Models
CP218-NPT, CP220-NPT & CP230-NPT

Triplex Ceramic Plunger Pump Operating Instructions/ Repair and Service Manual

ECO BLAST™ 2

Updated 04/17

Contents:

INSTALLATION INSTRUCTIONS

IMPORTANT OPERATING CONDITIONS

Failure to comply with any of these conditions invalidates the warranty.

Prior to initial operation, add oil to the crankcase so that oil level is between the two lines on the oil dipstick. DO NOT OVERFILL.

Use SAE 0W-40 or ECO_2Blast equivalent 01157, which is food grade compatible.

Crankcase oil should be changed after the first 50 hours of operation, then at regular intervals of 500 hours or less depending on operating conditions.

Several important points are to be observed when setting up, installing and operating the pumps:
Pump revolutions (rpm) should be kept as low as possible; the higher the revolutions the greater the danger of cavitation (gas formation).

An input pressure of at least 13.1 ft.-head (4 metres) of liquid column above the pump should be present. In addition, the inlet connection should be as short as possible, without any pressure reducing fittings (e.g. filter, kick-back valves, elbows, etc) and its cross section at least 2x larger than the diameter of the pump suction port.

To avoid heat influx, the intake line should be covered with good insulation material.

The intake line as well as the outlet line should be elastic to decouple the system from mechanical and hydraulic pump vibrations.

The pump should be run cold before the process operation. To do this, a T-piece should be fitted on the pump outlet port to enable the CO_2 to circulate back to the tank during a cold running phase of 30 sec. to 3 min. (depending on the conditions) until the pump head has the same medium temperature as the tank.

The discharge line diameter should be as narrow as possible to avoid parts of gas flowing back into the pump. The pipe diameter at the T-piece should be narrowed to slow the speed of the cooling circulation back to the tank to approximately 66-98 ft./sec (20-30 m/sec).

If the pump (or drive) is completely covered with ice after a long stoppage, it is not to be put into operation until the drive has thawed. Starting the pump where ice or frozen oil are present will cause major damage to the drive. Motor oil or SAE 0W 40 quality is to be used for the pump drive as this oil has better lubricating properties at low temperatures. The unloader valves in the ECO_2Blast product range do not offer suitable protection for the pumps. Safety valves with special seals must be used.

Finally, remember that high pressure operation in a pump system has many advantages.
But, if it is used carelessly and without regard to its potential hazard, it can cause serious injury.

CP200 SERIES - PUMP SPECIFICATIONS

U.S. Measurements

	Max. Flow	Max. Pressure	Max. Speed	Power Req'd.	Max. Temperature	Plunger Diameter	Stroke
Model	**GPM**	**PSI**	**RPM**	**HP**	**F**	**in**	**in**
CP230	0.5	2030	750	0.7	(-40) to 32	0.71	0.13
CP218	1.4	2030	750	2.0	(-40) to 32	0.71	0.39
CP220	1.9	2030	750	2.7	(-40) to 32	0.71	0.56

Metric Measurements

	Max. Flow	Max. Pressure	Max. Speed	Power Req'd.	Max. Temperature	Plunger Diameter	Stroke
Model	**L/min**	**Bar**	**RPM**	**kW**	**C**	**mm**	**mm**
CP230	1.8	140	750	0.5	(-40) to 0	18	3.4
CP218	5.3	140	750	1.5	(-40) to 0	18	10.0
CP220	7.3	140	750	2.0	(-40) to 0	18	14.1

Consult the factory for special requirements that must be met if the pump is to operate beyond one or more of the limits specified above.

Horsepower Ratings:

We recommend a 1.15 service factor be specified when selecting an electric motor as the power source.
To compute electric motor horsepower required, use the following formula: HP = (GPM X PSI) / 1450.
The formula to determine the horsepower required for a gas engine is: HP = (GPM X PSI) / 1150.
The formula to determine the horsepower required for a diesel engine is: HP = (GPM X PSI) / 1250.

For the Application of a Hydraulic Motor:

To Determine the Torque of a Hydraulic Motor -- (GPM x PSI x 36.77) / RPM = Torque (in-lbs)

Calculating RPM / GPM of Pump:

A pump must be connected to an electric motor or gas or diesel engine with the correct ratio of pulleys and belts to attain the required speed and GPM. The use of a Variable Frequency Drive (VFD) may also be used to control the RPM of a properly sized electric motor when variable flows are required.

