



MV70

OPERATOR'S MANUAL



DIXON INDUSTRIES PTY LTD

ABN 89 008 171 855

17 Frederick Road, Royal Park, South Australia, 5014. Tel: +61 8 8240 1555. Fax: +61 8 8240 5588

Email: sales@dixonind.com.au,

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1. Safety considerations

Know the machine

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

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 operates at over 200°C and contact can cause serious burns. Always wear gloves when handling the hot plate.

The heater is supplied with a 10 amp 1.8 metre cord that has an EPR rubber outer sheath which will delay, but will not prevent, the inevitable life threatening situation which could occur if the cord is allowed to contact the hot plate and melt through.

Never use a standard appliance cord with low melting point PVC sheath (eg. Computer cord).

Standing the hot plate so that the temperature controller handle is not vertically above the hot plate will direct the cord away from the hot surface, and keep the controller relatively cool.

Facer

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

The nature of the machine and welding process makes it impractical to guard the operational area. Do not attempt to remove shavings from the cutting area while the facer is running. Remove loose clothing or jewelry to prevent these items being dragged into moving parts.

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 cables.

2. Machine Description

The **FUSIONMASTER®** MV70 is designed for “single pressure – low pressure” butt welding of pipe up to 63mm.

The butt fusion unit is compact, light and ideal for bench, floor or narrow trench operation. It is very robust, its strength derived from heat treated aluminium alloy clamps mounted on stainless steel guide shafts. All mild steel components are zinc plated for maximum corrosion protection.

The MV70 has two wide pipe clamps, each with two hinged segments, for welding pipe to pipe. It cannot be used to butt weld fittings to pipe.



2.1. General Specification

Machine dimensions	
Main clamp bore	70mm
Length overall	260mm
Width overall	250mm
Height overall	350mm
Component Weights	
Butt machine	10kg
Heater plate	2.3kg
Facer	4.0kg
Heater/facer stand	2.5kg
Loaded accessory case (540x300x320mm)	30.0kg
Electrical	
Heater plate	750w, 240v, 1 phase
Facer drill	700w, 240v, 1 phase
Recommended genset for field operation.	2kva, 240V, 1 phase
Recommended grease for facer drive	Shell Alvania EP/LF2

2.2. Heater Plate

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

Plate temperature is regulated by an electronic controller sealed inside the heater handle. LED's indicate when power is connected to the electric element. A dial thermometer indicates internal plate temperature. (Refer section on heater technology.) It takes about 10 minutes to heat up to working temperature from ambient.

Replaceable non-stick cloths are fitted to the heater surfaces to eliminate hot plastic adhesion. They are secured by snap rings enabling quick and easy field repair if the surface is damaged.

The detachable 1.8m electric cord has a high melting point outer sheath for protection against short periods of accidental contact with the heater.

When not in use, the heater plate is stored in a protective floor stand that it shares with the facer.



2.3. Facer

The lightweight electric powered facing head is self-aligning and will always produce parallel pipe joint faces. Operating the variable speed motor at low speed will provide adequate torque and speed to process small or large diameter pipes quickly. There is one blade on each cutting face that will cut pipe from 110mm OD, to 22mm inside diameter.

2.4. Reducing Liners for pipe

Clamp liners can be supplied to suit metric, gas or rural pipe.

The reducing liner set for each pipe size consists of 2 rings, with each ring made up of 2 segments.



2.5. Accessory Case

A steel accessory case provides storage for the butt machine, heater, facer, the heater/facer floor stand, and reducing liners.

3. Using the MV70

3.1. Preparation

1. Connect only to a 240v, 50Hz power source. Ensure the output of any portable generator used is 240v \pm 20v.
2. Clean and/or replace the non-stick cloths. Clean the heater plate before every weld with clean dry paper or cotton cloth - never use synthetic materials that may melt.
3. Check, and if necessary adjust the heater surface temperature.
4. Install the correct reducing liners for the pipe to be welded.
5. Before facing, clean inside and outside of each pipe end, and the cutter blades.
6. Check the facer cutting action (the shaving thickness should be 0.30-0.40mm).
7. Protect the welding area from strong winds, excessive cold or heat, or rain.
8. Keep the weld zone free of bending stresses.
9. Determine the weld times required, see table 3.8.

TIP

When welding coiled and/or large diameter pipe, clamp the butt machine to a solid support base for rigidity and to assist with pipe straightening and alignment.

3.2. Pipe Alignment

Place the pipes in the clamp jaws with about 20mm of pipe extending past the clamps into the weld zone. Tighten the clamp toggle bolts securely to prevent the pipe from slipping when force is applied. The pipe protruding outside of the machine should be supported such that there is no external bending load on the machine.



Move the pipe ends together until they are almost touching, then check for misalignment (maximum allowable misalignment is 10% of wall thickness). Tolerances on small bore pipes should be sufficient to permit pipe alignment in the MV70 without adjusting the clamps. However, in severe out of round situations, adjust out any misalignment by loosening the clamps and rotating the pipes, and/or using packers as necessary.

