

INSULATING OIL CONDITIONING & REGENERATION SYSTEM

**CUSTOMIZABLE
STATIONARY &
MOBILE OPTIONS**



- ***Mineral Insulating Oils***
- ***Synthetic Ester Fluids***
- ***Natural Ester Fluids***
- ***Silicone Fluids***

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Oil Conditioning

Optional Oil Regeneration

Transformer Dry-Out

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// INTRODUCTION

The SESCO SES320 series of insulating oil conditioning and regeneration systems have been manufactured for more than 30 years and can be found in the power generation, transmission, distribution and transformer manufacturing industries world-wide.

The SES320 family of oil purifiers are used to condition new and recondition in service insulating fluids for use in high voltage electrical equipment. The SES320R incorporates an optional adsorbent treatment stage to add oil regeneration capability.

All SES320 models are designed to “single pass” oil processing performance standards to accommodate transformer maintenance and commissioning requirements.

The SES321-600 and SES321-1260 are compact, versatile, easy to tow, trailer mounted pre-configured systems with relatively few options.

The SES320-1260 through SES320-3000, are fully configurable, and available in stationary skid as well as numerous mobile versions.



// CAPABILITIES

• Prepare new and Group 2 in service dielectric fluids for transformer service	✓
• Reclaim badly degraded Group 3 in service mineral dielectric fluids for transformer service	✓ Requires optional adsorbent treatment stage.
• Remove moisture from transformer insulation via multi-pass oil circulation	✓
• Remove sludge from a transformer via multi-pass hot oil circulation	✓ Requires optional adsorbent treatment stage.
• Circulating oil within an energized transformer *	✓
• Drain transformer for maintenance	✓ Optional dry breathing air systems are available for dry air back fill.
• Heat transformer core for vacuum dry-out via multi-pass hot oil spray while under vacuum	✓ Requires optional inlet oil booster pump. Optional spray connection manifold recommended.
• Evacuate transformer for vacuum dry-out	✓
• Measure rate of water extraction during vacuum dry-out	✓ Requires optional vacuum line cold trap.
• Fill transformer while holding under vacuum **	✓

*Safe energized transformer processing is procedure dependent and requires an experienced transformer service technician.

** A redundant vacuum pump configuration is required to achieve for holding pressures < 0.5 torr while filling.

TREATMENT STAGES

01	02	03	04	05	06
Oil Heating The fluid is gently heated to reduce the viscosity in preparation for the vacuum dehydration and optional adsorbent treatment stages.	Polar Contaminant Adsorption (optional) The heated fluid then passes through an optional (bypass included) adsorbent media process that removes acids, color bodies and other polar contaminants.	Filtration (3μ β200) The next treatment phase uses long life, low pressure drop, pleated synthetic filter media to remove 99.9% of all particulate > than 3 microns.	Vacuum Dehydration & Degasification Vacuum and high efficiency thin film low temperature evaporation is used to remove dissolved water and dissolved gases.	Filtration (0.5μ β75) A polishing filter completes the process. Pleated synthetic filter media is used to remove 98.7% of all particulate > than 0.5 microns.	Ready for Use The conditioned oil is now ready for use. Discharge flow rate and pressure are adjustable to accommodate the application requirements.

PROCESSING PERFORMANCE & SPECIFICATIONS



Custom SES320-1260 FR3 Conditioning System

Design Flow Rate	15 GPM 3407 LPH
Max Flow Rate	20 GPM 4542 LPH
Vacuum Capacity @ 1 Torr	550–1150 CFM
Processing Vacuum Range	2.0 - 0.2 Torr
Heating Capacity	64-112 kW
Oil Heater Watt Density	11.5 W/in ²
Processing Temperature	Adjustable 40-87 C°
Filtration Stages	2
Filtration Efficiency	$\beta_x \geq 1000 @ 3 \mu$ $\beta_x \geq 200 @ 0.5 \mu$
Inlet Pressure	7 - 25 psia
Outlet Pressure	75 lbf/in ²
Seal Material	Fluorocarbon
Standard Control System	HMI w/ Automatic System Protection
Electrical Classification	NEMA, IEC
Power Supply	575V / 3 ϕ / 60Hz 480V / 3 ϕ / 60Hz 240V / 3 ϕ / 60Hz 380V / 3 ϕ / 50Hz
Power Consumption	85 - 140 kW

