

OPERATOR MANUAL
HYDRA-CLEAN FLUID SCRUBBING SYSTEM
830-022.1

INTRODUCTION

Hydra-Clean fluid scrubbing systems are high performance industrial filters designed to remove particulate and water from hydraulic and lubricating oil systems. Manufactured from durable corrosion resistant materials, they are designed for constant uninterrupted use without immediate supervision. The Hydra-Clean HC211 system utilizes two elements in series to remove water and particulate from the working fluid. This system ensures a high degree of fluid purity with an absolute minimum of maintenance and service requirements.

This operating manual is designed to provide you with the basic information to economically and efficiently service your fluid scrubbing system. HTI welcomes your comments and our technical service staff is available to assist you in applying our equipment to solve your fluid purity problems.

SYSTEM OPERATION

The Hydra-Supreme HC211 filtration system uses two separate filtration elements in series to progressively clean the working fluid. Fluid is drawn from the reservoir up through a check valve by a rotary pump. Where space requires that the filtration unit be set up farther than 10 feet (3 meters) from the reservoir, a booster pump may be required. If the vacuum gauge reads in excess of 15" vacuum, a booster pump is recommended. Fluid is then pushed through the flow sensing and pressure switch assembly into the water removal bag element where the free and emulsified moisture is absorbed. The partially cleaned solution passes through the axial flow wound media filter where both soft and hard particulate contamination is removed. After this process, the filtered oil passes through a set of solenoid operated selector valves and back into either the pressurized lubrication system, the upper turret, or the base reservoir. If the contamination level in the oil is high or if the filters are nearing capacity, several passes through the system may be required for total cleansing of the oil.

The check valve ensures adequate oil supply to wet the pump during start-up and prevents drain back when the system is shut-off. The vacuum gauge indicates the resistance to flow. It has a manual bleed cock that should be cracked open for safety relief during initial start-up should the motor be rotating backwards. Typical vacuum readings are from 3 - 10 ". The bleed cock on the outlet elbow of the pump is to relieve entrapped air from the pump chamber so that oil can be drawn into the restore pump suction.

An internal relief valve that is factory set at 70-PSI controls pump output pressure. *We do not recommend changing this setting.* Removing the acorn nut covering the adjustment screw without proper tools can result in an intake air leak that will require a new gasket.

The pump output and service life of the two filter elements are monitored by a series of flow and pressure switches. The flow switch monitors the volume of oil being pumped through the system. It is used to indicate when flow through the system has dropped below the minimum level required for adequate oil cleansing and replenishment of the lubrication pump reservoir. A flow failure is indicated by the absence of the red "normal oil flow" light inside the flow switch enclosure and the illumination of the warning light on the main panel. The flow switch is factory set at .22-.25 GPM (.83 -.95 l/min) and field adjustment is not advised. A pair of stepped pressure switches monitors the system pressure. The initial switch indicates that a filter change-out will be required soon. The second pressure switch indicates that the filter needs to be changed *promptly*. Pressure switch settings are field adjustable and must be set to reflect the type of oil used and operating temperatures the filter is working with to receive maximum use from the filters. The "change filter" (upper) switch typically activates at 08-10 PSI (.50-.65 BAR) above the start-up pressure and "shutdown" (lower) switch at 4 PSI (.25 BAR) above that. Because each installation and packaging operation is different, it is important that the pressure switches be set in the field. Complete field adjustment instructions are included in this manual. This model of 830-022.1 also has a digital temperature sensor that displays the oil temperature and can be programmed for low and high oil temperature alerts.

The selector/solenoid valves are operated by remote sensing switches and timers which vary depending on the option selected at the time the order is placed. The maximum line resistance pressure on the diverter valve should be less than 20 PSI (1.20 Bar) when the valve is activated.

SYSTEM PRESSURES

Pressure readings will vary widely with the oil viscosity, ambient air temperature and temperature of the oil entering the filtration system. It is also not unusual for system pressures to rise substantially over normal levels when re-starting a system that has been left off for several days or when changing particulate filters. Typically, the system will return to normal levels after 45-60 minutes as the warm oil from the seamer flushes out the cooler oil from the filter elements and filtration passages in the new element open under pressure. A timed delay in the pressure switch alarms should be programmed in for these reasons. In cold climates, it may be necessary to install a heater blanket (HTI # 270-001) on the Hydro-Fil filter canister to maintain the desired 90-110°F operating temperature.

Factory Set Warning Pressures and Change Out Pressures

Using 750 SUS (150 ISO) lubricant @ 100°F

Typical bag element change out is 08 -10 PSI (.55- .70 BAR) increase over new element pressure. All measurements should be made when system is fully warmed to operating pressure.

OIL SELECTION INFORMATION

HTI Filtration has tested many oils commonly used in seamers. While we do not recommend a specific brand or type of oil, we do recommend that you use a high quality oil that has good hydrolytic stability. That is, an oil that can be exposed to water repeatedly and dried without deleting or precipitating the additive package.

The viscosity of the oil plays a major role in determining the operating pressure of the system. A 40 Wt. oil rated at 750 SUS at 100°F is actually 2,000 SUS at 75° F, a 260% increase in viscosity! Even small temperature changes can result in significant pressure variations in the system. It is not uncommon for a cold filter system to read higher pressures in the morning and have the pressure drop off as the system components warm over several hours to an even operating temperature.

Field Adjustment of Pressure Switches

Before changing any settings on a Hydra-Clean Fluid Conditioning System run the seamer and filter until the oil is at the normal operating temperature (typically between 95-105°F). This normally takes several hours because of the relatively low flow volume and high metal mass of the components.

