OIL
FILTRATION
SYSTEMS
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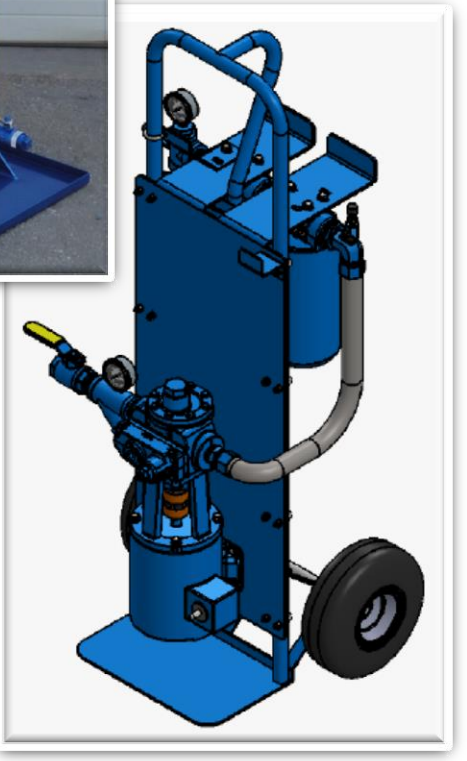
OPERATORS MANUAL

FILTER CART

MODEL #: _____

SERIAL #: _____



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1. GENERAL INFORMATION

The Filter Cart is designed to filter a wide variety of hydraulic and lubrication oils to meet or exceed new oil cleanliness specifications. For particulate removal, the system is typically equipped with high efficiency filter elements made from micro-glass media and rated Beta(c) > 1000 per ISO 16889, meaning that 99.9% of all particles of a given micron size are removed in a multi-pass system.

For water removal, Spin-On units can be equipped with water removal filter elements capable of removing up to 1 quart of free water per filter. Units equipped with the C472 Coalescer option remove water by passing the fluid through a coalescer / separator element, which separates emulsion of two intimately dispersed, immiscible liquids (such as water and oil).

