Spraying Systems Co.®
Experts in Spray Technology

AA190E & AA190E-EP SERIES ELECTRIC MOTOR-DRIVEN TANK WASHERS

AA190EP

OWNER'S MANUAL

MI-AA190E & AA190EP

TABLE OF CONTENTS

IMPORTANT: PLEASE READ ALL INSTRUCTIONS BEFORE INSTALLING OR OPERATING UNIT.
SAVE FOR FUTURE REFERENCE

PROPRIETARY NOTICE

FORWARD

The equipment and/or parts described in this document were manufactured and assembled with quality and high reliability, which have become synonymous with the name Spraying Systems Co. The description and specifications contained herein were effective on the revision date of this MI. Spraying Systems Co. reserves the right to alter or modify any unit specification on Spraying Systems Co. product without notice or obligation.

INTRODUCTION

The AA190E Rotary Tank Washer is designed for high pressure (500 psi MAX) washing of tanks up to a recommended maximum diameter of twelve (12) feet (depending on material being cleaned away) with heated (200 deg. F MAX) or unheated solutions at flow rates up to twenty (20) gallons per minute (with only up to a 40 psi pressure drop through the unit itself).

Tanks over twelve (12) feet in diameter may be cleaned adequately depending on the maximum tank dimension, cleaning solution being used, its temperature, spray pressure, flow rates, and the material being cleaned from the tank.

The AA190E Rotary Tank Washer may be used with plain water or with a variety of chemicals (compatible with 316SS). However, if chemicals are used, the unit should be flushed with clean water at the end of the day before the unit is stored away. A liquid line strainer before the unit is recommended to remove large particles, which may damage unit.

SPECIFICATIONS & OPERATING CONDITIONS

- LIQUID PRESSURE: 500 psi (35 bar) Max for AA190E
- FLOW RATES: Up to 44 gpm (76 l/m)
- PRESSURE DROP AT MAX. FLOW: 40 psi (2.8 bar)
- LIQUID TEMPERATURE: 200 degrees F (93 degrees C) Max.
- AMBIENT TEMPERATURE: 200 degrees F (93 degrees C) Max.
- TANK DIAMETER:
  FOR AA190E 25 feet (7.6 m) Max recommended
- Spray Head and Nozzles fit through a 3 ¾" (95 mm) dia. opening

Tanks over the specified diameters could possibly be cleaned adequately depending on the maximum tank dimension, cleaning solutions being used, temperatures, spray pressures, flow rates and the material being cleaned from the tank.

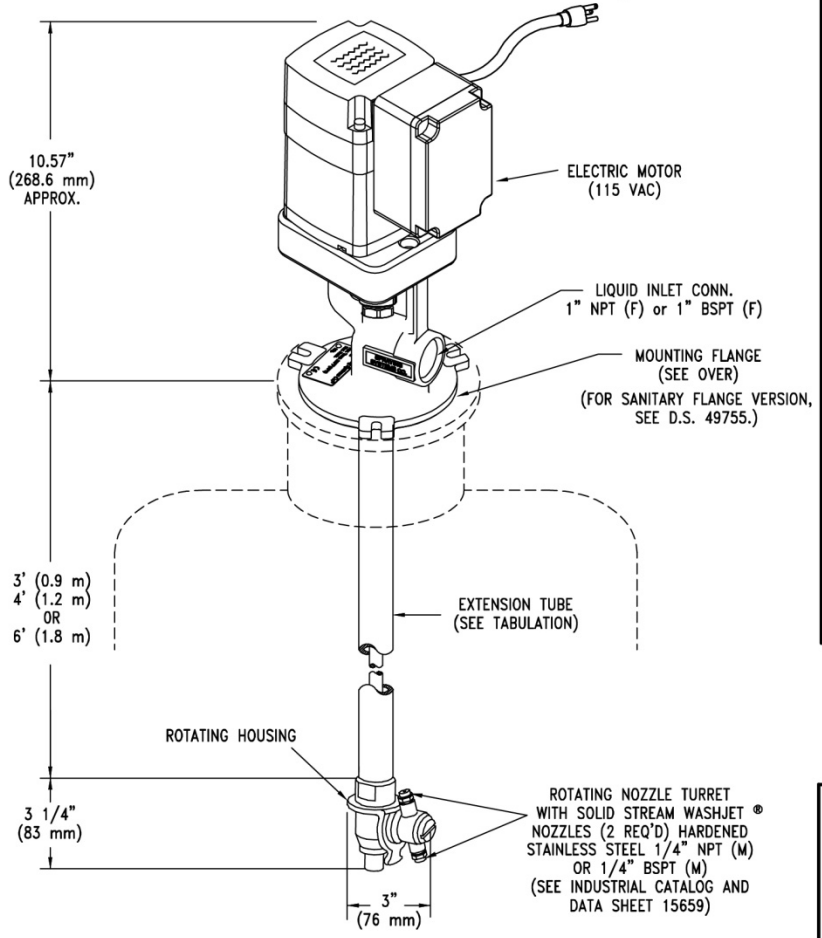
The tank washer may be used with plain water or with a variety of chemicals (compatible with 316 SS, ethylene propylene rubber, and carbon graphite filled Teflon®). However, if chemicals are used, review MSDS sheets and chemical compatibility with material used to construct this product. Also, the unit should be flushed with clean water at the end of the day before the unit is stored. A liquid line strainer ahead of the unit is recommended to remove large particles which may damage the unit.

***NOTE:** Certain atmospheres within the tank being cleaned could become explosive, such as dust particles in a flour silo, or fumes in paint mixing tanks. For this reason, the following safety precautions should be observed.*

CAUTION!

POWER CORD, WITH 3-PRONG PLUG INTACT, MUST BE PLUGGED INTO PROPERLY GROUNDED 115 VAC ELECTRICAL SUPPLY.

THIS MOTOR MAY PRODUCE AN ELECTRICAL SPARK OR SHOCK. THE EXPLOSION PROOF MOTOR (D.S. 090E-EP) OR AIR MOTOR VERSION (D.S. 090A) WOULD BE BETTER SUITED FOR APPLICATIONS INVOLVING WET OR HAZARDOUS CONDITIONS.



THE AA190E- ELECTRICALLY MOTORIZED TANK WASHER EASILY FITS INTO A 3" DIA. (76 mm) OPENING. IT IS IDEAL FOR CLEANING DRUMS, TOTES, TANKS, REACTORS AND OTHER PROCESS VESSELS. WITH MULTI-AXIS ROTATION OF THE SOLID STREAM NOZZLES, IT PROVIDES COMPLETE INTERNAL COVERAGE OF THE ENTIRE CONTAINER. ITS MATERIALS OF CONSTRUCTION ENABLE IT TO BE USED WITH ALL TYPES OF CLEANING SOLUTIONS AND AGENTS.

FEATURES:

- FITS THROUGH A 3" DIA. (76 mm) OPENING.
- CAN BE PERMANENTLY INSTALLED OR USED AS A PORTABLE UNIT.
- MULTI-AXIS ROTATION PROVIDES FULL COVERAGE OF INTERNAL TANK SURFACES.
- MOTORIZED DRIVE IS MOUNTED OUTSIDE OF THE TANK.
- ROTATIONAL SPEED OF THE NOZZLE TURRET IS INDEPENDENT OF THE CLEANING LIQUID PRESSURE AND FLOW.
- FOR TANK DIAMETERS UP TO APPROXIMATELY 12 FT. (3.7 m).
- FOR SPECIFICATIONS AND ADDITIONAL INFORMATION, SEE DATA SHEET 190E-1.
- MAXIMUM PRESSURE 500 PSI (35 bar).