MINERAL OIL

Dielectric Strength (ASTM-D1816-84A) (2 mm gap)	> 65 kV
Moisture Content Single pass (ASTM-D1533-88)	100 ppm reduced to < 10 ppm 50 ppm reduced to < 5 ppm
Moisture Content 3 Passes (ASTM-D1533-88)	100 ppm reduced to < 2 ppm
Total Gas Content Single Pass (ASTM-D2945)	Saturation reduced to < 0.25%
Total Gas Content 3 Passes (ASTM-D2945)	Saturation reduced to < 0.15%
Particulate Content	99.9% > 1 μ 97.8% > 1/2 μ
Processing Temperature (Adjustable)	Min 120 F° 49 C° Max Limit 190 F° 88 C°
Processing Vacuum Level	1.5 - 0.3 Torr

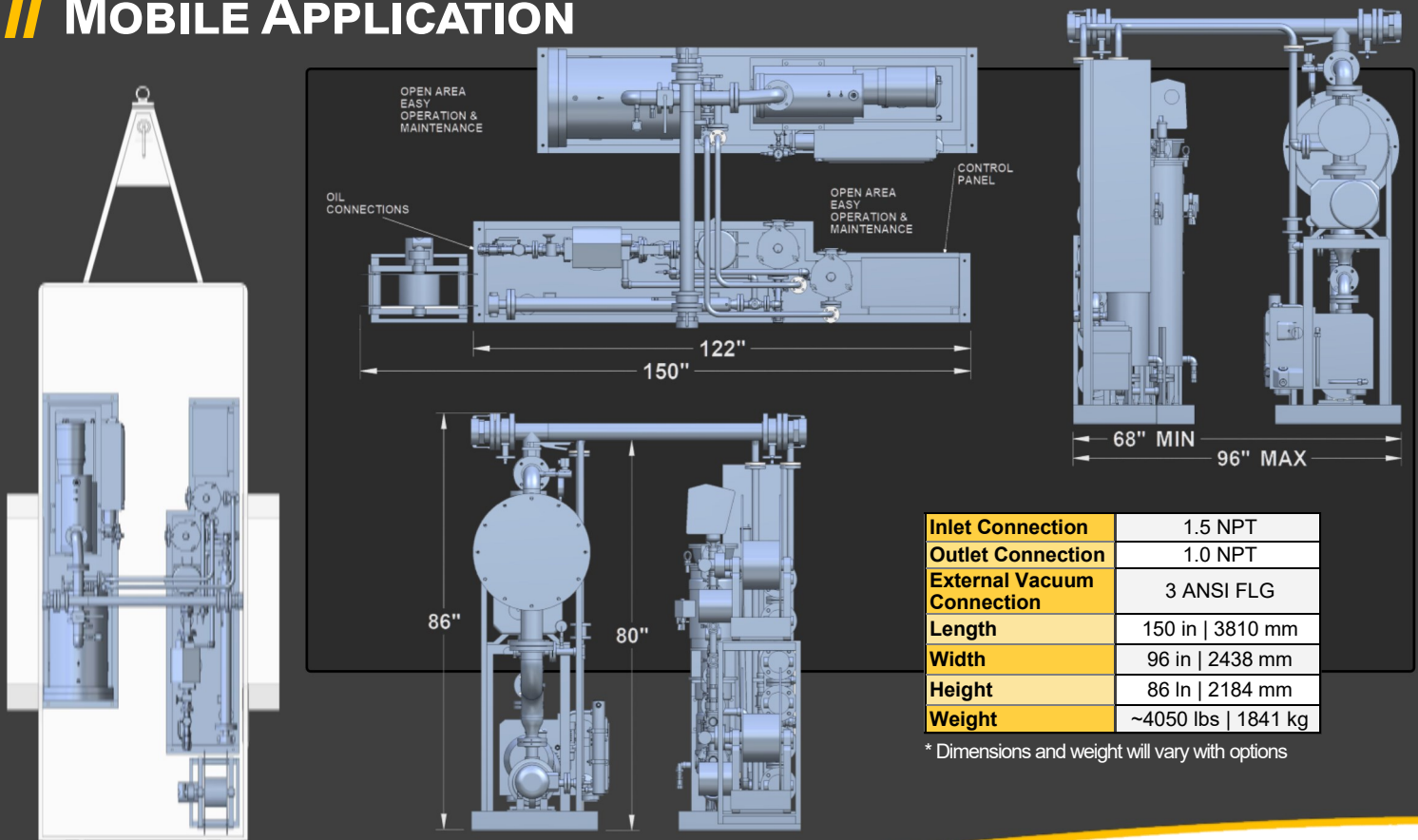
SYNTHETIC ESTER FLUIDS

Processing Rate	Derate processing rate by 25% (Multiple Passes Recommended)
Dielectric Strength (ASTM-D1816-84A) (2 mm gap)	> 60 kV
Moisture Content Single pass (ASTM-D1533-88)	200 ppm reduced to < 100 ppm
Moisture Content 3 Passes (ASTM-D1533-88)	200 ppm reduced to < 60 ppm
Total Gas Content Single Pass (ASTM-D2945)	Saturation reduced to < 0.25%
Total Gas Content 3 Passes (ASTM-D2945)	Saturation reduced to < 0.15%
Particulate Content	99.8% > 1 μ
Processing Temperature (Adjustable)	Min 170 F° 76 C° Max Limit 190 F° 88 C°
Processing Vacuum Level	1.5 - 0.2 Torr