(Max. Pump RPM / Rated Pump GPM) x Required Pump GPM = **Required Pump RPM**

To calculate a pulley diameter one (1) pulley diameter and the required pump RPM must be known:

(Pump RPM x Pump Pulley Diameter) / Motor RPM = Motor Pulley Diameter
(Motor RPM x Motor Pulley Diameter) / Pump RPM = Pump Pulley Diameter

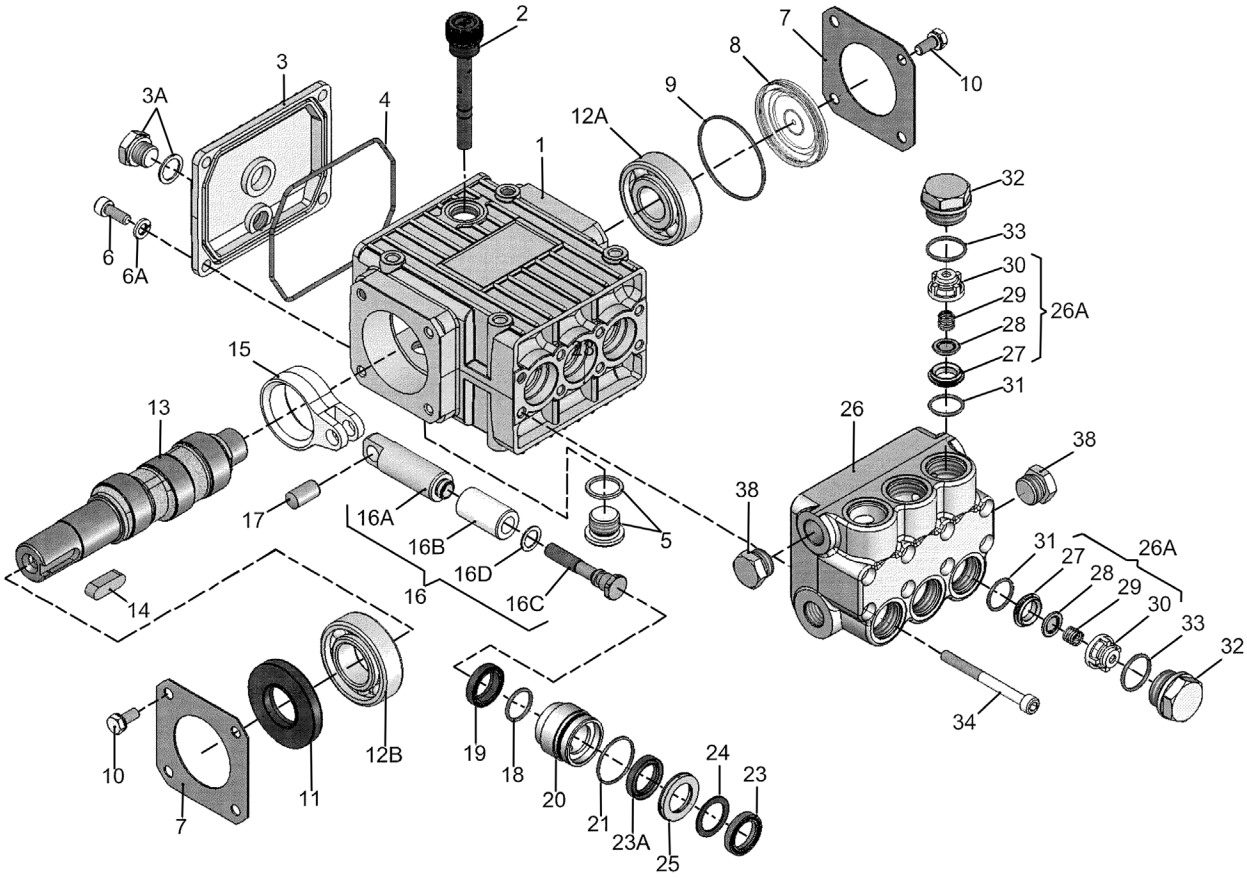
Common Specifications:

Inlet Pressure	580 PSI (40 Bar)
Crankshaft Diameter	0.94” (24mm)
Crankcase Oil Capacity	8.1 fl. oz. (0.24 L)
Inlet Ports	(2) 3/8” NPT
Discharge Ports	(2) 3/8” NPT
Weight	13.2 lbs (6 kg)
Shaft Rotation	Top of Pulley Toward Fluid End

