



36989 Low Viscosity Filtration Cart (Patent 8,147,683)

36994 Low Viscosity Portable Hand Held

TRICO LOW VISCOCITY FILTRATION SYSTEMS:

Trico Low Viscosity Filtration Systems are designed to transfer and filter hydraulic/ lubricating oils with viscosities less than 2000 SUS (430 cSt). Filter media is designed to be used with *hydrocarbon based fluids* and **should NOT be used with potentially flammable fluids** such as diesel fuel or alcohols. Before operating this equipment the operator should thoroughly read all instructions before proceeding.

The Trico Low Viscosity Filtration Systems are self priming units. Lubrication is not provided to the pump gears at the factory before the units are shipped. After assembly and before operating for the first time, it is recommended to place a small amount of oil that is intended to be pumped into the suction line and allow the fluid to enter the pump gears by elevating the suction line higher than the pump head. This should also be done whenever the units have been stationary for over a month or has been cleaned or serviced. ***Running the pump gears dry will cause premature wear and shorten the life of your filtration system.***

WARNING:

Always use safety around electrical equipment, follow instructions to prevent electrical shock. Electrical shock may cause death or other serious bodily harm. Although the Low Viscosity Filtration Systems are designed with TEFC motors they cannot be submersed into liquids. Use precaution when operating in wet environments and do not allow excess fluids to come in contact with electrical components. If fluid does come in contact with electrical components immediately disconnect the power by removing the electrical plug at the outlet or turn the power off at the breaker.

Do not use with flammable liquids or in areas where there is presence on large amounts of fumes. Failure to comply may cause an explosion. Always take precautions when working around open fuel sources.

Do to the rate of flow of oils across different materials there is always a potential to build up a static charge. Static discharge can cause an explosion if near or around open flammable fluids. Proper bonding and grounding equipment is recommended whenever combustible fluid is transferred from one container to another.

CAUTION:

Amperage draw from electric motor varies due to load at normal operating conditions. Full load amperage for the Low Viscosity Filtration Cart is 15.2A and a 20 Amp circuit is recommended. Full load amperage for the Low Viscosity Portable Hand Held is 8.8A and a 15 amp circuit is recommended. Failure to use the appropriate circuit type may cause overloading of the circuit and trip the breaker. Repeated attempts to use equipment on the same tripped circuit will cause electrical fire. Ensure to consult your maintenance electrician to identify proper outlets before using equipment.

PERFORMANCE DATA:

36989 Low Viscosity Filtration Cart	
Type:	Steel Internal Gear
Max Temperature:	150°F/65°C
Suction/ Discharge line:	1" non-collapsible PVC
Filter Type:	Spin-on
Filter 1 Media:	10 micron absolute Beta>200
Filter 2 Media:	25 Micron Nominal Water
Replace Element @:	40 psi differential
Max Viscosity:	2000 SUS (430 cSt)
Max Flow Rate:	14 gpm
Electric motor:	1-1/2 hp @ 1750 rpm
Electric Motor Rating:	115V, 60Hz, 15.2A
Pump Relief	100 psi
Filter Collapse Rating	80 psi differential
Maximum Filter Operating Pressure	120 psi

36994 Low Viscosity Portable Hand Held	
Type:	Bronze Internal Helical Gear
Max Temperature:	150°F/65°C
Suction/ Discharge line:	3/4" / 1" non-collapsible PVC
Filter Type:	Spin-on
Filter 1 Media:	10 micron absolute Beta>200
Filter 2 Media:	10 Micron Nominal Water
Replace Element @:	25 psi differential
Max Viscosity:	2000 SUS (430 cSt)
Max Flow Rate:	5.5 gpm
Electric motor:	1/2 hp @ 1750 rpm
Electric Motor Rating:	115V, 60Hz, 8.8A
Suction / Lift	20 ft
Pump Relief	50 psi
Filter Differential Collapse Rating	80 psi
Maximum Filter Operating Pressure	250 psi

FILTER ELEMENT TECHNICAL DATA:

Filter element life varies with the true dirt holding capacity of the element under dynamic flow conditions and the amount of contamination introduced into the Filtration System. Choosing the right media for the correct application is determined by the rate of ingestion with the desired ISO cleanliness level. The amount of dirt can vary from day to day and hour to hour, making it difficult to

predict when an element will become fully loaded. Element life is determined by 50% of the housing pressure drop plus the element pressure drop, subtracted from system design pressure. Increasing the rate of fluid flow increases the ability of the filter to trap particles. The effectiveness of your filter elements should be determined by the use of contamination monitoring. Our Predict laboratory has a wide range of oil analysis capabilities to help you determine and trend your fluid conditions.