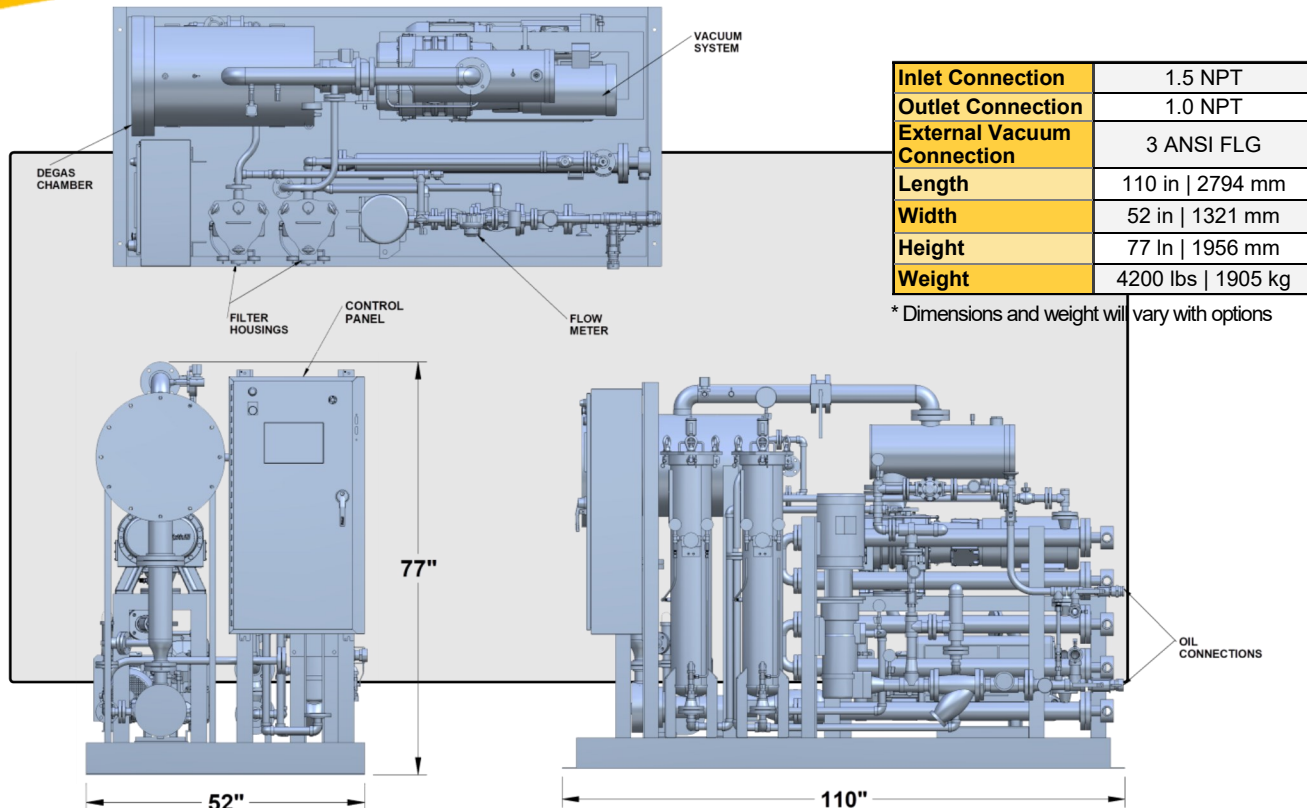
NATURAL ESTER FLUIDS

Processing Rate	Derate processing rate by 25% (Multiple Passes Recommended)
Dielectric Strength (ASTM-D1816-84A) (2 mm gap)	> 60 kV
Moisture Content Single pass (ASTM-D1533-88)	100 ppm reduced to < 40 ppm
Moisture Content 3 Passes (ASTM-D1533-88)	200 ppm reduced to < 30 ppm
Total Gas Content Single Pass (ASTM-D2945)	Saturation reduced to < 0.25%
Total Gas Content 3 Passes (ASTM-D2945)	Saturation reduced to < 0.15%
Particulate Content	99.8% > 1 μ
Processing Temperature (Adjustable)	Min 170 F° 76 C° Max Limit 190 F° 88 C°
Processing Vacuum Level	1.5 - 0.2 Torr

// MOBILE APPLICATION



// STATIONARY APPLICATION



// STANDARD FEATURES

- **Completely Customizable**
- **Numerous Mobile Options**
- **Variable Speed Flow Rate**
- **Automatic Temperature & Chamber Level Control**
- **Two Stage Vacuum System**
- **Vane, Piston, & Dry Screw Backing Pump Options**
- **Low Maintenance Vacuum Booster Pump**
- **Multi-Stage Degasification System**
- **Automatic Foam Control System**
- **Positive Displacement Low Speed Inlet & Discharge Oil Pumps**
- **Low Watt Density Oil Heating System**
- **7 Inch ASME Code Filter Housings (outer diameter)**
- **Discharge Flow & Totaling Rate Meters**
- **System Full Scale Vacuum Gauge**
- **Color Touchscreen Control System with Data Logging**
- **Optional Switch and Pilot Light Control System**

