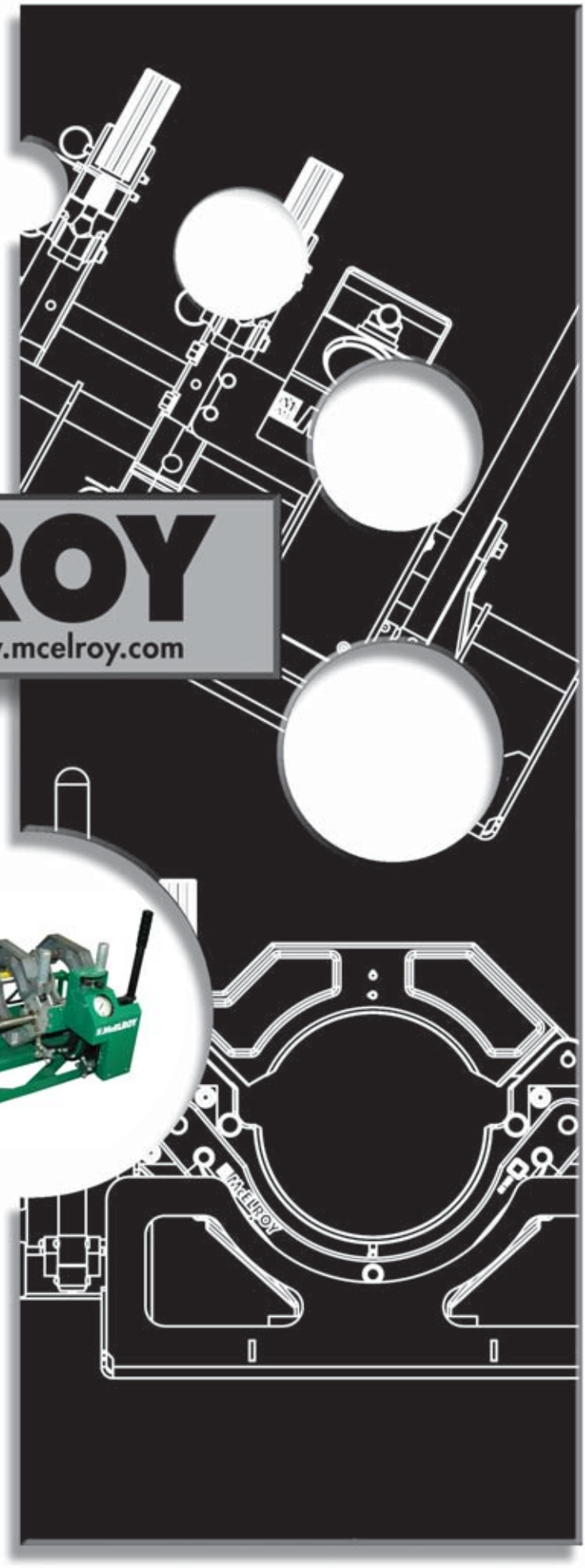
Operator's Manual



McELROY

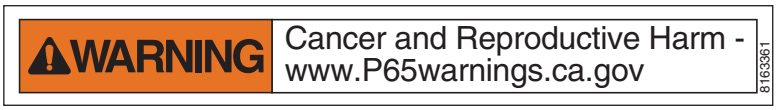
www.mcelroy.com

DynaMc®

28, 250 and 412 Hand Pump Fusion Machines

Manual: 1270901 Revision: E 10/18

Original Language: English



This product and other products could be protected by patents or have patents pending. All the latest patent information is available at patent.mcelroy.com

Introduction

Thank you for purchasing this McElroy Product

The McElroy DynaMc® HP fusion machines are manual hydraulic operated fusion machines designed to butt fuse polyethylene pipe.

If fusing other thermoplastic pipe materials, refer to the pipe manufacturer's fusion procedures or appropriate joining standard.

The DynaMc 28HP model fuses 2" IPS through 8" DIPS (63 mm - 200 mm).

The DynaMc 250HP model fuses 2" IPS (63mm) minimum to 250mm maximum pipe.

The DynaMc 412HP model fuses 4" IPS through 12" DIPS (110mm - 340mm)

With reasonable care and maintenance, this machine will give years of satisfactory service.

Before operating this machine, please read this manual thoroughly, and keep a copy with the machine for future reference. This manual is to be considered part of your machine.

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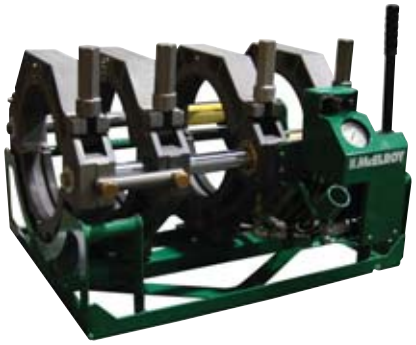

PH03877-4-15-09

McElroy University

For more than 30 years, McElroy has been the only pipe fusion machine manufacturer to continuously offer advanced training. Course offerings are meant to enhance your efficiency, productivity and safety in the proper use of McElroy machines. McElroy University classes are structured so that the skills learned and the machines used in each class closely match the machines found on pipelining jobsites. We offer training at our facility or yours. Our uniquely qualified McElroy University course instructors offer years of industry experience.

Tuition for each course includes lunches, course materials and a certificate of completion. Online registration, as well as up-to-date course offerings and dates, is available at **www.mcelroy.com/university**

This manual is intended as a guide only and does not take the place of proper training by qualified instructors. The information in this manual is not all inclusive and can not encompass all possible situations that can be encountered during various operations.

MU2-03-13-14

TX04659-03-24-14

Warranty

LIMITED WARRANTY

McElroy Manufacturing, Inc. (McElroy) warrants all products manufactured, sold and repaired by it to be free from defects in materials and workmanship, its obligation under this warranty being limited to repairing or replacing at its factory and new products, within **5 years** after shipment, with the exception of purchased items (such as electronic devices, pumps, switches, etc.), in which case that manufacturer's warranty applies. Warranty applies when returned freight is prepaid and which, upon examination, shall disclose to have been defective. This warranty does not apply to any product or component which has been repaired or altered by anyone other than McElroy or has become damaged due to misuse, negligence or casualty, or has not been operated or maintained according to McElroy's printed instructions and warnings. This warranty is expressly in lieu of all other warranties expressed or implied. The remedies of the Buyer are the exclusive and sole remedies available and Buyer shall not be entitled to receive any incidental or consequential damages. Buyer waives the benefit of any rule that disclaimer of warranty shall be construed against McElroy and agrees that such disclaimers herein shall be construed liberally in favor of McElroy.

RETURN OF GOODS

Buyer agrees not to return goods for any reason except upon the written consent of McElroy obtained in advance of such return, which consent, if given, shall specify the terms and conditions and charges upon which any such return may be made. Materials returned to McElroy, for warranty work, repair, etc., **must have a Return Material Authorization (RMA) number**, and be so noted on the package at time of shipment. For assistance, inquiry shall be directed to:

McElroy Manufacturing, Inc.
P.O. Box 580550
833 North Fulton Street Tulsa, Oklahoma 74158-0550

PHONE: (918) 836–8611, FAX: (918) 831–9285.
EMAIL: fusion@McElroy.com

Note: Certain repairs, warranty work, and inquiries may be directed, at McElroy's discretion, to an authorized service center or distributor.

DISCLAIMER OF LIABILITY

McElroy accepts no responsibility of liability for fusion joints. Operation and maintenance of the product is the responsibility of others. We recommend qualified joining procedures be followed when using McElroy fusion equipment.

McElroy makes no other warranty of any kind whatever, express or implied; and all implied warranties of merchantability and fitness for a particular purpose which exceed the aforestated obligation are hereby disclaimed by McElroy.

PRODUCT IMPROVEMENT

McElroy reserves the right to make any changes in or improvements on its products without incurring any liability or obligation to update or change previously sold machines and/or the accessories thereto.

INFORMATION DISCLOSED

No information of knowledge heretofore or hereafter disclosed to McElroy in the performance of or in connection with the terms hereof, shall be deemed to be confidential or proprietary, unless otherwise expressly agreed to in writing by McElroy and any such information or knowledge shall be free from restrictions, other than a claim for patent infringement, is part of the consideration hereof.

PROPRIETARY RIGHTS

All proprietary rights pertaining to the equipment or the components of the equipment to be delivered by McElroy hereunder, and all patent rights therein, arising prior to, or in the course of, or as a result of the design or fabrication of the said product, are exclusively the property of McElroy.

LAW APPLICABLE

All sales shall be governed by the Uniform Commercial Code of Oklahoma, U.S.A.

Register your product online to activate your warranty:www.McElroy.com/fusion

(Copy information listed on the machine nameplate here for your records).

Model No. _____

Serial No. _____

Date Received _____

Distributor _____

TX02486-11-4-13

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Fusion Equipment Safety

Safety Alerts

This hazard alert sign appears in this manual. When you see this sign, carefully read what it says. YOUR SAFETY IS AT STAKE.

You will see the hazard alert sign with these words: DANGER, WARNING, and CAUTION.

WR00051-11-30-92

DANGER Indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.

WARNING Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.

CAUTION Indicates a hazardous situation which, if not avoided, may result in minor or moderate injury.

In this manual you should look for two other words: **NOTICE** and **IMPORTANT**.

NOTICE: can keep you from doing something that might damage the machine or someone's property. It may also be used to alert against unsafe practices.

IMPORTANT: can help you do a better job or make your job easier in some way.

TX00030-12-1-92

Read and Understand

Do not operate this equipment until you have carefully read, and understand all the sections of this manual, and all other equipment manuals that will be used with it.

Your safety and the safety of others depends upon care and judgment in the operation of this equipment.

Follow all applicable federal, state, local, and industry specific regulations.

McElroy Manufacturing, Inc. cannot anticipate every possible circumstance that might involve a potential hazard. The warnings in this manual and on the machine are therefore not all inclusive. You must satisfy yourself that a procedure, tool, work method, or operating technique is safe for you and others. You should also ensure that the machine will not be damaged or made unsafe by the method of operation or maintenance you choose.

WR00052-12-1-92

TX02946-4-15-09

Fusion Equipment Safety

General Safety

Safety is important. Report anything unusual that you notice during set up or operation.

LISTEN for thumps, bumps, rattles, squeals, air leaks, or unusual sounds.