ROTARY TANK WASHER No.	EXTENSION LENGTH	WEIGHT (APPROX.)
AA_190E-3+*	3' (0.9 m)	14 LBS. (6.4 kg.)
AA_190E-4+*	4' (1.2 m)	15 LBS. (7 kg.)
AA_190E-6+*	6' (1.8 m)	18 LBS. (8.4 kg.)

* SPECIFY SOLID STREAM WASHJET® NOZZLE No. AND MATERIAL SUCH AS: 1/4MEG-0030, HARDENED STAINLESS STEEL

ORDER EXAMPLE: AA B 190E - 3 + B 1/4MEG-0030.

"B" FOR BSPT VERSION
MODEL NO.
TANK WASH LENGTH
"B" FOR BSPT VERSION
NOZZLE TYPE & CAPACITY

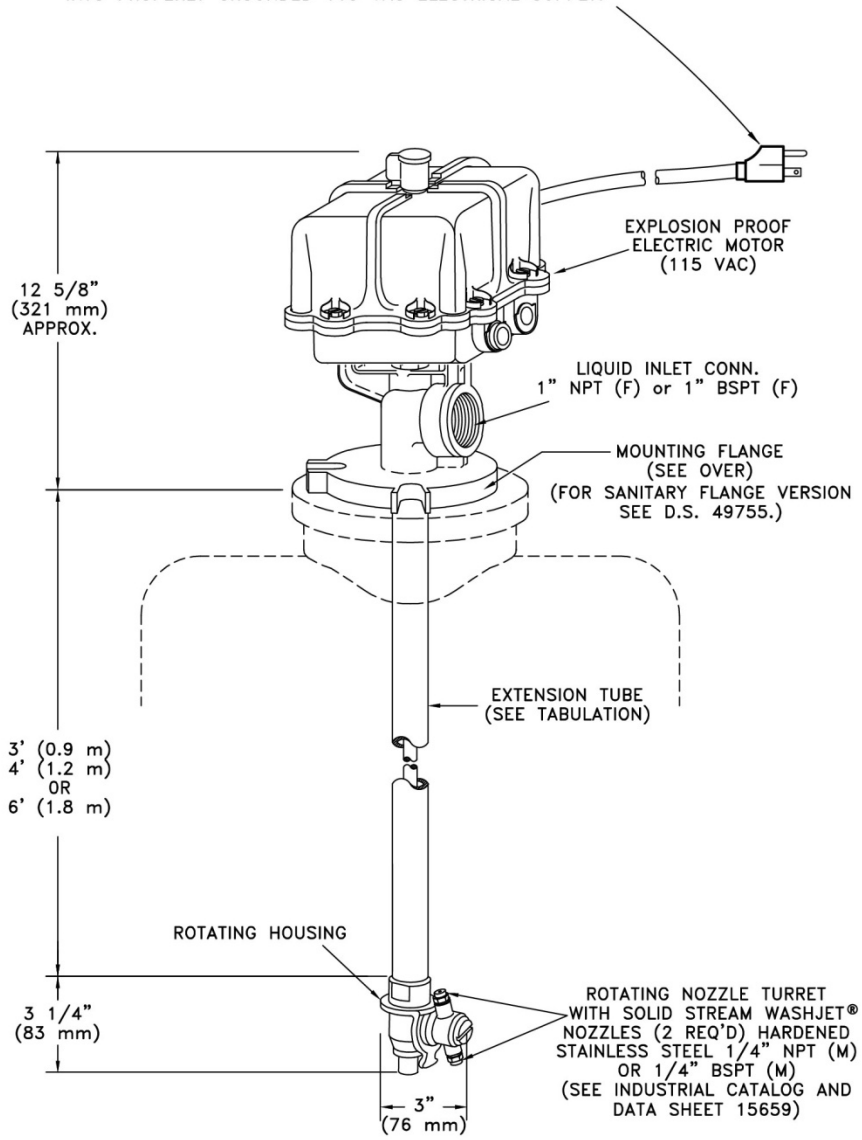
DESCRIPTION:
No. AA_190E- ELECTRICALLY MOTOR-DRIVEN TANK WASHER

Spraying Systems Co.®
Spray Nozzles and Accessories
P.O. Box 7900 - Wheaton, Il. 60187-7901

Rev. No. 9	Data Sheet No. 190E
Ref.	SHEET OF

CAUTION!

POWER CORD, WITH 3-PRONG PLUG INTACT, MUST BE PLUGGED INTO PROPERLY GROUNDED 115 VAC ELECTRICAL SUPPLY.



THE AA190E-EP ELECTRICALLY MOTORIZED TANK WASHER EASILY FITS INTO A 3" DIA. (76 mm) OPENING. IT IS IDEAL FOR CLEANING DRUMS, TOTES, TANKS, REACTORS AND OTHER PROCESS VESSELS. EQUIPPED WITH A NEMA 7 EXPLOSION PROOF MOTOR, IT IS USED IN CONTROLLED PROCESS AREAS WHERE ELECTRICAL SPARKS MAY BE HAZARDOUS. WITH MULTI-AXIS ROTATION OF THE SOLID STREAM NOZZLES, IT PROVIDES COMPLETE INTERNAL COVERAGE OF THE ENTIRE CONTAINER. ITS MATERIALS OF CONSTRUCTION ENABLE IT TO BE USED WITH ALL TYPES OF CLEANING SOLUTIONS AND AGENTS.

FEATURES:

- 100% DUTY CYCLE MOTOR, NEMA 7 EXPLOSION PROOF ENCLOSURE.
- CAN BE PERMANENTLY INSTALLED OR USED AS A PORTABLE UNIT.
- MULTI-AXIS ROTATION PROVIDES FULL COVERAGE OF INTERNAL TANK SURFACES.
- MOTORIZED DRIVE IS MOUNTED OUTSIDE OF THE TANK.
- STANDARD ELECTRIC MOTOR IS ALSO AVAILABLE (D.S. 190E)
- ROTATIONAL SPEED OF THE NOZZLE TURRET IS INDEPENDENT OF THE CLEANING LIQUID PRESSURE AND FLOW.
- FOR TANK DIAMETERS UP TO APPROXIMATELY 25 FT. (7.6 m).
- FOR SPECIFICATIONS AND ADDITIONAL INFORMATION, SEE DATA SHEET 190E-EP-1 (OVER).
- MAXIMUM PRESSURE 500 PSI (35 bar).

ROTARY TANK WASHER No.	EXTENSION LENGTH	WEIGHT
AA_190E-EP-3+*	3' (0.9 m)	22 LBS. (10 kg.)
AA_190E-EP-4+*	4' (1.2 m)	23 LBS. (10.5 kg.)
AA_190E-EP-6+*	6' (1.8 m)	26 LBS. (11.8 kg.)