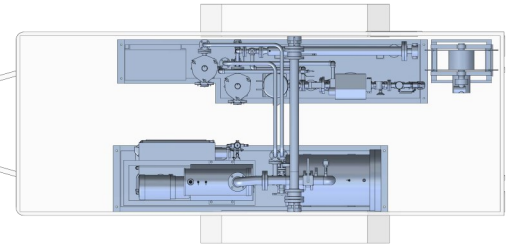


SES320-1260 PART NUMBER MATRIX

		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30		
SES320-900																																	
1	Oil Regeneration Capacity	None - Oil conditioning only Provisions for External (FE) treatment stage is provided Adsorbent (FE) treatment stage provided for oil regeneration	C P R																														
2	Purifier Mounting	Stationary - Open skid Stationary - Enclosed skid Mobile - Center isle skid (SES950-953 mobile options) Mobile - Center isle skid w/ hose storage (SES951-SES953 mobile options)	S E M H																														
3	Power Supply	240V/3PH/60HZ 380-415V/3PH/50HZ 460V/3PH/60HZ 575V/3PH/60HZ	A B C D																														
4	Inlet Heating System	64KW, (70°F 39°C Rise) 80KW, (87°F 48°C) 96KW, (106°F 58°C) 112KW, (125°F 69°C)		64																													
5	Discharge Heating System	None 16KW, (15°F 9°C) 32KW, (32°F 18°C)					X																										
6	Vacuum System Configuration	One vacuum pump with one vacuum booster Dual vacuum pumps with one vacuum booster. (optional for transformer service) Dual vacuum pumps with dual vacuum boosters. (optional for transformer service)	A B C																														
7	Vacuum System Type & Capacity	550 CFM, Vane (90) CFM - 650 CFM booster - 8 torr cut-in 550 CFM, Dry Screw (90) CFM - 650 CFM booster - 8 torr cut-in 875 CFM, Vane (170) CFM - 950 CFM booster - 20 torr cut-in 840 CFM, Dry Screw (120) CFM - 950 CFM booster - 5 torr cut-in 1150 CFM, Vane (170) CFM - 1450 CFM booster - 8 torr cut-in 1150 CFM, Piston (180) CFM - 1450 CFM booster - 8 torr cut-in 1150 CFM, Dry Screw (340) CFM - 1450 CFM booster - 50 torr cut-in		1	2	3	4	5	6	7																							
8	Vacuum Booster Control	Cut In @ safe pressure VFD for atmospheric start (Recommend for transformer evacuation)	C V																														
9	External Vacuum Connection	None (Oil processing only) Single (Transformer service) Dual (Transformer service - Mobile applications- both sides of trailer)							X	1	2																						
10	Automatic Valve Control (Pneumatic spring return)	None External Vacuum Only (Automatic close to preserve transformer vacuum) HMI Valve Control Package (HMI Oil & vacuum valve configuration)								X	E	I	A																				
Regeneration Treatment Phase (Required for regeneration only)																																	
11	Earth System Housings	None Single Dual								X	S	D																					
12	Earth Housing Capacity	None 250 # 500#								X	2	5																					
13	Inhibitor Injection & Sampling System	None Oxidation inhibitor mixing injection & sampling system Sample sink only								X	I	S																					