3.3. Facing

Move the pipe ends apart and place the facing machine between the pipe faces and close to the fixed pipe. Ensure the facer body is securely hooked on to both guide shafts to ensure the facer sits square to the frame and parallel with the clamps.

Start the facer rotating. Move the pipe ends into contact with the facer and apply just enough force so that a continuous shaving of plastic is simultaneously produced from both sides of the facer.

Caution: To maximise drill and facer drive life, operate the drill at low speed (for maximum torque), and do not apply excessive force to the carriage lever.

On completion of facing, reverse the pipe carriage away from the facer then stop facer rotation. This prevents a step being produced in the faced ends. Remove the facer and place it in the floor stand.

3.4. Check Alignment

Clear away all plastic cuttings without contaminating the pipe ends. **Do not touch the cut surface or re-clean it.** Move the pipe ends together and re-check pipe alignment (maximum allowable misalignment is 10% of wall thickness).

Always re-face the pipe ends if it becomes necessary to rotate the pipe in the clamps after initial facing.

3.5. Bead Up

Check the heater plate temperature before commencing each joint in case there has been any failure of the power supply or temperature controller.

Place the heater plate between the pipe faces and close to the fixed pipe.

Caution: Ensure the heater handle does NOT stand vertically above the hot plate or dangerous overheating may occur. Do not allow the electric cord to rest on the hot plate.

Move the carriage to bring the pipe faces into contact with the heater plate. Maintain load until an initial bead has formed completely around the pipe circumference on both sides of the heater plate. The time to reach “bead up” is variable. It is greatly influenced by pipe dimensions, ambient temperatures, and wind.

3.6. Heat Soak

After bead up, reduce the force applied to the heater and maintain just a slight positive load between the pipe and the heater for the heat soak period. Failing to reduce pressure forces hot plastic out of the joint zone and could lead to a weld failure.

On completion of heat soak time, reverse the carriage direction to “crack” the heater plate away from the melted pipe, then move the heater plate out of the weld zone as quickly as possible. (Refer to parameters table for allowable changeover time).

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.

3.7. Fusion Cycle

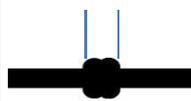
Bring the melted pipe faces into contact with each other immediately to minimise heat loss from the weld zone. Build up to the required fusion force smoothly to avoid squeezing out too much hot plastic. As the hot plastic is squeezed from the joint it rolls over to form a “bead”. Always ensure the bead rolls back until it touches the pipe.

Shrinkage will occur as the weld cools so it is important to manually maintain force on the lever until the bead becomes firm. Then tighten the lever wing nut to maintain load on the joint until the weld/cooling time is complete.

3.8. Butt Welding Table

The times for butt fusion of PE80 or PE100 pipe tabled below are based on the “single pressure – low pressure” fusion method, and assume a heater plate temperature of 220°C, ambient temperature of 20°C, and minimal air turbulence.

Operators must allow for variations from these conditions and establish a range of times to suit their particular environment and pipe wall thickness, paying particular attention to the size of the bead being formed.

Pipe Wall Thickness (mm)	Bead up Time Note (1)	Heat soak Time (seconds) Note (2)	Heater Changeover Time (seconds) Note (3)	Minimum Welding/cooling Time (minutes) Note (4)	Final Bead Size (mm) 
2.0	Variable	30	3	11	4-6
5.0	Variable	75	3	13	5-8
8.0	Variable	120	3	14	7-11

Notes

- (1) The time to reach “bead up” is variable. It is greatly influenced by pipe dimensions, ambient temperatures, and wind.
- (2) The heat soak period commences after the initial “bead up” i.e. after of molten material first forms.
- (3) Changeover time is the time between removal of the heater plate, and moving the molten pipe faces together. This must be fast to prevent heat loss from the joint.
- (4) The pipe should remain in the clamps under pressure for the minimum welding/cooling time.

For more information on joining PE pipe it is recommended that the following guidelines be downloaded from Plastics Industry Pipe Association of Australia Ltd web site (www.pipa.com.au).

- POP003 Butt Fusion Jointing of PE Pipes and Fittings - Recommended Parameters.
- TP003 Specifying Butt Welding of Polyethylene Pipe Systems.

3.9. Weld Quality Check

Inspect the uniformity of the bead size and shape all around the pipe. It is advisable to monitor and record times, temperatures and applied force at each phase of every joint for future reference. (See section on trouble-shooting weld failures.)

3.10. Weld failure trouble shooting

(Bead shapes are exaggerated for effect.)

	Uniform bead correct welding. NB the external bead is always more uniform than the internal bead.
	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.
	Insufficient bead roll over. Could be due to insufficient heat soak time or temperature, or changeover time too long, or insufficient fusion pressure, or no allowance for drag pressure,
	Unequal bead size. Look for temperature gradients e.g. pipe surface in the hot sun vs pipe in the shade, or heater plate hot spots. Look for unequal application of pressure. If unequal uniformly around the whole circumference, look for physical difference in materials being joined eg melt flow index.