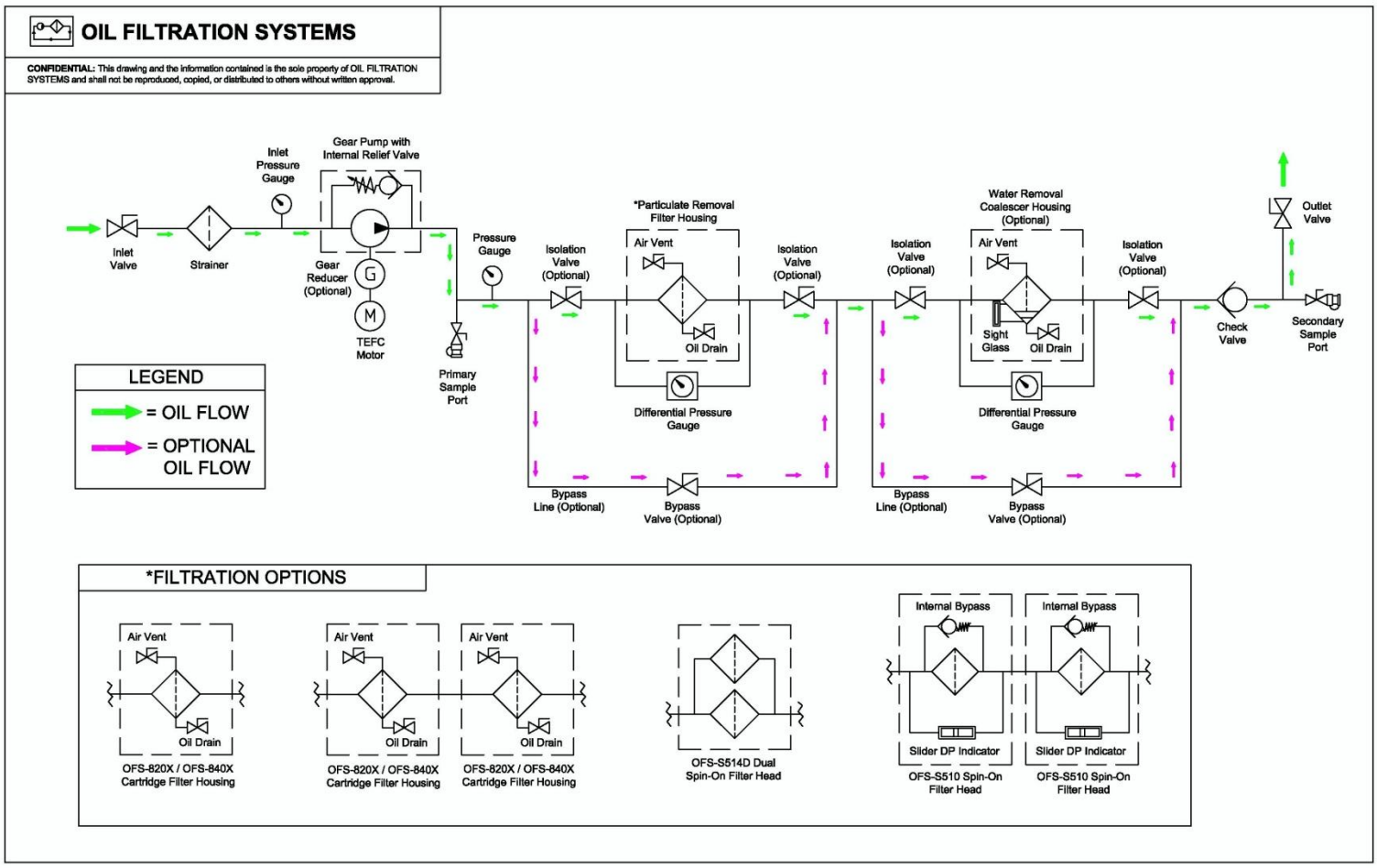


Figure 1: Flow Schematic

2. STANDARD FEATURES

FEATURES	ADVANTAGES	RESULTS
Differential Pressure Gauge	•Precise Filter Life Indication	•Less Filter Waste •Reduced Filter Costs
Compact size & weight	•Ease of Portability •Ease of On-Site Orientation	•Increased Usage
System Pressure Gauge (Pump Outlet Pressure Gauge)	•Overall System Pressure Indication	•Increased User Efficiency •Increased User Safety
Inlet Pressure Gauge (Pump Inlet Pressure Gauge)	•Exact Measurement of Pump Performance	•Increased User Efficiency
Positive Displacement Pump	•No Need to Prime System	•Less Operator Labor •No Additional Equipment Required
High Grade Petroleum Transfer Hose	•Longer Hose Life	•Reduced Replacement costs
Rigid Steel Construction	•Increased Durability	•Longer System Life
In-Line Sample Port Valves	•Quick and Easy Oil Sampling	•No System Downtime for Oil Sampling
Inlet Strainer	•Protects Pump from Large Particles	•Longer Pump Life

3. MODEL NUMBER KEY

FC -10 VFD - 840X - C472 - AD - DP - DPM - MSB - EHC - SS - 120 - N4 - V - Z

System Description:
FC = Filter Cart
FCC = Fuel Coalescer Cart

Flow Rate:
2 = 2 GPM
3 = 3 GPM
5 = 5 GPM
7 = 7 GPM
10 = 10 GPM
15 = 15 GPM
VFD = XGPM Variable Flow

Filtration:
820X = OFS-820X (Series) Cartridge
820X/2 = Qty. 2 OFS-820X (Series) Cartridge in Series
840X = OFS-840X (Series) Cartridge
840C = OFS-840C (Sereis) Coreless Cartridge
S510/2 = Qty. 2 OFS-S510 (Series) Spin-On Elements in Series
2/S510 = Qty. 2 OFS-S510 (Series) Spin-On Elements in Parallel
S514D/2 = Qty. 2 OFS-S514D (Series) Spin-On Elements in Series
2/S514D = Qty. 2 OFS-S514D (Series) Spin-On Elements in Parallel
*C472 = OFS-C472 Coalescer/Separator Element

****Optional Equipment:**
AD = Air Driven Motor
***DP = Differential Pressure Gauge
DPM = Digital Particle Monitor
EHC = Wetted Components Compatible with Fyrquel EHC Fluid
MSB = Manual Service Bypass
SS = Stainless Steel Wetted Components
HD = Heavy Duty Cart

Electrical Requirement:
120 = 120V / 1Ph / 60Hz
200 = 200V / 1Ph / 50Hz
220 = 220V / 1Ph / 50Hz
220V / 1Ph / 60Hz
220V / 3Ph / 50Hz
220V / 3Ph / 60Hz
380 = 380V / 3Ph / 50Hz
400 = 400V / 3Ph / 50Hz
415 = 415V / 3Ph / 50Hz
480 = 480V / 3Ph / 60Hz
575 = 575V / 3Ph / 50Hz

Electrical Rating:
N4 = NEMA 4
N7 = NEMA 7 Explosion Proof

Seal Material:
V = Viton
B = Buna N

Custom Options:
Z = Custom Equipment (Specified)

*This field of the model number represents optional filtration equipment and does not exist on standard Filter Carts, which are not equipped with a C472 Coalescer Housing.
**This field contains as many options as have been specified on the unit. On a standard Filter Cart, with no options, this field of the model number does not exist.
***This option is a standard feature on Filter Carts equipped with cartridge style filtration (820X / 840X).

4. SYSTEM SPECIFICATIONS

Mechanical Operating Specifications	
Maximum Flow Rate	See Nameplate Rating
Maximum Discharge Pressure	100 PSI (689.5 kPa)
Maximum Oil Viscosity	1500 SSU (323.7 cSt)
Seal Material	Viton or Buna N

Product Restrictions

IMPORTANT: This system should never be used to remove particulates from volatile fluids such as gasoline since the pump cannot be used for solvents with low lubricity. In addition, the unit should not be used on liquids with a flash point below 200°F (93°C).

5. ENGINEERING PRODUCT WARRANTY

For a period of one (1) year from the date of delivery, Oil Filtration Systems, LLC. (Seller) engineered products are warranted to be free from defects in materials and workmanship when properly installed, maintained, and operated within the specified working parameters for which the equipment was designed. If the engineered product does not perform as warranted, it will be repaired or replaced at the Seller's discretion. The Seller will provide parts and labor, free of charge if the defect had occurred within the first year.

This warranty does not apply to consumable components such as filter elements, light bulbs, etc. This warranty shall not apply to product altered by anyone other than Seller or their representative.

At the Purchaser's option, the defect may be handled by one of the following methods:

- Ship (freight pre-paid) the unit in its entirety to Seller for repair or replacement.

- Remove the defective component and ship (freight pre-paid) to Seller for inspection and test. Upon completion of the evaluation, typically fourteen (14) business days, Seller will notify Purchaser if the claim is warranty related. If the claim is valid, a replacement component will be immediately shipped. If the claim is found to be due to improper installation, maintenance, or operation, a Purchase Order will be required for the replacement component.

- Remove the defective component and ship (freight pre-paid) to Seller with an open Purchase Order. Seller will immediately ship a replacement component and begin evaluation concurrently. Upon completion of the evaluation, typically fourteen (14) business days, Seller will notify Purchaser if the claim is warranty related. If the claim is valid, the open Purchase Order will be returned without any charges. If the claim is found to be due to improper installation, maintenance, or operation, the open Purchase Order will be invoiced for the amount of the replacement component.

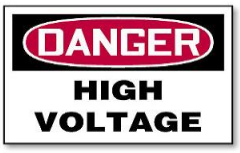
SELLER SHALL NOT BE RESPONSIBLE OR LIABLE FOR DOWNTIME, LOSS OF INCOME, LIVING EXPENSES, OR OTHER INCIDENTAL OR CONSEQUENTIAL DAMAGES THAT MAY ARISE OUT OF THE USE OF THIS PROPERTY. THIS WARRANTY IS THE SOLE WARRANTY MADE BY OIL FILTRATION SYSTEMS, LLC. IN REGARDS TO THIS EQUIPMENT. OIL FILTRATION SYSTEMS, LLC. MAKES NO OTHER WARRANTIES, EITHER EXPRESS OR IMPLIED, OR OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE.