NOTE: *Do not attempt to reduce or increase the operating pressure by adjusting the internal pressure relief valve on the pump. This safety device has been set and locked into place at the factory. Attempting to adjust the pressure setting screw can jam the relief valve and prevent proper movement. Improperly removing the acorn nut may also result in air leaking into the system, which will require frequent system bleeding until the acorn nut seal is replaced.*

1. Turn filter system on and allow oil to fill both canisters while venting the air through the bleed cocks on the canister lids.
2. As soon as fluid flows from bleed cock, close and secure.
3. Allow filter system to run for 60-120 minutes to flush cold oil out of the filters and bring entire system up to operating temperature. Note the operating pressures of the filters.
4. Slowly close the 1/4" ball valve at the base of the Hydra-Supreme (left hand side) canister, until the system pressure is 10 PSI higher than the reading in Step 3.
5. Remove cover of warning pressure switch (right hand switch) and adjust it by rotating the SET ring until LED illuminates. The RESET ring should be set 5 PSI below the level of the SET ring. Place the cover back on the switch
6. Increase system pressure by 2-4 PSI by further closing the valve and then adjust the maximum pressure switch (left-hand switch) the same way as in Step 5.
7. Open the ball valve to relieve the pressure build-up and allow the system to run for 10-15 minutes before recording the pressures for future reference.

SYSTEM LOCATION

Although the Hydra-Clean system uses a self-priming pump, it is advisable to keep the filter below and as close to the reservoir as possible. A suction line vacuum condition no greater than 20"hg should be experienced during start-up and normal operation. Pump damage will occur at vacuum levels above 24" hg. Where pump suction is high, either a larger inlet pipe size or a booster pump is required. We recommend using the HTI booster pump system 460-064 as it is pre-set for proper boost pressure and maximum efficiency. Remote mounted filters will also experience higher-pressure readings due to the increased return line resistance.

Set the filtration system cabinet on a solid level surface. Allow a minimum of 24" of frontal clearance for service access. Locate filter away from sources of moisture and heat. The filter system must be kept below 140°F and protected from moisture.

PLUMBING

Inlet and return tubing should be 3/4"/20mm with a preferred maximum distance of 20'. Smaller tubing can be utilized where the connection runs are shorter and/or the operating temperature is above 80° F.

The solenoid ports utilize 1/2" JIC fittings. Flow election is determined by remote activation of the solenoid valve from the main control panel. Outlet lines to the main reservoir and lubricating system should be 3/4" or 20 mm. Ball valves can be installed at both reservoir connections for easy shut off during installation or service.

ELECTRICAL

The motor utilizes a 1/3 HP 3 phase, 50/60 Hz power with a number of voltage options. Please check the nameplate on your motor if you are unsure of your power type.

The pressure switches, solenoid coils and flow sensor come standard using 24 VDC operating power. 120 VAC power is optional for all the sensors .

The power source for the filter should be independent of the basic machine control, as the oil filtration system should run continuously for efficient contaminant control.

INITIAL START-UP PROCEDURE

Upon completion of the electrical and hydraulic connections, the Hydra-Clean system is ready for start-up. The HC211 is factory adjusted to perform with a fluid viscosity of 750 SUS (164 C ST at 40°C) at 100°F. To use different viscosity fluids or to run at different temperatures, please make the recommended changes to the switch settings. (See previous section in this manual for further information on adjusting pressure settings.)

FILTER SYSTEM START-UP

Crack open the petcock between the check valve and the pump inlet. Turn the electrical power on to start the gear pump. **If air is being pushed out of the bleed cock, the motor is running in reverse.** Make sure the inlet and return lines to the reservoir are free of restriction and all valves are open. Crack open the bleed cocks at the top of both canisters. As soon as fluid starts to flow from the bleed hole, close the cock securely and wipe the fluid from the canister top. Let the system warm up to typical operating temperature.

When initially starting the Hydra-Clean system, air may enter the plumbing lines in sufficient quantity to keep the pump from priming itself or create a false reading in the oil flow sensor. Should this occur, you must bleed off this trapped air by opening the bleed cock located at the pump outlet elbow just above the union.

NOTE: *Your Hydra-Clean fluid scrubbing system should have no occasion to exceed 95 PSI when properly installed and using the recommended type fluid. Should a pressure condition exceed the recommended maximum, immediately shut off the filtering system and contact HTI for assistance.*

FILTER ELEMENT REPLACEMENT

BAG ELEMENT: 800-004

A new bag element should be installed after the system has been in service for a maximum of six (6) months or shows 8-10 PSI pressure increases.

- Step 1: Turn off the Filter System. It is not necessary to turn off the seamer to service the filter.
- Step 2: Open the drain cock at the bottom of the bag (left hand) canister. Open the bleed cock at the top. The 3/8" hose can be used to direct the oil to a container where it can be poured back into the canister for re-use.
- Step 3: When canister is empty, remove the canister clamp ring and lift off the lid.
- Step 4: Examine the "O" ring for wear and replace it if there are signs of wear or if the canister was leaking.
- Step 5: Slowly lift the bag out by the strap allowing the captured oil to drain back into the canister. Hang the bag over a receptacle if you want to reclaim the approximately 3 cups of oil entrained in the bag.
- Step 6: Slice open the plastic bag holding the new element. Carefully remove the bag and straighten to its full length. Slide the new bag into the colander using the fabric strap to push the metal bag ring down firmly onto the seat. Do not use the fabric strips inside the bag to seat the filter as they may tear..
- Step 7: Close the drain cock and fill the bag with the drained oil captured in Step 2.
- Step 8: Put the "O" ring back on the canister lip, replace the lid, clamp and tighten.
- Step 9: Start the motor and allow the air to escape through the bleed cock. Close the cock when fluid starts to come out, wipe off the unit and check for leaks.