Control System & Instrumentation																																	
14	Control System Adders	Standard HMI Control Interface (NEMA 4 touch screen operator interface) Add remote monitoring to standard control Interface Add redundant HMI to standard control Interface Add remote monitoring & redundant HMI to standard control Interface Adder for Switch and Pilot Light Control Interface													H	R	Z	Y	S														
15	Moisture (ppm) & Temperature Monitors	None Inlet Outlet Inlet & Outlet													X	1	2	3															
16	External Vac Line Dew Point & Temperature Monitor	None Provided w/ local & HMI display													X	D																	
17	Contamination Monitor (ISO Classification)	None Provided w/ local & HMI display																X	C														
18	Total Dissolved Gas Monitor (%)	None Provided w/ HMI display only																	X	G													
19	Chamber Level Transmitter	None Provided w/ HMI display																		X	L												
20	Dirty Filter Alarms	None Provided w/ HMI display																			X	F											
21	Additional Vacuum Gauges	None Dual Gauges - System & external connection Dual Gauges- Common system & remote transformer Three Gauges Degas chamber, external connection & remote transformer																				X	2	3	4								
Hose Reels & Loose Storage																																	
22	Oil Hose Reels (2) (Includes Hose & bypass) (Isolation Valves 7 cams)	None Live reel w/ electric rewind Live reel w/ manual rewind Storage reel only																				X	E	M	S								
23	Reel Capacity	None 50FT 75FT (May not be available on all mounting options) 100FT (May not be available on all mounting options)																				X	5	7	1								
24	Suction & Discharge Hose (25FT Sections)	None 50FT 75FT 100FT																					X	1	2	3							
25	Vacuum Hose (3") (15 ft FT Sections)	None 45FT 60FT 75FT																					X	1	2	3							
Integrated Oil Storage (Mobile Applications Only)																																	
26	Oil Storage Capacity	None 125 Gallons 225 Gallons																						X	1	2							
27	Oil Storage Processing Control	None Manual valve processor integration Automatic actuated valve integration and reservoir processing mode logic																											X	M	A		
28	HMI Reservoir Level Display	None Provide reservoir level transmitter w/ HMI display																												X	L		
Misc.																																	
29	Skid Lifting Provisions	None Fork lift pockets Crane lifting provisions Crane & fork lift lifting provisions																												X	P	C	B
30	Spare Parts Kit	None Include																															