6. SAFETY INSTRUCTIONS

This System has been examined and tested for safety. If there is any possibility that the oil being purified is contaminated with a solvent or materials which could be considered hazardous, either with toxicant or flammable explosives, the purifier should not be used unless precautions are taken to vent the vapors in a safe manner according to local, state, and federal codes and the flash point is above 200°F (93°C). This caution is necessary to prevent the possibility of fire, explosion, or toxic injury to persons and property.

Nameplate is a General Representation

NOTE: Normal safety practices and common sense should always be exercised when operating this unit.



Each unit has been manufactured to meet application specific electrical requirements (see nameplate for electrical power input rating). The main power disconnect on the electrical panel (if equipped) door must be in the OFF position to gain access to the electrical panel. Supply power to the unit should be disconnected before the electrical panel door is opened. Only authorized and trained personnel should open the electrical cabinet to attempt service.

7. FLUID COMPATIBILITY

Seal material is represented by a "V" or "B" in the model number. Depending on the seal material of the system, the following specifications apply:

Viton (V): The process fluid must be compatible with Viton seal material. Viton is good in the temperature range of -15°F to +400°F. It is generally recommended for lubricating, fuel and hydraulic oils.

Buna N (B): The process fluid must be compatible with Buna N seal material. Buna N is generally recommended for petroleum, water, diesel and water glycol. Buna N is good in the temperature range of -65°F to +250°F.

Each unit may be ordered with different seals to provide compatibility with specialty fluids.

8. OPERATION PROCEDURES

8.1 - Unpacking

This system is delivered with maximum protection during transportation and handling.

NOTE: All damage attributed to the handling and delivery of the unit must be recorded and brought to the attention of the shipper immediately.

This system has been thoroughly tested for a minimum run time required to ensure proper operation. Fluid used to test the unit is matched as closely as possible to that listed on the application sheet completed by the customer and supplied with the order. The unit has been thoroughly inspected for defects prior to the delivery. All connections, however, should be checked prior to operating this unit, vibration and/or rough handling during delivery could adversely affect component alignment and/or connection tightness.

8.2 - Mechanical Installation

With the system in place, connect the inlet and outlet hoses from the reservoir to the system. The inlet port has been sized to provide enough flow to operate the unit in the automatic mode using oil with a maximum viscosity of 1500 SSU (323.7 cSt). A hose diameter equal to inlet/outlet port size (see specification sheet) is required to provide adequate oil supply to this unit.

NOTE: Use of a smaller diameter line will restrict the flow and will adversely effect the automatic operation of the unit.

The inlet/outlet connections have been sized for maximum hose lengths of 20 feet. Use of longer hose lengths must be approved prior to installation. When using "quick disconnect" on the inlet it may be necessary to oversize the hose, as "quick disconnect" fittings can restrict flow to the unit in specific applications. The system is capable of pulling oil up to 8 ft. (2.4 m) of negative head. For applications that exceed this, please consult the factory.

8.3 - Operating Instructions

Connect the hoses from the system to the oil supply reservoir.

Connect the Power Supply Cord to the electrical receptacle.

CAUTION: Supply power disconnect should be located within a line of sight to the power supply source.

Close all Drain Valves on the system.

Open the Inlet and Outlet Valves on the system and the oil supply reservoir.

8.3 - Operating Instructions (Continued)

Supply power to the system by turning the system ON/OFF switch to the ON position. The system will begin to operate.

Observe the Inlet Pressure Gauge. Normal indication should be between -10" Hg and 10 PSI depending on the fluid viscosity and inlet condition. A reading below -10" Hg indicates that there is probably a restriction in the system inlet and the strainer may need to be cleaned.

Once the system is up and running, slowly open the Air Vent Valve and bleed off the air in the Filter Housing (if equipped). Be sure that a container is placed under the Air Vent Valve while bleeding the air, as oil will come out after the air is purged.

The Filter Cart is now functioning fully. Observe the System Pressure Gauge. Normal discharge operating pressure is between 0 PSI and 20 PSI. However, with restricted or long discharge lines the pressure can be higher. The pump is set from the factory to relieve at 100 PSI to accommodate these higher pressure applications.

If a problem or failure occurs, it can likely be resolved by using the *Troubleshooting* section of this manual.

To stop the system, close the Inlet Valve and allow the unit to run for approximately 30 seconds. Any residual oil in the system will be returned to the reservoir.

Turn the system ON/OFF switch to the OFF position.

NOTE: Filter Elements should be changed as necessary when the unit is stopped, unless the unit is equipped with the Manual Service Bypass option. In this case, filtration can be bypassed and new elements can be installed during operation. Filter replacement guidelines and instructions can be found in the *Filter Replacement Procedures* section of this manual.

NOTE: If the unit is equipped with the OFS-C472 Coalescer / Separator Element, the unit should be stopped when the water level reaches the top of the sight glass and water should be drained from the C472 Coalescer Housing. If the C472 Coalescer Housing can be bypassed, water can be drained during system operation.

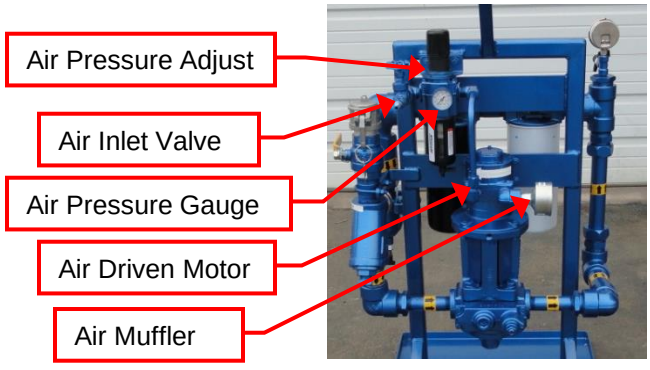
Close all valves on the reservoir and on the system.