AXIAL ELEMENT: 800-016

- Step 1: Turn off the filter system. It is not necessary to turn off the seamer to service filter.
- Step 2: Open the drain cock at bottom filter (right hand) canister. Open the bleed cock at the top. The 3/8 "hose can be used to direct the oil to a container where it can be poured back into the canister for reuse.
- Step 3: When canister is empty, remove the canister clamp ring and lift off the lid.
- Step 4: Examine the canister "O" ring for cracks and wear spots. If the canister lid sea was leaking, or if the "O" ring shows signs of wear, replace the ring.
- Step 5: Unscrew the "T" handle (CCW motion) assembly that holds the filter in place. The cup seal on the handle assembly should be smooth and free of rough spots or tears. Replacement seals are available.
- Step 6: Slice open the end of the plastic bag holding the new element. Remove the new element and set in a clean area. Lift used element off of center post and slide it into plastic bag.
- Step 7: Slide new element over the center post. Make sure the metal lifting bale is at the top. Insert "T handle" into top of element and turn in a CW motion until the handle firmly stops.
- Step 8: Close drain cock and refill canister with oil.
- Step 9: Put the "O" ring back on the canister lip, replace lid, clamp and tighten.
- Step 10: Start the pump motor and allow air to bleed out through bleed cock on top of canister. Close bleed cock when fluid starts to come out. Wipe off unit and check for leaks.

CAUTION

*Some hydrocarbon oils are not suitable for extended use after they have been mixed with water. These non-hydrolytically stable lubricants tend to precipitate out their additives, which are captured by the Hydra-Supreme axial filter element. These oils **look** acceptable, but no longer have the original anti-wear and anti-oxidization characteristics of new oil.*

HTI Filtration recommends that you use a premium grade lubricant whenever you have an on-going water contamination problem and that you consult your lubricant supplier for specific information on your specified oil.



HTI FILTRATION INC.

7716 Gary Watson Pt. • Colorado Springs • CO 80915 • USA • Ph 719-490-8800

SYSTEM SPECIFICATION SHEET - System # 830-022.1

System Description: Hydra Supreme HC211 filtration systems are designed to remove water and particulate from lubricating oil circuits. Our Model 830-022.1 is an updated system designed to work with fillers and seamers where water intrusion is a problem. This system applies the patented Hydro-Fil water bag to absorb free and emulsified water in series with the Hydra Supreme series filter element, which removes both hard and soft particulate from the oil supply. The 830-022.1 is designed for use with lubricating fluids ranging from 350 to 1000 SUS (at 100 F). Each system comes completely assembled on a panel for mounting inside a cabinet or enclosure. Each system has dedicated motor, pump with internal relief valve, flow sensing switch, dual pressure switches, diversion valve and electrical connection box. The canister assembly requires overhead clearance inside the enclosure to facilitate filter element exchange.

Physical Data:

System Height: 31.5" (80 cm)
Width: 24.4" (70 cm)
Depth: 13" (33 cm)
Weight: 207 lb. (94 kg) Crated

Material:

Canisters: Electroless Nickel coated steel
Panel: Epoxy coated mild steel
Pressure Gauges: SS body, Lexan lens

Performance Data:

Pump type: Rotary ring gear, internal relief
Flow: 0.5 GPM (oil: 750 SUS @ 100°F)
1.9l/min (oil: 108 Cs @ 37.7C)

Water Retention Capacity: 2.0 liter typical

Electrical Specifications:

Motor - 1/3 HP TEFC 50/60 Hz 3 phase 190-575 V
Connectors and Rails: DIN EN 50 022, UK 2.5 B
Cables: Olflex 150 (Quatro Approval)

Connection Data:

Oil inlet - 3/4" male 37' JIC
Oil outlet - 3/4" male 37' JIC

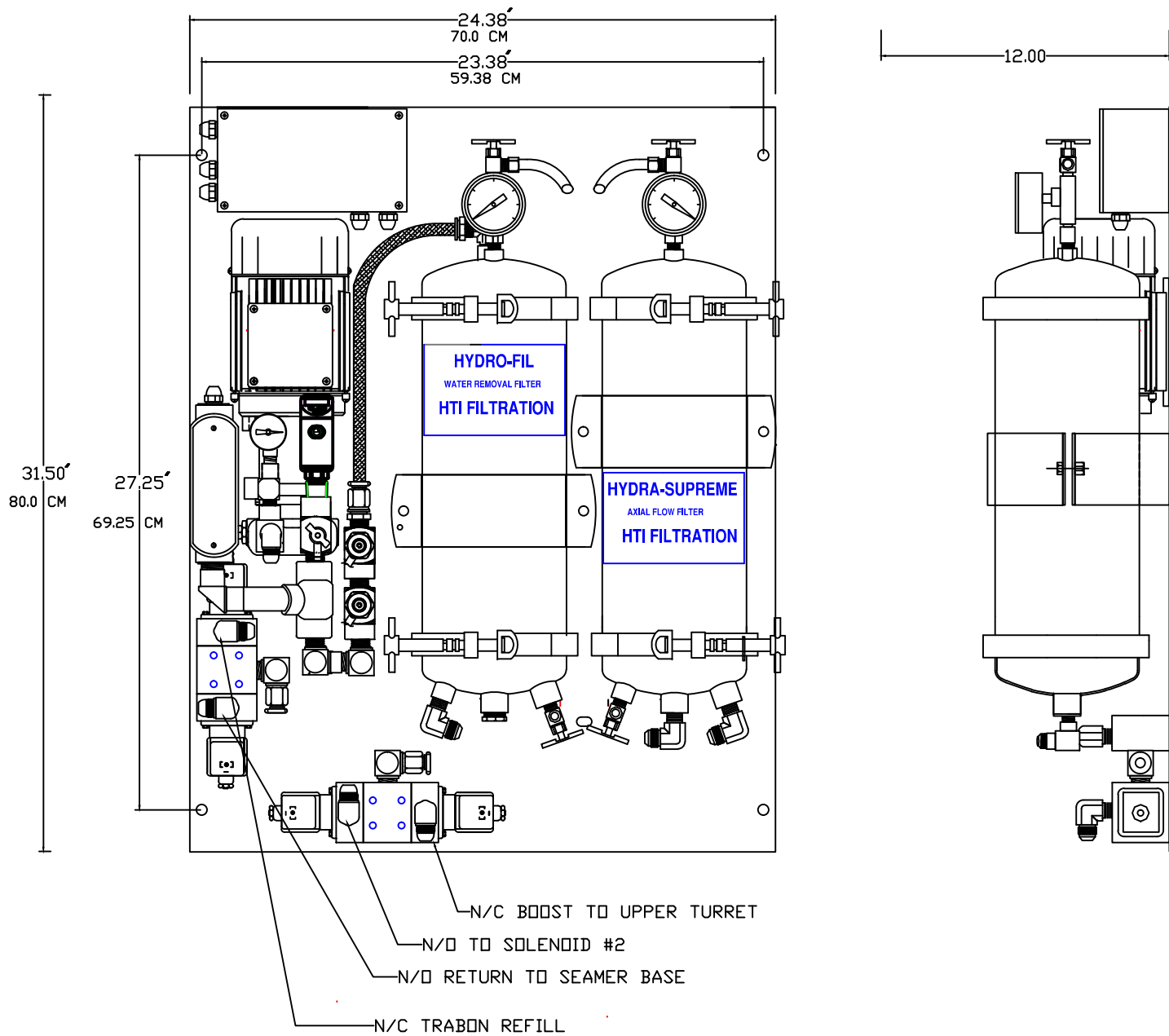
Safety Switches:

Flow switch - 24 VDC
Pressure switch - 9.6-32 VDC Field adjustable, PNP 5 m PUR. LED switching and power status

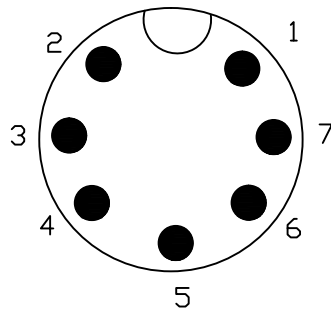
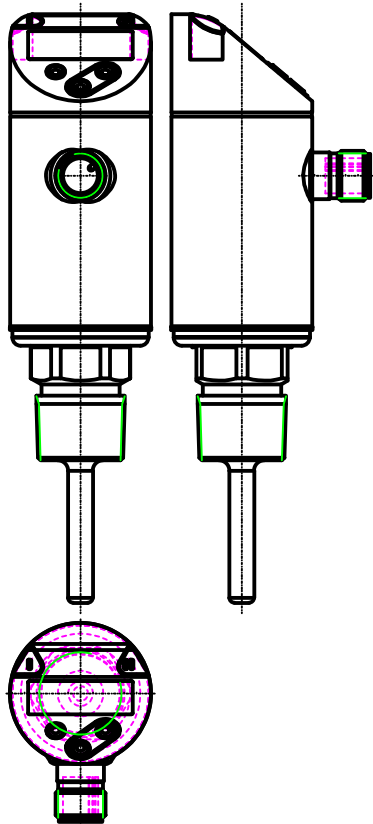
Filters:

Hydro-Fil - 800-004
Hydra-Supreme - 800-016





DWG. TITLE 830-022.1 FILTRATION SYSTEM				HTI FILTRATION		830-022.1 LAYOUT			
PROJECT DESCRIPTION LUBRICATION OIL CLEANING SYSTEM						- - - - - ORIGINAL ISSUE			
7716 Gary Watson pt. Colorado Springs, CO CO, USA 80915				0	09-30-13	SP	SP	DESCRIPTION	
JOB NO. -	DRAWING NO. 830-022.1	REVISION B	CUST. CONTR. NO. -	REV. DATE: DRWN BY: CHKD BY: CUSTOMER:					

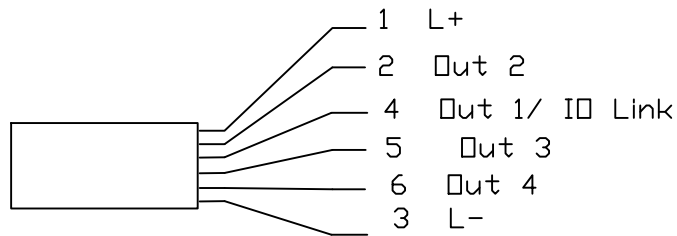


PROGRAMING OF SWITCH OUTPUTS:

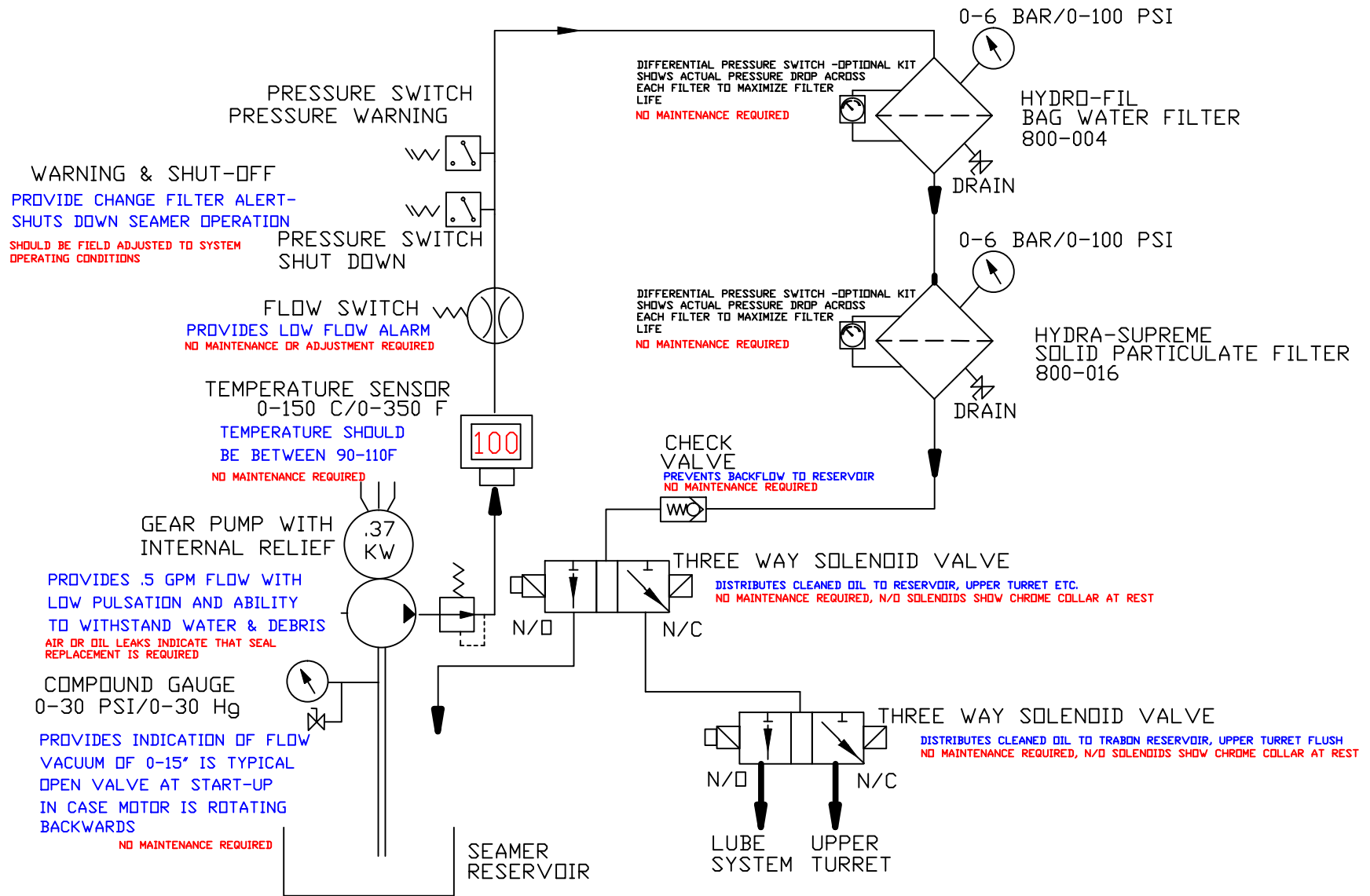
Hno = HYSTERESIS IS / NO
 Hnc = HYSTERESIS IS/ NC
 Fno = WINDOW / NO
 Fnc = WINDOW / NC

ELECTRICAL DATA-

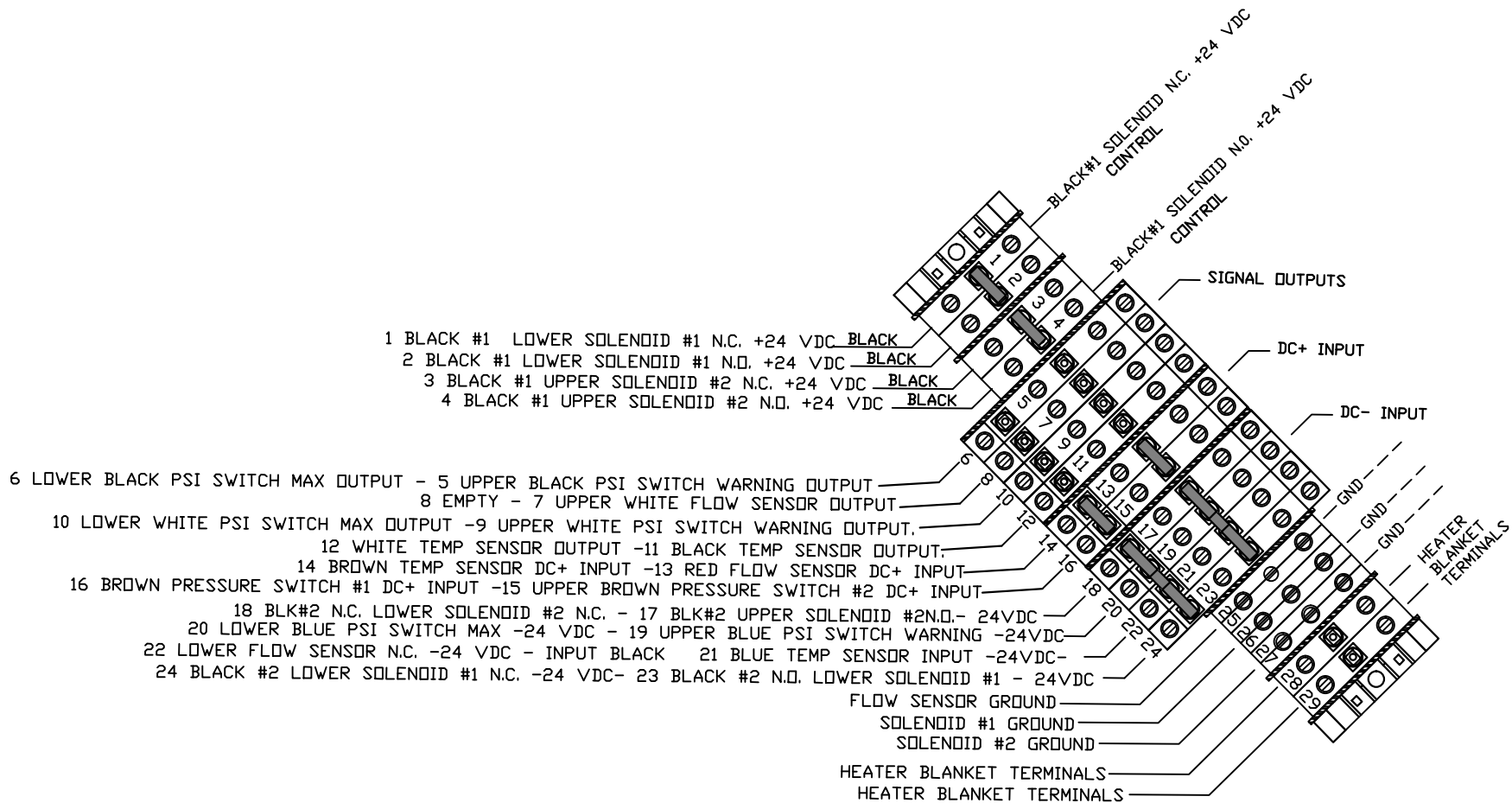
DESIGN - DC PNP
 OPERATING VOLTAGE - 18..30 VDC
 CURRENT CONSUMPTIION I_{max} <80
 PROTECTION CLASS III
 REVERSE POLARITY PROTECTION - YES



