620SC Butt Fusion System

Operator's Manual

CONNECTRA® equipment

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Description

The purpose of this manual is to provide operating and maintenance instructions for the 620SC Butt Fusion System. The 620SC Butt Fusion System fuses polyethylene pipe quickly and accurately.

The 620SC Butt Fusion System uses centerline applied fusion force to butt fuse 6" IPS through 20" IPS polyethylene pipe. The machine also fuses metric pipe sizes from 160mm through 500mm. Clamping jaws are sized for 20" IPS pipe. Easily insertable liners are used for pipe sizes down to 6" and 160mm.

Clamp liners are available for 11.25° mitered fusions, permitting fabrication of a 90° elbow in 6" through 18" IPS pipe sizes.

Features

* Fully powered, self contained 20HP gasoline engine drives the hydraulic pump and electric generator.
* Three and four clamp in-ditch capabilities.
* One heater for all pipe sizes that easily pivots out of the way.
* Narrow, lightweight facer with quick-disconnect design.
* Accommodates 6" through 20" IPS and 160mm through 500mm pipe sizes.
* Dual hydraulic pipe lifters.
* Modular design cart with locking wheel comes standard and delivers excellent field maneuverability.
* Protected, consolidated hydraulic controls with pressure adjustments.
* Ported for DataConnect or other competitive data recorders.
* Rugged design with no "bells and whistles" means less maintenance expense.
* A superior piece of equipment at an extraordinary price.
* Limited three-year warranty.

Copy information listed on your Warranty Card for your records:

Model No. _____

Serial No. _____

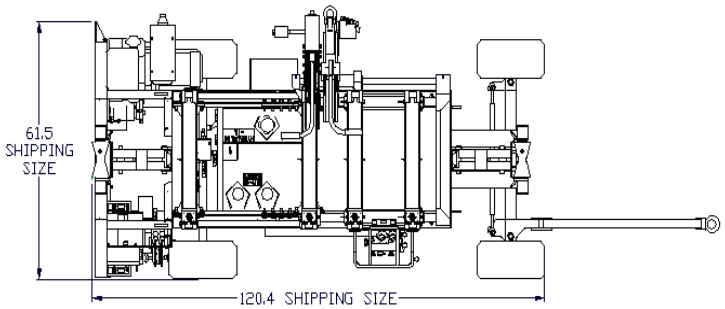
Date Received _____

Distributor _____

Specifications

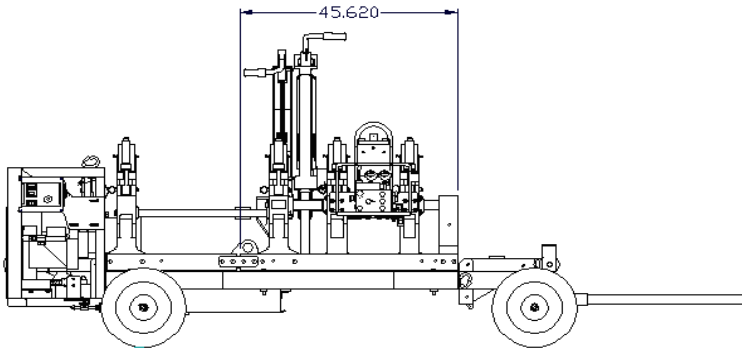
Carriage Unit Dimensions (three clamp)

Length	45.62 inches	1,159 mm
Width	48.39 inches	1,229 mm
Height	33.75 inches	857 mm
Weight	766 pounds	347.5 kg



Carriage Mounted on Frame

Length	122.40 inches	3,109 mm
Width	61.50 inches	1,562 mm
Height	50.75 inches	1,289 mm
Total Weight (all components)	2,500 pounds	1,133.9 kg



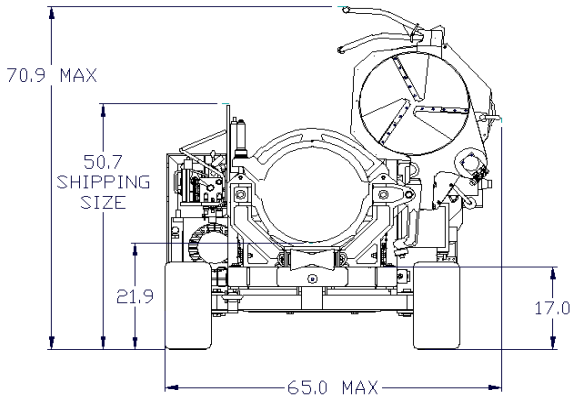
Capacities

Model 620SC - 6" IPS thru 20" IPS*

Model 620SC-500mm - 160mm thru 500mm*

Electrical data

240 VAC Single Phase	Watts	Amps
Heater	4,000	16.7



* With the use of optional reducing liners.