Disconnect the Power Supply Cord from the electrical receptacle.

Disconnect all hoses.

8.4 - Air Driven Motor (Optional)

The Air Driven Motor option enables the Filter Cart to operate without an electrical power source. Units equipped with this option require an external air supply for operation. Compressed air can be delivered to the system through an external air hose with quick disconnect. Once the Air Inlet Valve is open, air pressure can be adjusted by turning the Air Pressure Adjust Valve. At 75 PSI the system is operating at full capacity. If the Air Pressure Gauge reads more than 75 PSI, the pressure must be adjusted to a lower setting. The air motors are typically non-lubricated and require no external lubrication, consult factory for any questions.



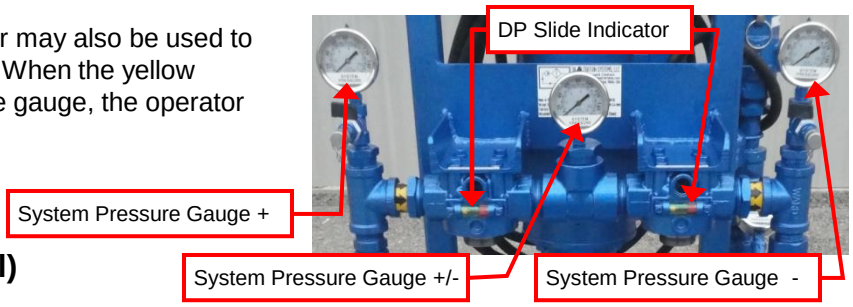
8.5 - Differential Pressure Gauge (Optional)

The Differential Pressure Gauge is used to measure filter life. For units equipped with cartridge style filtration (OFS-820X / OFS-840X), the filter element(s) should be changed when is the differential pressure reading is 40 PSID. For units equipped with Spin-On elements (OFS-S510 / OFS-S514D), the filter elements should be changed when the differential pressure reading is 25 PSID.

8.5 - Differential Pressure Gauge (Optional) (Continued)

Using pressure gauges before and after the filter housing(s) is another option to determine when the filter element(s) needs to be replaced. By taking the difference between the System Pressure Gauge +, before the filter housing, and the System Pressure Gauge -, after the filter housing, you are able to calculate the differential pressure. The same recommended differential pressure readings should be used to replace the filter elements- 40 PSID for cartridge style filtration (OFS-820X / OFS-840X) and 25 PSID for Spin-On elements (OFS-S510 / OFS-S514D).

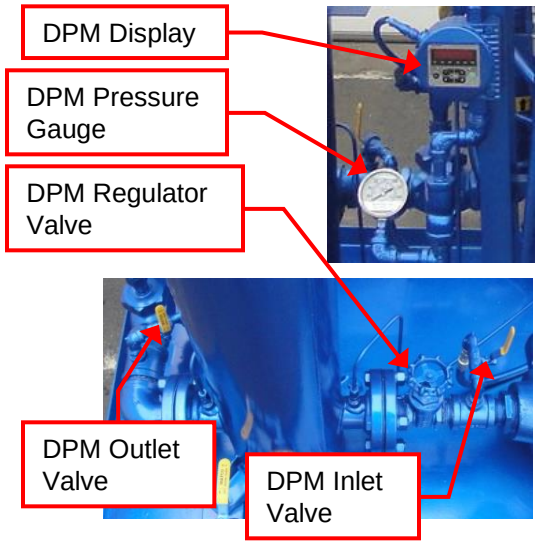
For a Spin-On filter housing, a DP Slide Indicator may also be used to determine when the filter needs to be replaced. When the yellow colored indicator moves to the red section on the gauge, the operator needs to replace the filter element.



8.6 - Digital Particle Monitor (Optional)

To use the Digital Particle Monitor (DPM), first open the DPM Inlet and Outlet Valves. Make sure that the DPM Regulator Valve is all the way open. The DPM Regulator Valve sets the required pressure drop between the inlet and outlet of the device for proper operation. Start closing the DPM Regulator Valve until the DPM Pressure Gauge reaches 20 PSI above normal operation (if the pressure is 10 PSI before closing the DPM Regulator

Valve, the operator should close the valve until the pressure is 30 PSI). Next, turn the Digital Particle Monitor to the ON position. The device will gather samples for 5 minutes for accuracy. The ISO Cleanliness Code can be checked by pressing the “Code Scroll” button on the DPM display. There are light indicators next to each particle size reading (4-micron, 6-micron and 14-micron). Record the first three readings for the ISO Cleanliness Code. If faulty readings occur, or if there is inadequate flow to the DPM, check the DPM Strainer for blockage. When the Digital Particle Monitor is not in use, turn off the device, close the DPM Inlet and Outlet Valves, and fully open the DPM Regulator Valve.



IMPORTANT: Turn off and Isolate the device when not in use. In addition, do not turn the device on when the oil is known to be dirty. Only turn it on after oil has circulated through the system 2-3 times.

* Factory DPM manual available upon request.

8.7 - Manual Service Bypass (Optional)

The Manual Service Bypass option allows the operator to bypass filtration while the unit is still operating, enabling the unit to stay online during a filter change or to be used as a transfer pump. To use the bypass, close the isolation valves on the inlet and outlet of the filter housing(s) or spin-on head(s). Then open the valve on the bypass line.

8.8 - Filter Replacement Procedures

For cartridge filter elements, drain the filter housing before replacing elements. Drain the housing(s) by opening the drain valve (with a container below) and opening the air vent valve. This will allow the atmospheric pressure to evacuate fluid from the vessel. After draining the housing, loosen the eye nuts to remove the lid.

IMPORTANT: OFS-820X (Series) and OFS-840X (Series) Cartridge style filter elements need to be replaced when the Differential Pressure Gauge reads 40 PSID, or every 6 months. OFS-C472 Coalescer / Separator Elements need to be replaced when the Differential Pressure Gauge reads 20 PSID, or every 6 months.