4. Maintenance - Daily Check List

1. Keep the machine and accessories clean and free of dust and grease. *Do not lubricate any MV70 components except for the facer drive (see later).*
2. Check the temperature of a number of points on the surface of both sides of the heater plate. The reading at any point on either side of the heater plate surface should not be more than $\pm 10^{\circ}\text{C}$ from the desired welding temperature. (Refer later section on heater plates.)
3. Do electrical safety checks.
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 shaving thickness of 0.30-0.40mm. Shim worn blades if necessary; sharpen cutter blades if blunt; replace cutter blades if chipped.
6. Ensure the facer drill is securely fixed into the facer body casting, if not the drive gears may not mesh properly causing extensive damage.
7. Feel for “sloppy” movement of the cutter plates. This indicates the need to adjust the facer drive internally.
8. If using a portable generator, ensure its output is $240\text{v} \pm 20\text{v}$ and 50hz, to protect electronic equipment from permanent damage.

5. Maintenance - periodic

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

5.1. General

Check the machine frame and slide rails are not bent or damaged such that sliding is restricted.

5.2. Heater Plate

Heater surfaces should be flat, smooth and free of dents or gouges. Dress as necessary.

FUSIONMASTER® heater plates have a vent machined in the edge of the casting to allow entrapped air to escape from under the non-stick cloth. Clean out any build-up of foreign material from the air vent to prevent any adverse temperature effect.

Caution: Ensure heater plate non-stick surfaces are protected from damage during transport.

5.3. Heater Temperature Adjustment

The temperature setting of the MV70 heater is adjusted by turning the screw in the end of the heater handle. Turn clockwise for higher temperature, and anticlockwise for lower temperature. One degree of turn will result in approximately one degree of temperature change. Always allow several minutes for the plate temperature to stabilise after making any adjustment.

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

5.4. Temperature Calibration

The thermometer in the heater plate indicates the internal plate temperature not the surface temperature, although the difference will not be great.

It is essential to check and record the surface temperature of the heater plate before every weld. This is best measured with either a contact pyrometer or a non-contact infrared pyrometer. The outer circumference of the heater should not be measured as this is too far from the weld area.

The pyrometer used to measure surface temperature will itself require calibration to a procedure as recommended by the pyrometer manufacturer.

Caution: Be aware that an insulating air gap can form between the Teflon cloth and the hot plate. Always ensure the cloth is forced into contact with the hot metal surface when using an infrared or non-contact pyrometer or a false reading is likely to occur. Never use an infrared pyrometer on a shiny surface as a false reading will occur.

5.5. Heater Non-Stick Cloth Replacement

The non-stick cloths should be replaced if they are torn, contaminated, or badly discoloured (due to overheating) or lose their non-stick ability. Use the following procedure.

1. Use a screw driver to lever the snap rings out of their securing grooves. This takes very little force. Do not attempt to remove the snap rings if the plate temperature is more than 40°C because they will not release.
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 in position with one hand. With the free hand, use a piece of wood or plastic to force the snap ring completely into its groove. (This may take several attempts until some experience is developed.) Never use metallic objects to force the snap rings back into position as this may result in accidental damage to the cloth.

5.6. Temperature Controller Failure

1. When power is connected, one LED glows amber. When the electric element is drawing power the other LED glows red. Either of the LEDs flashing on-off indicates the temperature controller has failed and must be replaced.
2. If neither LED glows when power is connected, first test the power supply and the power cord to ensure those items are not at fault. If not faulty, next test the element pad before replacing the temperature controller.

5.7. Electrical safety testing heater plate

Use an appliance tester capable of performing a *Class 1 250V Run Test* to verify the functionality of **FUSIONMASTER®** model MV70, SV70, LF110, HF225, EHF225 heater plates. These devices cannot be safety tested either as an earthed appliance or as a double insulated appliance because the temperature controller is fitted with surge protection (i.e. metal oxide varistor), and uses solid state switching that only functions when power is applied.

5.8. Element Pad Failure

Caution: This job must be performed by a qualified electrician.

1. Disconnect the power supply.
2. (Refer to heater plate drawing.) Remove the screws securing the temperature controller handle to the heater bracket, and the screws securing the bracket to the heater plate.
3. Remove the bracket and gasket from the heater plate to expose the temperature sensor probe. (If the gasket is broken by this action it should be replaced.)
4. Withdraw the sensor probe with long nose pliers, pulling on the metal case, not the fine lead wires.
5. Disconnect the quick connect leads from the element ends and unscrew the earth connection and measure the resistance across the two ends of the element (should be 40 ohms $\pm 10\%$). If there is a short circuit, the element pad must be replaced. If the element, leads and connectors are OK, the controller will be faulty and must be replaced.
6. Before re-fitting the controller, sparingly coat the sensor probe with some silicon heat sink compound to increase thermal sensitivity, then carefully insert the probe into the probe hole.
7. Reassemble the handle and bracket to the heater plate and tighten screws securely.
8. Reconnect the power cord and switch on. Both LEDs should glow immediately. Allow 20 minutes for the heater to reach temperature and to stabilise before making any adjustments or measuring temperature.