Materials Used for CP200 Pumps:

Manifold	Forged Brass
Plungers	Solid Ceramic Oxide
Valves	High Grade Stainless Steel
Seals	Teflon and Nitrile with Fabric Reinforcing
Gear End	Aluminum

CP218, CP220 & CP230 Pump - Exploded View



CP218, CP220 & CP230 Pumps Spare Parts

Item	Part No.	Description	Qty.	Item	Part No.	Description	Qty.
1	CP08300A	Crankcase	1	16C	CP08456	Tension Screw	3
2	CP08301	Oil Dipstick with O-Ring	1	16D	CP07676	Copper Gasket	3
3	CP08302A	Crankcase Cover, Short	1	17	CP08442	Wrist Pin	3
3A	CP07190	Drain Plug & Gasket	1	18	CP07770	O-Ring	3
4	CP08005	O-Ring	1	19	CP08356	Oil Seal	3
5	CP08185	Oil Drain Plug w/gasket	1	20	CP08444	Seal Case	3
6	CP07188	Screw, Crankcase Cover	4	21*	CP06815	O-Ring	3
6A	CP07223-0100	Spring Washer	4	23	CP08087	V-Sleeve	3
7	CP08303	Bearing Cover I	2	23A	CP08087-0020	V-Sleeve, Teflon	3
8	CP08490	Oil Sight Glass	1	24	CP07904	Pressure Ring	3
9	CP08492	O-Ring	1	25	CP08445	Weep Return Ring	3
10	CP07225	Screw with Lock Washer	8	26	CP08446	Valve Casing	1
11	CP01166	Radial Shaft Seal	1	26A	CP04273	Valve Assembly (27-30)	6
12A	CP08020	Ball Bearing	1	27	CP07849-0100	Valve Seat	6
12B	CP01020	Ball Bearing	1	28	CP06809	Valve Plate	6
13	CP08440	Crankshaft (CP218)	1	29	CP06816	Valve Spring	6
13	CP08467	Crankshaft (CP220)	1	30	CP07907	Valve Spring Retainer	6
13	CP06694	Crankshaft (CP230)	1	31*	CP06817	O-Ring	6
14	CP06207	Fitting Key	1	32	CP07928	Valve Plug	6
15	CP08333	Connecting Rod	3	33*	CP06818	O-Ring	6
16	CP08469	Plunger, Complete	3	34	CP08316	Hex Head Cap Screw	8
16A	CP08468	Plunger Base	3	38	CP13338	Plug, 3/8” NPT	1
16B	CP08455	Plunger Pipe	3				

* These EPDM (Buna) o-rings must not come into contact with mineral oil or mineral grease. Use silicone grease only.

CP218, CP220 & CP230 Pump Repair Kits

Valve Assembly Kit
Part # CP09556-0123

Item #	Part #	Description	Qty.
26A	CP04273	Valve Assembly, Complete	6
31	CP06817	O-Ring	6
33	CP06818	O-Ring	6

Oil Seal Kit - Part # CP09144

Item #	Part #	Description	Qty.
19	CP08356	Oil Seal	3

Plunger Packing Kit
Part # CP09554-0123

Item #	Part #	Description	Qty.
21	CP06815	O-Ring	3
23	CP08087	V-Sleeve, weep	3
23A	CP08087-0020	V-Sleeve, brown	3
24	CP07904	Pressure Ring	3

CP218, CP220 & CP230 Pump Torque Specifications

Position	Item#	Description	Torque Amount
16C	CP08456-0100	Tension Screw, Plunger	199 in.-lbs. (22.5 Nm)
32	CP07928-0100	Valve Plug	55 ft.-lbs. (75 Nm)
34	CP08316-0100	Hex Head Cap Screw, Valve Casing	105 in.-lbs. (12 Nm)

Pump Mounting Selection Guide

Bushings
01074 - 24 mm Tapered H Bushing

Pulley & Sheaves
01061 - 7.75” Cast Iron -1 gr. - AB Section
01062 - 7.75” Cast Iron -2 gr. - AB Section