For Spin-On filter elements, loosen the element by rotating it counter-clockwise (from the bottom end of the element). Be sure to place a spill containment pan or container below the filter element before removal.

IMPORTANT: Spin-On style filter elements need to be replaced when the Differential Pressure Indicator reaches red, or every 6 months.

8.8 - Filter Replacement Procedures (Continued)

OFS-840C (Series) Coreless Cartridge Filter Elements:

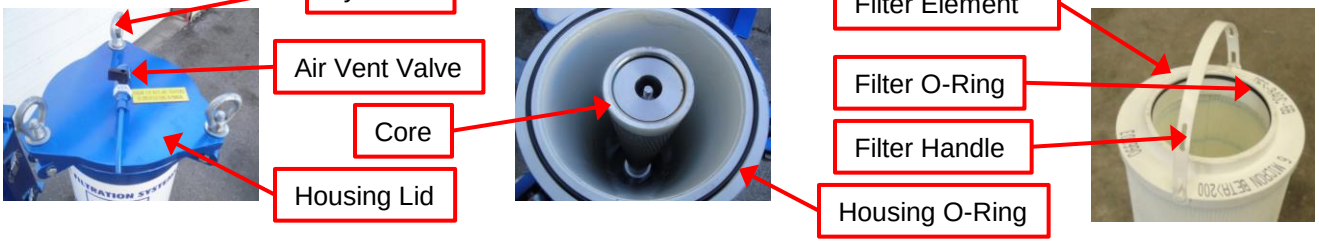
Open the Filter Housing Lid.

Remove existing Filter using handle (will lift straight up).

Lubricate Filter O-Rings with clean oil and Insert new Filter (handle side up) over the Core. Push down to properly seat the filter element.

Make sure the Filter Housing O-Ring is seated properly in the groove.

Close the Filter Housing Lid and tighten the Eye Nuts for a proper seal.



OFS-820X (Series) and OFS-840X (Series) Cartridge Filter Elements, and OFS-C472 Coalescer / Sepatator Elements:

Open the Filter Housing Lid.

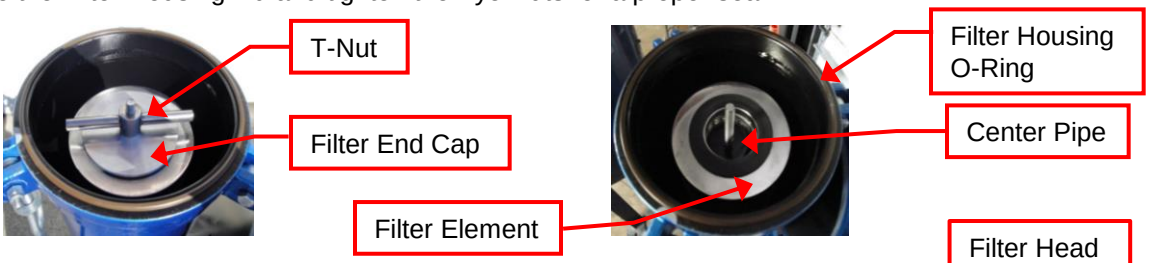
Loosen the T-Nut to remove the Filter End Cap and used Filter Element.

Install new Filter Element over the Center Pipe, so that it seats properly at the bottom of the Filter Housing.

Reinstall the Filter End Cap so that it seats properly at the top of the Element and tighten the T-Nut to secure the new Filter Element.

Make sure the Filter Housing O-Ring is seated properly in the groove.

Close the Filter Housing Lid and tighten the Eye Nuts for a proper seal.

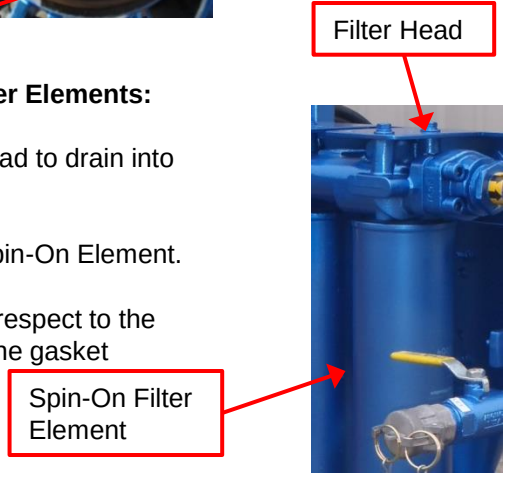


OFS-S510 (Series) or OFS-S514D (Series) Spin-On Filter Elements:

Unscrew the used Spin-On Element and allow the Filter Head to drain into spill containment pan or container.

Apply a light coat of clean oil to the rubber gasket on the Spin-On Element.

Install new Spin-On Element by spinning it clockwise (with respect to the bottom end of the element) onto the Spin-On Head. Once the gasket contacts the head, tighten ¾ turn more for a proper seal.