High Water Content Fluids

High water content fluids consist of either water and soluble mineral based oil or water and soluble synthetic oil. The oil proportion is usually 5%, but may vary from 2% to 10%. All Trico micron filter medias are compatible with these types of fluids and should be used in lieu of the Trico water removal filters. However, the high specific gravity and low vapor pressure of these fluids can create a potential for severe cavitations and monitoring of the Filtration System with the use of these fluids is highly recommended. Failure to identify cavitations will lead to destruction of the pump valves and filter media.

Inverted Emulsions

Inverted Emulsions consist of a mixture of petroleum based oil and water. Typically the proportions are 60% oil and 40% water. All Trico micron filter medias are compatible with these types of fluids and should be used in lieu of the Trico water removal filters. Filters should be sized conservatively for water emulsions since they are non-Newtonian and their viscosities are a function of shear. Potentials due exists for cavitations similar to high water based fluids.

Water Glycols

Water glycols consist of a mixture of water, glycol and various additives. All Trico micron filter medias are compatible with these types of fluids and should be used in lieu of the Trico water removal filters. Potentials due exists for cavitations similar to high water based fluids.

Phosphate Esters

Phosphate Esters are classified as synthetic fluids. All Trico micron and water filter medias are compatible with these types of fluids.

LOW VISCOSITY FILTRATION CART OPERATION:

1. Remove Filtration Cart System from shipping container, inventory items and inspect for damage.
2. Assemble hose assemblies to filtration cart by pushing each hose end onto the pump inlet barb and the manifold exit barb and secure with hose clamps.

3. Spin-on filters are hand tightened during the assembly at the Trico factory, tighten filters with filter wrench or strap wrench to form a proper seal with gasket. When changing or tightening filters grasp filters at the bottom with the filter wrench where they are the strongest to prevent collapsing the canister.
4. Place wand assemblies with the suction side into the container selected to filter and the exit wand into another opening on the container or desired clean container if transferring oils. Ensure that the suction wand does not become impeded by blockage from internal components within the gear case or container.
5. Before plugging the units into the electrical outlet ensure that the receptacle is rated for appropriate 20 amp draw. As resistance increases, due to filtration, amperage draw will increase in the electric motor. Full Load amperage is 15.2 Amps.
6. Check to make sure the Filtration unit switch is in the off position, and that the bypass valve is closed by screwing the knob down until it is stopped.
7. Check all other hose connections by tightening clamps.
8. For initial startup of the unit, place a small amount of fluid intended to filter into the suction hose and allow the fluid to enter the pump head by raising the hose above the pump. This will help lubricant the internal gears of the pump and prevent dry running that can cause gear wear. Once gears are lubricated this step is not necessary unless the unit has been in storage for over a month or has been cleaned during maintenance.
9. Plug the electrical plug into the outlet and switch the Low Viscosity Filtration Cart to the "On" position. Fluid should begin to be drawn through the suction hose and into the pump.
10. Once the fluid fills both filter elements and flows out of the exit hose, purge any remaining air from the system by opening the by-pass valve by screwing it in a counterclockwise direction until fully open/ stopped position.

Note: When the by-pass valve is open pressure in the system is diverted away from the filter elements through and exit passage closing the system check valve. This keeps fluid from flowing through the filters during by-pass mode. The filters however, still remain open to the system pressure and therefore still register pressure across each filter element. As the valve is opened gage pressure will drop on each of the differential gages.

11. The Check valve has two purposes in the Low Viscosity Cart System. One it closes the flow of fluid from the filter elements in By-pass mode and two it prevents fluid back flow when pumping fluid vertically when reservoirs are higher than the pump or base container.
12. As filter elements become clogged the pressure differential between the gauges 1 and 2, 2 and 3 increases. When the differential pressure between these gages equals 40 psi differential the element needs to be changed out. If

elements are not changed at or before the specified pressure the system pressure will continue to increase until the pressure relief valve opens at 100psi at the inlet. At this point oil is bypassing the system and is no longer being filtered.