5.9. Facer Drive

Refer to Facer drawing.

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 the worm, or worm wheel, or worm shaft or dog coupling is excessively worn or broken, the complete worm drive assembly must be replaced as a matching assembly.
3. Inspect the worm shaft needle thrust bearing for damage and replace if necessary.
4. Otherwise, clean out and re-grease sparingly with a high pressure grease e.g. Shell Alvania EP2.

Do not use molybdenum disulphide, graphite grease or similar as these may run and cause welding contamination.

5. Replace felt dust seals as required.

5.10. Cutter Blade Sharpening

If chipped or damaged, the blades should be replaced.

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.

6. Notes About Heater Plates And Temperature

6.1. PE Welding Temperatures

Polyethylene pipe is weldable at temperatures ranging from 180°C to 260°C. However butt fusion parameters typically specify 220 ±15°C which is the required surface temperature of the heater plate.

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.

Caution: Either situation may lead to premature joint failure.

6.2. Heater Plate Temperature

Heater plate temperature displays generally indicate the internal heater temperature. Actual surface temperature may vary from the display, and will also fluctuate, for the following reasons.

1. The rate of heat loss from the heater surface depends on the design of the heater plate and temperature controller. The surface temperature could be significantly different to the thermometer indication. This variation will be greatest on cold, windy days. Always use a shelter when welding in these conditions.
2. As power input cycles on and off 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 heater surface 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.

6.3. Measuring Surface Temperature

5. Always wait 5 minutes after the heater has first reached set temperature for the temperature to stabilize before recording measurements.
6. Take readings at several points (at 3, 6, 9, 12 o'clock) on both sides of the heater, at the diameter of the pipe being welded.
7. **FUSIONMASTER®** heater plates are fitted with non-stick replaceable cloth. It is essential to use a contact probe to force the cloth into intimate contact with the plate. (Incorrect readings will result when the cloth system traps an insulating air layer between the cloth and the heater surface.)
8. If a contact probe is used it should be held in position for several seconds before the reading is taken.
9. If an infra red pyrometer is used incorrect reading are likely to result unless:
 - the emissivity is set at 0.95 for use on the non-stick cloth;
 - the device is held square to the surface being measured;
 - the non-stick cloth is forced into intimate contact with the heater plate (see suggestion below).
10. 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 rim of a heater plate) or an error will result.

Note:

It is not physically possible for heater surface temperatures to vary significantly from one point to another. If such a variation is observed, it is most likely to result from using an incorrect temperature measuring technique.

Suggestion

Use a "spot control adapter" fitted to an Infra-red pyrometer for consistently accurate measurements. When pressed squarely against the heater surface the infra-red beam is correctly focused every time, and intimate contact between the heater plate and non-stick cloth is assured.