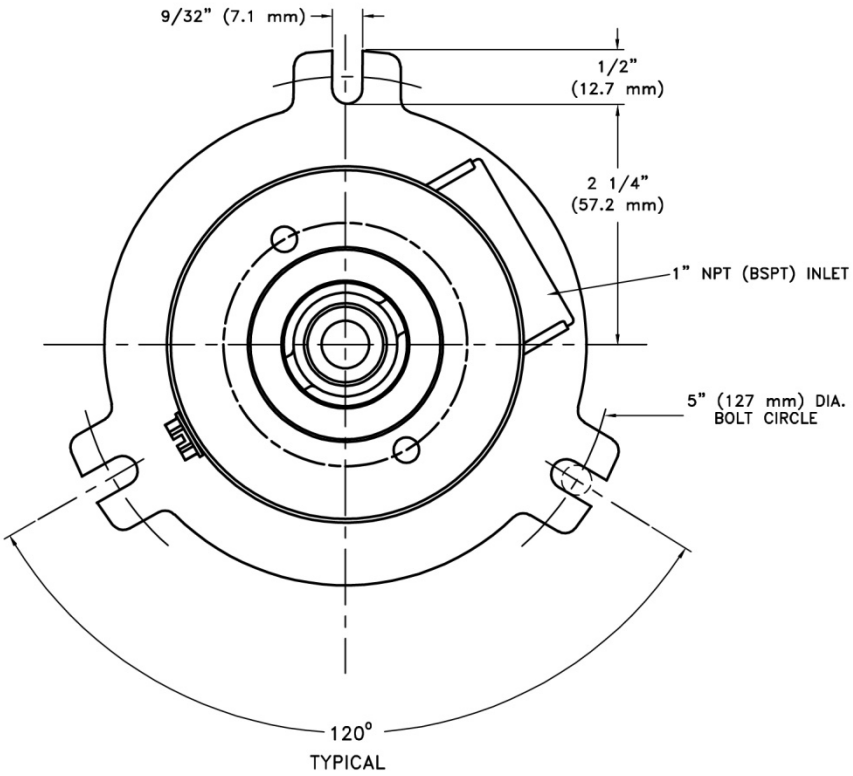
* SPECIFY SOLID STREAM WASHJET® NOZZLE No. AND MATERIAL SUCH AS; 1/4MEG-0030, HARDENED STAINLESS STEEL

FOR BSPT CONNECTION MODELS, ADD "B" TO THE WASHER No. AND NOZZLE No. SUCH AS AAB190E-EP-3+B1/4MEG-0030.

DESCRIPTION:
No. AA190E-EP-
ELECTRICALLY MOTORIZED
TANK WASHER
(EXPLOSION PROOF MOTOR)

Spraying Systems Co.®
Spray Nozzles and Accessories
P.O. Box 7900 - Wheaton, Il. 60187-7901

Rev. No.	Data Sheet No. 190E-EP
Ref.	SHEET OF



MOTOR END VIEW OF INLET BODY MOUNTING FLANGE

SPECIFICATIONS

- WETTED PARTS ARE TEFLON AND TYPE 316 STAINLESS STEEL.
- MAXIMUM PRESSURE – 500 PSI (35 bar).
- MAXIMUM RECOMMENDED FLOW – 20 GPM (76 l/min).
- MAXIMUM LIQUID TEMPERATURE – 200° F (93° C).
- PRESSURE LOSS – 40 PSI (2.8 bar) AT 20 GPM (76 l/min).
- SPRAY HEAD FITS THROUGH A 3" (76 mm) DIAMETER HOLE.

ELECTRIC MOTOR DATA (115 VAC)

AC FREQUENCY	SPEED RPM	CURRENT (AMPS)	POWER (WATTS)	1 COMPLETE CYCLE (MIN.)*	IP RATING
50 HZ.	3.1	.39	41	11	44
60 HZ.	3.8	.33	34	9	44

* 35 REVOLUTIONS ARE REQUIRED FOR 1 COMPLETE CYCLE.

FLOW RATE DATA

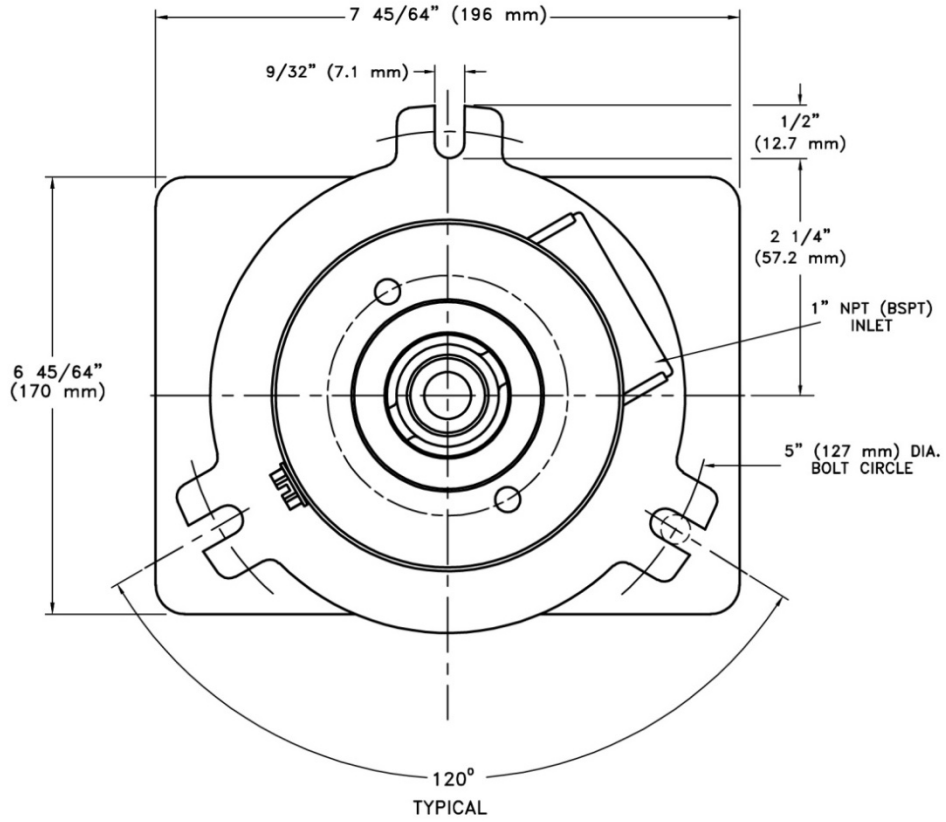
NOZZLE SIZE	U.S. UNITS: TOTAL FLOW FOR 2 NOZZLES (EQUAL CAPACITY) GALLONS PER MINUTE — LIQUID INLET PRESSURE (PSI)					METRIC UNITS: TOTAL FLOW FOR 2 NOZZLES (EQUAL CAPACITY) LITERS PER MINUTE — LIQUID INLET PRESSURE (bar)				
	100	200	300	400	500	7	15	20	30	35
1/4MEG–0010	3.1	4.4	5.4	6.3	7.0	11.8	17.3	20	24	26
1/4MEG–0015	4.7	6.6	8.1	9.4	10.5	17.9	26	30	37	40
1/4MEG–0020	6.2	8.8	10.8	12.4	13.9	24	35	40	49	53
1/4MEG–0025	7.7	10.9	13.3	15.4	17.2	29	43	50	61	66
1/4MEG–0030	9.1	12.9	15.8	18.2	20.4	35	51	59	72	78
1/4MEG–0035	10.5	14.8	18.1	20.9		40	59	68	83	
1/4MEG–0040	11.8	16.7	20.4			45	66	76		
1/4MEG–0050	14.2	20.1				54	79			
1/4MEG–0060	16.4					63				
1/4MEG–0070	18.3					70				
1/4MEG–0080	19.9					76				

NOTE: FLOW RATES TABULATED ABOVE INCLUDE EFFECT OF PRESSURE DROP THROUGH UNIT.