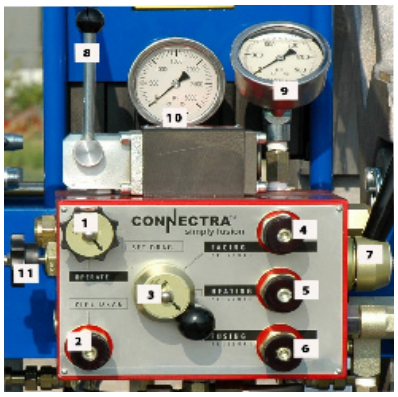
Specifications are subject to change without notice.

Equipment Information

Controls

The control box mounts on the cart. It contains the on/off switch and temperature control knob for the heater. Voltage readout is provided for the heater. The hour meter logs time in service. Three power cords coming off the control box supply power for the heater system and hydraulic oil cooler, plus receives power from the generator.

The numbering below corresponds to the numbering as shown on the hydraulic manifold.



1. Operating Knob: Turn to the "set drag" position when determining pressure required to overcome pipe drag. Return to "operate" when ready to begin fusion operations.

2. Drag Control Knob: With Operate Knob (1) turned to "set drag", this knob is turned clockwise to compensate for drag caused by weight of pipe or other operating conditions.

3. Function Selector Switch: Used to select the functions of facing, heating and fusion for the purposes of setting desired working pressures.

4. Facing Pressure Knob: Used to set desired facing pressure.

5. Heating Pressure Knob: Used to set desired heating pressure.

6. Fusion Pressure Knob: Used to set desired fusing pressure.

7. Facer Motor Control: This lever is used to operate the facer

8. Directional Control Lever: Used to move the moveable carriage. Movement to the left brings the stationary and moveable clamps together. Movement to the right separates the clamps.

9. Carriage Pressure Gauge: Indicates pressure in the function selected by the Function Selector Switch (3).

10. System Pressure Gauge: This gauge indicates system operating pressure.

11. Carriage Speed Control: This control is used to set the high speed or low speed necessary to join different brands of pipe.

Power Unit Controls

Before starting the power unit, the operator should be familiar with the HONDA engine operator's manual, which contains details of operating and maintaining the engine.

Clamp Liners

The clamp liners are sized to hold 20" IPS pipe.

For smaller pipe, a combination of clamp liners are used. They are held in place with the insertion of a clevis pin.

The 18" IPS liner must be inserted as a base for smaller sizes to 12" before installing appropriate liners.

Separation from the Cart

Extension hydraulic hoses make possible separation of the joining assembly from the cart if it has to be moved into the ditch.

- If desired, the facer can be removed from the joining assembly by disconnecting the hydraulic hoses, and removing the two hex bolts at the facer base.

- By removal of three bolts on each side of the joining assembly base, it can be removed from the cart.
- If space restrictions in the ditch require, the joining assembly can be made smaller by removal of the end stationary clamp. Five bolts are removed from each side. Removal of this clamp also makes possible fusing a section of pipe to a side outlet, which has already been saddle-fused to another section of pipe.

Safety Precautions

Read this manual carefully before attempting to operate this machine. Working with extreme temperatures and sharp facer blades can be dangerous if proper procedures are not followed. Know proper fusion techniques. Recommendations of pipe manufacturers regarding fusion temperatures, pressure, and techniques must be known to ensure proper fusion joints.

Only responsible, qualified, trained personnel should operate this equipment. Operating personnel should be familiar with the equipment, its functions, its potential hazards and proper precautionary measures.

To prevent tip-over, the fusion machine must be in a stable position. The equipment operator should be aware that potentially dangerous lateral and horizontal forces could exist within a length of pipe and should take precautions to guard against these forces.

Do not wear loose clothing, jewelry, or long loose hair near operating machinery. Recommended

safety apparel includes gloves, safety glasses, safety shoes, and hat or hair net.

Warnings and Cautions

The purpose of Warnings and Cautions in this manual is to call the operator's attention to the possible danger of injury to personnel and damage to equipment. The hazard alert sign above appears in this manual. When you see this sign, carefully read what it says. YOUR SAFETY IS AT STAKE.

Warning: Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury and/or damage to equipment.

Caution: Indicates a potentially hazardous situation which, if not avoided, may result in personal injury and damage to equipment. It may also be used to alert against unsafe practices.