7. Warranty

FUSIONMASTER® Butt Fusion Equipment

1. Subject to the terms below, Dixon Industries Pty Ltd (“**The 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.

Disclaimer

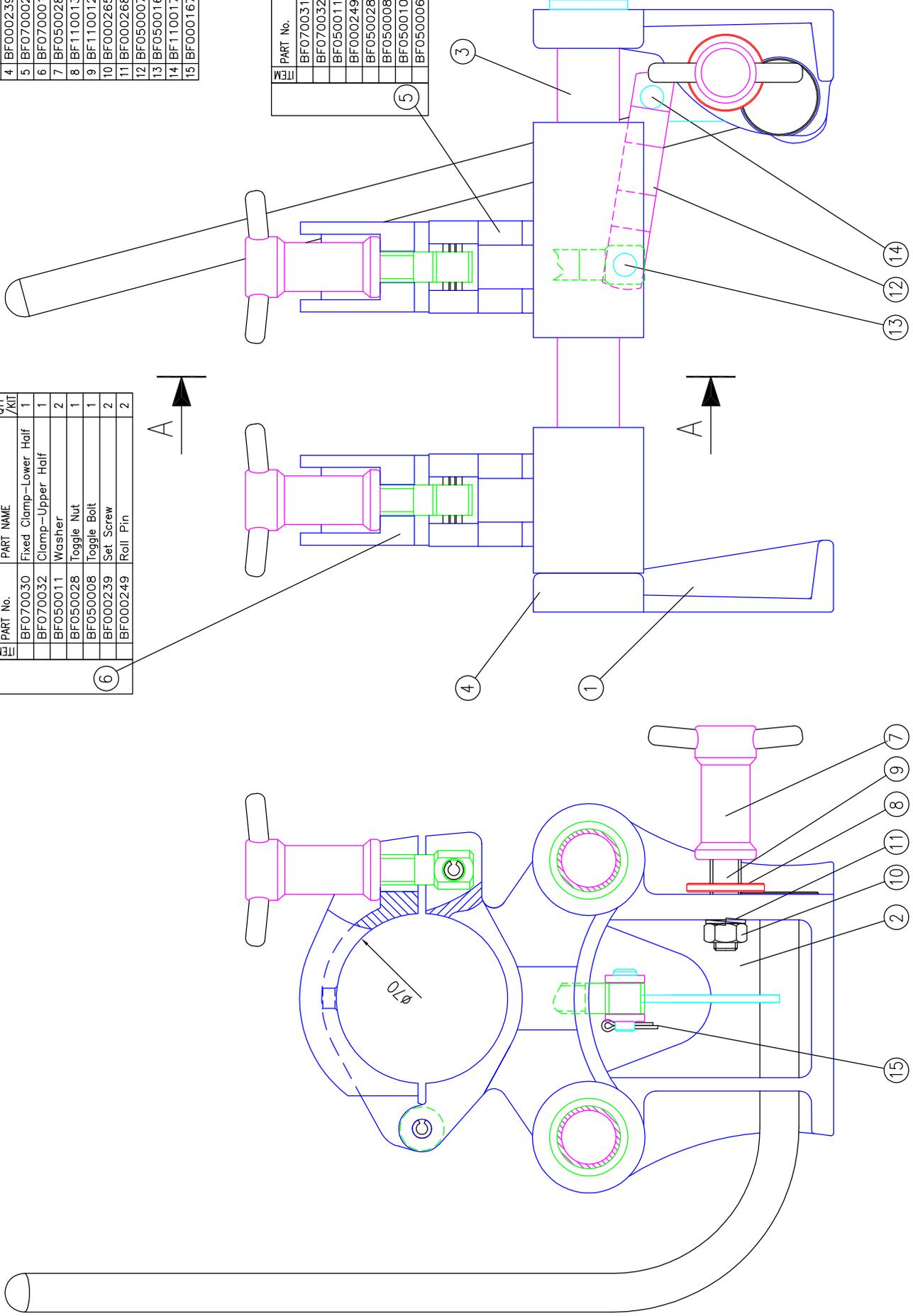
As the conditions of use of welding equipment are outside the control of Dixon Industries, no warranties are expressed or implied and no liability is assumed in connection with the use of butt welding equipment or the butt welding guidelines or parameters.

The manufacturer reserves the right to vary specifications without notice.

ITEM	PART No.	PART NAME	QTY /KIT
1	BF050005	Fixed Leg	1
2	BF050023	Lever Leg Assembly	1
3	BF050020	Guide Tube Assembly	2
4	BF000239	Set Screw	4
5	BF070002	Sliding Clamp Assembly	1
6	BF070001	Fixed Clamp Assembly	1
7	BF050028	Toggle Nut	1
8	BF110013	Washer	1
9	BF110012	Stepped Lock Nut	1
10	BF000265	Lock Nut	1
11	BF000268	Spring Washer	1
12	BF050007	Link Bar	1
13	BF050016	Clevis Pin Long	1
14	BF110017	Clevis Pin Short	1
15	BF000167	Split Pin	2

ITEM	PART No.	PART NAME	QTY /KIT
	BF070031	Sliding Clamp-Lower Half	1
	BF070032	Clamp-Upper Half	1
	BF050011	Washer	2
	BF000249	Roll Pin	2
	BF050028	Toggle Nut	1
	BF050008	Toggle Bolt	1
	BF050010	Toggle Bolt Tapped	1
	BF050006	Bush	4

ITEM	PART No.	PART NAME	QTY /KIT
	BF070030	Fixed Clamp-Lower Half	1
	BF070032	Clamp-Upper Half	1
	BF050011	Washer	2
	BF050028	Toggle Nut	1
	BF050008	Toggle Bolt	1
	BF000239	Set Screw	2
	BF000249	Roll Pin	2