Warning: Failure to monitor the system and change filter elements may cause filter media to collapse at 80psi differential which may induce further contamination by inducing filter media into reservoir or container at fluid exit point. Maintain monitoring of the Filter Cart while in operation.

13. The Low Viscosity Filtration Cart is also equipped with two sample points located on the top of the manifold block at the entrance and exit points. Fluid Samples may be extracted at these points to monitor fluid conditioning.
14. When finished filtering fluid, turn the power switch to the off position, unplug the cord and wrap around handle for storage. Wipe any excess oil from the unit that might have spilled during the filtering process. Remove the wands and place one into each ring located on the side of the cart. Place the wand tip into the try to catch any remaining fluid. An absorbent pad can be placed into the tray to absorb any fluid remaining in the wands.

LOW VISCOSITY HAND HELD FILTRATION SYSTEM

1. Remove Filtration Hand Held System from shipping container, inventory items and inspect for damage.
2. Assemble hose assemblies to Hand Held unit by pushing each hose end onto the pump inlet barb and the manifold exit barb and secure with hose clamps.
3. Spin-on filters are hand tightened during the assembly at the Trico factory, tighten filters with filter wrench or strap wrench to form a proper seal with gasket. When changing or tightening filters grasp filters at the bottom with the filter wrench where they are the strongest to prevent collapsing the canister.
4. Place wand assemblies with the suction side into the container selected to filter and the exit wand into another opening on the container or desired clean container if transferring oils. Ensure that the suction wand does not become impeded by blockage from internal components within the gear case or container.
5. Before plugging the unit into the electrical outlet, ensure that the receptacle is rated for 15 amp draw. As resistance increases, due to filtration, amperage draw will increase in the electric motor. Full Load amperage is 8.8 Amps.
6. Check to make sure the Filtration unit switch, located on the cord, is in the off position.
7. Check all other hose connections by tightening clamps.
8. For initial startup of the unit, place a small amount of fluid intended to filter into the suction hose and allow the fluid to enter the pump head by raising the hose above the pump. This will help lubricant the internal gears of the pump and prevent dry running that can cause gear wear. Once gears are lubricated

this step is not necessary unless the unit has been in storage for over a month or has been cleaned during maintenance.