Machine Operation Safety

Warning: Do not operate heater in the presence of a combustible atmosphere or in damp or wet conditions. In this case, heater should be brought to desired temperature then unplugged before taken into areas with a combustible atmosphere.

Heating plate temperature reaches 450°F. (232°C.). Use caution when handling the plate to avoid burns. Gloves are recommended. This heater is not explosion proof. Be careful not to scratch the non-stick coating on heater plates.

Keep away from facing tool blades while equipment is in operation and during positioning and retracting the facing tool.

Note: Machine should be covered when used in inclement weather.

Do not force machine. It will work better if operated within design limits. Apply only slight pressure when facing. Excessive pressure could damage equipment. Maintain machine in top condition.

Use sharp facer blades and keep machine clean for best and safest performance. Follow lubrication instructions contained in this manual.

Before moving unit, secure the clamps and latch facer in the down position. If facer is not properly latched, damage to machine and/or personal injury could result. Torque generated by the turning of the facer motor may cause it to move unexpectedly if not latched. Secure heater carrier.

Warning: Make sure facer is latched before turning on motor. If not, it may jump unexpectedly when turned on and could cause personal injury and/or damage to the equipment.

Make sure all hydraulic hoses and electrical cords are connected. Check hydraulic fluid level.

⚠ Caution: Make sure the directional control lever is in the neutral or centered position before engine start up. If hydraulics are engaged, carriage could move unexpectedly and damage the heater shroud or result in personal injury.

Service the HONDA gasoline engine according to manufacturer's recommendations. Refer to the HONDA Engine Owner's Manual.

Start engine. Allow engine to run a few minutes to warm up before beginning the facing and fusing operation.

⚠ Caution: Engine speed has been set at the factory. Do not change. Damage to alternator and other equipment could result.

Operating Procedures

Preparation

Move the unit into position. Make sure it is as level as possible. Exceeding a 20° tilt will affect engine performance and possibly cause damage. Set the brake on the right rear wheel.

Connect heater to receptacle on the back of the machine. Permit sufficient preheating time to stabilize temperature reading on heater thermometer. This thermometer will indicate approximate surface temperature of the heater plates.

Set temperature recommended by the pipe manufacturer on the control dial.

⚠ Caution: Use on AC power source only. If used on direct current (DC) power, the heater controller of the heater tool will be damaged.

Proper heating temperature is important in making a good fusion joint. The thermometer built into the heater tool indicates internal temperature and should be used only for reference. To assure the pipe manufacturer's temperature specifications are met, it is recommended that the surface temperature of the heater be measured prior to initial use and at reasonable intervals thereafter.

A hand-held surface pyrometer, [Connectra® part number 28-8554-1200-10], can be used for measuring this temperature. Several areas should be checked to ensure even heat distribution.

Use the pyrometer to check temperature in the center and at several points around the edges. (Do not use temperature crayons.) Each reading should be +/- 10º of each other.

Adjust temperature dial on control box as necessary to obtain required surface temperature.

⚠ Caution: Do not adjust heater above 550ºF. This may result in damage to heater components and cause deterioration of non-stick surface coating on face of the heater, which can result in contaminated fusion joints.

Install correct liners as required when pipe smaller than 20" IPS is to be fused. Place the liners into the clamp and insert the clevis pin to secure to the clamp or master liner.. Liners are stamped upper and lower on the side.

Inspect facer blades for nicks, scratches, etc., that might affect facing. Replace if necessary. Disconnect unit from power source before replacing blades.

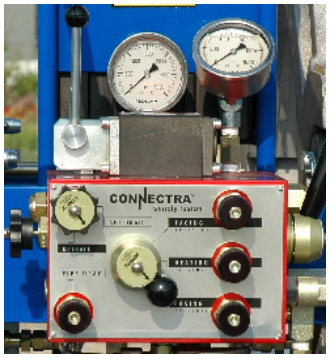
When replacing facer blades, make sure blade slots are free of dirt and foreign material so that the blades will seat properly.

⚠ Caution: Facer blades are extremely sharp.

Load Pipe or Fittings

Turn on/off switch on the control box to the "on" position.

Move the directional control lever to the right to open the carriage assemblies.



Open all of the hold-down clamps.

Load pipe in the stationary clamps. Extend pipe past inside edge of clamp. Tighten pipe using outer clamp. A ratchet wrench is provided to aid in tightening. Tighten inner clamp hand tight.

Load pipe in moveable carriage clamps. Extend pipe past inside edge of clamp. In order to minimize any ovality problems, it is recommended that the two pipe sections be installed with the line-up markings aligned. Tighten pipe using outer clamp. Tighten inner clamp hand tight.

Place the other two pipe ends on suitable pipe supports.