// CARGO TRAILER

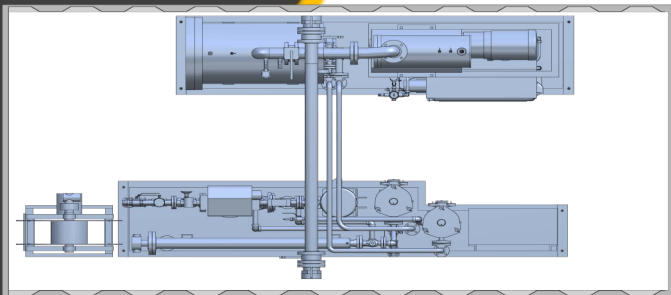
SES950 - CARGO TRAILER MOUNTING			1	2	3	4	5	6	7	8	9	10	11		
SESS950-															
1	Hitch Type	Rear Ball Hitch	1												
		Rear Pintal Ring Hitch	2												
		Gooseneck Ball Hitch	3												
		Gooseneck Fifth Wheel Hitch	4												
2	Extra Body Length	4 ft	4												
		6 ft	6												
		8 ft	8												
		10 ft	10												
3	Side Man Door	None			X										
		Single			S										
4	Wall Lining	None				X									
		½" White Plywood or FRP				L									
5	Mounted Spare Tire	None					X								
		Tounge Mounted Spare Tire					T								
6	Oil Connections	None						X							
		Single Rear							R						
		Dual Rear								2					
7	Vacuum Connections	None							X						
		Single Rear								R					
		Single Side									1				
		Dual Driverside & Curbside										D			
8	Lighting Package	None							X						
		Interior									I				
		Interior & Exterior										E			
9	120V Package	None								X					
		Interior										I			
		Interior & Exterior											E		
10	HVAC	None										X			
		5 kW Forced Air Heater											H		
		18k BTU Wall Mount A/C												A	
		Heater & Air Conditioner													B
11	Vacuum & Oil Hose Storage	None											X		
		Tongue Mounted Cabinet and Interior Wall Hangers for Vacuum & Oil Hose													V
Example			SESS950-	1	10	S	L	T	2	R	E	E	H	V	



// ISO CONTAINER

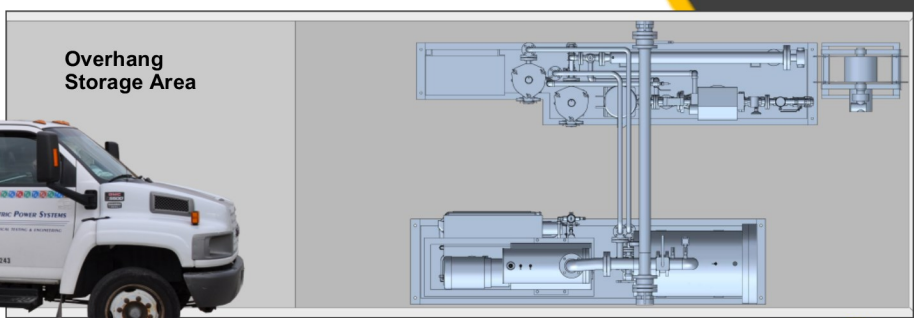
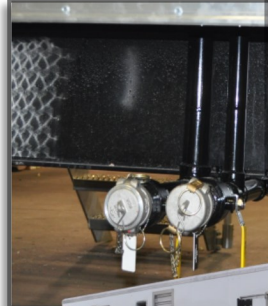


SES953 - ISO Container Mounting Matrix			1	2	3	4	5	6	7	8	9	10	11		
SESS953 -															
1	Container Type	None	1												
		20' ISO Standard	2												
		40' ISO Standard High Cube	3												
		Custom Length High Cube (ft)	#												
2	Chassis	None			X										
		Standard Spring Suspension			S										
		Air Ride Suspension			A										
3	Condition	New				N									
		Used Once				U									
		Used - Restored				R									
4	Oil Connections	None					X								
		Single Rear						R							
		Dual Rear							2						
5	Vacuum Connections	None						X							
		Single Rear							R						
		Single Side									1				
		Dual Driverside & Curbside										D			
6	Ventilation	None						X							
		Factory Installed									V				
		Kit for Customer Installation										K			
7	Lighting Package	None								X					
		Interior										I			
		Interior & Exterior											E		
		Interior Kit for Customer Installation												K	
8	120V Package	None										X			
		Interior												I	
		Interior & Exterior													E
		100A Load Center Only													L
9	HVAC	None											X		
		Forced Air Heater													H
10	Vacuum Hose Storage	None											X		
		Verical Wall Mounted Storage Tube Assembly													V
		Ceiling Mounted Storage Tube Assembly													
11	Loose Oil Hose Storage	None											X		
		Interior Wall Hangers													W
		Verical Wall Mounted Storage Tube Assembly													
Example			SESS953 -	1	S	U	2	R	V	E	E	H	V	X	