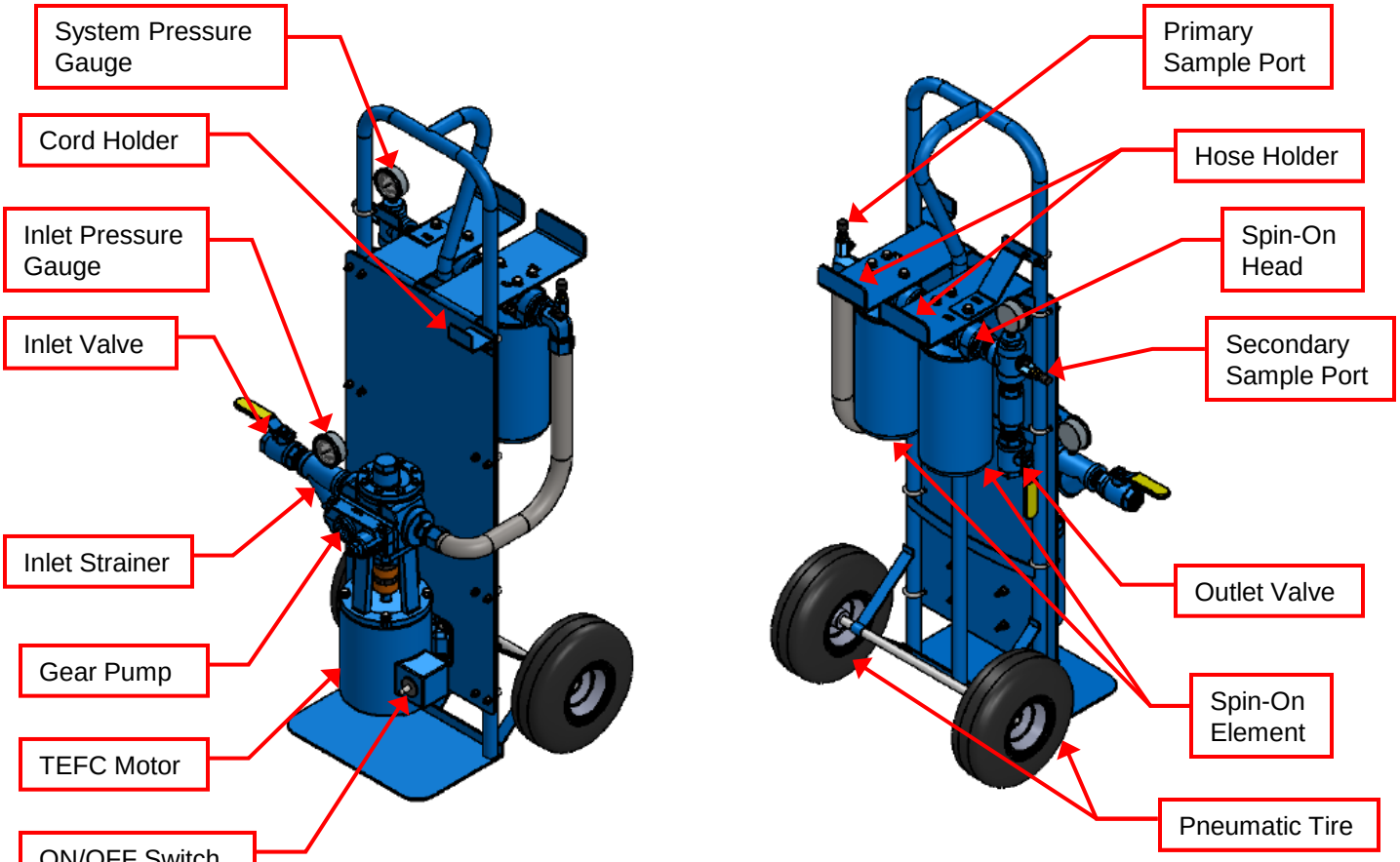
9. TROUBLESHOOTING

PROBLEM	CAUSE	SOLUTION
Unit fails to start when start button is pushed	•Improper external power connection •Breaker at main power source tripped	•Make sure input power matches machine specifications •Make sure the power cord is the right size
Unit fails to pump fluid	•Inlet valve is partially or fully closed	•Open the inlet valve
	•Inlet hose improperly sized or use of “quick disconnect” has occurred	•See specification sheet and change hose size if necessary •Replace “quick disconnect” with oversized unit
	•Air Leak on inlet supply line	•Check all fittings up to the pump inlet for leaks and repair as necessary
	•Strainer screen blocked	•Remove screen and clean with lint free rag or compressed air
	•Outlet valve is partially or fully closed	•Open the outlet valve
	•Reservoir inlet/outlet valves are partially or fully closed.	•Open inlet/outlet valves on the oil reservoir
Pump is making excessive noise	•Inlet valve is partially or fully closed	•Open the inlet valve
	•Strainer is obstructed	•Remove screen and clean with lint free rag or compressed air.
	•Inlet hose improperly sized or use of “quick disconnect” has occurred	•See specification sheet and change hose size if necessary •Replace “quick disconnect” with oversized unit