Hydraulic Flow/Pressure

The pressure gauge reading is affected by oil flow through the system. Normally, without the facer motor running, the pump is in a low flow condition, which has a minimal effect on the pressure settings in the system. When the facer motor is running, there is a higher flow rate in the system and a corresponding increase in return line pressure can be seen in the carriage pressure gauge.

It is important to set the following pressures with the factor motor not running. During facing operations there will be an increase in the carriage pressure due to the higher flows in the system. Carriage force is not affected since the increase in pressure is applied on both sides of the hydraulic cylinder.

Setting Fusion Pressure

Set the operating knob to "Operate".

Turn the drag control knob all the way counterclockwise.

Set the function selector switch to "Fusing".

Refer to pipe manufacturer's specifications for proper interfacial pressure necessary to fuse the pipe. The fusion pressure chart, provided with this manual, is designed to compute the appropriate pressure settings for the 620SC Butt Fusion System.

Another method to calculate proper gauge pressure, is to use the following formula:

Where
OD = Outside diameter (actual pipe diameter)
ID = Inside diameter
SDR = Standard dimensional ratio
WT = Wall thickness
IP = Interfacial Pressure (use pipe manufacturer's recommendation)
PA = Combined effective piston area ($in^{2)}$ for both cylinders
PA for the 620SC is 7.854 (in^2).
*Drag Factor = Hydraulic fusion pressure required to move the carriage holding the pipe. 30 psi is generally accepted as a minimum.

To find wall thickness: $WT = \frac{OD}{SDR}$

To find ID: $ID = OD - (WTx2)$

To find carriage hydraulic gauge pressure (psi):

$$\text{Hydraulic Gauge Pressure} = \frac{(OD^2-ID^2) \times .7854 \times IP}{PA} + \text{Drag Factor}$$

* The drag factor is an important parameter easily overlooked. If two long pieces of pipe are being fused the drag factor can easily reach several hundred psi.

Note: This data is provided as a guide only and is believed to be accurate and reliable. However, the user should always use the recommendations and procedures of the pipe manufacturer and/or the owner of the pipeline. Due to the variability of applications and service conditions, no warranty or guarantee, expressed or implied, is given in conjunction with the use of this data.

Setting Heating Pressure

Set the function selector switch to "Heating".

Turn the heating pressure knob all the way counterclockwise.

Setting Facing Pressure

Set the function selector switch to "Facing".

Turn the facing pressure knob clockwise to set about 50 - 100psi indication on the carriage pressure gauge. This may vary depending on pipe diameter and SDR.

Establish Drag

Set the operating knob to "Set Drag".

With the directional control lever held to the left, turn the Drag Control Knob clockwise until carriage starts to move toward facer, and overcome any drag due to pipe or other operating condition.

Return the operating knob to the "Operate" position.

Drag pressure will now be automatically added to fusing, heating, and facing functions.

Except for drag, these settings will not require change as long as the same type, SDR and size of pipe, are being fused. Drag may have to be reset, or at least checked, depending on changes in length of pipe in carriage or other field conditions.

Facing the Pipe

Clean the pipe ends, making sure they are free of foreign material. Inspect facer blades for sharpness. Replace if necessary.

When replacing blades, make sure facer plates are free of dirt and foreign material so that the blades will seat properly.

⚠ Caution: Facer blades are extremely sharp. Handle with care when replacing.

Lower the facer into facing position. Make sure it locks in position.

Set the function selector switch to the "Facing" position.

Pull the facer motor control toward you to operate facer.

Move the directional control lever to the left to bring the pipe ends to the facer.

As the pipe faces, adjust facing pressure up or down by turning the facing pressure knob clockwise or counterclockwise to achieve a continuous facing ribbon. Use no more pressure than the minimal amount required to produce this ribbon.

Facing is complete when the carriage and stationary clamp come into contact with the facer stops, located on the guide rails.

Turn off the facer. Do not open until facer stops rotating. Then, raise the facer clear of the pipe.

Pipe/Fitting Alignment

Remove all shavings and inspect the pipe ends to see that they are completely faced and free of chips or shavings. Bring the pipe ends together, and verify that alignment and squareness meet the pipe manufacturer's recommendations.

Note: Do not touch faced surface of the pipe or fittings. These surfaces must be kept free of dirt, water, body oil and other contaminants, which may cause defects in the fusion.

It is important to remove all shavings from pipe ends and machine base. Accumulated shavings can cause difficulty in proper operation of the unit and result in a faulty fusion of pipe.

If necessary, repeat the facing operation and/or adjust the pipe in the fusion jig until alignment meets the pipe manufacturer's recommendations.