DWG. TITLE TEMPERATURE SENSOR ILLUSTRATION				HTI FILTRATION						
PROJECT DESCRIPTION TEMPERATURE SENSOR 640-004						7716 Gary Watson Pt. Colorado Springs, CO CO, USA 80915		0	03-10-21	SP
JOB NO. -	DRAWING NO. 640-004	REVISION	CUST. CONTR. NO. -			REV.	DATE:	DRWN BY	CHKD BY	DESCRIPTION
						CUSTOMER				

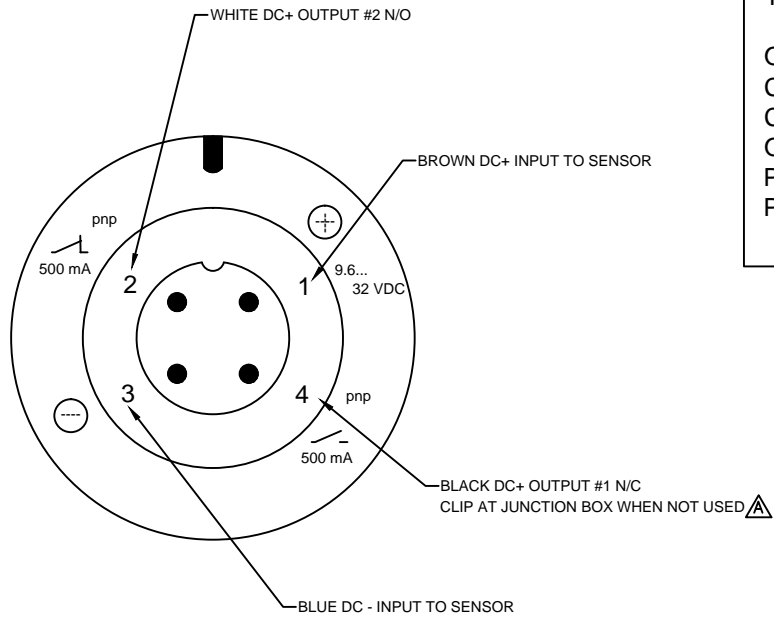


DWG. TITLE				830-022.1 MAINTENANCE SCHEMATIC				HTI FILTRATION INC.				830-022.1			
PROJECT DESCRIPTION								7716 Gary Watson Pt. Colorado Springs, CO							
SEAMER PARTICULATE AND WATER REMOVAL SYSTEM								CUSTOMER							
JOB NO.	DRAWING NO.	REVISION	CUST. CONTR. NO.	B	830-022.1	8	-	REV.	DATE:	DRWN BY	CHKD BY	DESCRIPTION	-		
-	830-022.1	B	-	A	8-18-2010	SP	RH	A	8-18-2010	SP	RH	ADD CHECK VALVE	-		
-				-				-				-			



NOTE- JUMPER TERMINALS 23 & 24, 15 & 16 TO PROVIDE POWER BETWEEN LAYERS

DWG. TITLE 830-022.1 CONNECTOR DIAGRAM				HTI FILTRATION INC		830-022.1				
PROJECT DESCRIPTION 830-022.1 FILTRATION UNIT				7716 Gary Watson Pl. Colorado Springs, CO CO, USA 80915		C	08-25-201	SP	RH	ADD SPARE TERMINALS
						B	06-16-20	SP	RH	ADD TEMP SENSOR
						A	12-18-12	SP	SP	NEW PRESSURE SENSOR WIRING
JOB NO.	DRAWING NO.	REVISION	CUST. CONTR. NO.			REV.	DATE:	DRWN BY	CHKD BY	DESCRIPTION
-	830-022.1 CD	C	-			CUSTOMER	-			