SMELL odors like burning insulation, hot metal, burning rubber, hot oil, or natural gas.

FEEL any changes in the way the equipment operates.

SEE problems with wiring and cables, hydraulic connections, or other equipment.

REPORT anything you see, feel, smell, or hear that is different from what you expect, or that you think may be unsafe.

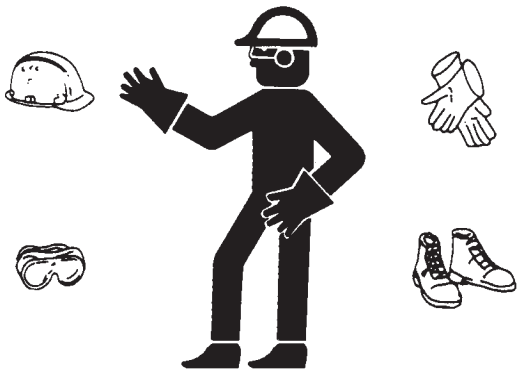
SAFE1ST-1222-92

TX00114-4-22-93

Wear Safety Equipment

Wear a hard hat, safety shoes, safety glasses, and other applicable personal protective equipment.

Remove jewelry and rings, and do not wear loose-fitting clothing or long hair that could catch on controls or moving machinery.



WR00053-122-92

TX00032-4-7-93

Heater is Not Explosion Proof

⚠ DANGER This heater is not explosion proof. Operation of heater in an explosive atmosphere without necessary safety precautions will result in serious injury or death.

When operating in an explosive atmosphere, the heater should be brought up to temperature in a safe environment, then unplugged before entering the explosive atmosphere for fusion.

WR00034-11-30-92

TX04467-03-24-14

Electric Motors are Not Explosion Proof

⚠ DANGER Electric motors are not explosion proof. Operation of these components in an explosive atmosphere without necessary safety precautions will result in serious injury or death.

See Section "Facer" in the Overview section for instructions on removing brushes from facer motor.

TX02979-04-02-14

WR00080-4-15-09

Pipe Handling Safety

⚠WARNING Do not position yourself or any other personnel under supported or raised pipe. Pipe is heavy and could fall unexpectedly.

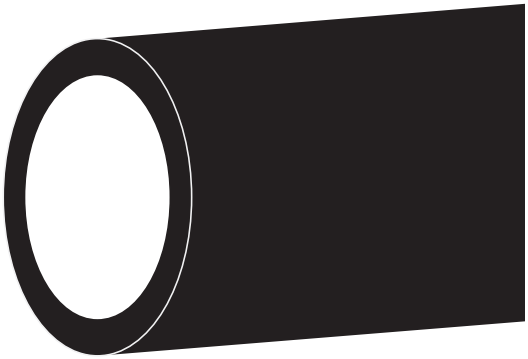
⚠WARNING Pipe that is bent can store a great amount of energy. Do not bend and force the pipe into the machine. A bent pipe with stored energy can generate tremendous force when that energy is released.

It is recommended that the pipe is always held securely by either being clamped in the fusion machine jaws or properly attached to a lifting device.

NOTICE: Do not leave machine unattended to unauthorized personnel. Do not allow unauthorized personnel to operate the machine.

Keep persons that are not involved in handling pipe away from pipe handling operations. Keep away from the pipe when the pipe and handling equipment are in motion. When in motion, all persons involved in handling pipe should be able to see all other persons at all times. If any handling person is not in sight, immediately stop moving equipment and pipe and locate that person. Do not continue until all persons are accounted for and in sight.

Never push, roll, dump or drop pipe lengths, bundles or coils off the delivery truck, off handling equipment, or into a trench. Always use appropriate equipment to lift, move, and lower the pipe.



WR00097-4-17-13

TX04882-04-18-16

Fusion Equipment Safety

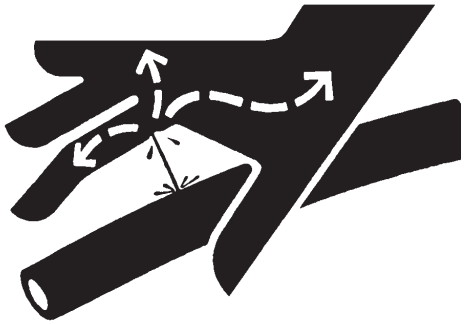
Units With Hydraulics

Although the hydraulic pressures in this machine are low compared to some hydraulically operated equipment, it is important to remember that a sudden hydraulic oil leak can cause serious injury, or even be fatal if the pressure is high enough.

⚠WARNING Escaping fluid under pressure can penetrate the skin causing serious injury. Keep hands and body away from pinholes which eject fluid under pressure. Use a piece of cardboard or paper to search for leaks. If any fluid is injected into the skin, it must be immediately removed by a doctor familiar with this type of injury.

NOTICE: wear safety glasses, and keep face clear of area when bleeding air from hydraulic system to avoid spraying oil into eyes.

TX00110-8-23-95



WR00078-4-8-93

Electrical Safety

⚠WARNING Always ensure power cords are properly grounded. It is important to remember that you are working in a wet environment with electrical devices. Proper ground connections help to minimize the chances of an electric shock.

Frequently inspect electrical cords and unit for damage. Have damaged components replaced and service performed by a qualified electrician.

Do not carry electrical devices by the cord.

NOTICE: Disconnect the equipment from the power source before attempting any maintenance or adjustment.

TX02947-4-15-09

WR00055-4-7-93

WR00025-11-30-92

Crush Points

⚠WARNING Hydraulically operated equipment is operated under pressure. Anything caught in the machine will be crushed. Keep fingers, feet, arms, legs, and head out of the machine while operated.

TX03004-8-11-09

WR00012-124-92

Fusion Equipment Safety

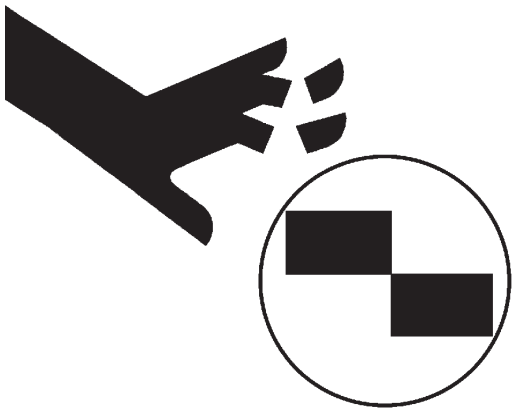
Facer Blades Are Sharp

⚠WARNING Facer blades are sharp and can cut. Never attempt to remove shavings while the facer is running, or is in the facing position between the jaws. Use care when operating the facer, and when handling the unit.

NOTICE: Disconnect power from the facer, and remove the facer blades before attempting any maintenance or adjustment.

NOTICE: Never extend the blade beyond the inner or outer circumference of the facer.

TX02378-1-24-05



WR00073-4-6-93

Heater is Hot

⚠CAUTION The heater is hot and will burn clothing and skin. Keep the heater in its insulated heater stand or blanket when not in use, and use care when heating the pipe.

NOTICE: Use only a clean non-synthetic cloth to clean the heater plates.

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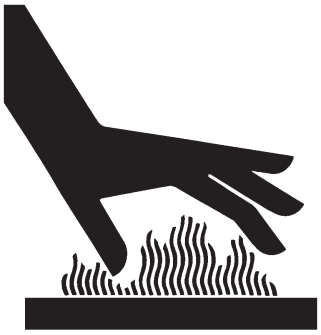

WR00030-2-10-93

Personal Lifting Safety

⚠CAUTION The machine components are heavy. Using one person to lift the facer or carriage may result in an injury. Use a lifting strap and an overhead lifting device to lift facer or carriage. For manual lifting, two people are required to lift the facer or carriage.

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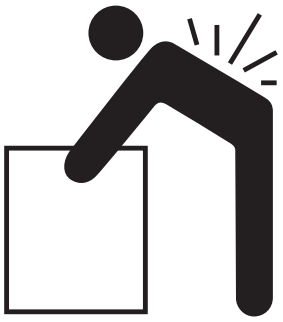


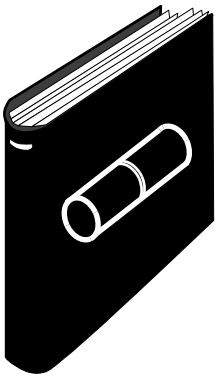
HeavyLifting5-25-10

Fusion Procedures

Obtain a copy of the pipe manufacturer's procedures or appropriate joining standard for the pipe being fused. Follow the procedure carefully, and adhere to all specified parameters.

NOTICE: Failure to follow pipe manufacturer's procedure could result in a bad joint. Always follow pipe manufacturer's procedures.

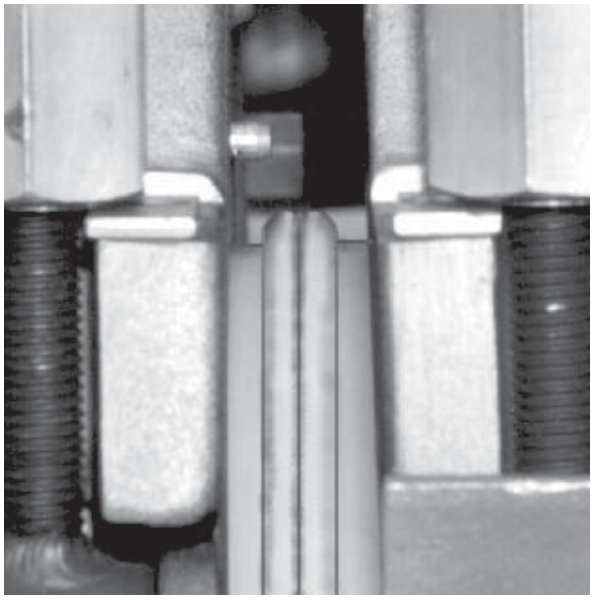
TX04469-10-24-12



WR00079-1-24-96

Theory of Heat Fusion

The principle of heat fusion is to heat two pipe surfaces to a designated temperature, and then fuse them together by application of force. This develops pressure which causes flow of the melted materials, which causes mixing and thus fusion. When the thermoplastic material is heated, the molecular structure is transformed into an amorphous condition. When fusion pressure is applied, the molecules from each thermoplastic part mix. As the joint cools, the molecules return to their form, the original interfaces are gone, and the fitting and pipe have become one monolithic unit. A strong, fully leak tight connection is the result.