Check pipe alignment by closing the clamps to bring the pipe ends together. Carefully check pipe alignment and the fit of the faced surfaces. This can be done by running a straight edge across the seam to determine if one edge is raised above the other.

- If one pipe end is slightly higher than the other, lower it to the aligned position by tightening the hold-down clamp on that section of pipe. Do not loosen hold-down clamps to obtain alignment.
- If misalignment is side-to-side, slight rotation of the shorter section will help bring them into alignment.
- When joining coiled pipe, it may be necessary to rotate each end of pipe to make an "S" or "U" shape and re-clamp the pipe to provide acceptable alignment. Re-face pipe ends.

If any of the above adjustments are necessary, the facing operation must be repeated.

Bring pipe ends together, applying force equal to or greater than the fusion force to be used. Make sure the pipe does not slip.

When satisfactory alignment has been achieved, separate the clamp assemblies to make room for insertion of the heater.

Fusing the Pipe

Recheck heater for proper temperature recommended by pipe manufacturer. Use surface pyrometer to check temperature of heater face surface. If pyrometer indicates that temperature is not as recommended, refer to instructions for setting temperature before proceeding.

NOTE: The heater is coated with a non-stick surface to minimize sticking and contamination of the molten plastic. This coating should be wiped clean before fusing each joint, using a clean, soft rag.

Set the function selector switch to "Fusing".

Place the heater in position between two pipe ends.

Move the directional control lever to bring the pipe ends against the heater.

Observe pipe ends. Once the melt pattern begins to occur, move the function selector switch to the "Heating" position, then return the directional control lever to the center position.

The 620SC comes with a carriage speed control knob located on the left side of the manifold. It can be used to adjust carriage speed depending on fusion conditions.

When the melt area conforms to what the pipe manufacturer recommends, move the function selector switch to the "Fusing" position.

Note: As pipe ends reach proper temperature, a melt bead will form where the pipe ends contact the heater. The "size of the bead" is often referred to by pipe manufacturers to determine if proper melt has been reached.

Move the directional control valve to the right to open the clamp assemblies.

The heater will tend to stick to one of the pipe faces. Grasp the heater handle and give it a sharp lateral movement to the left or right to dislodge the heater from the pipe.

Raise the heater into its shroud.

⚠ Caution: Heater tool is extremely hot and will burn exposed skin and damage clothing.

⚠ Caution: It is important to turn off the heater before shutting down the engine. If the engine is shut down with the heater on, it could cause the capacitor on the generator to burn out or explode.

Quickly inspect pipe ends to ensure melt is uniform. If melt is not uniform and does not meet pipe manufacturer's recommendations, the pipe must be re-faced, repeating at the facing operation.

Move the directional control lever to the left to close the carriage assemblies and to bring melted pipe ends into contact, forming a double rollback bead as specified by pipe manufacturer.

Check carriage pressure gauge to make sure fusion pressure meets manufacturer's requirements. If it does not meet manufacturer's requirements, the fusion will have to be cut out and a new fusion made.

⚠ Caution: Let heater cool in its protective shroud. Do not submerge into water for cooling. Internal components will be damaged.

Note: The exact amount of pressure to apply during fusion is determined by following pipe manufacturer's recommended procedures. Check pipe manufacturer's literature to determine how the bead should appear.

- Over-pressuring the fusion joint will cause the bead to be too large and could result in an inferior fusion. The melt can be pushed to the OD and out of the ID of the fusion bead, creating a possible "cold joint" in the center section of the fusion.
- Under-pressuring the fusion joint could result in an inferior fusion due to insufficient interfacial contact in the melt area.

- Extreme care should be exercised to maintain pressure during the fusion operation even if bead exceeds desired width. Reversing pressure can cause porosity in the fused area.
-

Maintain specified pressure until pipe cools. Do not adjust controls until cooling time has elapsed.

Note: Should power/pressure be lost during the cooling period, the fusion should be cut out and redone.

Move the directional control lever to the center position to release pressure.

Remove Pipe

Note: It is best not to test, stress, pull, or rough-handle newly fused pipe until the minimum cooling time specified by the manufacturer has been reached.

Position facer/heater assembly between sliding clamps to minimize potential damage to equipment.

Open clamps. Use the operating handle on both ends to raise pipe lifters under pipe. This raises the pipe out of the clamp area, permitting the pipe to be pulled out, or the fusion machine to be pulled along under the pipe.

In the Ditch Pipe Fusion

If working in tight quarters, such as a ditch, the facer can be removed and the top clamps can be removed by pulling a pin in each.

The off-center handle of the machine cart permits pulling the cart/fusion machine along under fused pipe.