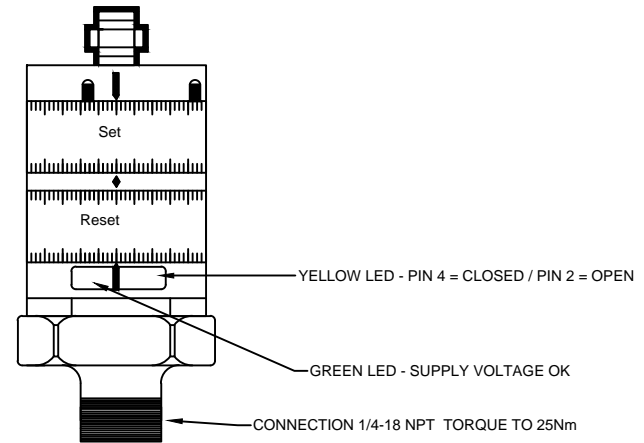


TECHNICAL DATA -

OPERATING VOLTAGE -	9.6 TO 32 VDC
CURRENT RATING (mA) -	500
CURRENT CONSUMPTION -	<25
OPERATING TEMPERATURE -	-25 TO 80 C
PROTECTION -	IP 67 / III
PRESSURE RANGE-	0...10 BAR 0...145 PSI

NOTE:
 USE 620-005 RIGHT ANGLE CONNECTOR
 M12 micro DC (4 pin) 5m 22 AWG, Black
 PUR jacket

USE 620-006 CLEAR COVER



DWG. TITLE PRESSURE SWITCH ILLUSTRATION				HTI FILTRATION						
PROJECT DESCRIPTION PRESSURE SWITCH 620-004						7716 GARY WATSON PT COLORADO SPRINGS CO 80915		A	02-20-24	SP
JOB NO.	DRAWING NO.	REVISION	CUST. CONTR. NO.			0	08-10-12	SP	SP	ORIGINAL ISSUE
-	620-004	A	-			REV.	DATE:	DRWN BY	CHKD BY	DESCRIPTION
						CUSTOMER				

**TROUBLESHOOTING GUIDE
ANGELUS SANITARY CAN SEAMER FILTRATION SYSTEM
ALL HYDRA-SUPREME MODELS**

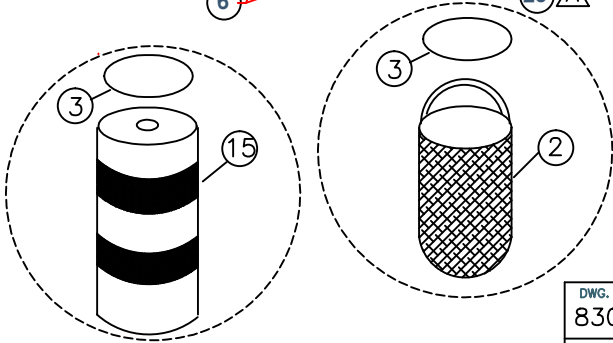
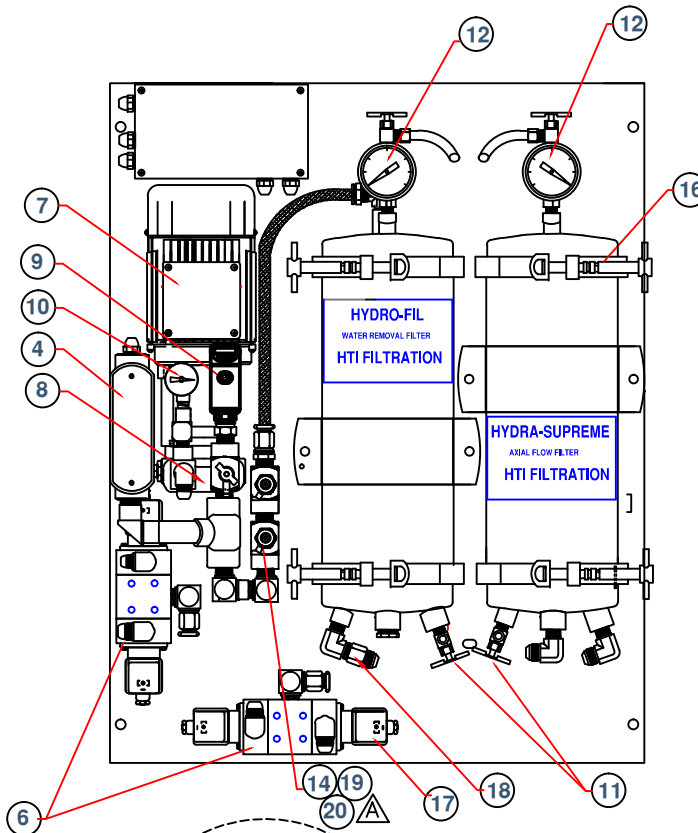
When using this guide please remember that all pressure and flow readings are to be taken with the system at normal operating temperatures.