DESCRIPTION:
SPECIFICATIONS FOR
AA190E– ELECTRICALLY
MOTORIZED
ROTARY TANK WASHER

Spraying Systems Co.®
Spray Nozzles and Accessories
P.O. Box 7900 - Wheaton, Il. 60187-7901

Rev. No. 3	Data Sheet No. 190E–1
Ref.	SHEET OF



MOTOR END VIEW OF INLET BODY MOUNTING FLANGE

SPECIFICATIONS

- WETTED PARTS ARE A FLOUROPOLYMER RESIN (TEFLON), ACETAL (DELRIN) AND TYPE 316 STAINLESS STEEL.
- MAXIMUM PRESSURE – 500 PSI (35 bar).
- MAXIMUM RECOMMENDED FLOW – 20 GPM (76 l/min).
- MAXIMUM LIQUID TEMPERATURE – 200° F (93° C).
- SPRAY HEAD FITS THROUGH A 3" (76 mm) DIA. HOLE.

EXPLOSION PROOF ELECTRIC MOTOR (115 VAC)

AC FREQUENCY	SPEED RPM	CURRENT (AMPS)	POWER (WATTS)	1 COMPLETE CYCLE (MIN.)*
50 HZ.	.8	.32	32.64	43.75
60 HZ.	1	.27	27.5	35

* 35 REVOLUTIONS ARE REQUIRED FOR 1 COMPLETE CYCLE.

FLOW RATE DATA

NOZZLE SIZE	U.S. UNITS: TOTAL FLOW FOR 2 NOZZLES (EQUAL CAPACITY) GALLONS PER MINUTE — LIQUID INLET PRESSURE (PSI)					METRIC UNITS: TOTAL FLOW FOR 2 NOZZLES (EQUAL CAPACITY) LITERS PER MINUTE — LIQUID INLET PRESSURE (bar)				
	100	200	300	400	500	7	15	20	30	35
1/4MEG–0010	3.1	4.4	5.4	6.3	7.0	11.8	17.3	20	24	26
1/4MEG–0015	4.7	6.6	8.1	9.4	10.5	17.9	26	30	37	40
1/4MEG–0020	6.2	8.8	10.8	12.4	13.9	24	35	40	49	53
1/4MEG–0025	7.7	10.9	13.3	15.4	17.2	29	43	50	61	66
1/4MEG–0030	9.1	12.9	15.8	18.2	20.4	35	51	59	72	78
1/4MEG–0035	10.5	14.8	18.1	20.9		40	59	68	83	
1/4MEG–0040	11.8	16.7	20.4			45	66	76		
1/4MEG–0050	14.2	20.1				54	79			
1/4MEG–0060	16.4					63				
1/4MEG–0070	18.3					70				
1/4MEG–0080	19.9					76				

NOTE: FLOW RATES TABULATED ABOVE INCLUDE EFFECT OF PRESSURE DROP THROUGH UNIT.

DESCRIPTION:
SPECIFICATIONS FOR AA191E-EP-ELECTRICALLY MOTORIZED TANK WASHER (EXPLOSION PROOF MOTOR)

Spraying Systems Co.®
Spray Nozzles and Accessories
P.O. Box 7900 - Wheaton, Il. 60187-7901

Rev. No. 1
Ref.
Data Sheet No. 190E-EP-1
SHEET OF

SAFETY PRECAUTIONS

YOUR SAFETY AND THE SAFETY OF OTHERS IS EXTREMELY IMPORTANT.

We have provided important safety messages in this manual for your product. Always read and obey all safety messages.

This is the safety alert symbol. This symbol alerts you to hazards that can kill or harm you as well as others. The safety alert symbol and the words "**DANGER**" and "**WARNING**" will precede all safety messages. Read the following words and what they signify:

DANGER — YOU MAY BE KILLED OR SERIOUSLY INJURED IF YOU DON'T FOLLOW THESE INSTRUCTIONS.

WARNING — YOU MAY BE SERIOUSLY INJURED IF YOU DON'T FOLLOW THESE INSTRUCTIONS.

All safety messages will identify the hazard, tell you how to reduce the chance of injury and tell you what can happen if the safety instructions are not followed.

WARNING: All safety related and operating instructions should be read before the nozzle is operated. Follow all operating instructions. Failure to do so could result in serious injury.

- **WARNING: DO NOT USE TO SPRAY FLAMMABLE LIQUIDS--SUCH USE COULD RESULT IN FIRE OR EXPLOSION CAUSING BODILY INJURY OR DEATH.**
- **WARNING:** It is important to recognize proper safety precautions when using a pressurized spray system. Fluids under pressure can penetrate skin and cause severe injury.
- **WARNING:** When dealing with pressure applications, the system pressure should never exceed the lowest rated component. Always know your system and all component capabilities, maximum pressures and flow rates.
- **WARNING:** Before performing any maintenance, make sure all liquid supply lines to the machine are shut off and /or disconnected and chemical/fluid are drained.
- **WARNING:** The use of any chemicals requires careful control of all worker hygiene.
- **WARNING:** Spraying Systems Co. does not manufacture or supply any of the chemical components used in this equipment and is not responsible for their effects. Because of the large number of chemicals that could be used and their different chemical reactions, the buyer and user of this equipment should determine compatibility of the materials used and any of the potential hazards involved.
- **WARNING:** Before use be sure appropriate connections are secure and made to withstand weight and reaction forces of the operating unit.
- **WARNING:** Spraying Systems Co. strongly recommends the use of appropriate safety equipment when working with potentially hazardous chemicals.

<u>THIS EQUIPMENT INCLUDES BUT IS NOT LIMITED TO:</u>

- Protective hat
- Safety glasses or face shield
- Chemical-resistant gloves and apron
- Long sleeve shirt and long pants
- Appropriate footwear.

***NOTE:* Always remember to carefully read the chemical manufacturer's label and follow all directions.**

- **WARNING:** It is important to operate equipment within the temperature range of all components. Also insure that appropriate time lapses or proper safety equipment is used when handling components after they're exposed to high temperatures.
- **WARNING:** Never operate tank cleaning equipment in the open due to the potential of bodily injury.
- **WARNING:** If walking on top of a tank is deemed safe and is necessary, use proper safety precautions to protect individuals as well as the equipment.
- **WARNING:** Do not put any part of your body in the tank during operation of the tank cleaner. This is NOT a safe procedure for verification of operation.
- **WARNING:** Proper hoisting procedures should be used when installing and removing all equipment.
- **WARNING:** To insure the safety of the equipment as well the individuals using them, only use Spraying Systems Co. components.
- **WARNING:** When packaging and transporting use structurally sound boxes or crates that can handle the weight of the equipment.
- **WARNING:** Tank cleaners should be flushed out with clean water before they're stored or shipped to minimize health hazards or cross contamination.
- **WARNING:** Removed equipment from the tank before attempting any repairs.
- **WARNING:** Do not use any equipment outside the intended purposes of the product. Misuse can result in personal injury or product damage.

INSTALLATION

Qualified personnel must perform all work required to assemble, install, operate, maintain and repair this equipment. Improper installation and operation can result in severe personal injury and/or damage to property. Correct installation is your responsibility.

WARNING

Install proper guards as needed. Follow basic lifting guides when transporting or handling this product. Failure to follow this instruction can result in back injury, burns or other serious injury.