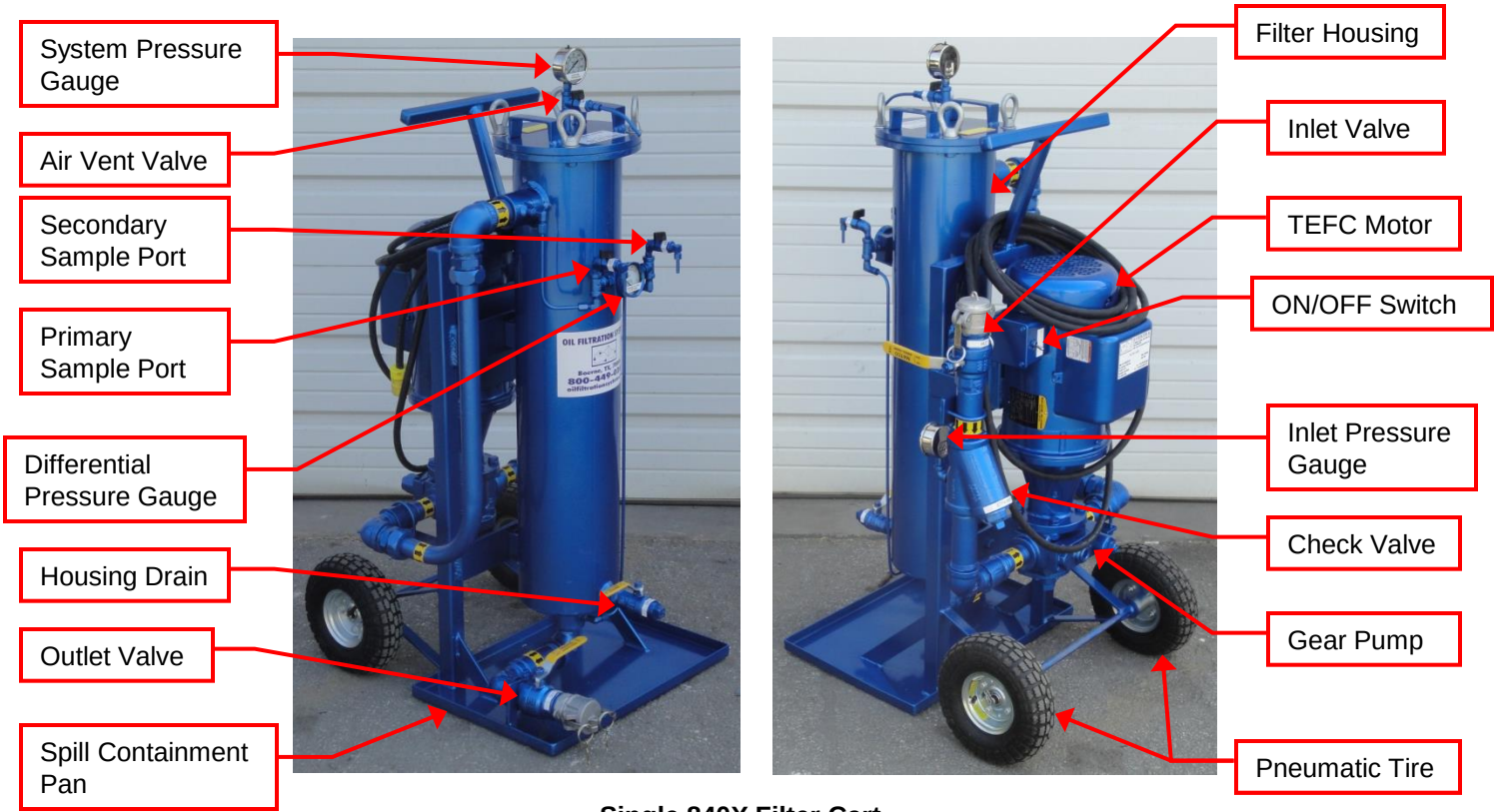
10. REPLACEMENT PARTS

PART NUMBER	DESCRIPTION
OFS-820X (Series)	Cartridge Particulate Removal Element
OFS-840X (Series)	Cartridge Particulate Removal Element
OFS-840C (Series)	Coreless Particulate Removal Element
OFS-S510 (Series)	Spin-On Element
OFS-S514D (Series)	Spin-On Element
OFS-C472	Coalescer / Separator Element
OR-8.75-1/4-27.49-V	Particulate Filter Housing O-Ring (OFS-820X / OFS-840X / OFS-840C)
OR-6.75-3/16-21.21-V	OFS-C472 Coalescer / Separator Housing O-Ring
02-000481	Minimess Sample Kit