PH00363B-1-4-96

The principal operations include:

Clamping The pipe pieces are held axially and radially to allow all subsequent operations to take place.

Facing The pipe ends are faced to establish clean, parallel mating surfaces perpendicular to the centerline of the pipes.

Aligning The pipe ends are aligned with each other to minimize mismatch of the pipe walls.

Heating A melt pattern that penetrates into the pipe is formed around both pipe ends.

Fusing The melt patterns are joined with a specified force, which is constant around the pipe interfacial area.

Cooling The fusion joint is held immobile with a specified force until adequately cooled.

Inspecting Visually examine the entire circumference of the joint for compliance with the standard or fusion procedure used.

TX04660-04-18-16

Introduction to the DynaMc 28, 250 and 412 Hand Pump Fusion Machine

The McElroy DynaMc HP fusion machines are manual hydraulic operated fusion machines designed to butt fuse polyethylene pipe.

If fusing other thermoplastic pipe materials, refer to the pipe manufacturer's suggested procedures or appropriate joining standard.

The DynaMc 28HP model fuses 2" IPS through 8" DIPS (63 mm - 200 mm).

The DynaMc 250HP model fuses 2" IPS (63 mm) minimum to 250 mm maximum pipe.

The DynaMc 412HP model fuses 4" IPS through 12" DIPS (110 mm - 340 mm)

PH05032-01-03-14

TX02948-4-15-09

Carriage Assembly

The DynaMc HP fusion machines are available in a 4-Jaw and 2-Jaw model and are hydraulic hand pump operated.

The 4-Jaw HP carriage assembly consists of two fixed jaws and two hydraulically operated movable jaws bolted to a skid.

For fittings, the inner fixed jaw can be connected to the movable jaws on the carriage for a 3 movable 1 fixed jaw configuration.

The 2-Jaw HP carriage assembly consists of one fixed jaw and one hydraulically operated movable jaw bolted to a skid.

All HP carriage assemblies have a hydraulic hand pump to pressure the hydraulic cylinders to move the jaws.

PH05032-01-03-14

PH05033-01-03-14

TX02949-4-15-09

Hydraulic Fluid Reservoir

The hydraulic pump has a reservoir that stores the hydraulic fluid. The hydraulic fluid is filled through a plug on the top of the reservoir.

Refer to the "Check Hydraulic Fluid Level" section for instructions on checking and filling the hydraulic fluid.

Refer to the "Hydraulic Fluids" section of this manual for hydraulic fluid recommendations.

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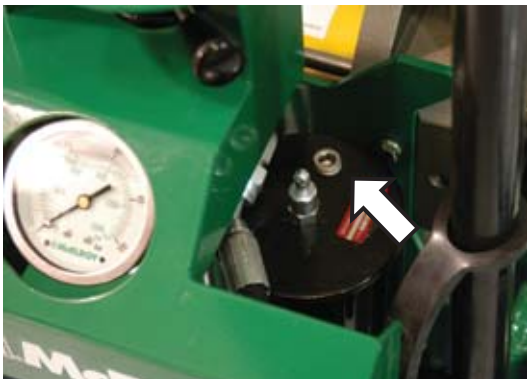
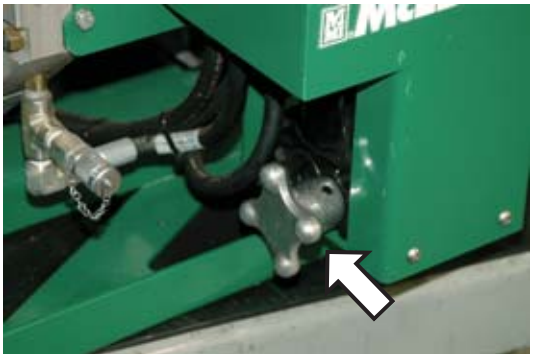


PH03861-4-15-09

Pump

The carriage assembly has a manually operated hydraulic pump that is used to apply hydraulic pressure to the carriages hydraulic cylinders in order to move the jaws. The pump has a pressure release valve on the lower left side of the pump.

PH03860-4-15-09



PH05031-01-03-14

TX02951-4-15-09

Hydraulic Cylinders

The two carriage cylinders have air bleed screws and must be bled if the system ever runs low on oil or leaks air on inlet side of pump. Air in the system is indicated when carriage movement becomes jerky and erratic.

Consult the "Maintenance" section of this manual for procedure to follow when bleeding air from system.

PH03872-4-15-09

TX01137-10-23-96

Facer

DANGER Electric motors are not explosion proof. Operation of these components in a hazardous environment without necessary safety precautions will result in serious injury and death.

Ensure facer power switch is in the off position.

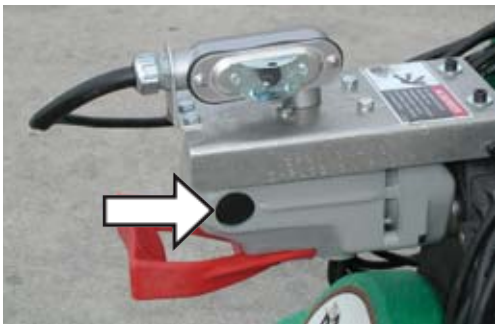
Connect facer to proper power source.

Don't turn on facer until ready to face.

PH04125-4-12-10

Remove brushes on the Milwaukee facer motor:

The armature brushes must be removed from the electric motor when manually operating in a hazardous condition. Unscrew the brushes from both sides of the motor. (Both brushes must be removed). A 1-1/8" hex shaft allows for manual operation in hazardous conditions.



PH01847-7-25-00

Remove brushes on the Eibenstock facer motor:

The armature brushes must be removed from the electric motor when manually operating in a hazardous condition.

Remove the rear cover of the motor.

Slide the spring clip away from the brush and pull the brush out (A).

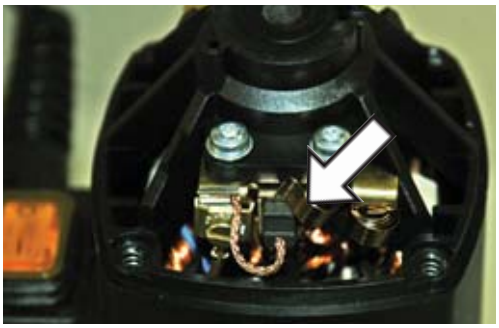
Loosen the brush ground wire (B) and pull the wire loose.

Repeat these steps on the wire on the opposite side.

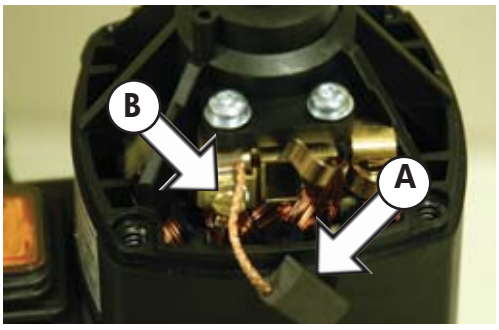
Store the brushes in a safe location until needed.

A 1-1/8" hex shaft allows for manual operation in hazardous conditions.

PH04129-4-12-10



PH04130-4-12-10



PH04130-4-12-10

TX04004-04-07-14

Heater

⚠ DANGER Heater is not explosion proof. Operation of heater in an explosive atmosphere without necessary safety precautions will result in serious injury or death.

If operating in an explosive atmosphere, heater should be brought up to temperature in a safe environment, then **unplugged before entering** the explosive atmosphere for fusion.

The heater has a green indicator light which will flash on and off. This indicates that the controller is operating normally. If the green indicator is not flashing then the controller may not be operating properly. If this occurs, disconnect power and have the heater repaired by a McElroy Authorized Service Center.

The heater temperature is controlled by a microprocessor. It has a red indicator light on the handle at the bottom of the temperature scale. When the heater is plugged in and preheating the light glows steadily until the set temperature is reached. The light then goes off and on slowly as the heater maintains temperature.

The heater body is not coated. Coated butt fusion heater plates are available for all butt fusion applications.

NOTICE: The heater should never be used without butt fusion heater plates installed.

To prevent a build-up of plastic pipe residue from accumulating on the heater plates (loss of surface temperature and pipe sticking may result), the heater plates should be cleaned with a non-synthetic cloth before every fusion joint.

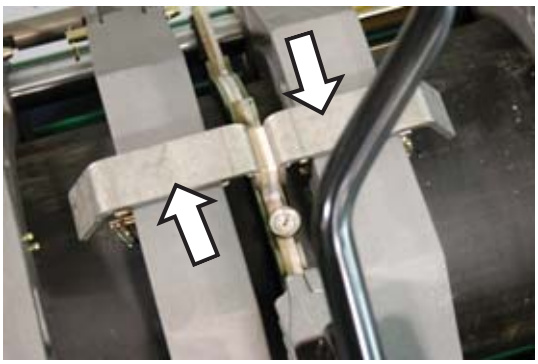
PH03874-4-15-09

PH03875-4-15-09

TX02981-01-03-14

Heater Stripper Bar

The heater is equipped with a stripper bar that is used to separate the heater from the pipe ends after the heating cycle. When the inner jaws are opened, the jaws lift and press against the stripper bar separating the heater from pipe ends.



PH03906-4-17-09

TX02982-4-27-09

Insulated Heater Stand

The heater should always be stored in the insulated heater stand or blanket for protection of the operator and to minimize heat loss and risk of mechanical damage.

PH03874-4-15-09

TX00363-9-15-94

Butt Fusion Procedure

Read Before Operating

Before operating this machine, please read this manual thoroughly, and keep a copy with the machine for future reference.

The fusion procedures in this manual are for use with polyethylene pipe. If fusing other thermoplastic pipe materials, refer to the pipe manufacturer's suggested procedures or appropriate joining standard.

TX02953-4-15-09

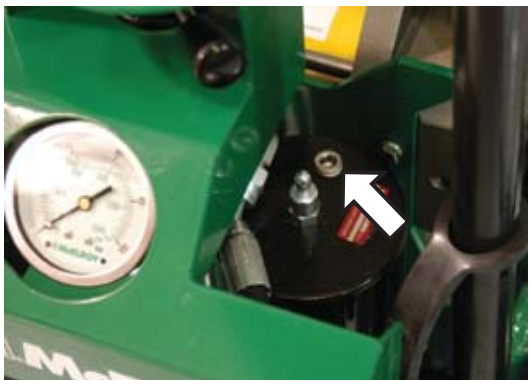
STOP-122-92

Check Hydraulic Fluid Level

Check fluid level by removing the plug on the top of the hydraulic pump's reservoir. The reservoir should be approximately half full of fluid. Do not overfill.