Lower the clamps, facer and heater with shroud before transporting machine.

Mitered Fusions

Using special liner sizes, mitered fusions can be made. Pipe ends are faced at 11.25°.

Mitered clamp liners are accessory items. Instructions for use accompany the liners. Contact the factory for more information.

Maintenance

Keeping the 620SC Butt Fusion System clean and lubricated is the most important part of field maintenance. Mechanical linkages must operate freely for the unit to work properly. Keep mechanical linkages lightly lubricated at all times.

Guide Rods and Clamps

Guide Rods are lubricated by the hydraulic system. The facer and heater pivot rod is lubricated at the factory and should not need any additional lubrication. Keep guide rods clean and free from contaminants.

Hydraulic System

Inspect the hydraulic hoses periodically for leaks or wear marks.

Change the hydraulic fluid and filter every 6 months or after each 500 operating hours, whichever comes first. Operation in an extremely dusty environment necessitates more frequent changes.

When the hydraulic system requires changing, drain as follows:

- Remove the drain plug on the bottom of the reservoir and dispose of the fluid properly.
- Replace the drain plug.
- Fill the reservoir with clean fluid and replace filter.

Use Chevron Rykon premium ISO68 hydraulic fluid - approximately seven (7) gallons.

Note: The oil is drained from any unit transported overseas due to shipping regulations.

Facer Assembly

Keep hydraulic connections clean to avoid contamination, especially when hoses are disconnected.

Slow facing operation and rough pipe ends indicate dull blades. Replace dull blades. Inspect facer blades regularly and replace as necessary.

Make sure power is disconnected when replacing facer blades. When changing blades, make sure blade slots are free of dirt and foreign material to ensure proper blade seating.

 Warning: Facer blades are sharp and can cause a severe cut. Handle blade and cutting head with great care.

Heater Assembly

Read these instructions before performing any maintenance on the 620SC heater assembly. Only a qualified technician should perform tool repair to ensure work is done in accordance with approved electrical standards.

Keep the heater face clean with a cotton cloth. Do not use polyester material. It will stick to the surface and damage the coating.

Should the heater plates become scratched or otherwise marred, remove them and return them to the factory for re-coating. They can be removed by removing the handle attachment and the butt plate screws around the perimeter.

Should the heater fail to heat properly, it must be returned to the factory for repairs.

Check the heater electrical cable for wear. Replace as needed if insulation is worn.

Some causes of heater plate malfunction include:

- Improper power source.
- Extension cord(s) too long.
- Extension cord(s) of inadequate load size.
- Generator running too slowly.

Power Unit Engine

The engine manufacturer's service manual provides instructions on care and maintenance of the power unit engine. The operator should read this manual carefully before operating, servicing, or repairing the engine.

Check engine oil level in the crankcase before operating, and every two to three hours during use. Follow manufacturer's recommendation of engine oil to use.

Use a good quality gasoline.

Change engine fuel, air and oil filters as recommended by manufacturer's maintenance manual. Follow engine manual recommendations for air filter replacement.

⚠ Caution: Improper air filter installation can cause engine to ingest excessive dirt into engine and will void the warranty.

Cart Assembly

Check air in tires periodically and maintain at 14 psi. Lubricate wheel fittings periodically.

Replacement/Accessory Parts

Heater Assembly - 240V	28-8218-3500-30
Facer Blade Set - Standard	28-0218-4560-40
Facer Blade Set - Long	28-0218-4690-40
Heater Butt Plate - Front	28-8218-3550-20
Heater Butt Plate - Rear	28-8218-3560-20
Heater Bag	28-8218-3680-10
Heater Shield Assy	28-8218-3650-30
RTD Temperature Sensor	28-8402-0300-10
Heater Controller/Dial	00-6973-0001-00
Heater Element	28-8218-3510-30
Thermometer	28-8559-0410-10
Pipe Stands	800150
Hydraulic Extension Hose - 25 ft	28-8208-5100-30
Hydraulic Extension Hose - 50 ft	28-8218-5100-30
Hydraulic Cylinder Seal Kit	28-0218-9750-40
Heat Exchanger	00-2650-0007-00
Sub Assy, Motor Generator	28-8220-5000-30
Engine, HONDA	00-0691-0041-00
Spark Arrestor	00-5000-0585-00
Modified Generator	28-8218-5210-20
Carling Switch	00-3637-0003-00
Generator Capacitor	00-4193-0002-01
Gas Cap w/Gauge	28-8218-5011-10
Gas Cap w/o Gauge	28-8218-5013-10