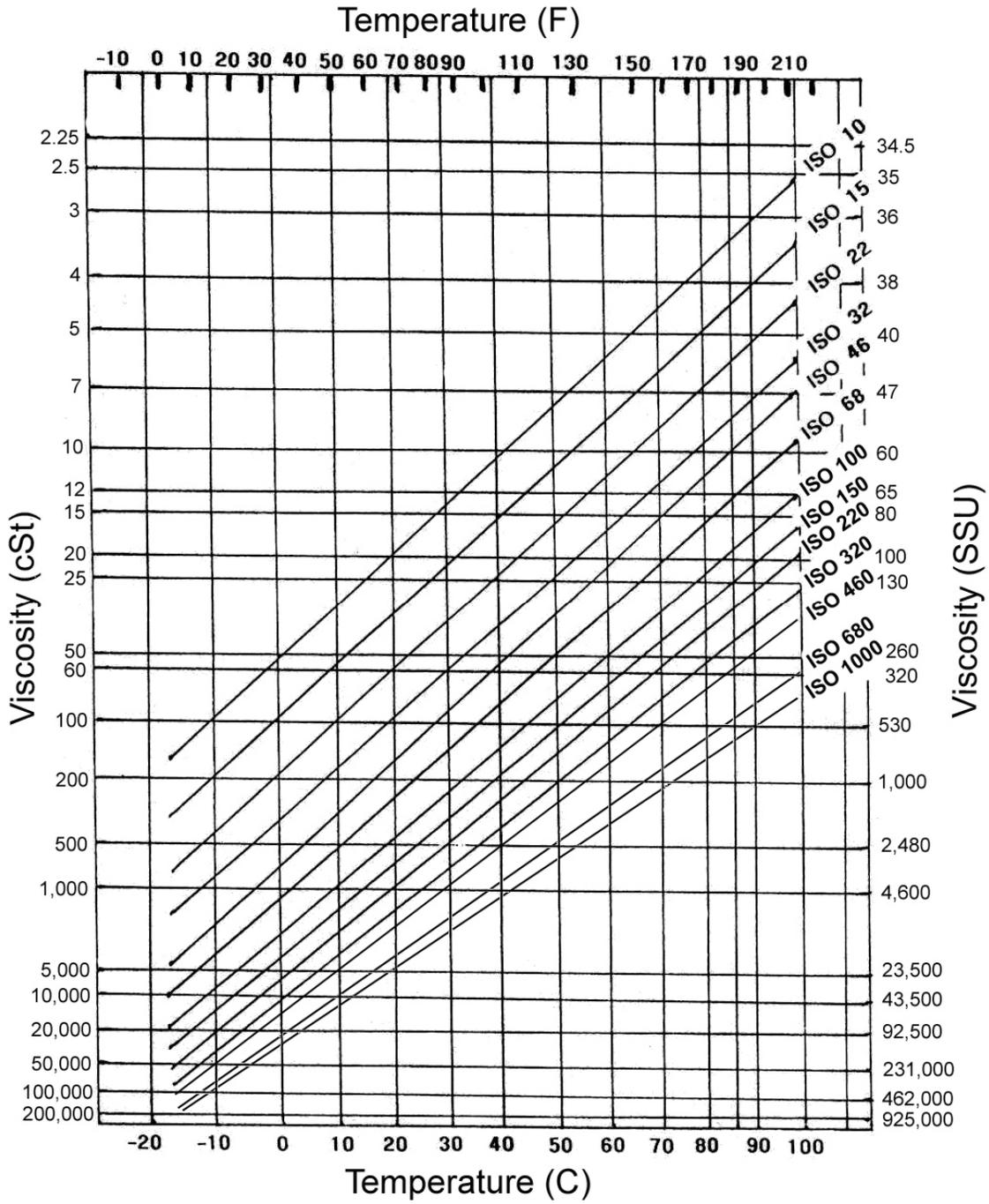
9. Plug the electrical plug into the outlet and switch the Low Viscosity Filtration Hand Held to the "On" position. Fluid should begin to be drawn through the suction hose and into the pump.
10. As filter elements become clogged, the pressure differential between the gauges 1 and 2, 2 and 3 increases. When the differential pressure between these gages equals 25 psi differential the element needs to be changed out. If elements are not changed at or before the specified pressure the system pressure will continue to increase until the pressure relief valve opens at 50psi at the inlet. At this point the pump will run in bypass relieving built up pressure.

CAUTION: Continued running of the pump in bypass will cause excess heat generation and or cavitations reducing the life of the filtration unit.

TROUBLE SHOOTING:

Symptom	Possible Cause(s)	Corrective Action
Pump system does not prime	Suction tube above liquid	Ensure that open end of suction tube remains completely below surface of liquid
	Clogged suction tube/ discharge line and/or filter	Clean suction tube/ discharge line and/or replace filter
	Suction line too long	Reduce length in suction line to reduce pressure
Insufficient flow	Motor adapter worn, damaged or detached	Inspect adapter for wear and/or damage, replace if necessary
	Clogged filter	Check differential pressure between gages change filter element
	Clogged/ kinked discharge line or nozzle	Remove and flush discharge line and nozzle, inspect for damage
	Fluid viscosity exceeds recommended viscosity for motor	Check viscosity of fluid at temperature. See SUS vs. Temp. Chart or contact fluid supplier.
Fluid Leaking	Loose filter	Check tightness of filter element
	Broken hose	
	Loose fitting	
Electric motor does not function/ or stops working while filtering	Power On/Off switch not fully switched	Check On/Off switch
	No power to receptacle	Check outlet for power and breaker
	Unit has overheated tripping internal overload breaker	Turn unit power to the "0" position, allow motor to cool, turn back to "on" position and resume filtering
	Unit generates excessive heat	Fluid viscosity exceeds maximum recommended viscosity <2000 SUS

TEMPERATURE VS. VISCOSITY



ISO CLEANLINESS RATING

Lubricating oils stored in bulk containers can contain contaminants. Ordinarily it has been thought that lubricant stored in drums prior to use were contaminant-free. However, it is now been learned that it is beneficial to filter lubricant even prior to its use as the original container can impart impurities to the lubricant prior to its first use. The majority of rotating equipment is manufactured to a class 2 or class 3 fit typical of most industrial operations. Hydraulic components and rotary screw compressors tend to have tighter tolerances in the sliding and rotating elements. Clearances in components are used to establish cleanliness requirements. The best source for cleanliness requirements is from the equipment manufacturer. In general, as the viscosity of the oil increases the cleanliness level decreases. Below is a general guideline for cleanliness levels.