11. SYSTEM COMPONENTS

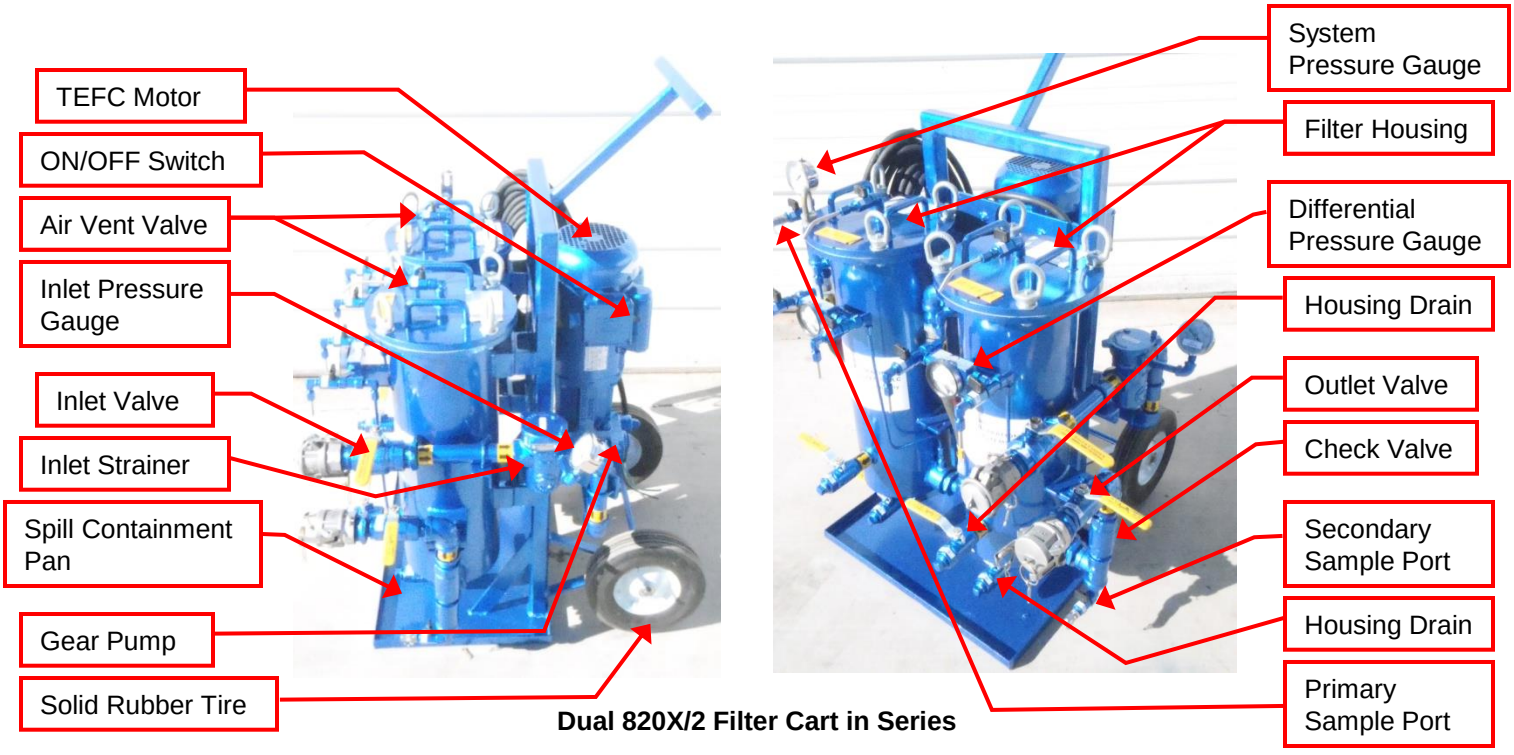


S510/2 Dual Spin-On Filter Cart in Series

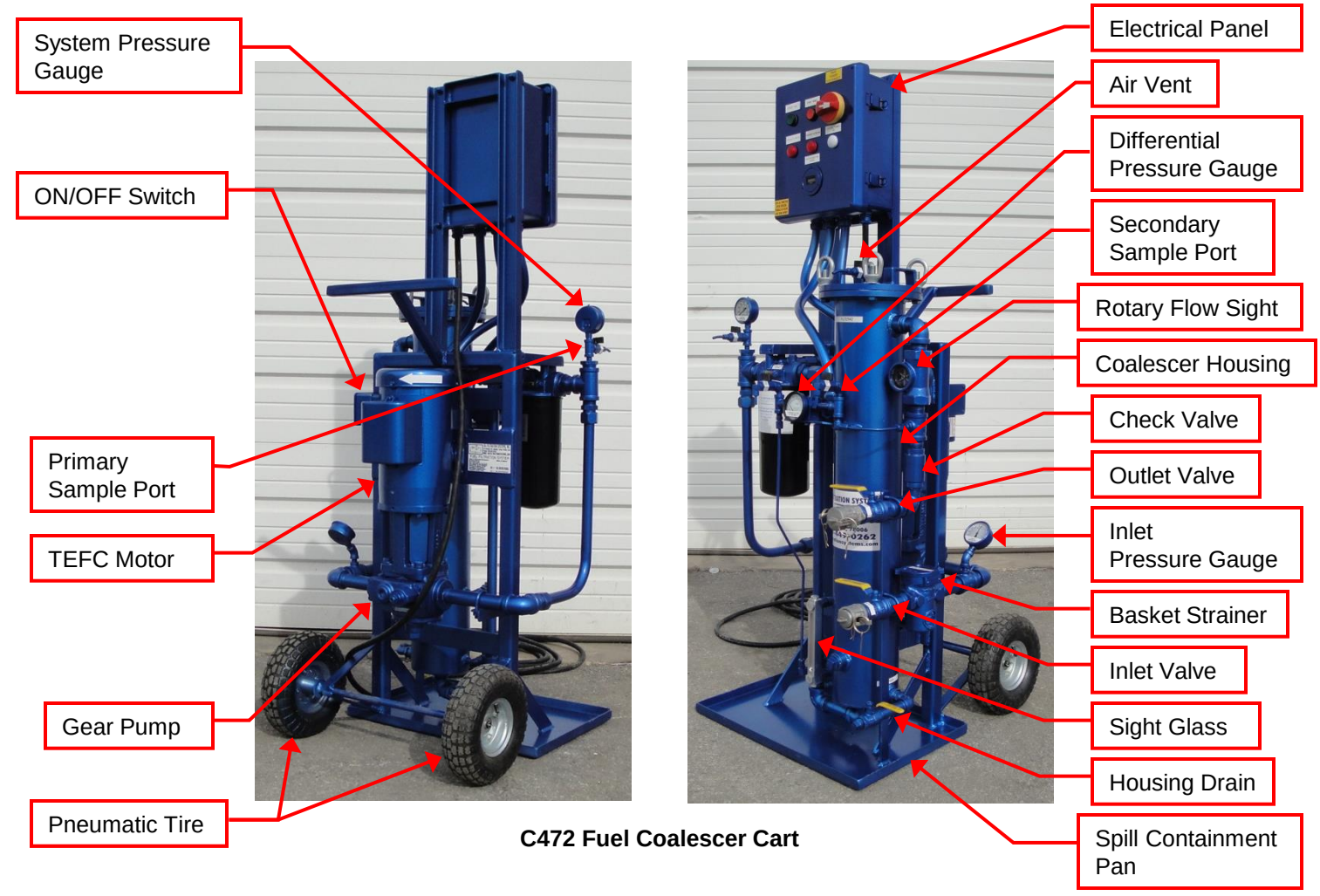


Single 840X Filter Cart

11. SYSTEM COMPONENTS (Continued)

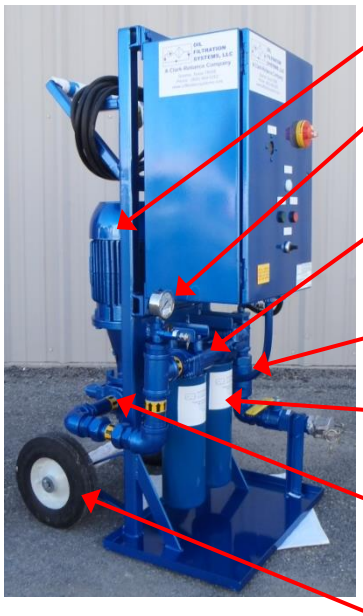


Dual 820X/2 Filter Cart in Series



C472 Fuel Coalescer Cart

11. SYSTEM COMPONENTS (Continued)



Inlet Valve

Secondary Sample Port

Primary Sample Port

Inlet Pressure Gauge

Outlet Valve

Spill Containment Pan

TEFC Motor

System Pressure Gauge

Filter Housing

Check Valve

Spin-On Element

Gear Pump

Solid Rubber Tire

VFD S514/2 Dual Spin-On Filter Cart in Parallel

Main Power Disconnect

Motor Frequency

Power On Indicator

Start / Run Button

Stop / Reset Button

Pump / Motor Speed Control

3 Phase Voltage Monitor

Main Power Disconnect

2 Pole Relays

Breakers

Variable Frequency Drive

Terminal Blocks

VFD Panel and Components