Refer to the "Hydraulic Fluids" section of this manual for hydraulic fluid recommendations.

TX02954-08-08-14



PH03861-4-15-09

Prepare Heater

DANGER Heater is not explosion proof. Operation of heater in an explosive atmosphere without necessary safety precautions will result in serious injury or death.

If operating in an explosive atmosphere, heater should be brought up to temperature in a safe environment, then unplugged before entering the explosive atmosphere for fusion.

Install butt fusion heater plates.

NOTICE: The heater should never be used without butt fusion heater plates installed. Refer to the "Maintenance" section of this manual for installation procedure.

Place heater in insulated heater stand.

Plug heater into a proper power source.

Allow heater to warm-up to operating temperature.

Refer to the "Maintenance" section of this manual for instructions on how to adjust heater temperature.

TX02310-03-24-14

PH02312-424-02

PH00420-11-1-94

Butt Fusion Procedure

Set up Pipe Supports

Set up pipe stands or pipe rollers and adjust height so the pipe is in line with the jaws.

TX02955-4-15-09

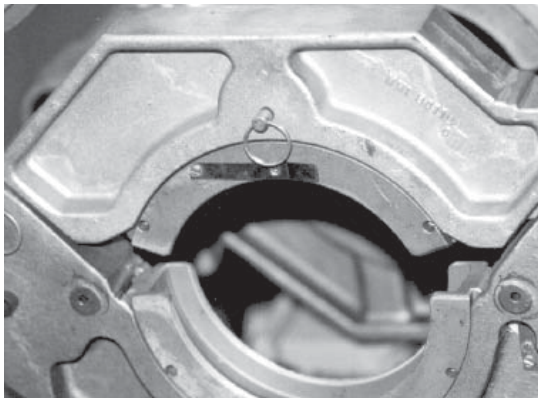
PH03879-4-15-09

Install Clamping Inserts

Select and install appropriate clamping inserts for the pipe that is being fused.

Clamping inserts are required for all sizes except sizes that match the size of the jaw without inserts.

TX02956-4-15-09



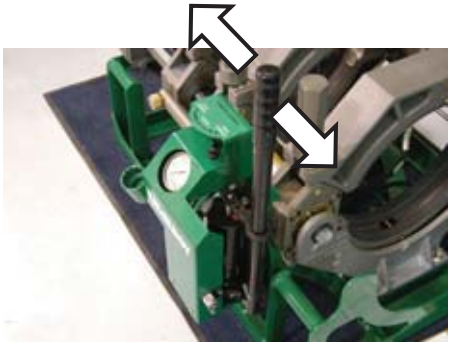
PH00304-9-24-93

Pump

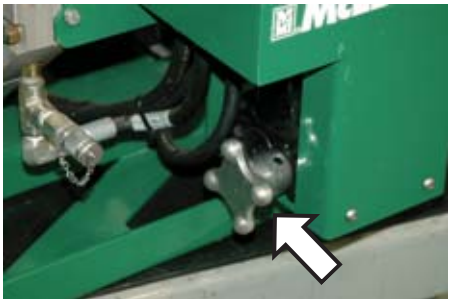
Use the carriage control valve to select desired carriage direction. The neutral position does not apply pressure to the cylinders. With the valve in the appropriate position, actuate the pump handle to build pressure. The pump applies pressure in both strokes of the handle.

There is a pressure release valve on the bottom left side of the pump. Rotate the lever counter-clockwise to release pressure.

PH03888-4-15-09



PH03892-4-15-09



PH05031-01-03-14

TX02957-4-27-09

Butt Fusion Procedure

Determine Fusion Pressure

The theoretical fusion pressure can be determined using the fusion pressure calculator that is supplied with the machine or by using the McCalc® app is available for iOS, Android, Windows Phone and PC devices.

Always add drag pressure to the theoretical fusion pressure.

Gauge (Fusing) Pressure = Theoretical Fusing Pressure + Drag Pressure

Drag pressure should be determined using the following procedure:

After facing the pipe, move the carriage so that the pipe ends are approximately 2" apart.

Shift the carriage control valve to the closed position.

Gradually increase the pressure by actuating the pump lever. Record the pressure at which the carriage begins to move as drag pressure.

Take the theoretical fusion pressure, determined from the calculator, then add the actual measured drag pressure. This will be the gauge pressure to be used for the fusion.

PH04004-8-25-09

TX02978-08-21-17

Jaw Configuration

The DynaMc HP 4 jaw machines can be configured to a 2 movable jaw/2 fixed jaw configuration or a 3 movable jaw/1 fixed jaw configuration. This will allow work in close proximity to ells and tees without the removal of the outer jaw.

To change to the 3 movable/1 fixed jaw configuration:

Unscrew the knobs on the jaw braces and remove the braces.

Align the brace between the inner movable jaw and the inner fixed jaw. The carriage may have to be moved to align the brace. Attach the brace with the knobs to secure them in place.

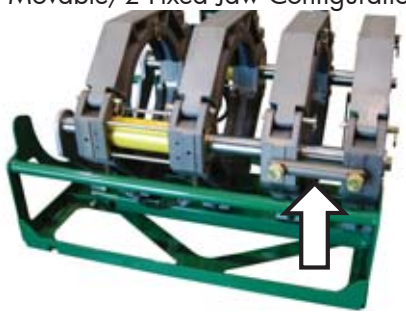
To change to the 2 movable/2 fixed jaw configuration:

Unscrew the knobs on the jaw braces and remove the braces.

Align the brace between the inner fixed jaw and the outer fixed jaw. The carriage may have to be moved to align the brace. A block of wood should be used on both sides across the guide rods to push the inner fixed with the movable jaws to align with the outer fixed jaw. Attach the brace with the knobs to secure them in place.

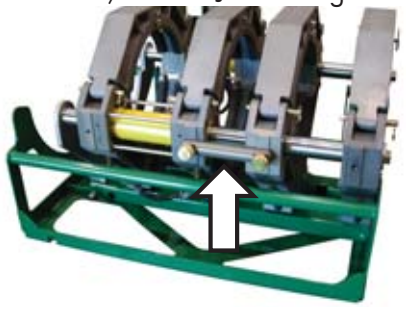
TX02958-4-15-09

2 Movable/2 Fixed Jaw Configuration



PH03899-4-15-09

3 Movable/1 Fixed Jaw Configuration



PH03898-4-15-09

Butt Fusion Procedure

Loading Pipe Into Machine

Clean the inside and outside of pipe ends that are to be fused.

Open the upper jaws and insert pipe in each pair of jaws with applicable inserts installed. Let the ends of the pipe protrude past the face of the jaws .75" for 28 and 1.25" for 250 and 412.

TX02983-4-27-09

PH03862-4-15-09

Facing the Pipe

Move facer into place

Turn on the facer.

Move the carriage control valve to the close carriage position.

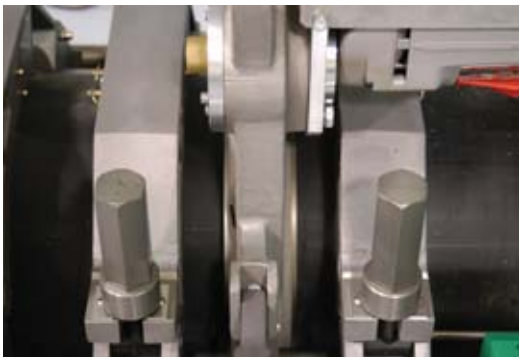
Pump the handle to move the carriage to the left against the facer.

If the facer begins to stall, reduce the amount of pressure applied to the handle.

Move the carriage until the facer bottoms out on facer stops.

Allow the facer to run for several revolutions to ensure that there are no chips hanging to the end of the pipe.

Turn facer off.



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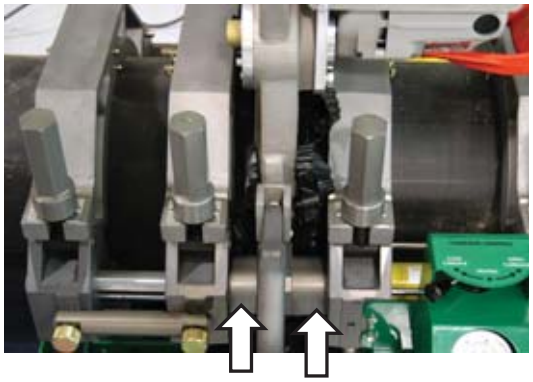
PH04125-4-12-10



PH03909-4-27-09

TX02960-4-15-09

Remove Facer

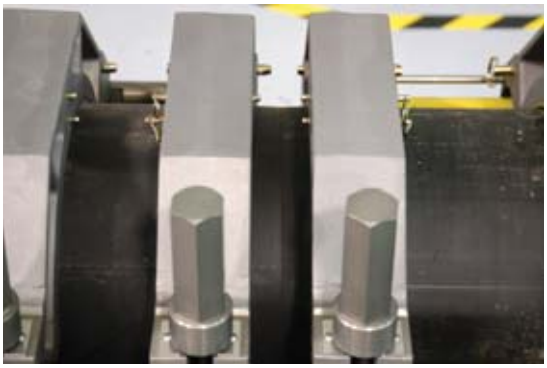
Move the carriage control valve to the open carriage position and open the carriage.

Release the trigger lock, and move the facer out.

Remove chips from pipe ends.

Do not touch faced pipe ends.

Inspect both pipe ends for complete face off. If the face off is incomplete, return to **Loading Pipe into Machine**.

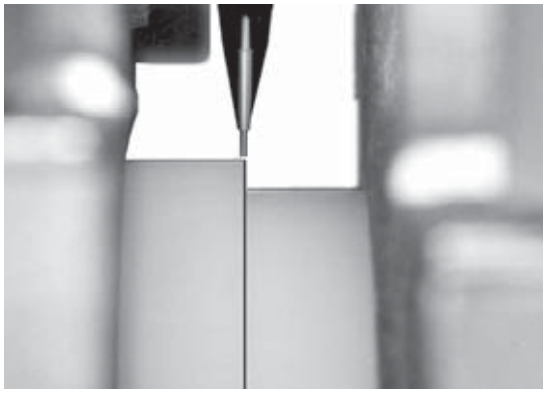


PH03882-4-15-09

Move the carriage to the left until ends of pipe butt together.