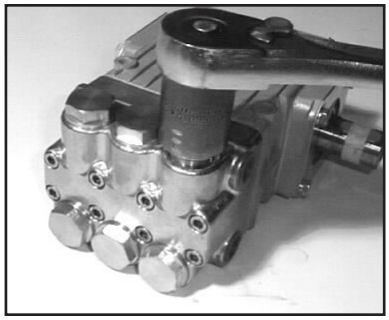
Rails
01160/01161- Plated Steel Channel Rails
(L=5.75”x W=1.00”x h=2.50”)

Preventative Maintenance Check List & Recommended Spare Parts List

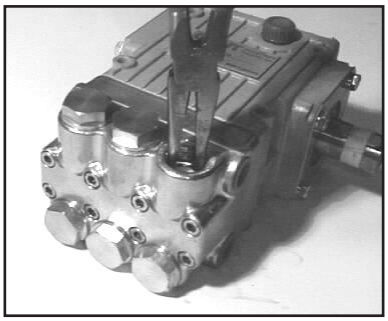
Check	Daily	Weekly	50 Hrs.	Every 500 Hrs	Every 1500 Hrs	Every 3000 Hrs
Oil Level/Quality	X					
Oil Leaks	X					
Water Leaks	X					
Belts, Pulley		X				
Plumbing		X				
Recommended Spare Parts						
Oil Change See page 2			X	X		
Plunger Packing Kit (1 kit/pump) See above					X	
Oil Seal Kit (1 kit/pump) See above					X	
Valve Repair Kit (1 kit/pump) See above						X

CP218, CP200 & CP230 Pumps Repair Instructions

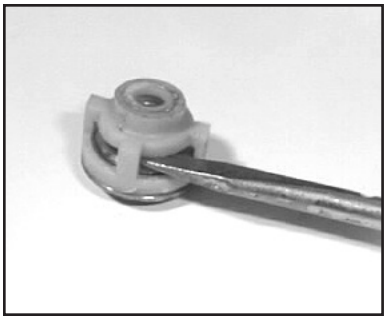
CAUTION EPDM seals must not come into contact with mineral oil or mineral grease. Use silicone grease only.



1. With a 22mm socket wrench, remove the (3) discharge valve plugs and (3) inlet valve plugs (32) Inspect the o-ring (33) for wear and replace if damaged.

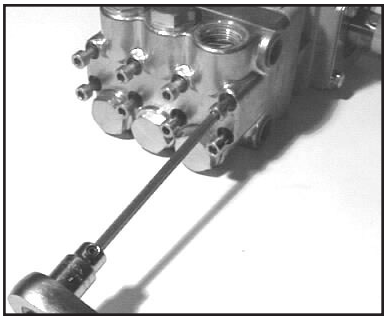


2. Using a needle nose pliers, remove the inlet and discharge valve assemblies (26A) and o-ring (31). Inspect all parts for wear and replace as necessary.

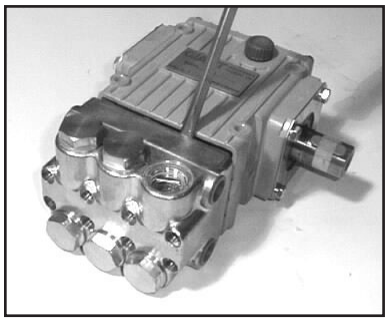


3. By inserting a small screw driver between the valve seat (27) and the valve spring retainer (30), the valve assembly can be separated.

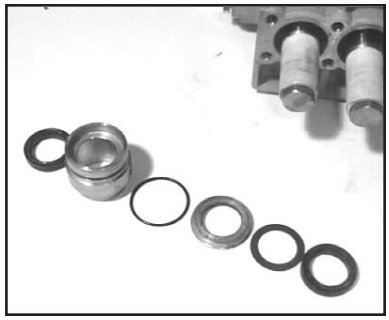
4. Apply one drop of Loctite 243 to the valve plugs (32) and tighten to 55 ft.-lbs. (75 Nm).



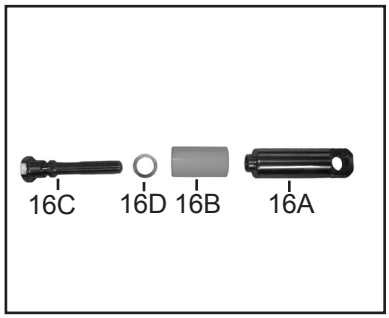
5. Next, use a 5mm allen wrench to remove the 8 socket head cap screws (34).



