



P+ S4000 End User Maintenance Item Descriptions:

Service Item Description	ElectraTherm Part #	Miscellaneous Maintenance Item Requirements/Notes	Estimated Part Costs from ElectraTherm (USD)	*Estimated Maintenance Material Cost (USD)	Total Estimated Maintenance costs (USD)	Estimated Labor Hours Required for Service (hours)	Required Service Maintenance Interval (hours)
Drive Belt Tension Inspection / Oil catch bottle		Adjust belt tension if necessary / monitor and record oil in catch bottle			\$ -	0.5	4400
Inspect all plumbing, flanges, and valves for leaks		*if visual sign of leak present, use liquid leak detector		\$ 10.00	\$ 10.00	1	4400
Inspect bearings and grease generator bearings		expander shaft end play measurement / generator shaft rotation / grease		\$ 25.00	\$ 25.00	1	4400
Clean cooling vents of generator		requires cleaning materials		\$ 5.00	\$ 5.00	1	4400
Inspect hardware for wear/damage		Manually actuate air valves, and inspect rotating equipment			\$ -	0.5	4400
Inspect for electrical wear/damage		visual inspection of electrical connections or use infrared camera			\$ -	0.5	4400
Inspect electrical box wiring of Generator and Pump Motor		open electrical junction boxes and inspect wire terminations			\$ -	0.5	4400
Verify cabinet cooling fan operation		visual inspection and cleaning of fan on cooling unit			\$ -	0.5	4400
Check for NCGs in working fluid					\$ -	0.5	4400
Check operation of compressed air system		*May require leak detector			\$ -	0.5	4400
Check HX water-side pressure drop		measure and record pressure drop			\$ -	0.5	8800
Verify operability of safety equipment		visual inspection of buttons, lights, and labels			\$ -	0.5	8800
Clean enclosure / Clean LLR		*requires cleaning materials		\$ 5.00	\$ 5.00	2	8800
Replace 37 mm Drive Belt	10839 OR 11863			\$ 519.34	\$ 519.34	1	8800
Replace PLC and HMI batteries	11214 x2	Machine must be powered on when replaced		\$ 15.43	\$ 15.43	0.5	17600
Expander Exchange**		Expander is replaced at site with core exchange unit from ElectraTherm	\$ 12,484.00		\$ 12,484.00	16	22000
Replace VFD internal cooling fan		available from from VFD manufacturer, not stocked by ElectraTherm		\$ 300.00	\$ 300.00	1	26400
Replace Low Side PRVs***	11285 x2	replace per local code requirement or every 5 years (2 total PRVs)		\$ 464.36	\$ 464.36	2	44000
Replace Generator Bearings		Generator may be have to be removed from Power+		\$ 1,000.00	\$ 1,000.00	8	92400

Current maintenance intervals are conservative, and may be extended based on field experience.

Estimated hours are based on time to perform service at site, and do not include any mobilization or transportation time to and from the site.

\*Maintenance items that are not supplied by ElectraTherm. Cleaning supplies, leak detector solution--these items should be available locally.

\*\*The cost for the expander exchange listed here is a NET amount of the following transactions: Owner will issue payment for the amount of a new expander (greater than the amount listed here) and receive a refund when the owner has returned the expander being removed from service, and that used expander is in condition to be rebuilt and or refurbished.

\*\*\*PRVs should be replaced immediately if they discharge or show signs of water ingress. PRVs should be replaced at the interval required by local code or every 5 years, whichever is less.

Detailed instructions and part number details are provided in Operation and Maintenance Manual, available from ElectraTherm Service Department.

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# P+ Series 4000: 3 Year End User Routine Maintenance Schedule