Check pipe joint for proper alignment.

⚠WARNING Do not use finger to check for hi/lo (misalignment). The unit is under pressure, and slippage could result in crushed fingers. Always keep hands clear of the jaw area.



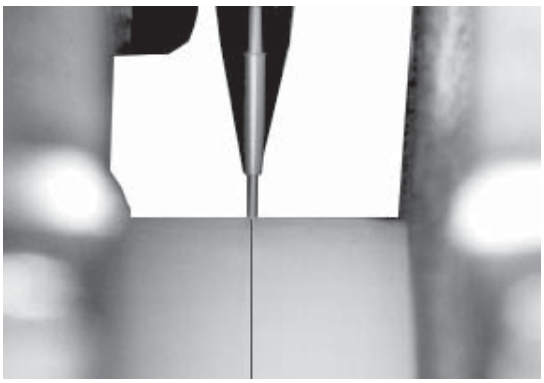
PH00366-9-12-94

If pipe is not lined up, tighten the high side jaw to bring into alignment.

IMPORTANT: Always tighten the side that is higher, never loosen the low side.

When the pipe is properly aligned tighten outside clamps to insure against slippage (4 Jaw units only).

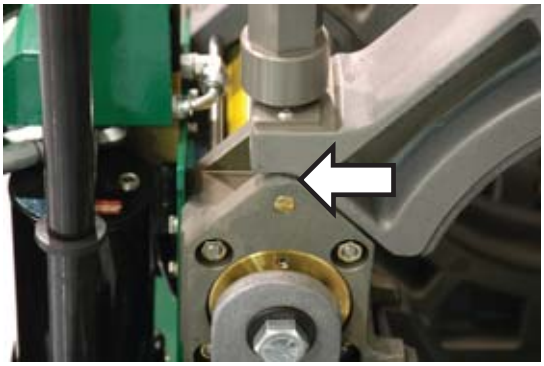
Ensure there is no unacceptable gap between the pipe ends. If there is an unacceptable gap, return to **Loading Pipe into Machine**.



PH00357-9-12-94

NOTICE: When clamping, do not over-tighten the clamp knobs because machine damage can result. Check to see if there is space between the upper and lower jaws. If the two jaws are touching, do not continue to tighten.

Bring the pipe ends together under fusion pressure to check for slippage. If slippage occurs, return to **Loading Pipe into Machine**.

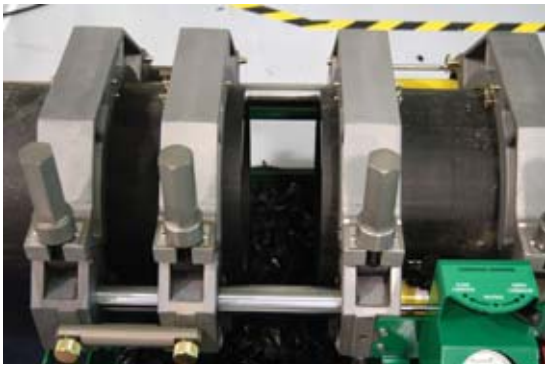


PH03883-4-15-09

TX02961-4-27-09

Position Carriage for Heater Insertion

Move carriage to the right to open a gap large enough to insert the heater.



PH03864-4-15-09

TX00374-9-15-94

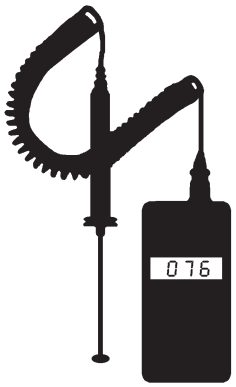
Check Heater Temperature

NOTICE: Incorrect heating temperature can result in questionable fusion joints. Check heater plates periodically with a pyrometer and make necessary adjustments.

Refer to the "Maintenance" section of this manual for instructions how to adjust heater temperature.

Check heater surface temperature.

Refer to the pipe manufacturer's recommendations for proper heater temperature.



VR00077-4-16-93

IMPORTANT: The dial thermometer on the heater indicates internal temperature which varies from the actual surface temperature.

The dial thermometer can be used as reference once the surface temperature has been verified.

PH00420-11-1-94

TX02001-11-1-02

Inserting Heater

⚠ DANGER Heater is not explosion proof. Operation of heater in an explosive atmosphere without necessary safety precautions will result in serious injury or death.

If operating in an explosive atmosphere, heater should be brought up to temperature in a safe environment, then unplugged before entering the explosive atmosphere for fusion.

Use a clean non-synthetic cloth to clean the butt fusion heater surfaces.

Verify heater temperature by noting the reading on the dial thermometer.

Insert heater between the pipe ends.

TX00377-04-16-14

PH03885-4-15-09

PH03886-4-15-09

Heating the Pipe

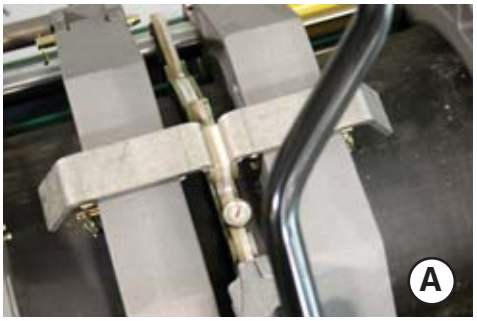
A) Move the carriage to the left, bringing the heater into contact with both pipe ends. Ensure both ends are in full contact with the heater.

B) Carefully reduce pressure to measured drag pressure by partially actuating the pressure release lever. Be sure to close release lever after pressure reaches measured drag pressure.

C) Move the carriage control valve to the neutral position to prevent accidental actuation of the pump lever from affecting carriage position or pressure during the heating cycle. During the heating cycle make sure the pipe does not pull away from the heater.

NOTICE: It may be necessary to omit Step C to prevent the pipe from pulling away from the heater. If this is necessary, drag pressure must be manually maintained by actuating the pump lever.

TX02963-4-15-09



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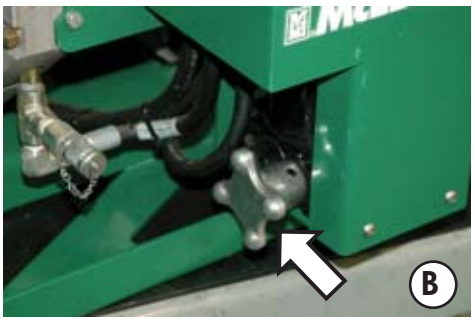


PH05031-01-03-14

PH03888-4-15-09

Fusing the Pipe

NOTICE: Failure to follow pipe manufacturer's fusion procedures may result in a bad joint.

CD00141A-9-12-94

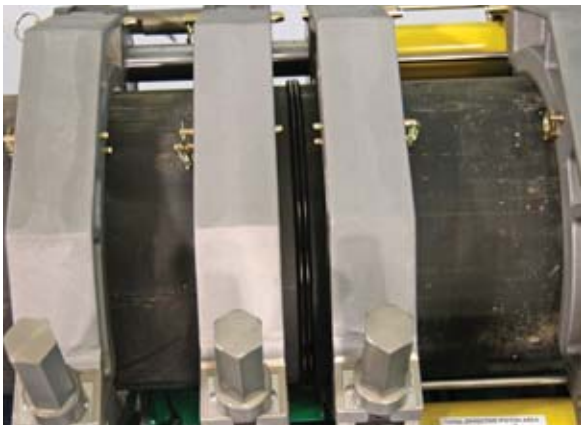
After following the pipe manufacturer's suggested heating procedure:

A) Shift carriage control valve to the open position.

B) Move the carriage to the right just enough to engage the stripper bar.

Quickly remove the heater.

C) Shift carriage control valve to close carriage. Quickly move the carriage to the left, bringing the pipe ends together under the pipe manufacturer's recommended pressure. It is necessary to continually actuate pump lever to maintain fusion pressure until the fused joint solidifies.



PH03868-4-15-09

Allow joint to cool under pressure according to pipe manufacturer's recommendation.

D) The carriage pressure may continue to bleed off slightly during the cool-down period. This can be overcome by actuating the pump lever periodically to maintain proper carriage pressure, being careful not to over pressure the joint.

TX02964-4-27-09

Opening Movable Jaws

After the joint has cooled for the pipe manufacturer's recommended time, move the carriage control valve to the neutral position.

Loosen all clamp knobs.

Open the movable jaws.

PH03890-4-15-09

TX02965-4-15-09

Opening Fixed Jaws

Open the fixed jaws.

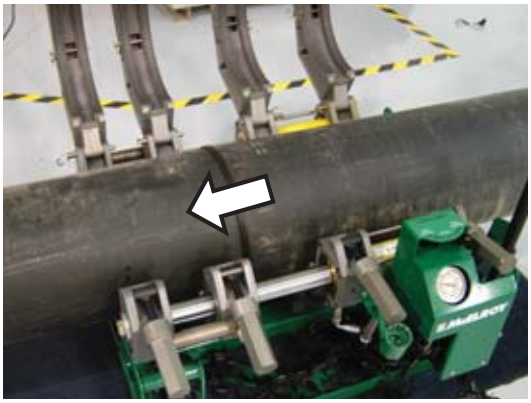
TX00381-9-16-94

PH03891-4-15-09

Position Machine for Next Joint

Move the fusion machine into position for the next fusion joint.

TX02985-5-4-09



PH03891-4-15-09

Install Next Piece of Pipe

Move the carriage control valve to the open position and actuate the pump lever to open the carriage completely.

Insert a new piece of pipe in movable jaws and repeat all previous procedures.

TX02966-4-15-09

PH03862-4-15-09

Special Operations - In Ditch

Remove Carriage from Base

The carriage can be removed from the base for close quarters in ditch fusion.

To remove the carriage:

Remove one of the nuts from the threaded rod at the base of the carriage.

Remove the threaded rod out of the carriage and through the opening on the base.

Slide the carriage forward to release it from the back of the base.

Lift the carriage away from the base.