VIEW A-A

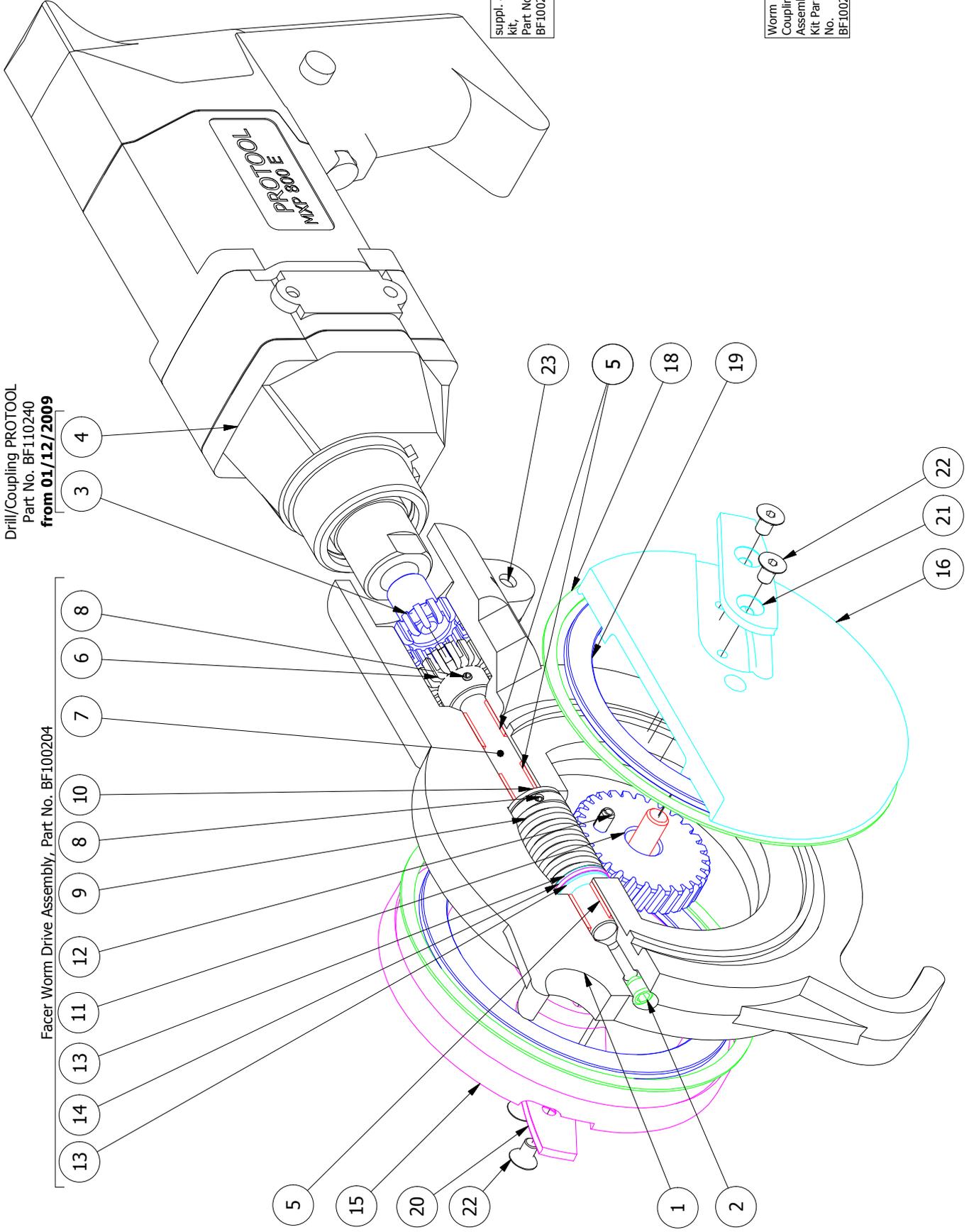
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 Scale: Not To Scale
 Drawn: SR
 Date: 6/08/09
 CAD File: U:\DWG_Manual Dwg\MV050-MAN\MV070040-MAN



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Drill/Coupling PROTOOL
Part No. BF110240
from 01/12/2009