// DECK OVER CARGO TRAILER

SESS951 - DECK OVER CARGO TRAILER MOUNTING MATRIX			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19		
	SESS951-																						
1	Hitch Type	Rear Ball Hitch	1																				
		Rear Pintal Ring Hitch	2																				
		Gooseneck Ball Hitch	3																				
		Gooseneck Fifth Wheel Hitch	4																				
4	Wall Lining	None		X																			
		½" White Plywood or FRP		L																			
5	Mounted Spare Tire	None			X																		
		Tongue Mounted Spare Tire		T																			
6	Oil Connections	None				X																	
		Single Rear				1																	
		Dual Rear				2																	
		Dual Exterior Belly Mounted				3																	
7	Vacuum Connections	None					X																
		Single Rear					R																
		Single Side Wall					1																
		Dual Driverside & Curbside Side Wall					D																
8	Side Man Door	None					X																
		Trailer Grade FRP w/ Cam Lock					P																
		SS Commercial Grade with SS Lockset					S																
9	Side Access Doors	None						X															
		Gooseneck Area Access Doors						G															
10	Control Area Length	Minimum Amount Required										M											
		Custom Length (36" Min - 76" Max)											#										
11	Control Area Partition	None									X												
		Solid Framed Wall with Man Door									S												
		Clear Hinged Sliding Partition										T											
12	DO Trailer Entry Stairs	None									X												
		Rear										R											
		Side										S											
		Rear & Side											B										
13	Entry Stair Railings	None										X											
		Single										S											
		Dual											D										
15	Interior Lighting Package	None												X									
		Equipment & Control Area													A								
		Equipment, Control, & Gooseneck Area													B								
16	Exterior Lighting Package	None													X								
		Curbside & Driverside Flush Mount Flood Lights (2)														2							
		Curbside & Driverside Flush Mount Flood Lights (4)														4							
17	Interior 120V/1 Package	None													X								
		Equipment & Control Area														A							
		Equipment, Control, & Gooseneck Area														B							
18	Exterior 120V/1 Package	None														X							
		Curbside & Driverside Receptacles (2)															2						
19	HVAC	None																	X				
		Forced Air Heater																		H			
		Nose Wall Mount Air Conditioner																			A		
		Heater & Air Conditioner																				B	
20	Vacuum Hose Storage	None																		X			
		Vertical Wall Mounted Storage Tube Assembly																			V		
		Trailer Frame Integrated Storage Tube Assembly																				T	
21	Loose Oil Hose Storage	None																			X		
		Interior Wall Hangers																				W	
22	AL Belly Storage Box (18" W x 14" H x 48" L)	None																				X	
		Curbside																				C	
		Roadside																					R
		Both																					B
Example			SESS951-	1	L	T	2	R	S	X	76	T	B	S	A	2	A	2	B	T	X	C	

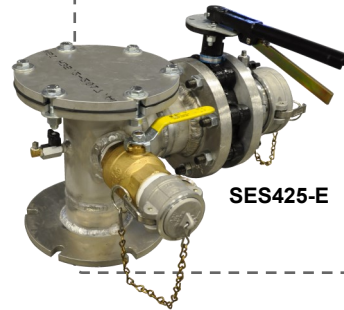


(34" deck height, no wheel wells, 96" - 102" width)

