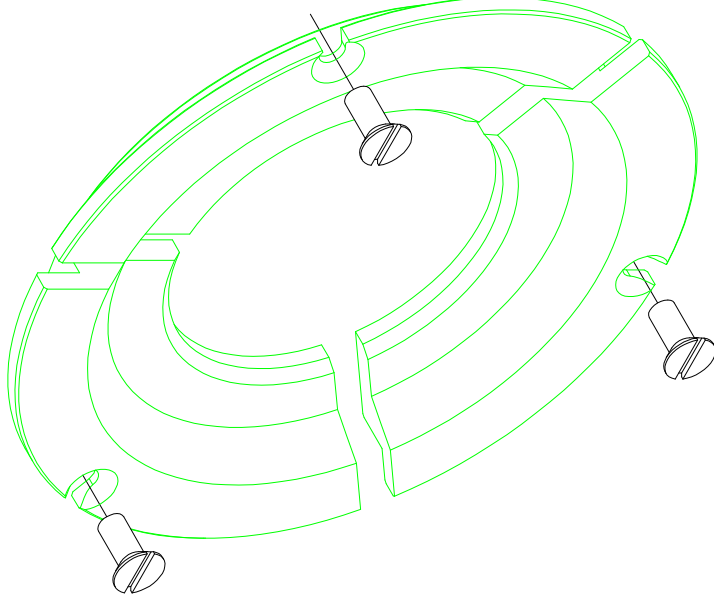
PART No.	PART NAME	QTY /KIT
1	BF110409 Base Weldment	1
2	BF110402 Toggle Arm	1
3	BF110412 Arm	1
4	BF110403 Hinge Plate	2
5	BF110407 Hinge Pin Short	4
6	BF110406 Hinge Pin Long	1
7	BF110407 Toggle Hinge	1
8	BF000139 Wing Nut	1
9	BF000127 Set Screw	1
10	BF000096 Narrow Liner Mtg Screws	3



USE MOUNTING SCREW  
PART No. BF000236

PART No.	SIZE
BF110925	110-25
BF110932	110-32
BF110935	110-35
BF110940	110-40
BF110943	110-43
BF110948	110-48.2
BF110950	110-50
BF110957	110-57.6
BF110960	110-60.3
BF110963	110-63
BF110975	110-75
BF110990	110-90

110-63 SHOWN  
LINERS FIT INTO MACHINE CLAMPS



USE MOUNTING SCREW  
PART No. BF000096

PART No.	SIZE
BF110725	110-25
BF110732	110-32
BF110740	110-40
BF110750	110-50
BF110763	110-63
BF110775	110-75
BF110790	110-90

110-63 SHOWN  
LINERS FIT INTO FITTINGS ATTACHMENT









**FUSIONMASTER10Rural PE welding parameters ISO21307 SPLP.xls**

Based on AusPoly Industry Guideline POP003: Butt Fusion Joining - issued 29/2/2000.

Pipe OD		D <sub>n</sub>	mm	57.6	43	36	29
Class				Rural B	Rural B	Rural B	Rural B
nominal pipe od			inch	2	1½	1¼	1
Bore			mm	50	40	32	25
mean wall thickness		e <sub>n</sub>	mm	3.8	1.5	2.0	2.0
		Parameter					
mean heater surface temp		220+/-20	°C	220	220	220	220
allowable axial misalignment		0.1e <sub>n</sub>	mm	0.4	0.2	0.2	0.2
Bead up pressure	P1	170+/-20	kg	11	4	4	3
+ measured drag	P1	+drag	kg				
Total bead up pressure	P1		kg				
Bead up time	T1						
Heat soak pressure	P2	0 to drag	kg	drag	drag	drag	drag
Minimum heat soak time	T2	(11 ± 1)e <sub>n</sub>	second	42	23	30	30
Maximum heater plate removal time	T3	0.1e <sub>n</sub> + 4	second	4	4	4	4
Maximum time to achieve interfacial pressure	T4	0.4e <sub>n</sub> + 2	second	4	3	3	3
Fusion jointing pressure	P3	170+/-20	kg	11	4	4	3
+ measured drag	P3	+drag	kg				
total welding & cooling pressure	P3		kg				
Minimum cooling time in machine under pressure	T5	e <sub>n</sub> + 3	minute	7	5	5	5
Minimum cooling time in machine without pressure	T6	e <sub>n</sub> + 3	minute	7	5	5	5