MOUNTING

Bolt or clamp the unit to the tank to be cleaned as dictated by the mounting flange provided. Adjustable flanges allow easy positioning of the tank wash unit to various spray depths for maximum cleaning effectiveness.

LIQUID INLET CONNECTION

Proper installation requires liquid supply line (pipe, hose, etc.) Meet or exceed maximum working pressure. Use of PTFE pipe tape or other appropriate sealant compatible with your process fluids is highly recommended for leak free connections.

DANGER

Failure to install the tank washer with insufficient connections could result in leaks and/or explosion. If you do not follow these instructions, you may be killed or seriously injured.

MECHANICAL CLEARANCES

Proper installation requires that sufficient clearance be maintained between the rotary housing and nozzles of the tank wash unit and any internal baffles or the walls of the tank being cleaned.

DANGER

It is your responsibility to ensure that there is no possibility of the moving parts coming in contact with fixed objects. Failure to install the tank washer with sufficient clearances could result in the generation of sparks with a resultant explosion or fire. If you do not follow these instructions, you may be killed or seriously injured.

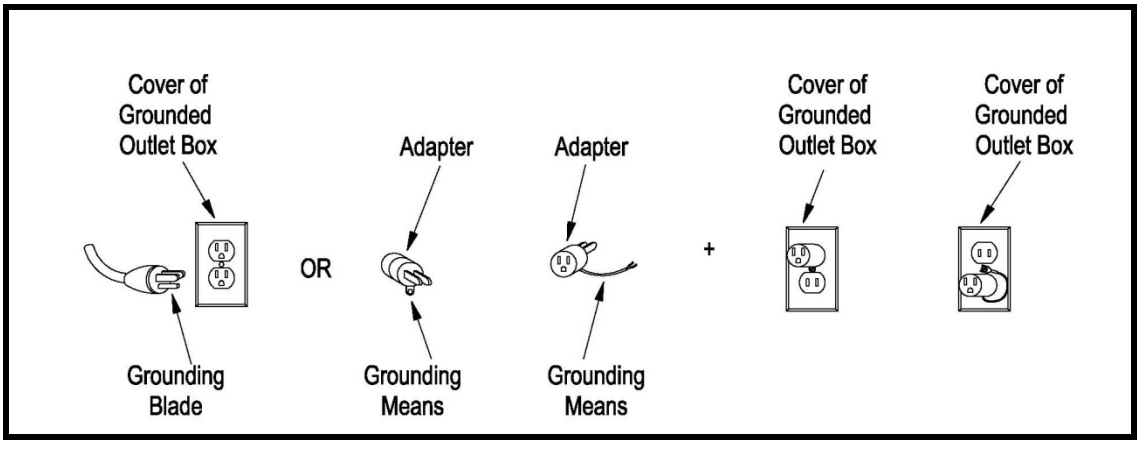
GROUNDING

A ground screw is provided on the liquid inlet body marked with a ground symbol. A ground wire should be clamped under the screw head and connected to earth ground via an approved grounding method. Likewise, a ground wire should be affixed to the tank and terminated at an earth ground.

DANGER

It is not sufficient to ground only the tank washer or the tank itself because the electrical continuity between the tank wash unit and tank cannot be guaranteed. A separate ground connection from both the tank wash unit and the tank itself should be made. Failure to follow this instruction can result in buildup of static charge between the tank and the tank washer parts which could cause a sudden discharge of current with a resultant explosion or fire.

- **WARNING:** Never touch unit with wet hands or while standing in a wet environment until power is turned off to unit.
- **WARNING:** Always use a properly grounded 110V-120V electrical outlet. See following chart:



- Use wire/extension cords of adequate size to minimize voltage drop at the motor. Extension cords should be Underwriters Laboratories listed and conform to the following minimum wire size chart. The proper fuse size should always be used.

Extension Cord Length	Min. Gauge Wire
1 to 150 ft.	18
150 to 300 ft.	16

- All wiring should be performed by a qualified electrician and follow all electrical and safety codes as well as the most recent National Electrical Code (NEC) and the Occupational Safety and Health Act (OSHA).
- Protect electrical cord from sharp objects, hot surfaces, oil, and chemicals. Avoid kinking the cord. Replace or repair damaged or worn cords immediately.
- Disconnect power before servicing unit. If power disconnect is out of sight, lock it in the open position and tag it to prevent unexpected application of power.
- Do not touch an operating motor. Modern motors are designed to operate at high temperatures.
- Never operate unit around explosive fumes or liquids or in an explosive atmosphere.

YOU MAY BE KILLED OR SERIOUSLY INJURED IF YOU DO NOT FOLLOW THESE INSTRUCTIONS.

HIGH IMPACT SPRAYS

This tank washer may be equipped with solid stream nozzles which concentrate the flow energy into a small area for maximum impact and cleaning efficiency. Operation at high pressure increases their effectiveness but also creates a hazard if the proper precautions are not followed.

WARNING

INJURY HAZARD FROM HIGH IMPACT SPRAYS.

High impact sprays can cause severe injury. The liquid pressure to the tank washer should never be turned on while the unit is outside the tank. ***FAILURE TO FOLLOW THIS INSTRUCTION CAN RESULT IN FLUID PENETRATION THROUGH CLOTHING AND INTO THE HUMAN SKIN CAUSING SEVERE INJURY, POSSIBLY RESULTING IN AMPUTATION OR DEATH***. If any part of the body comes in contact with the spray stream, immediately consult a physician.

OPERATION

It is your responsibly to operate this product at recommended speeds, loads and temperatures.

Run the unit within the specified pressures and flow rates to ensure safety. To maintain proper operations do not run the unit dry, always keep liquid flow on before stopping the electric motor.

WARNING

DO NOT USE TO SPRAY FLAMMABLE LIQUIDS--SUCH USE COULD RESULT IN FIRE OR EXPLOSION CAUSING BODILY INJURY OR DEATH.

WARNING

SOUND LEVEL FROM MOTOR MAY EXCEED 85DB(A). CHECK COMPATIBILITY OF SERVICE FLUID WITH MATERIALS USED TO CONSTRUCT THIS PRODUCT. USE A PRESSURE GAUGE TO MONITOR LIQUID PRESSURE (SEE 190E-1 FOR FLOW RATE DATA). ENSURE THAT THE PUMPING SYSTEM HAS MONITOR CONTROLS AND EMERGENCY SHUT OFF SYSTEM IN CASE OF PRESSURE SPIKE WHICH CAN CAUSE HARM TO THIS PRODUCT. FAILURE TO FOLLOW THIS INSTRUCTION CAN RESULT IN BURNS, EYE INJURY OR OTHER SERIOUS INJURY.

DANGER

SPRAYING SYSTEMS CO. STRONGLY RECOMMENDS THE USE OF APPROPRIATE SAFETY EQUIPMENT WHEN WORKING WITH POTENTIALLY HAZARDOUS CHEMICALS. SEE YOUR CHEMICAL'S MSDS SHEET FOR ALL SAFETY MEASURES RELATING TO YOUR CHEMICAL.

<u>THIS EQUIPMENT INCLUDES BUT IS NOT LIMITED TO:</u>

- Protective hat
- Safety glasses or face shield
- Chemical-resistant gloves and apron
- Long sleeve shirt and long pants
- Appropriate footwear.

Always remember to carefully read the chemical manufacturer's label and follow all directions.