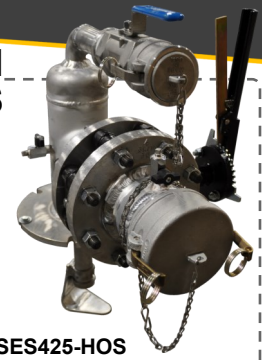
ACCESSORIES

SES320 Accessory Matrix		SES320A					
Inlet Oil Booster Pump Enables partially filled transformer oil circulation under full vacuum.	None Centrifugal (Recommended) 36" Oil head @ 40GPM / 20" @ 20 GPM Small, easy to store, carry to position (135 lb) Low pressure drop suction hose provided. Positive Displacement 30" Oil head @ 40 GPM / 20" @ 20 GPM VFD controlled Low speed gear pump Two wheel cart mounted (475 lb) Storage provisions required	X	C	P			
Transformer Vacuum Manifold PRV Mounted	None Evacuation Aluminum construction 4", 2", & 1" isolated vacuum hose connections PRV replacement flange (2) 1/8" isolated gauge connections Hot Oil Spray Aluminum construction 4" Vacuum & 2" Oil isolated connections Adjustable oil spray splash plate Provide Evacuation & Hot Oil Spray Manifolds	X	V	S	B		
Vacuum Line Cold Trap	None Portable 9.2L Liquid Nitrogen Trap Integrated 9.2L Liquid Nitrogen Trap Integrated Cascade Refrigerated Trap	X	P	N	C		
Dry Air System	None 25CFM / Single Stage / -60° to -70°F Output 100°F @ 90% RH Supply Not Breathing Certified (No CO or order treatment) 25CFM / Two Stage / -70° to -90°F Output 110°F @ 100% RH Supply Not Breathing Certified (No CO or order treatment) 25CFM / Single Stage / -60° to -70°F Output 100°F @ 90% RH Supply Class "D" Breathing Certified 25CFM / Two Stage / -70° to -90°F Output 110°F @ 100% RH Supply Class "D" Breathing Certified	X	1	2	3	4	
Dry Air Dew Point Monitor	None Local display (°F/°C) HMI display and logging (°F/°C) with adjustable threshold alarm	X	L	H			
Dry Air CO Monitor	None Local out of range (ppm) audible alarm Local & HMI out of range (ppm) audible alarm	X	L	H			
Dry Air Hose (85FT SS Braid w/ cover)	None Dry Air Hose Only Dry Air Hose & Spring Return Reel	X	H	R			

TRANSFORMER VACUUM PRV MANIFOLDS

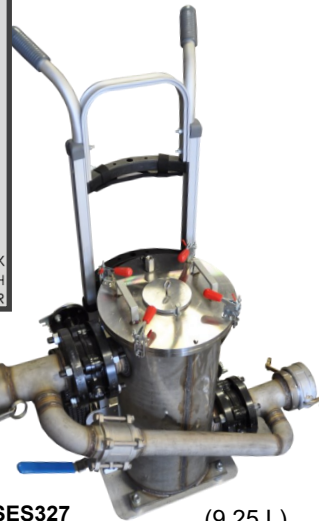


SES425-E



SES425-HOS

LIQUID NITROGEN COLD TRAP



SES327

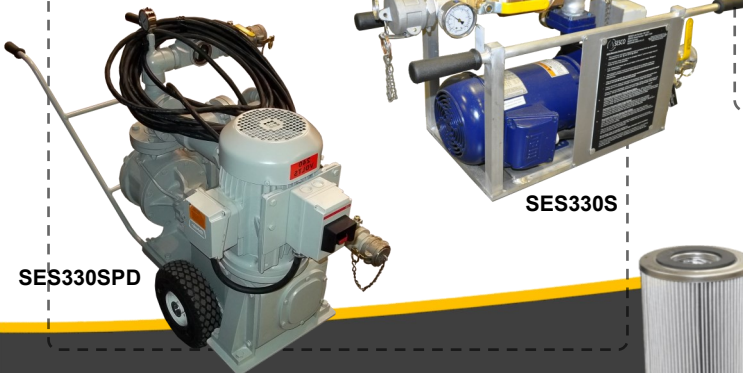
(9.25 L)



SES329

DRY AIR SYSTEM

INLET OIL BOOSTER PUMPS



SES330S

SES330SPD

STANDARD SPARE PARTS KIT

- First Stage Filter Elements (4)**
Pleated Synthetic Media (5 μ β200 Efficiency)
- Second Stage Filter Elements (4)**
Pleated Synthetic Media (1/2 μ β75 Efficiency)
- Vacuum Chamber Dispersal Elements (1 set)**
- Vacuum Pump Oil (20 L)**
- Gasket Kit**

(Fuses are not required)



CUSTOM SES320 - 1260 PACKAGE

To request a quotation for your customized SES320 -1260 package, fill in the three categories below with the numbers that correspond to your desired options. Use the tables shown on previous pages as guides for generating each number.

// Unit Configuration (Page 5)

SES320-1260

1	2	3	4	5	6	7	8	9	10	-	11	12	13	-	14	15	16	17	18	19	20	21	-	22	23	24	25	-	26	27	28	-	29	30
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// Mobility Options (Pages 6 & 7)

SES 95

SES950

SES953

SES951

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
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// Accessories (Page 8)

SES320A

1	2	3	4	5	6	7
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