## CUMULATIVE RUN TIME HOURS

REQUIRED SERVICE ITEMS	1 YEAR(8760 HOURS PER YEAR)						2 YEARS(8760 HOURS PER YEAR)						3 YEARS(8760 HOURS PER YEAR)					
	4400HR SERVICE ITEMS			8800HR SERVICE ITEMS			13200HR SERVICE ITEMS			17600HR SERVICE ITEMS			22000HR SERVICE ITEMS			26400HR SERVICE ITEMS		
	ITEM	HRS	COST	ITEM	HRS	COST	ITEM	HRS	COST	ITEM	HRS	COST	ITEM	HRS	COST	ITEM	HRS	COST
Drive Belt Tension Inspection / Oil catch bottle	◆	0.5	\$ -	◆	0.5	\$ -	◆	0.5	\$ -	◆	0.5	\$ -	◆	0.5	\$ -	◆	0.5	\$ -
Inspect all plumbing, flanges, and valves for leaks	◆	1	\$ 10	◆	1	\$ 10	◆	1	\$ 10	◆	1	\$ 10	◆	1	\$ 10	◆	1	\$ 10
Inspect bearings and grease generator bearings	◆	1	\$ 25	◆	1	\$ 25	◆	1	\$ 25	◆	1	\$ 25	◆	1	\$ 25	◆	1	\$ 25
Clean cooling vents of generator	◆	1	\$ 5	◆	1	\$ 5	◆	1	\$ 5	◆	1	\$ 5	◆	1	\$ 5	◆	1	\$ 5
Inspect hardware for wear/damage	◆	0.5	\$ -	◆	0.5	\$ -	◆	0.5	\$ -	◆	0.5	\$ -	◆	0.5	\$ -	◆	0.5	\$ -
Inspect for electrical wear/damage	◆	0.5	\$ -	◆	0.5	\$ -	◆	0.5	\$ -	◆	0.5	\$ -	◆	0.5	\$ -	◆	0.5	\$ -
Inspect electrical box wiring of Generator and Pump Motor	◆	0.5	\$ -	◆	0.5	\$ -	◆	0.5	\$ -	◆	0.5	\$ -	◆	0.5	\$ -	◆	0.5	\$ -
Verify cabinet cooling fan operation	◆	0.5	\$ -	◆	0.5	\$ -	◆	0.5	\$ -	◆	0.5	\$ -	◆	0.5	\$ -	◆	0.5	\$ -
Check for NCGs in working fluid	◆	0.5	\$ -	◆	0.5	\$ -	◆	0.5	\$ -	◆	0.5	\$ -	◆	0.5	\$ -	◆	0.5	\$ -
Check operation of compressed air system	◆	0.5	\$ -	◆	0.5	\$ -	◆	0.5	\$ -	◆	0.5	\$ -	◆	0.5	\$ -	◆	0.5	\$ -
Check HX water-side pressure drop	◆	0.5	\$ -	◆	0.5	\$ -	◆	0.5	\$ -	◆	0.5	\$ -	◆	0.5	\$ -	◆	0.5	\$ -
Verify operability of safety equipment				◆	0.5	\$ -				◆	0.5	\$ -				◆	0.5	\$ -
Clean enclosure / Clean LLR				◆	2	\$ 5				◆	2	\$ 5				◆	2	\$ 5
Replace PLC and HMI batteries										◆	0.5	\$ 15						
Expander Exchange**													◆	16	\$ 12,484			
Replace VFD internal cooling fan																◆	1	\$ 300
Service Interval Parts Total (USD)			\$ 40			\$ 45			\$ 40			\$ 60			\$ 12,524			\$ 345
Service Interval Labor Hours Total		7			9.5			7		10			23			10.5		

Current maintenance intervals are conservative, and may be extended based on field experience.

Estimated hours are based on time to perform service at site, and do not include any mobilization or transportation time to and from the site.

Costs shown are in USD.

3 Year Part Total (USD):	\$13,054.43
3 Year Labor Hours Total:	67

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# P+ S4000: 20 Year End User Maintenance Schedule



**CUMULATIVE RUN TIME HOURS ON POWER+ GENERATOR**

REQUIRED SERVICE WORK	CUMULATIVE RUN TIME HOURS ON POWER+ GENERATOR																	
	4000	8800	13200	17600	22000	26400	30800	35200	39600	44000	48400	52800	57200	61600	66000	70400	74800	79200
	1 year	2 years	3 years	4 years	5 years	6 years	7 years	8 years	9 years									
Drive Belt Tension Inspection / Oil catch bottle	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆
Inspect all plumbing, flanges, and valves for leaks	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆
Inspect bearings and grease generator bearings	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆
Clean cooling vents of generator	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆
Inspect hardware for wear/damage	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆
Inspect for electrical wear/damage	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆
Inspect electrical box wiring of Generator and Pump Motor	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆
Verify cabinet cooling fan operation	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆
Check for NCGs in working fluid	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆
Check operation of compressed air system	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆
Check HX water-side pressure drop	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆
Verify operability of safety equipment	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆
Clean enclosure / Clean LLR		◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆
Replace 37 mm Drive Belt		◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆
Replace PLC and HMI batteries			◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆
Expander Exchange				◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆
Replace VFD internal cooling fan					◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆
Replace Low Side PRVs*						◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆
Replace Generator Bearings**										◆	◆	◆	◆	◆	◆	◆	◆	◆

continued on chart below



**CUMULATIVE RUN TIME HOURS ON POWER+ GENERATOR**

REQUIRED SERVICE WORK	CUMULATIVE RUN TIME HOURS ON POWER+ GENERATOR																						
	83600	88000	92400	96800	101200	105600	110000	114400	118800	123200	127600	132000	136400	140800	145200	149600	154000	158400	162800	167200	171600	176000	
	10 years	11 years	12 years	13 years	14 years	15 years	16 years	17 years	18 years	19 years	20 years												
Drive Belt Tension Inspection / Oil catch bottle	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆
Inspect all plumbing, flanges, and valves for leaks	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆
Inspect bearings and grease generator bearings	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆
Clean cooling vents of generator	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆
Inspect hardware for wear/damage	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆
Inspect for electrical wear/damage	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆
Inspect electrical box wiring of Generator and Pump Motor	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆
Verify cabinet cooling fan operation	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆
Check for NCGs in working fluid	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆
Check operation of compressed air system	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆
Check HX water-side pressure drop	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆
Verify operability of safety equipment	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆
Clean enclosure / Clean LLR		◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆
Replace 37 mm Drive Belt		◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆
Replace PLC and HMI batteries		◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆
Expander Exchange		◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆
Replace VFD internal cooling fan					◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆
Replace Low Side PRVs*	◆										◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆
Replace Generator Bearings**			◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆

\* PRVs should be replaced immediately if they discharge or show signs of water ingress. PRVs should be replaced at the interval required by local code or every 5 years, whichever is lower.  
 \*\* Generator bearings are rated for 100,000 hours of operation.

Current maintenance intervals are conservative, and may be extended based on field experience.

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