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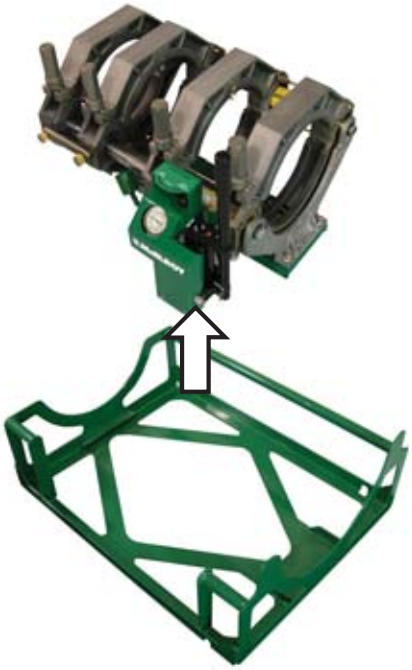


PH03900-4-15-09

PH03901-4-15-09

TX02967-4-15-09

Lower the Carriage into Ditch

Tighten all jaw clamp knobs.

Attach lifting sling to carriage.

Lift carriage assembly up and lower into ditch.

Remove the upper jaws by removing pins.

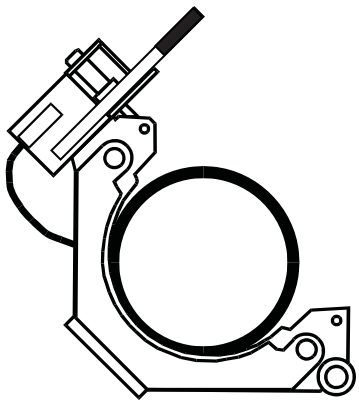
PH03903-4-15-09

TX02968-4-15-09

Special Operations - In Ditch

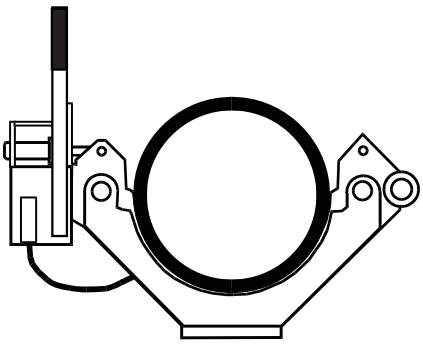
Clamp Carriage Assembly to Pipe

Position carriage assembly on side of the pipe. Lift pipe and slide carriage assembly under pipe.



CD00193c2-19-96

Rotate carriage assembly around to a normal upright position.



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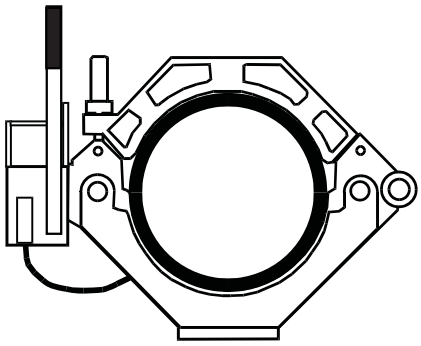
Attach the top jaws and loosely clamp around pipe.



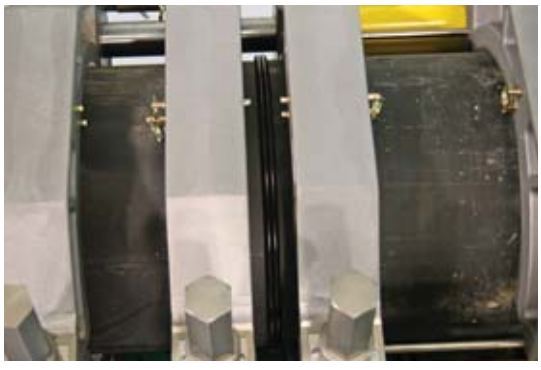
CD00195c2-19-96

TX00879-2-19-96

Make Fusion Joint

Refer to the "Butt Fusion Procedure" for operating instructions.

After facing operation, remove the facer from ditch.



PH03889-4-15-09

TX00450-9-16-94

Special Operations - In Ditch

Remove Carriage Assembly from Ditch

Loosen clamp knobs and remove top jaws.

Rotate carriage assembly from under the pipe.

IMPORTANT: Always rotate unit with valve system facing up to protect against damage.

Attach upper jaws to carriage. Tighten clamp knobs.

Attach sling to carriage.

Lift carriage assembly from ditch.

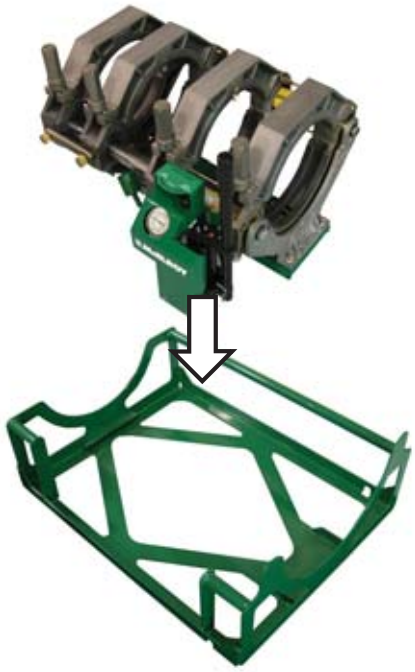
TX02969-4-27-09

PH03903-4-15-09

Reassemble Fusion Machine

Install carriage assembly to the base.

Insert the threaded rod and tighten the nuts on both ends.



PH03900-4-15-09

PH03901-4-15-09

PH03900-4-15-09

TX02970-4-15-09

Special Operations - Lifting Fusion Machine

Lifting Safety

Follow all applicable federal, state, local, and industry specific regulations when lifting.

SAFE1st- 12-14-92

VR00014-3-8-93

⚠WARNING

Safety warnings:

1. Do not exceed rated load or lift loads greater than the rated load rating of the lifting device.
2. Do not operate a damaged or malfunctioning lifting device.
3. Do not lift persons.
4. Do not lift a suspended load over persons.
5. Do not leave a suspended load unattended.
6. Do not remove or obscure warning labels.
7. Read and understand the operator's manual before using the device.
8. Stay clear of the suspended load.
9. Lift loads only as high as necessary.
10. Do not alter or modify the lifting device.
11. Employ generally accepted safe lifting practices.
12. Do not shock or impact load the lifting device.
13. Inspect all lifting pins for damage.

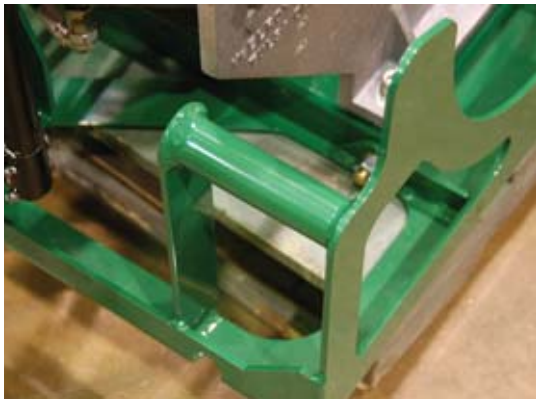
TX04594-4-18-13

Manual Lifting

There are two hand holds on the operator side of the machine and a long hand hold along the opposite side of the machine.

The fusion machines are a two person lift and should not be lifted alone.

⚠CAUTION Using one person to lift the machine may result in injury. Two people are required to lift the machine.



PH02497-07-11-03

TX02971-4-15-09

Special Operations - Lifting Fusion Machine

Powered Lifting

Powered lifting requires a hoist or lifting equipment of proper lifting capacity to lift the machine.

Tighten the jaw clamp knobs.

Attach a properly rated lifting sling through the center of all four jaws.

Using proper overhead rigging and equipment of adequate load rating to lift the fusion unit.

TX02972-4-15-09

PH02497-07-11-03

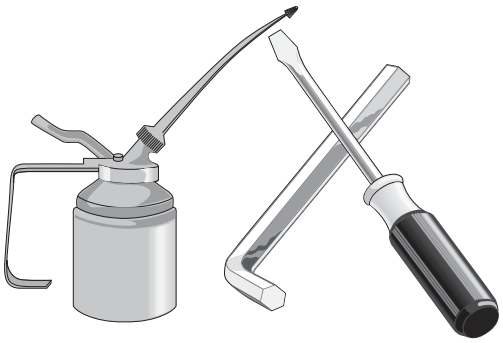
Maintenance

Preventative Maintenance

To insure optimum performance, the machine must be kept clean and well maintained.

With reasonable care, this machine will give years of service. Therefore, it is important that a regular schedule of preventive maintenance be kept.

Store machine inside, out of the weather, whenever possible.



CD00142-11-2-94

TX00428-8-10-95

Washing the Machine

The machine should be cleaned, as needed with a soap and water wash.

PH03877-4-15-09

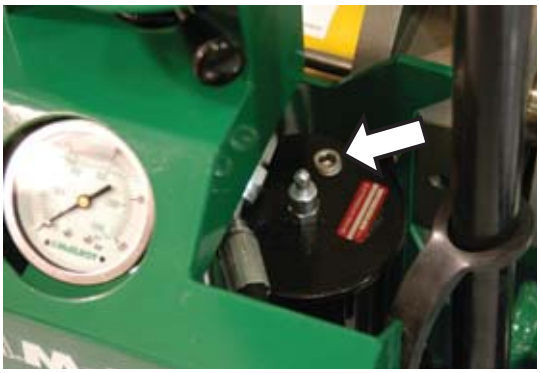
TX00429-9-15-94

Check Hydraulic Fluid

The hydraulic fluid level should be checked daily.

The reservoir should be approximately half full of fluid. Do not overfill.

If the pump and cylinders are empty, fill pump with fluid and move the carriage left and right fully 3 times and check the fluid level and fill. Bleeding the hydraulic system is required when system has been empty. Refer to "Bleeding the Hydraulic System" section for instructions on bleeding the hydraulics.



PH03861-4-15-09

Change the hydraulic fluid every two years. Drain the reservoir completely and refill the reservoir with clean new fluid.

Refer to the "Hydraulic Fluids" section of this manual for hydraulic fluid recommendations.