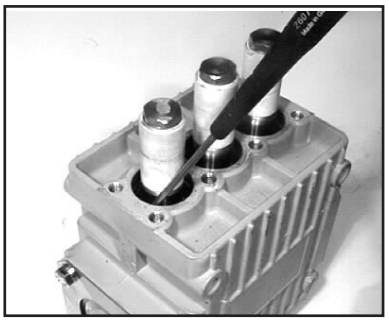
6. Carefully slide the valve casing (26) out over the plungers.



7. Remove the weep return ring (25), pressure ring (24), and v-sleeve (23) from the valve casing (26). Remove the rear v-sleeve (23A) from the seal case (20). Inspect all parts, including o-ring (21) for wear and replace as necessary.



8. Check surfaces of plunger pipe (16B). A damaged surface will cause accelerated wear on the seals. Deposits of any kind must be carefully removed from the plunger surface. A damaged plunger must be replaced!



9. If the crankcase oil seals (19) are to be replaced, they can be removed by prying loose with a flat screwdriver. Take care not to make contact with the plunger.

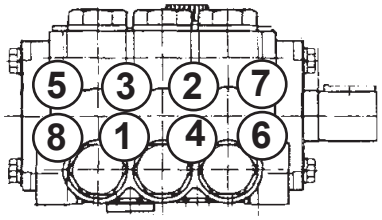
CP218, CP200 & CP230 Pumps Repair Instructions

Disassembly sequence of the gear end.

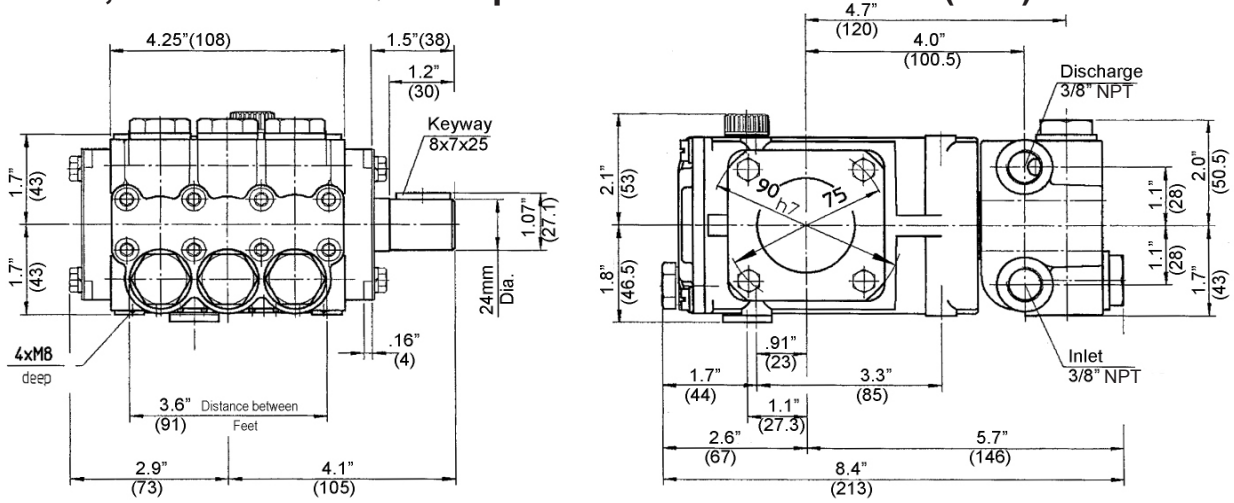
1) Before you begin, drain the oil from the crankcase.
2) Remove the crankcase cover (3) and O-ring (4) from the crankcase (1). To remove the crankshaft (13), remove the bearing cover (7) and sight glass (8). Using a rubber mallet, remove the crankshaft axially through the connecting rods by tapping on the end of the shaft. Be careful not to bend or damage the connecting rods during crankshaft removal.
3) If the bearings (12A and 12B) and radial shaft seal (11) are still in the crankcase, remove them. Inspect both bearings and seal for wear and replace if necessary.
4) Remove the connecting rod (15) and plunger assembly (16). Remove the wrist pin (17) if necessary. Check the plunger bore in the crankcase for wear. Inspect parts and replace as necessary.
5) Should you find it necessary to service the plunger assembly (16) you can do so by removing the tension screw (16C). Replace crush washer (16D).