Facer Worm Drive Assembly, Part No. BF100204



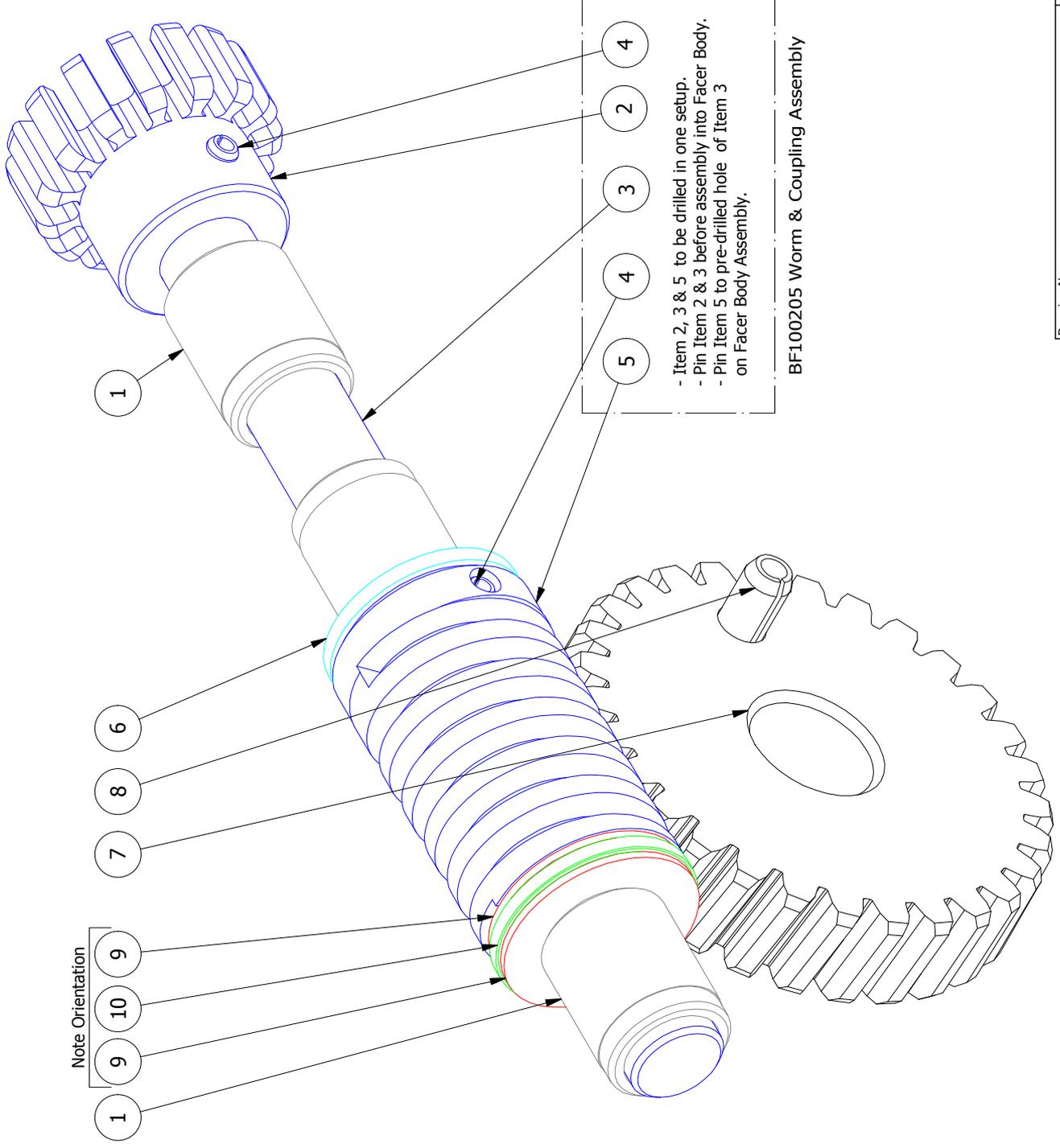
Item	Part No.	Part Name	QTY
23	BF000232	SHCS 1/4BSW x 3/4	1
22	BF000217	C/Sunk SH 3/16 x 3/8	4
21	BF100212T	Cutter Blade, tapped	1
20	BF100212B	Cutter Blade, bored	1
19	BF100218	Thrust Ring - pair	2
18	BF100208	Felt Seal - pair	2
17	BF000253	SHCS 5/16BSW x 1 1/4	1
16	BF100202T	Cutter Plate - tapped	1
15	BF100202B	Cutter Plate - bored	1
14	BF000175	Thrust Bearing	1
13	BF000206	Thrust Washer	2
12	BF000222	Spring Pin 3/16 x 1	1
11	BF100224	Worm Wheel	1
10	BF100238	Acetal Spacer	1
9	BF100222	Worm	1
8	BF000213	Spring Pin 1/8 x 3/4	2
7	BF100220	Worm Shaft	1
6	BF100226	Dog Coupling, Fixed	1
5	BF100231	Nylon Bush	3
4	BF000722	Drill, PROTOOL (mod)	1
3	BF110241G	Dog Coupling Threaded	1
2	BF000239	Set Screw 5/16BSW x 5/16	1
1	BF100201	Facer Body MV/LR	1

suppl. as
kit,
Part No.
BF100212

Worm &
Coupling
Assembly,
Kit Part
No.
BF100205

Drawing Name: MV/LR Facer Assembly
OPERATORS MANUAL ONLY
Scale: not to scale
Drawn: SR
Update: 05/07/13
CAD File: J:\Inventor\mv\BF100200\BF100200MAN.idw

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Note Orientation

- 1
- 9
- 10
- 9

- 5
- 4
- 3
- 2
- 4

- Item 2, 3 & 5 to be drilled in one setup.
 - Pin Item 2 & 3 before assembly into Facer Body.
 - Pin Item 5 to pre-drilled hole of Item 3 on Facer Body Assembly.