TX02973-08-21-17

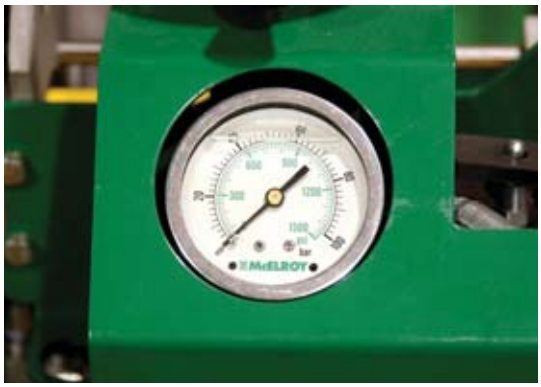
Check Gauge

Gauge should be checked daily.

The gauge should read zero when the unit is not under pressure.

Damaged gauges should be replaced.

TX02974-4-15-09



PH03897-4-15-09

Clean Jaws and Inserts

To prevent slippage and insure proper alignment, the jaws and inserts must be clean.

Clean the jaws and inserts of any dirt or residual material using a stiff-bristled brush.

TX00433-9-15-94

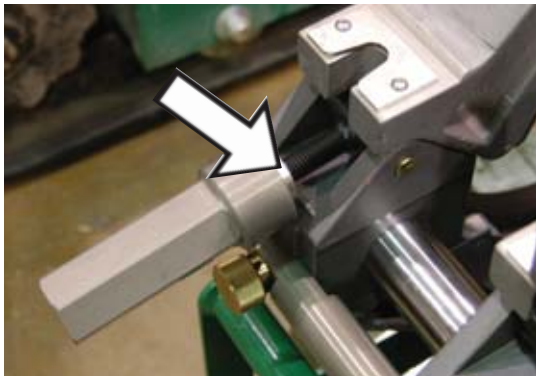
PH03894-4-15-09

Clean Thrust Bearings

The thrust bearings located in the clamp knobs must turn freely.

Wash the clamp knob bearing assembly with a solvent, and then lubricate with 30W or lighter oil.

TX00434-9-13-94

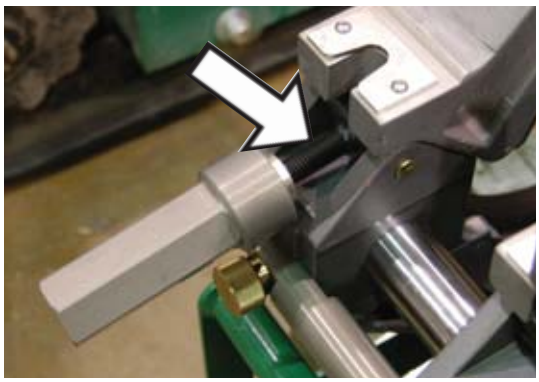


PH03895-4-15-09

Clean Eyebolt Threads

Keep the clamp knob eyebolt threads brushed clean.

TX00435-9-13-94



PH03895-4-15-09

Fasteners Must Be Tight

Check all nuts, bolts, and snap rings to make certain they are secure and in place.

TX00437-9-13-94

PH00433-11-1-94

Facer

The facer should be lubricated annually.

TX00438-9-15-94

PH03873-4-15-09

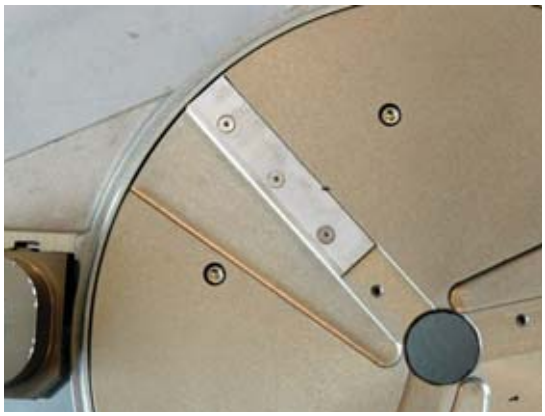
Facer Blades

Blades bolt directly to the blade holder and should be inspected for damage and sharpness.

Dull or chipped blades must be replaced.

NOTICE: Never extend the blade beyond the inner or outer circumference of the facer.

TX02475-3-29-05



PH03896-4-15-09

Clean Heater Surfaces

The heater faces must be kept clean and free of any plastic build up or contamination.

Before each fusion joint the heater surfaces must be wiped with a clean, non-synthetic cloth.

NOTICE: Do not use an abrasive pad or steel wool. Use a non-synthetic cloth that won't damage surfaces.

TX00440-8-14-08

PH03875-4-15-09

Installing Butt Fusion Heater Plates

The heater body of this assembly is not coated. Coated butt fusion heater plates are available for all butt fusion applications.

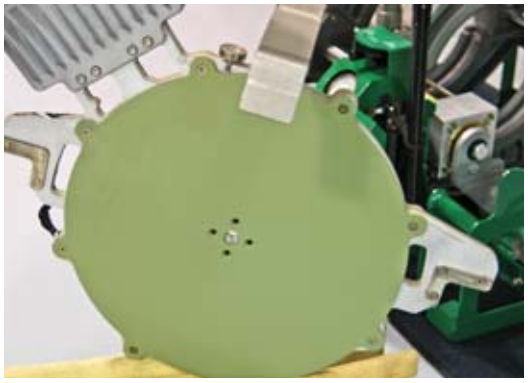
Butt fusion heater plates are installed with eight Stainless Steel Cap Screws.

Care should be taken to assure that the butt fusion heater plates are seated on the heater body, and that there is no foreign matter trapped between these surfaces.

IMPORTANT: Do not over tighten the bolts.

The surface of the butt fusion heater plates are coated with an antistick coating.

TX02311-07-30-04



PH03876-4-15-09

Adjusting Heater Temperature

Turn knob to desired temperature. Measure the heater surface temperature with a pyrometer. Any variance must be corrected to the pyrometer reading.

Loosen setscrew in the knob. Turn knob to point to the same temperature as the pyrometer. Tighten setscrew in the knob.

Turn knob to desired temperature. Allow heater to stabilize at the new temperature (5 to 10 minutes) after adjusting.

The thermometer on the heater body indicates internal temperature and should be used as a reference only.

TX02009-3-13-02

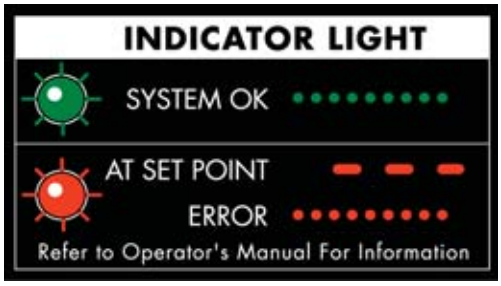
PH02313-4-24-02

Heater Indicator Light

PH02314-4-24-02

The heater has a green indicator light which will flash on and off. This indicates that the controller is operating normally. If the green indicator is not flashing then the controller may not be operating properly. If this occurs, disconnect power and have the heater repaired by an McElroy Authorized Service Center.

The heater has a red indicator light on the handle at the bottom of the temperature scale. When the heater is plugged in and preheating the light glows steadily until the set temperature is reached. The light then goes off and on slowly as the heater maintains temperature.



PH02571-09-16-03

If the heater is not operating properly, the control will attempt to turn the heater off and the indicator light will flash rapidly. If this occurs, disconnect the power and take it to a McElroy Authorized Service Center for repair.

TX02213-09-16-03

Bleeding Air From Hydraulic System

PH03872-4-15-09

The two carriage cylinders have air bleed screws and must be bled if the system ever runs low on oil or leaks air on inlet side of pump. Air in the system is indicated when carriage movement becomes jerky and erratic. To bleed the system, proceed as follows:

For the 28 and 250 machines:

Remove upper jaws and clamping eye bolts from the two movable clamp jaws to expose the bleed plugs recessed in top of the lower jaws.

For the 412 machines:

The bleed screws are on the ends of the rod glands.

Tilt machine so the fixed jaw end is higher than the opposite end.

Move the carriage control valve to close carriage, and move the carriage to the fixed jaw end.

Loosen the bleed plug on one cylinder next to the fixed jaw.

Hold pressure on the cylinder until no air is indicated and quickly tighten the plug.

Repeat this operation on the opposite cylinder.

Tilt the machine so the opposite end is higher than the fixed jaw end. Move the carriage to the end opposite the fixed jaw and repeat the above procedure on the this end of the cylinders.

TX02975-4-15-09

Maintenance Checklist

Fusion Machine Checklist

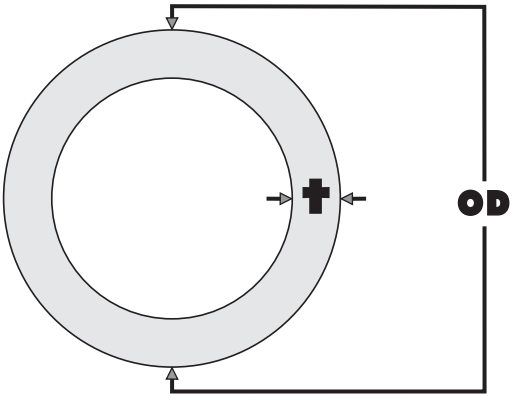
Item to Check	Satisfactory	Needs Repair	Repair Comments
UNIT			
Machine is clean			
All pins and snaprings are in place			
All nuts and bolts are tight			
All placards and handles are in place			
All clamp knobs turn freely			
Cords and plugs are in good condition			
All hardware is on the basic machine			
Hydraulic pump is filled to correct level			
Machine is free of hydraulic leaks			
Hydraulic gauge reads correctly			
Jaws are properly aligned			
Facer operates smoothly			
Face-off is square			
Inserts fit and pin properly			
Carriage Control Valve operates smoothly			
HEATER			
Cord and plug are in good condition			
Heater surface is clean and in good condition			
Thermometer is in good working order			
Surface temperature checked with pyrometer			

TX02976-4-15-09

Determining Fusion Pressure

Variable Definitions

O.D. = Outside Diameter of Pipe (inch)
t = Wall Thickness of Pipe (inch)
$\prod$ = 3.14
SDR = Standard Dimensional Ratio of Pipe (unitless)
IFP = Interfacial Pressure of Pipe (PSI)
TEPA = Total Effective Piston Area of Carriage Cylinders (inch^2)