CONNECTRA FUSION
BUTT FUSION GAUGE PRESSURES
620SC MACHINE--7.854 sq. in. CECA

IPS PIPE ONLY

IPS	IPS						SDR						
Nominal	Actual	7.0	7.3	9.0	9.3	11.0	1 1.5	13.5	15.5	17.0	21.0	26.0	32.5
6.000	6.625	161	156	130	126	109	104	90	79	73	60	49	39
8.000	8.625	273	264	220	214	184	177	153	135	123	101	82	67
10.00	10.750	424	410	342	333	286	275	238	209	192	157	128	103
12.00	12.750	597	576	481	468	403	387	334	294	270	221	180	145
14.00	14.000	720	695	580	564	486	467	403	355	325	267	217	175
16.00	16.000	940	907	758	737	634	609	526	463	425	348	284	229
18.00	18.000	1190	1149	960	932	803	771	666	586	538	441	359	290
20.00	20.000	1469	1418	1185	1151	991	952	823	724	664	544	444	358

Interfacial Pressure 75

Combined Effective Cylinder Area 7.854

You must also add drag pressure. This is the hydraulic pressure required to move the carriage while holding the pipe, and is easily overlooked. If two long pieces of pipe are being fused, the drag factor can reach several hundred pounds.

This data is provided as a guide only and is believed to be accurate and reliable. However, the user should always use the recommendations and procedures of the pipe manufacturer and/or the owner of the pipeline. Due to the variability of applications and service conditions, no warranty, expressed or implied, is given in conjunction with the use of this data.

CONNECTRA FUSION
BUTT FUSION GAUGE PRESSURES
620SC MACHINE--7.854 sq. in. CECA

DIPS PIPE ONLY

DIPS	DIPS						SDR						
Nominal	Actual	7.0	7.3	9.0	9.3	11.0	11.5	13.5	15.5	17.0	21.0	26.0	32.5
6.000	6.900	175	169	141	137	118	113	98	86	79	65	53	43
8.000	9.050	301	290	243	236	203	195	168	148	136	111	91	73
10.00	11.100	452	437	365	355	305	293	253	223	205	168	137	110
12.00	13.200	640	618	516	501	432	415	358	315	289	237	193	156
16.00	17.400	1112	1073	897	871	750	721	623	548	503	412	336	271
18.00	19.500	1396	1348	1126	1094	942	905	782	688	631	517	422	340

Interfacial Pressure 75

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CONNECTRA FUSION
BUTT FUSION GAUGE PRESSURES
620SC MACHINE--7.854 sq. in. CECA

IPS PIPE ONLY

IPS	IPS						SDR						
Nominal	Actual	7.0	7.3	9.0	9.3	11.0	1 1.5	13.5	15.5	17.0	21.0	26.0	32.5
6.000	6.625	129	124	104	101	87	84	72	64	58	48	39	31
8.000	8.625	219	211	176	171	147	142	122	108	99	81	66	53
10.00	10.750	339	328	274	266	229	220	190	167	153	126	103	83
12.00	12.750	477	461	385	374	322	310	267	235	216	177	144	116
14.00	14.000	576	556	464	451	389	373	322	284	260	213	174	140
16.00	16.000	752	726	607	589	508	488	421	371	340	278	227	183
18.00	18.000	952	919	768	746	642	617	533	469	430	352	287	232
20.00	20.000	1175	1134	948	921	793	762	658	579	531	435	355	286

Interfacial Pressure 60

Combined Effective Cylinder Area 7.854

You must also add drag pressure. This is the hydraulic pressure required to move the carriage while holding the pipe, and is easily overlooked. If two long pieces of pipe are being fused, the drag factor can reach several hundred pounds.

This data is provided as a guide only and is believed to be accurate and reliable. However, the user should always use the recommendations and procedures of the pipe manufacturer and/or the owner of the pipeline. Due to the variability of applications and service conditions, no warranty, expressed or implied, is given in conjunction with the use of this data.

CONNECTRA FUSION
BUTT FUSION GAUGE PRESSURES
620SC MACHINE--7.854 sq. in. CECA

DIPS PIPE ONLY

DIPS	DIPS						SDR						
Nominal	Actual	7.0	7.3	9.0	9.3	11.0	11.5	13.5	15.5	17.0	21.0	26.0	32.5
6.000	6.900	140	135	113	110	94	91	78	69	63	52	42	34
8.000	9.050	241	232	194	189	162	156	135	119	109	89	73	59
10.00	11.100	362	349	292	284	244	235	203	178	164	134	109	88
12.00	13.200	512	494	413	401	345	332	287	252	231	190	155	125
16.00	17.400	889	859	717	697	600	577	498	438	402	329	269	217
18.00	19.500	1117	1078	901	875	754	724	626	551	505	414	337	272

Interfacial Pressure 60

Combined Effective Cylinder Area 7.854

You must also add drag pressure. This is the hydraulic pressure required to move the carriage while holding the pipe, and is easily overlooked. If two long pieces of pipe are being fused, the drag factor can reach several hundred pounds.