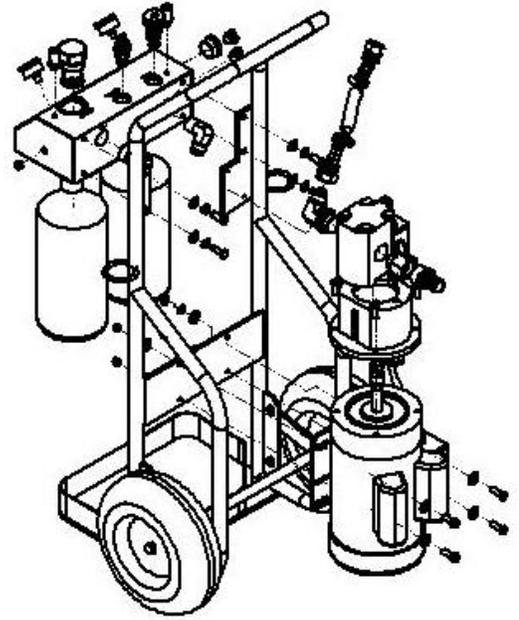
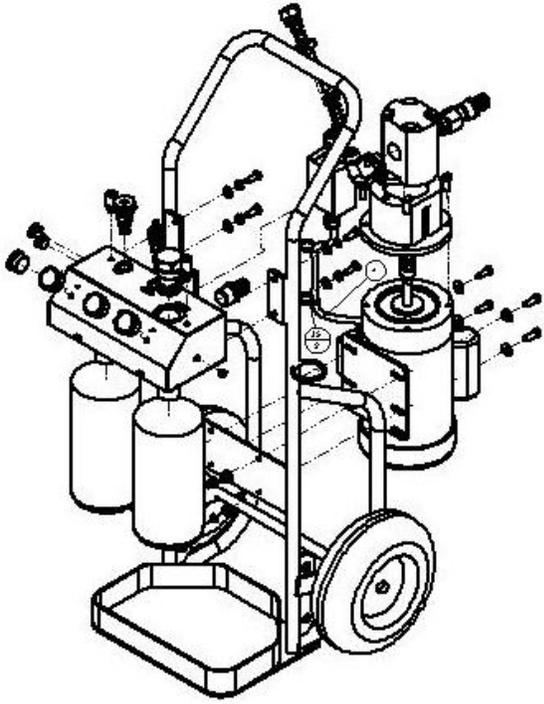
ISO Oil Grade Classification	Cleanliness Code (R4/R6/R14)
32	16/14/11
46	16/14/11
68	17/14/12
100	18/15/13
150	18/15/13
220	19/16/14
320	19/16/14
460	19/16/14
680	20/18/14

Determining the ISO Cleanliness level of equipment requires analysis of the running lubricating oil. Our **Predict** analysis laboratories can provide you with an accurate indication of the ISO Cleanliness level of your lubricating oil before and after filtration. Each number in the ISO code represents the micron range of particulate in which the count lies within (R₄ microns/ R₆ microns/ R₁₄ microns). **Example: 19/16/14, the 19 code shows that count of 4 micron particle lies between 5,000 and 2,500 per ml of fluid.**

ISO Number	Particle Count per ml of fluid		
		to	
25	160,000	to	320,000
24	80,000	to	160,000
23	40,000	to	80,000
22	20,000	to	40,000
21	10,000	to	20,000
20	5,000	to	10,000
19	2,500	to	5,000
18	1,300	to	2,500
17	640	to	1,300
16	320	to	640
15	160	to	320
14	80	to	160
13	40	to	80
12	20	to	40
11	10	to	20
10	5	to	10
9	2.5	to	5
8	1.3	to	2.5

ISO 320
19/16/14

TRICO LOW VISCOSITY CART FILTRATION SYSTEM



TRICO LOW VISCOSITY HAND HELD FILTRATION SYSTEM