SYMPTOM	CAUSE	CORRECTIVE ACTION
ERRATIC FLOW RATE, BUBBLES IN OIL STREAM	AIR LEAK IN FITTINGS, BLEED COCK OR VACUUM GAUGE	CONFIRM THAT VACUUM BLEED AND GAUGE ARE AIR TIGHT, CHECK FITTINGS
	AIR LEAK UNDER RELIEF PUMP ADJUSTMENT NUT	MAKE SURE TORQUE STRIPE ON ACORN NUT IS INTACT, REPLACE SEAL IF BROKEN
	LOOSE OR PINCHED FEED TUBE CONNECTION	MAKE SURE ALL PLUMBING CONNECTIONS ARE TIGHT
	LOW FLUID LEVEL	CHECK FLUID LEVEL IN RESERVOIR
EXCESSIVE VACUUM (ABOVE 15")	FLOW RESTRICTION	CHECK INLET PIPING FOR RESTRICTION, BLOCKAGE
	INLET PIPING RESTRICTION	CONFIRM ¾"-1" INLET PIPING SIZE
	OIL TOO THICK (OVER 900 SUS @100°F)	CHANGE TO LIGHTER GRADE OF OIL
	ENVIRONMENT TOO COLD - LESS THAN 60° FARENHEIT	INSULATE FEED LINE TO FILTER, HEAT CANISTERS
	SEAMER RUNS TOO COLD-OIL DOESNT' GET OVER 80° F.	CHANGE TO LIGHTER GRADE OIL
	AMBIENT AIR AND SEAMER TEMPERATURE UNDER 80° F.	INSTALL HEAT BLANKET ON FILTER CANISTER
LOW FLOW RATE WITH LOW PRESSURE	AIR BUBBLE IN PUMP	OPEN AIR VENTS TO BLEED OF AIR
	INSUFFICIENT MOTOR POWER GENERATED	CHECK FOR PROPER PUMP VOLTAGE AND ROTATION
	OIL BYPASSING THROUGH RELIEF VALVE	CHECK RELIEF VALVE FOR PROPER SETTING

SYMPTOM	CAUSE	CORRECTIVE ACTION
LOW FLOW RATE WITH HIGH PRESSURE	LOADED FILTER	REPLACE FILTER ELEMENT
	RESTRICTED OUTLET LINES	CHECK AND CLEAR RETURN LINES
EXCESSIVE PRESSURE	RELIEF VALVE SET TOO HIGH	CHANGE FILTER AND RE-SET RELIEF VALVE TO 65 PSI
PUMP WON'T WORK AFTER ELEMENT CHANGE OR STRAINER CLEANING	VACUUM LOCK IN PUMP	BLEED AIR OFF AT BLEED VALVE ON PUMP OUTLET
UPPER TURRET OR LUBRICATOR WON'T FILL	FAULTY SOLENOID COIL	CHECK COIL ON SOLENOID, REPLACE IF DEFECTIVE
CANISTERS LEAK AT LID CLAMP	CUT OR ERODED SEAL	CHECK SEALS FOR DAMAGE
	LID NOT TIGHT	TIGHTEN CLAMP BOLT

BILL OF MATERIAL

ITEM NO.	DESCRIPTION	DWG. NO
1	-	-
2	WATER BAG FILTER	800-004
3	O-RING	450-001
4	FLOW SENSOR 24VDC	620-010
5	-	-
6	SOLENOID VALVE H RATED	430-074
7	MOTOR	780-029
8	PUMP	770-013
9	TEMPERATURE SENSOR	640-004
10	VACUUM GAUGE	610-008
11	DRAIN COCK	430-004
12	PRESSURE GAUGE	610-010
13		
14	PRESSURE SWITCH	620-004
15	AXIAL FILTER	800-016
16	LID CLAMP	540-005
17	COIL 24 VDC	430-087
18	CHECK VALVE	430-086
19	PRESSURE SWITCH CABLE	620-005
20	PRESSURE SWITCH COVER	620-006
21		
22		



DWG. TITLE			
830-022.1 FILTRATION SYSTEM			
PROJECT DESCRIPTION			
LUBRICATION OIL CLEANING SYSTEM			
JOB NO.	DRAWING NO.	REVISION	CUST. CONTR. NO.
-	830-022.1	B	-

**HTI
FILTRATION**

7716 Gary Watson Pt
Colorado Springs
CO, USA 80915

830-022.1 PARTS LIST				
B	08/23/21	SP	RH	CHANGE TO TEMPERATURE SENSOR
A	07/31/17	SP	RH	CHANGE PRESSURE SWITCH
REV.	DATE:	DRWN BY	CHKD BY	DESCRIPTION
CUSTOMER	-			



HTI FILTRATION INC.

7716 Gary Watson Pt. • Colorado Springs, CO 80915 • 719.490.8800 • sales@htifiltration.com

STANDARD WARRANTY

This filter system was inspected before shipment from our plant. To the original purchaser of this system, HTI Filtration warrants its products free from defects in material and workmanship for a period of one (1) year from date of purchase.

HTI Filtration makes no other express warranty and excludes (and buyer waives) any and all implied warranties including, without limitation to, implied warranties in connection with the design, sale, merchantability or fitness of the goods for any particular use or purpose.

In order for any claim under this warranty to be valid, HTI Filtration must receive notice in writing from the buyer within a reasonable time period, not to exceed thirty (30) calendar days after any defect is discovered. The claim must include a detailed report of the conditions of use at the time of discovery of defect. Parts which fail or become defective during the warranty period (except as a result of freezing, melting, improper installation, use or care), shall be replaced or repaired at HTI Filtration's option at no charge within 90 days of the receipt of the defective part, barring unforeseen delays. HTI Filtration shall in no event be responsible for the repairs made by others without the express written permission and consent of HTI Filtration.

To obtain warranty replacement or repairs, defective components or parts should be returned, freight prepaid, to place of purchase or nearest authorized service center. HTI Filtration shall not be responsible for cartage, removal and/or reinstallation labor or any other such costs incurred in obtaining warranty replacements. In no event shall HTI Filtration be responsible for any incidental or consequential damage, whether foreseeable or not and whether or not such damage occurs, or is discovered before or after repair or replacement.

The forgoing warranty does not apply to wear components, seals or filtration elements.

This warranty extends only to the original buyer and HTI Filtration makes no other warranty, expressed or implied, to other persons or entities. If buyer makes any warranty or representation inconsistent with or in addition to the warranty stated hereinabove, the buyer shall, at their own expense, defend and hold HTI Filtration harmless from any claim thereon of any nature whatsoever.