This data is provided as a guide only and is believed to be accurate and reliable. However, the user should always use the recommendations and procedures of the pipe manufacturer and/or the owner of the pipeline. Due to the variability of applications and service conditions, no warranty, expressed or implied, is given in conjunction with the use of this data.

Statement of Warranty

Warranty/Disclaimers – Georg Fischer Central Plastics, LLC ("Seller") warrants for a period of three (3) years from the date of invoice that the products sold under the order invoiced (the "Products") will be free from defects in materials and workmanship, except for items supplied to Seller by other vendors in connection with the order. The items to which the warranty does not extend (the "Excluded Items") include, without limitation, electrical devices, pumps, controls, and similar items. Seller assigns to the buyer of the Products, without recourse, any warranty on the Excluded Items which is provided by manufacturer thereof.

The warranty provided hereby does not apply to any product or component that has been repaired or altered by anyone other than Seller, and does not cover any failure of the Products which Seller determines to have been caused due to abuse, misuse, negligence or normal wear and tear.

As a condition to the buyer's exercise of its rights under this warranty, the Products must be returned to Seller's dock, freight prepaid, in Shawnee, Oklahoma, within ten (10) days of the date of failure, accompanied by a Return Goods Authorization (available from Seller) and information related to the claim. Buyer's REMEDIES UNDER THIS WARRANTY ARE LIMITED to, at Seller's sole option, the replacement or repair of the Products determined by Seller to be defective, or a refund of the purchase price, less an allowance for services rendered by the Product prior to the warranty claim. IN NO EVENT SHALL SELLER BE LIABLE FOR LOSS OF USE, DAMAGE TO OR LOSS OF PRODUCTS OR SERVICES, FAILURE TO REALIZE EXPECTED SAVINGS, FRUSTRATION OF ECONOMIC OR BUSINESS EXPECTATIONS, LOST REVENUE OR PROFITS , OR FOR ANY OTHER SPECIAL, INCIDENTAL, CONSEQUENTIAL OR PUNITIVE DAMAGES, EVEN IF THEY WERE FORESEEABLE OR SELLER WAS INFORMED OF THEIR POTENTIAL. Products repaired or replaced pursuant to this warranty will be delivered to buyer FOB Seller's dock in Shawnee, Oklahoma.

THIS WARRANTY IS IN LIEU OF ALL OTHER WARRANTIES EXPRESS OR IMPLIED, INCLUDING THE WARRANTIES OF MERCHANTABILITY AND FITNESS FOR PARTICULAR PURPOSE, WHICH ARE EXPRESSLY DISCLAIMED. SELLER NEITHER ASSUMES NOR AUTHORIZES ANY OTHER PERSON TO MODIFY THESE TERMS AND CONDITIONS, WARRANT SPECIFIC APPLICATIONS, OR ASSUME FOR SELLER ANY OTHER LIABILITY IN CONNECTION WITH THE SALE OF ANY SELLER'S PRODUCT OTHER THAN AS PROVIDED IN THIS WARRANTY.

Recommendations - Any recommendations and suggestions provided by Seller concerning its products and the use thereof are based on tests and data believed to be reliable but are not intended to be complete or exhaustive. The user is responsible for determining the applicability of governmental regulations relating to the use of the products and for all other aspects of the use of Seller's products.

Actual use of the products by others is beyond the control of Seller and Seller makes no warranty or other agreement, expressed or implied, regarding any aspect of such use. Seller shall have no liability arising from the use of Seller's products by a third party.

Modifications – Seller may improve or otherwise modify its products without any obligation to improve or otherwise modify in any way any products (including any parts or accessories) previously sold by Seller.

Distributors – Seller's products are sold through authorized distributors, who determine the price, terms and conditions of sale.

Other – No partial invalidity of this agreement shall affect the remainder. This agreement shall be governed and construed in accordance with the laws of Oklahoma, excluding its laws relating to conflicts-of-law.

The sole purpose of the exclusive remedy contained in the limited Warranty shall be to provide repair or replacement of failed products, or to refund the purchase price of the failed product as explained above. This exclusive remedy shall not be deemed to have failed of its essential purpose so long as Seller agrees to repair or replace the failed product or to refund the purchase price as explained above.

Notes

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