Reassembly sequence of the CP200 series pump

1) Reassemble plunger assembly (16). Apply a drop of Loctite to the tension screw threads (16C) and tighten to 199 in.-lbs. (22.5 Nm). Assemble the connecting rod (15) with wrist pin (17). Place assemblies in crankcase (1). Install crankshaft through connecting rods again being careful not to bend or otherwise damage the connecting rods.
2) Replace left and right side bearings (12A and 12B) if they were removed from the crankshaft. Be certain the bearings are pressed all the way onto the shaft and completely into the crankcase. Replace radial shaft seal (11), bearing cover (7), sight glass (8), and crankcase cover (3) with its O-ring (4).
3) If oil seals (19) were removed, replace with seal lip towards crankcase. Lubricate seal before replacing.
4) Replace seal case (20) with O-rings (21) over plungers. Generously lubricate O-rings and oil seal before reassembly. Replace and v-sleeve (23) over plungers (16).
5) Generously lubricate v-sleeve (23A) and assemble into valve casing (26). Assemble weep return ring (25) and pressure ring (24) over plungers (16). Slide valve casing over plungers and seat firmly. Replace the eight socket head cap screws (34) and tighten to 105 inch-pounds (12 Nm) in a crossing pattern (**see below**).
6) Re-install the six O-rings (31) and the six valve assemblies (27-30). Now replace the six valve plugs with O-rings (32 and 33) and tighten securely with a 22mm socket wrench to 199 in.-lbs. (22.5 Nm).
7) Fill crankcase with 8.1 ounces (2.4 liters) of oil.



CP218, CP220 & CP230 Pumps - Dimensions - inches (mm)



LIMITED WARRANTY

ECO$_2$Blast pumps and accessories are warranted by the manufacturer to be free from defects in workmanship and material as follows:

1. For portable pressure washers and car wash applications, the discharge manifolds will never fail, period. If they ever fail, we will replace them free of charge. Our other pump parts, used in portable pressure washers and in car wash applications, are warranted for five years from the date of shipment for all pumps used in NON-SALINE, clean water applications.
2. One (1) year from the date of shipment for all other ECO$_2$Blast industrial and con sumer pumps.
3. Six (6) months from the date of shipment for all rebuilt pumps.
4. Ninety (90) days from the date of shipment for all ECO$_2$Blast accessories.

This warranty is limited to repair or replacement of pumps and accessories of which the manufacturer's evaluation shows were defective at the time of shipment by the manufacturer. The following items are NOT covered or will void the warranty:

1. Defects caused by negligence or fault of the buyer or third party.
2. Normal wear and tear to standard wear parts.
3. Use of repair parts other than those manufactured or authorized by ECO$_2$Blast.
4. Improper use of the product as a component part.
5. Changes or modifications made by the customer or third party.
6. The operation of pumps and or accessories exceeding the specifications set forth in the Operations Manuals provided by ECO$_2$Blast

Liability under this warranty is on all non-wear parts and limited to the replacement or repair of those products returned freight prepaid to ECO$_2$Blast which are deemed to be defective due to workmanship or failure of material. A Returned Goods Authorization (R.G.A.) number and completed warranty evaluation form is required prior to the return to ECO$_2$Blast of all products under warranty consideration. Call (419)-531-4600 or fax (419)-531-6836 to obtain an R.G.A. number.

Repair or replacement of defective products as provided is the sole and exclusive remedy provided hereunder and the MANUFACTURER SHALL NOT BE LIABLE FOR FURTHER LOSS, DAMAGES, OR EXPENSES, INCLUDING INCIDENTAL AND CONSEQUENTIAL DAMAGES DIRECTLY OR INDIRECTLY ARISING FROM THE SALE OR USE OF THIS PRODUCT.

THE LIMITED WARRANTY SET FORTH HEREIN IS IN LIEU OF ALL OTHER WARRANTIES OR REPRESENTATION, EXPRESS OR IMPLIED, INCLUDING WITHOUT LIMITATION ANY WARRANTIES OR MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE AND ALL SUCH WARRANTIES ARE HEREBY DISCLAIMED AND EXCLUDED BY THE MANUFACTURER.

Sold Exclusively through ECO$_2$Blast 1025 W. Commerce Dr., Decatur, IN 46733
Phone: (260)728-4433 www.eco2blast.com