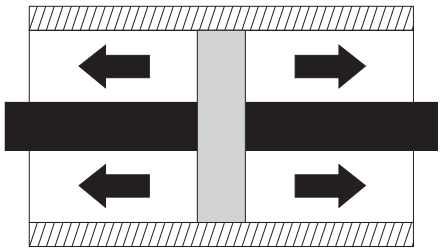


Formulas

$$t = \frac{O.D.}{SDR}$$

PIPE AREA = (O.D. - t) x t x $\prod$
FUSION FORCE = AREA x IFP

$$\text{GAUGE PRESSURE} = \frac{\text{FUSION FORCE}}{\text{TEPA}} + \text{DRAG}$$



Example

Pipe Size = 8" IPS, SDR 11
O.D. = 8.625 inch
DRAG = as measured in PSI (for this example use 30 PSI)
Recommended IFP = 75 PSI
Using a Model 28 High Force Fusion Unit

$$t = \frac{O.D.}{SDR} = \frac{8.625}{11} = 0.784$$

TEPA = 4.71 (From Table)

$$\text{GAUGE PRESSURE} = \frac{(O.D. - t) \times t \times \prod \times IFP}{TEPA} + \text{DRAG}$$

$$\text{GAUGE PRESSURE} = \frac{(8.625 - .784) \times .784 \times 3.14 \times 75}{4.71} + 30 \text{ PSI} = 338 \text{ PSI}$$

Total Effective Piston Areas (in^2)

Fusion Model	High Force	Medium	Low Force
A160/A250	-	-	0.90
28	4.71	3.24	1.66
250	4.71	3.24	1.66
412	11.78	6.01	3.14
618	11.78	6.01	3.14
500	-	6.01	3.14
824/T630	29.44	15.32	9.43
1236/T900	29.44	15.32	9.43
1648/T1200	31.42	14.14	-
2065	31.42	-	-
1600	31.42	14.14	-
2000	32.99	-	-

TX02893-04-18-16

Hydraulic Fluids

The use of proper hydraulic fluid is mandatory to achieve maximum performance and machine life. Use a clean, high quality, anti-wear hydraulic fluid with a viscosity index (VI) of 135 minimum. It should have a maximum viscosity of 500 cSt (2000 SSU) at startup (ambient temperature) and a minimum viscosity of 13 cSt (65 SSU) at the maximum fluid temperature (generally 80°F above ambient). Using hydraulic fluids that do not meet these criteria may cause poor operation and/or damage to the hydraulic components.

The following table specifies the fluid temperature at various viscosities. Temperature rise of the hydraulic fluid can vary from 30° F to about 80° F over the ambient temperature depending on the pressure setting, age of the pump, wind, etc. Mobil Univis N46 hydraulic fluid is installed at our factory. The advantage of this fluid is a wider temperature range, however, this fluid should not be used for continuous operation below 24°F.

TX03082-04-18-16

Hydraulic Fluids Characteristics

Manufacturer	Fluid Name	cSt 100F	cSt 210F	V.I.	-20F -10F 0F 10F 30F 50F 70F 90F 110F 130F 150F	Range °F	Range °C
Mobil	DTE 10 Excel 15	15.8	4.1	168	**********	-16 - 113	-27 - 45
	DTE 10 Excel 32	32.7	6.6	164	**********	12 - 154	-11 - 68
	DTE 10 Excel 46	45.6	8.5	164	**********	23-173	-5 - 78
	DTE 10 Excel 68	68.4	11.2	156	**********	37-196	3 - 91
	Univis N-32	34.9	6.9	164	**********	12-150	-11 - 66
	Univis N-46	46	8.5	163	**********	24-166	-4 - 74
	Univis N-68	73.8	12.1	160	**********	39-193	4 - 89

NOTE: This chart is based on pump manufacturer recommendations of 13 to 500 cSt.

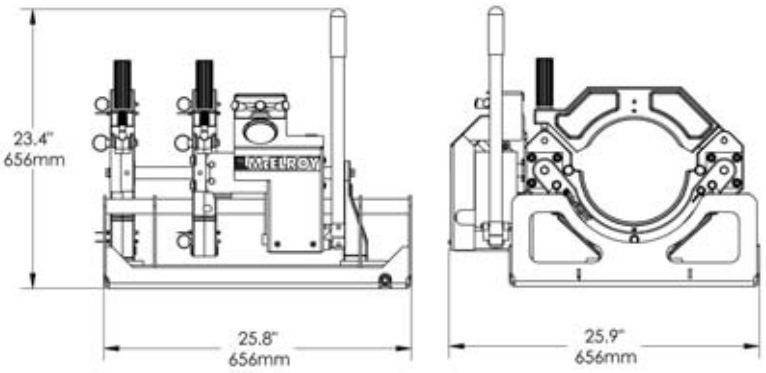
NOTE: Temperatures shown are fluid temperatures. – NOT ambient temperatures.

Specifications

Fusion Machine Dimensions:

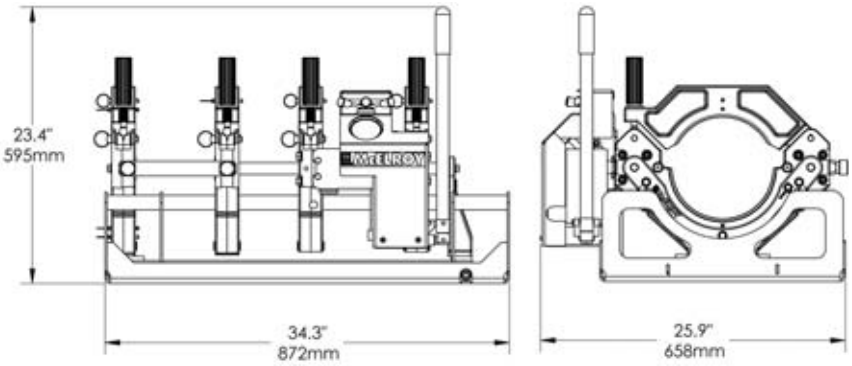
2-Jaw DynaMc 28 HP/250 HP

Width:	25.9" (658mm)
Length:	25.8" (656mm)
Height:	23.4" (595mm)
Weight:	108 lbs. (49 kg)
without cradle	97 lbs. (44 kg)
Facer:	39 lbs. (17.7 kg)
Heater:	
28	21 lbs. (9.5 kg)
250	27 lbs. (12.2 kg)



4-Jaw DynaMc 28 HP/250 HP

Width:	25.9" (658mm)
Length:	34.3" (872mm)
Height:	23.4" (595mm)
Weight:	155 lbs. (70 kg)
without cradle	142 lbs. (64 kg)
Facer:	39 lbs. (17.7 kg)
Heater:	
28	21 lbs. (9.5 kg)
250	27 lbs. (12.2 kg)



Specifications:

Maximum Pressure: 1400 psi max.
Fluid Capacity: 1 quart

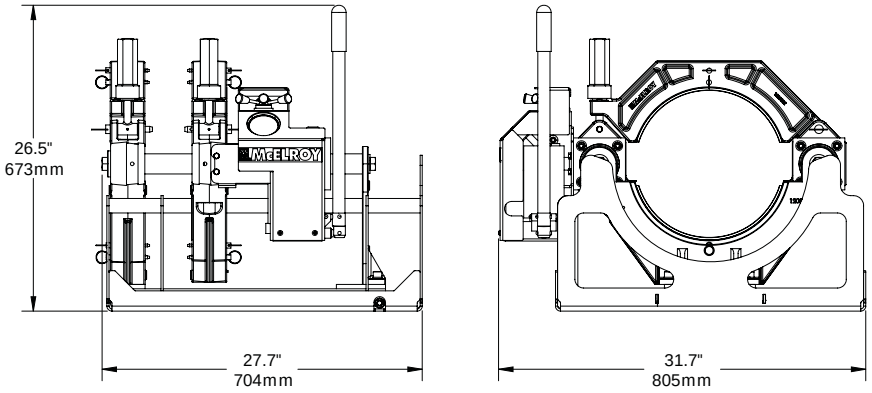
Designed for connecting the McElroy Datalogger® unit .

Specifications

Fusion Machine Dimensions:

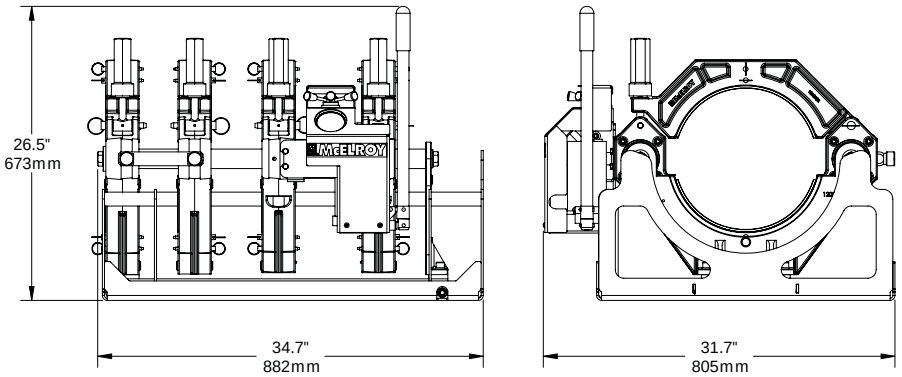
2-Jaw DynaMc 412 HP

Width:	31.7" (805mm)
Length:	27.7" (704mm)
Height:	26.5" (673mm)
Weight:	200 lbs. (90 kg)
without cradle	186 lbs. (84 kg)
Facer:	54 lbs. (24.5 kg)
Heater:	24 lbs. (10.9 kg)



4-Jaw DynaMc 412 HP

Width:	31.7" (805mm)
Length:	34.7" (882mm)
Height:	26.5" (673mm)
Weight:	293 lbs. (132 kg)
without cradle	277 lbs. (125 kg)
Facer:	54 lbs. (24.5 kg)
Heater:	24 lbs. (10.9 kg)



Specifications:

Maximum Pressure: 1400 psi max.
Fluid Capacity: 1 quart

Designed for connecting the McElroy Datalogger® unit .

TX02977-4-15-09

About this manual . . .

McElroy Manufacturing continually strives to give customers the best quality products available. This manual is printed with materials made for durable applications and harsh environments.

This manual is waterproof, tear resistant, grease resistant, abrasion resistant and the bonding quality of the printing ensures a readable, durable product.

The material does not contain any cellulose based materials and does not contribute to the harvesting of our forests, or ozone-depleting constituents. This manual can be safely disposed of in a landfill and will not leach into ground water.

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