MAINTENANCE

It is your responsibility to regularly inspect and make necessary repairs to this product in order to maintain proper operation.

It is recommended that the bushings and seals be inspected every 1000 hours of operation or sooner if excessive leakage of the seals occurs.

REMOVAL AND REPLACEMENT OF SPRAY NOZZLES (ITEM 25 ON PARTS LIST DRAWING PL 190E)

Make sure the unit is completely disconnected from the power source before attempting to service nozzles.

1. Unscrew spray nozzles (25) from nozzle hub (24) and inspect for plugging and wear.
2. If a nozzle is plugged or partially plugged, clean out the orifice and inlet area with a wooden toothpick or other relatively soft probe. Screwdrivers, wire or other hard metal items should not be used since they may scratch and severely damage the orifice.

A. If the nozzles need replacement, obtain new nozzles.

3. Replace spray nozzles (25) in nozzle hub (24) by tightly screwing them in.

REMOVAL AND REPLACEMENT OF NOZZLE HUB BUSHINGS (ITEM 23 ON PARTS LIST PL 190E)

1. Unscrew (clockwise-left hand thread) rotary housing plug (26), and slide nozzle hub bushings (23) and nozzle hub (24) off the rotary housing (20).
2. Remove any foreign material from nozzle hub gear teeth.
3. To replace parts, slide one nozzle hub bushing (23) over the tube of rotary housing (20) up to the shoulder.
4. Insert second nozzle hub bushing (23) into nozzle hub (24) and push nozzle hub onto rotary housing tube.
5. Apply Loctite 243 or 242 to threads of rotary housing plug (26) and screw (counterclockwise) into rotary housing (20) until it seats firmly.
6. Torque to 20 lb-ft (27 nm).

REMOVAL OF #21039 ELECTRIC MOTOR DRIVE (SEE PARTS LIST DRAWING PL 190E)

1. First make sure the unit is completely disconnected from the power source.
2. Using an Allen wrench, unscrew and remove all 4 10 - 32 x 3/4 socket head cap screws socket head cap screws (9) and respective spring washers (10).
3. You should now be able to lift the electric motor drive completely off the 190 inlet casting.

REMOVAL/REPLACEMENT OF ELECTRIC MOTOR DRIVE COUPLING (ITEM 7 ON PARTS LIST PL 190E)

1. If it is necessary to remove the coupling (7) from the gear motor sub-assembly (14) shaft, tap the coupling with a rubber or plastic mallot until it releases from the shaft.
2. To reassemble, align the keyway on the coupling (7) with the key on the gear motor sub-assembly (14) shaft and lightly tap the coupling (7) until it bottoms on the shaft.

   NOTE: The coupling (7) on the gear motor sub-assembly (14) shaft has a press fit so the coupling (7) does not inadvertently come apart during removal or installation of the gear motor sub-assembly.

REMOVAL OF THE UPPER SHAFT SEAL BODY SUB-ASSEMBLY (5) AND LOWER BUSHING RETAINER SUB-ASSEMBLY (18) ON PARTS LIST PL 190E)

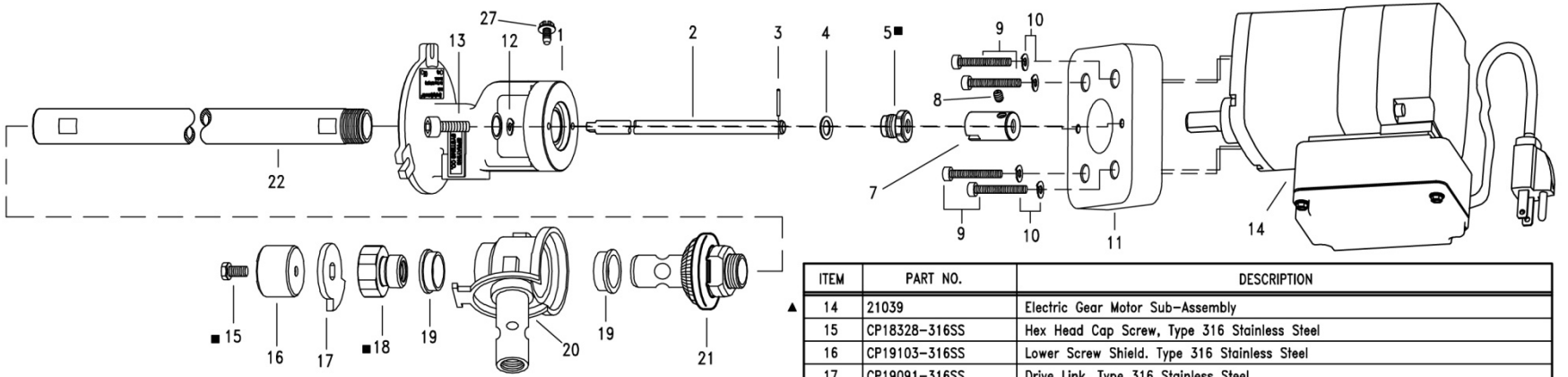
1. If it has not already been done, the power motor sub-assembly should be removed as described in the ***removal of #21039 electric motor drive*** section above.
2. Next, tap out the groove pin (3), unscrew the upper shaft seal body sub-assembly (5) and slide off the shaft (2).
3. Remove gasket (4) from shaft (2).
4. Now unscrew the 5/16" hex head cap screw (15), remove the lower screw shield (16) and drive link (17).
5. Unscrew the lower bushing retainer sub-assembly (18) and slide off the shaft (2).
6. Pull the rotary housing (20) and gear tube bushings (19) off the bevel gear sub-assembly (21).
7. Inspect o-rings inside the upper shaft seal body sub-assembly (5) and seals inside lower bushing retainer sub-assembly (18).
8. If damaged or worn, replace with new sub-assemblies.
9. Remove any foreign material from gear teeth of the beveled gear sub-assembly (21) before reassembly.

REASSEMBLY OF THE UNIT (SEE PARTS LIST PL 190E)

1. Install one new gear tube bushing (19) into the lower end of the rotary housing (20) and one new gear tube bushing (19) onto the bevel gear sub-assembly (21) up to shoulder.
2. Slide the rotary housing (20) and gear tube bushing (19) back onto the bevel gear assembly (21) making sure the gear teeth on the nozzle hub (16) and bevel gear sub-assembly (21) mesh properly.
3. Reassemble lower bushing retainer sub-assembly (18) onto shaft (2) by slowly rotating it as you slide it onto the shaft. *This procedure will help prevent damage to the shaft seals inside.*
4. Torque lower bushing retainer sub-assembly (18) to 40 lb-ft (54 nm).
5. Replace the drive link (17) and lower screw shield (16).
6. The bottom of the shaft should pass through the drive link so it is about flush with the bottom of the drive link.
7. Apply Loctite 243 or 242 to threads of hex head cap screw (15) and thread into shaft (2).
8. Holding the rotary housing (20), torque hex head cap screw(15) to 5 lb-ft (7 nm).
9. Install gasket (4) onto shaft (2) at the upper end of the shaft.
10. Apply Loctite 243 or 242 to threads of the upper shaft seal body sub-assembly (5) and reassemble onto shaft (2) by slowly rotating it you slide it onto the shaft.
11. This procedure will help prevent damage to the shaft seals inside.
12. Torque upper shaft seal body sub-assembly (5) to 50 lb-ft (68 nm).
13. Complete the reassembly by installing the groove pin (3) into shaft (2).