BF100205 Worm & Coupling Assembly

Item	Part No.	Part Name	QTY
10	BF000175	Thrust Bearing	1
9	BF000206	Thrust Washer	2
8	BF000222	Spring Pin	1
7	BF100224	Worm Wheel	1
6	BF100238	Acetal Spacer	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

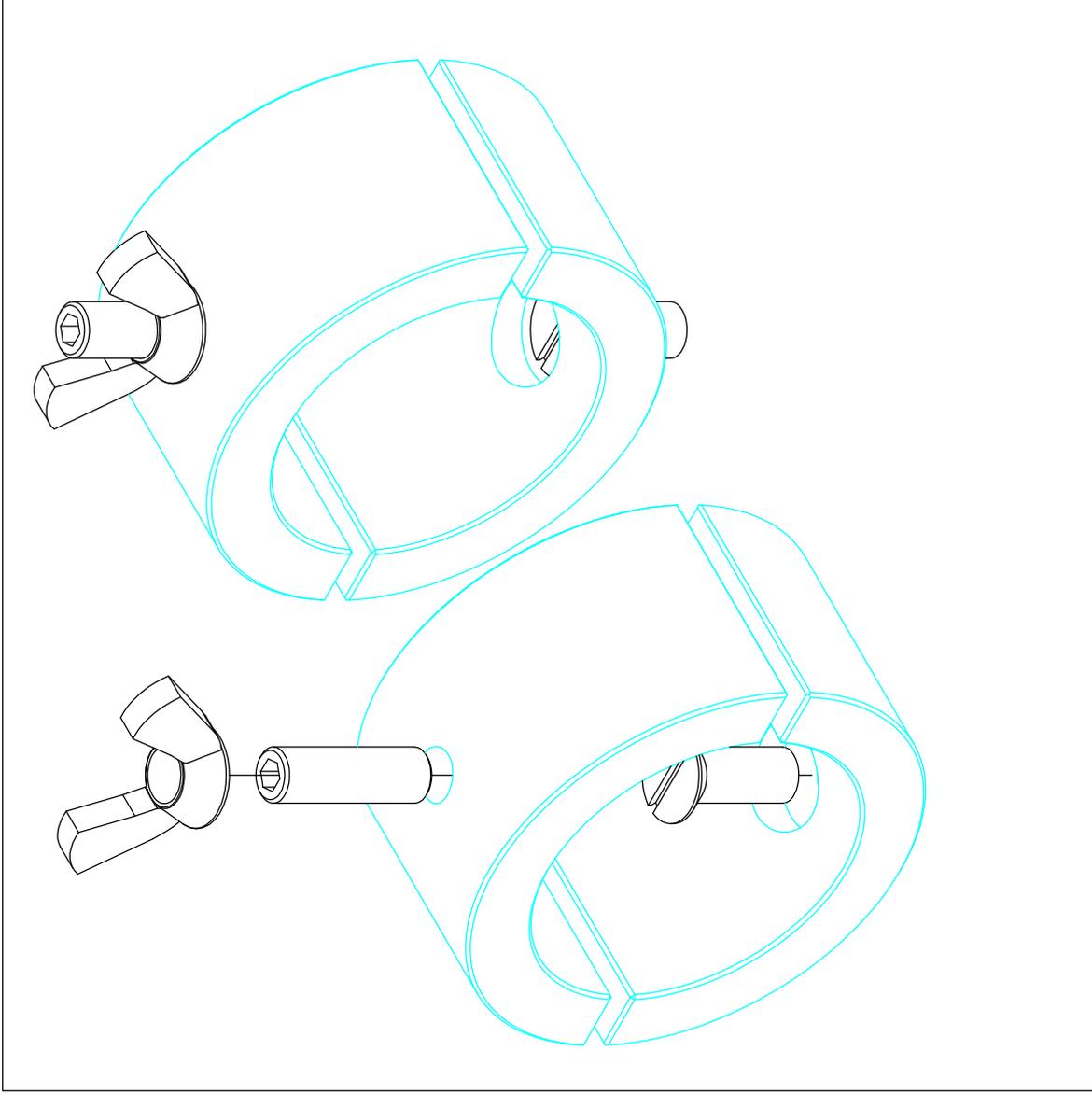
BF100204
 Facer Worm Drive Assembly

Drawing Name: MV/LR/LF Facer Worm Drive Assembly
 Drawn: SR
 Update: 05/07/13
 CAD File: J:\Inventor\mv\BF100200\BF100200MAN.idw



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Supplied Liner Set



Size	Type	Part No.
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METRIC	32mm	metric	BF070932M
	40mm	metric	BF070940M
	50mm	metric	BF070950M
	63mm	metric	BF070963

GAS	42.2mm	32NB	BF070932
	48.2mm	40NB	BF070940
	60.3mm	50NB	BF070950

RURAL	28mm	1"R	BF070928
	35mm	1¼"R	BF070935
	43mm	1½"R	BF070943
	57.6mm	2"R	BF070957

SPECIAL LINER SIZES
AVAILABLE UPON REQUEST

Drawing Name: MVO70 CLAMP LINERS OPERATORS MANUAL ONLY
CAD File: U:\DWG\Mech Desktop\MV050\MV070 Clamp Liners.dwg

Scale: Not To Scale
Drawn: SR
Date: 6/08/09



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A.B.N. 89 008 771 855 www.dixonind.com.au



DIXON INDUSTRIES PTY LTD

ABN 89 008 171 855

17 Frederick Road, Royal Park
South Australia, 5014.

Tel: (08) 8240 1555

Fax: (08) 8240 5588