REPLACEMENT OF #21039 ELECTRIC MOTOR DRIVE (SEE PARTS LIST DRAWING PL 190E)

1. If it is not already attached, align the keyway on the coupling (7) with the key on the gear motor sub-assembly (14) shaft and lightly tap the coupling (7) until it bottoms on the shaft.
2. Insert the coupling (7) through the hole in the top of the 190 inlet casting.
3. The slot on the coupling (7) should be aligned and indexed over the groove pin and drive shaft on the 190 assembly.
4. Using a hex Allen wrench, secure the gear motor sub-assembly (14) to the 190 inlet body (1). ***Before re-installing in a tank, connect power to the electric motor drive to make sure the unit works properly.***



■ NOTE: SEE TORQUE REQUIREMENTS AND LOCTITE NOTES FOR REASSEMBLY OF THE PARTS

TORQUE REQUIREMENTS			LOCTITE ADHESIVE
ITEM NO.	POUND-FT.	NEWTON METER	TYPE USED
6	50 LB.-FT.	68 Nm	243 OR 242
15	5 LB.-FT.	27 Nm	243 OR 242
18	40 LB.-FT.	54 Nm	243 OR 242
26	20 LB.-FT.	7 Nm	243 OR 242

▲ Note: Use Motor Kit 72190 as Replacement Motor Kit on Older Tank Washer Units sold before 1/1/2007.

	ITEM	PART NO.	DESCRIPTION
	1	B18335-SS	Liquid Inlet Body-Mounting Plate Sub-Assembly, Type 316 Stainless Steel (1" B.S.P.T. Conn.)
	2	CP19097-3-316SS	Shaft, Type 316 Stainless Steel (For Model #AAB190E-3)
		CP19097-4-316SS	Shaft, Type 316 Stainless Steel (For Model #AAB190E-4)
		CP19097-6-316SS	Shaft, Type 316 Stainless Steel (For Model #AAB190E-6)
★	3	CP19109-SS	Groove Pin, Stainless Steel
★	4	CP58362-NY	Gasket, Nylon
★	5	CP63023-316SS/EPR	Upper Shaft Seal Body Sub-Assembly, Stainless Steel, Type 316 & Ethylene Propylene Rubber
	7	CP19094-316SS	Coupling, Type 316 Stainless Steel
	8	CP19108-SS	Set Screw, Stainless Steel
▲	9	CP19669-SS	Socket Head Cap Screw, Stainless Steel (4 Req'd)
▲	10	CP20674-SS	Washer, Stainless Steel (4 Req'd)
▲	11	CP19093-AL	Adapter Plate, Aluminum
▲	12	CP20128-SS	Lock Washer, Stainless Steel (2 Req'd)
▲	13	CP26197-1-1/4-SS	Socket Head Cap Screw, Stainless Steel (2 Req'd)

	ITEM	PART NO.	DESCRIPTION
▲	14	21039	Electric Gear Motor Sub-Assembly
	15	CP18328-316SS	Hex Head Cap Screw, Type 316 Stainless Steel
	16	CP19103-316SS	Lower Screw Shield. Type 316 Stainless Steel
	17	CP19091-316SS	Drive Link, Type 316 Stainless Steel
★	18	18332-316EPR	Lower Bushing Retainer Sub-Assembly, Type 316 Stainless Steel and Teflon® Carbon Graphite Filled & Ethylene Propylene Rubber
★	19	CP19100-CGRTEF	Gear Tube Bushing, Teflon® Carbon Graphite Filled (2 Req'd.)
	20	CP19088-316SS	Rotary Housing, Type 316 Stainless Steel
	21	18331-316SS	Bevel Gear Sub-Assembly, Type 316 Stainless Steel
	22	CP19098-3-316SS	Extension Tube, Type 316 Stainless Steel (For Model AAB190E-3)
		CP19098-4-316SS	Extension Tube, Type 316 Stainless Steel (For Model AAB190E-4)
		CP19098-6-316SS	Extension Tube, Type 316 Stainless Steel (For Model AAB190E-6)
★	23	CP19104-CGRTEF	Nozzle Hub Bushing, Teflon® Carbon Graphite Filled (2 Req'd.)
	24	CPB19086-1/4-SS	Nozzle Hub, Type 316 Stainless Steel (1/4" B.S.P.T. Conn.)
	25	**	Spray Nozzle, Solid Stream WashJet Nozzle (2 Req'd), Hardened Stainless Steel (1/4" BSPT Conn.) See Ind. Catalog and D.S. #15659 (WashJet)
	26	CP19105-316SS	Rotary Housing Plug, Type 316 Stainless Steel (Left Hand Thd.)
	27	CP55000-3-IZP	Grounding Screw, #10-32 x 3/8" Lg., Steel, Zinc Plated
		No. AAB190E-3+**, Motorized Rotary Tank Washer, (3' Extension)	
		No. AAB190E-4+**, Motorized Rotary Tank Washer, (4' Extension)	
		No. AAB190E-6+**, Motorized Rotary Tank Washer, (6' Extension)	

** Specify Spray Nozzle Number (Including B.S.P.T. Designation) and Material
Example: B1/4MEG-0020, Hardened Stainless Steel

★SOLD IN KITS ONLY - AB190 - KIT -
SPARE PARTS KIT (INCLUDES ALL PARTS MARKED WITH "★")

DESCRIPTION:
No. AAB190E-- ELECTRICALLY MOTOR-DRIVEN TANK WASH

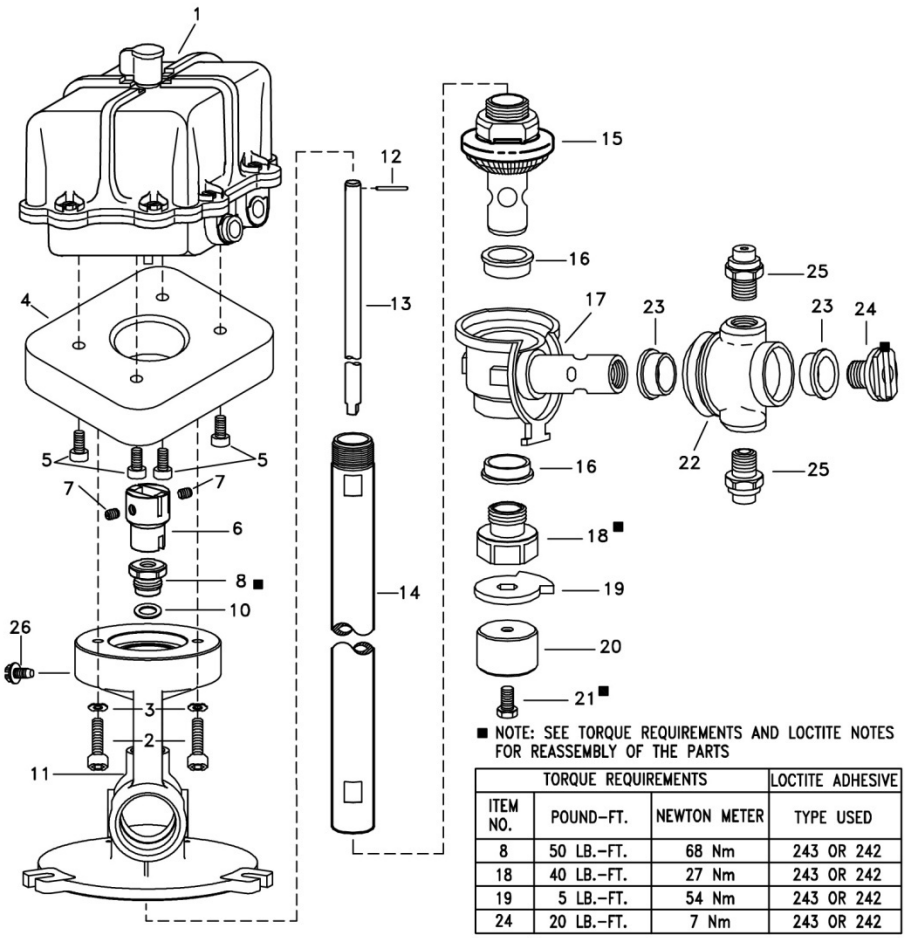
Spraying Systems Co.®
Spray Nozzles and Accessories
P.O. Box 7900 - Wheaton, Il. 60187-7901

Rev. No. 2	Parts List No. PL B190E
Ref.	SHEET OF

ITEM	PART NO.	DESCRIPTION
1	26193	Electric Gear Motor (Explosion Proof)
2	CP26197–SS	Socket Head Cap Screw, Stainless Steel (2 Req'd)
3	CP20128–SS	Lock Washer, Stainless Steel (2 Req'd)
4	CP26194–AL	Mounting Plate, Aluminum
5	CP26198–SS	Socket Head Cap Screw, Stainless Steel (4 Req'd)
6	CP26195–SS	Coupling, Stainless Steel
7	CP19108–SS	Set Screw, Stainless Steel (2 Req'd)
★ 8	18330–316SS/EPR	Upper Bushing Retainer Sub–Assembly, Stainless Steel & Ethylene Propylene Rubber
★ 10	CP58362–NY	Gasket, Nylon
11	18335–SS	Liquid Inlet Body–Mounting Plate Sub–Assembly, Type 316 Stainless Steel (1" N.P.T. Conn.)
	B18335–SS	Liquid Inlet Body–Mounting Plate Sub–Assembly, Type 316 Stainless Steel (1" B.S.P.T. Conn.)
★ 12	CP19109–SS	Groove Pin, Stainless Steel
13	CP19097–3–316SS	Shaft, Type 316 Stain. Steel (For AA190E–EP–3, AAB190E–EP–3)
	CP19097–4–316SS	" " (For AA190E–EP–4, AAB190E–EP–4)
	CP19097–6–316SS	" " (For AA190E–EP–6, AAB190E–EP–6)
14	CP19098–3–316SS	Extension Tube, Type 316 Stain. Steel (For AA190E–EP–3, AAB190E–EP–3)
	CP19098–4–316SS	" " (For AA190E–EP–4, AAB190E–EP–4)
	CP19098–6–316SS	" " (For AA190E–EP–6, AAB190E–EP–6)
15	18331–316SS	Bevel Gear Sub–Assembly, Type 316 Stainless Steel
★ 16	CP19100–CGRTEF	Gear Tube Bushing, Carbon Graphite Filled TEFLON® (2 Req'd)
17	CP19088–316SS	Rotary Housing, Type 316 Stainless Steel
★ 18	18332–316EPR	Lower Bushing Retainer Sub–Asb. Type 316 Stainless Steel, and Carbon Graphite Filled TEFLON® + Ethylene Propylene Rubber
19	CP19091–316SS	Drive Link, Type 316 Stainless Steel
20	CP19103–316SS	Lower Screw Shield, Type 316 Stainless Steel
21	CP18328–316SS	Hex. Head Cap Screw, Type 316 Stainless Steel
22	CP19086–SS	Nozzle Hub, Type 316 Stainless Steel (1/4" N.P.T. Conn.)
	CPB19086–SS	Nozzle Hub, Type 316 Stainless Steel (1/4" B.S.P.T. Conn.)
★ 23	CP19104–CGRTEF	Nozzle Hub Bushing, Carbon Graphite Filled TEFLON® (2 Req'd)
24	CP19105–316SS	Rotary Housing Plug, Type 316 Stainless Steel (Left Hand Thread)
25	**	Spray Nozzle, Solid Stream VeeJet® or WashJet® Nozzle (2 Req'd) Type 303 or 316 Stainless Steel or Hardened Stainless Steel (1/4" NPT or BSPT Conn.)
26	CP55000–3–IZP	Grounding Screw#10–32 X 3/8" Lg., Steel Zinc Plated

No. AA190E–EP–3+**, Motorized Rotary Tank Washer (3' Extension), NPT Inlet Conn.
No. AA190E–EP–4+**, Motorized Rotary Tank Washer (4' Extension), NPT Inlet Conn.
No. AA190E–EP–6+**, Motorized Rotary Tank Washer (6' Extension), NPT Inlet Conn.
No. AAB190E–EP–3+**, Motorized Rotary Tank Washer (3' Extension), BSPT Inlet Conn.
No. AAB190E–EP–4+**, Motorized Rotary Tank Washer (4' Extension), BSPT Inlet Conn.
No. AAB190E–EP–6+**, Motorized Rotary Tank Washer (6' Extension), BSPT Inlet Conn.

** Specify Spray Nozzle Size Required. (SEE D.S. 190E–EP1)



■ NOTE: SEE TORQUE REQUIREMENTS AND LOCTITE NOTES FOR REASSEMBLY OF THE PARTS

TORQUE REQUIREMENTS			LOCTITE ADHESIVE
ITEM NO.	POUND–FT.	NEWTON METER	TYPE USED
8	50 LB.–FT.	68 Nm	243 OR 242
18	40 LB.–FT.	27 Nm	243 OR 242
19	5 LB.–FT.	54 Nm	243 OR 242
24	20 LB.–FT.	7 Nm	243 OR 242

★SOLD IN KITS ONLY – AB190 – KIT
SPARE PARTS KIT (INCLUDES ALL ITEMS MARKED WITH "★")

DESCRIPTION:
No. AA190E–EP–– & AAB190E–EP––
Electrically Motorized
Tank Washer
(Explosion Proof)

Spraying Systems Co.®
Spray Nozzles and Accessories
P.O. Box 7900 - Wheaton, Il. 60187-7901

Rev. No. 4	Parts List No. PL 190E–EP
Ref.	SHEET OF

SPRAYING SYSTEMS CO. WARRANTY

Seller warrants that its products will conform to and perform in accordance with the products' specifications. Seller warrants that the products do not infringe upon any copyright, patent or trademark. The foregoing warranties are in lieu of all other warranties, expressed or implied, including, but not limited to, those concerning merchantability and fitness for a particular purpose.

Because of the difficulty of ascertaining and measuring damages hereunder, it is agreed that, except for claims for bodily injury, seller's liability to the buyer or any third party, for any losses or damages, whether direct or otherwise, arising out of the purchase of product from seller by buyer shall not exceed the total amount billed and billable to the buyer for the product hereunder. In no event will seller be liable for any loss of profits or other special or consequential damages, even if seller has been advised of the possibility of such damages.

MAINTENANCE RECORD

DATE	PROCEDURE PERFORMED

Spraying Systems Co.®

Experts in Spray Technology

North Avenue and Schmale Road, P.O. Box 7900,
Wheaton, IL 60187-7901
Tel: 1.800.95.SPRAY Intl. Tel: 1.630.665.5000
Fax: 1.888.95.SPRAY Intl. Fax: 1.630.260.0842
Visit our Website at http://www.spray.com