

Accessories

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Oil Recommendations

HYDRAULIC OIL RECOMMENDATIONS

All parts, with the exception of a few items, are lubricated by the hydraulic oil in the circuit. Particular attention must be paid to keep the oil in the circuit clean. Whenever there is a hydraulic component failure (cylinder, pump, valve), and there is a reason to feel that metal particles may be in the system, the oil must be drained, the entire system flushed clean, and any filter screens thoroughly cleaned or replaced. New oil should be supplied for the entire system. Oil suitable and recommended for use in circuits involving pumps, motors and cylinders should meet the following specifications:

| | |
|-------------------------------|---|
| Viscosity Index: | 90 minimum |
| Aniline Point: | 175 maximum |
| Recommended Additives: | Foam depressant, rust and oxidation inhibitors. |
| Filtration: | 10 micron recommended for maximum pump life. |

| | | |
|-----------------------------|--------------------|--------------------|
| Normal Temperatures: | Minimum | Maximum |
| Ambient: | 0° F (-18° C.) | 100° F. (37.8° C.) |
| System: | 100° F. (37.8° C.) | 180° F.(82.2° C.) |

Other Desirable Characteristics:

- Stability of physical and chemical characteristics.
- High demulsibility (low emulsibility) for separation of water, air and contaminants.
- Resistant to the formation of gums, sludges, acids, tars and varnishes.
- High lubricity and film strength.

General Recommendations:

A good quality hydraulic oil conforming to the characteristics listed above is essential to the satisfactory performance and long life of any hydraulic system.

Oil should be changed on regular schedules in accordance with the manufacturers recommendations and the system periodically flushed.

Oil operating temperature should not exceed 200° F. (93° C.) with a maximum of 180° F. (82° C.) generally recommended. 120° F to 140° F. (50° C. to 60° C.) is generally considered the optimum system operating temperatures. High temperatures result in rapid oil deterioration and may point out a need for an oil cooler or a larger reservoir. The nearer to optimum temperature, the longer the service life of the oil and the hydraulic components.

The system reservoir capacity should equal, in gallons, the pump output in gpm or the total gpm of all pumps where there is more than one in the system.

Oil poured into the reservoir should pass through a 100 mesh screen. Pour only clean oil from clean containers into the reservoir.

PHYSICAL PROPERTIES

| TEST | REQUIREMENT | METHOD |
|-------------------------------------|-----------------|------------|
| Viscosity @ 100 deg. F. | 150 SSU Minimum | D88 |
| Viscosity @ 210 deg. F. | 42 SSU Minimum | D88 |
| Viscosity index | 95-125 | D2270 |
| Gravity, API | 28.9-31.0 | D287 |
| Zinc | .08% Minimum | By Weight |
| Corrosion at 212 deg. F. Maximum | 1 | D130 |
| Emulsion at 130 deg. F. | 30 | D1401 |
| Flash point deg. F. Minimum | 380 | D92 |
| Foam Test: | | |
| Tendency @ 75 deg. F., M1, Maximum | 75 | D892-IP146 |
| Stability @ 75 deg. F., M1, Maximum | 0 | |
| Pour Point deg. F., Minimum* | -20 | D97 |
| Rust Test | Pass | D665 |
| Minimum Hours to reach Acid No. 2 | 2,000 | D943 |

Filters



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Filters



FLR1 Series

FLR1 SERIES, LINE TYPE CARTRIDGE FILTER

| Order Code | Bill of Material # | Port Type | | Element Micron | | By-Pass Spring | | | Indicator | Indicator Ports Machined and Plugged [H] |
|--------------|--------------------|----------------|--|-----------------|-----------------|----------------|-----------|------------|-----------|--|
| | | 1 1/4" NPT [1] | | 10 Shielded [E] | 33 Shielded [L] | NR [N] | 5 PSI [B] | 15 PSI [D] | None [N] | |
| FLR112-1ENNH | 7516-122 | • | | • | | • | | | • | • |
| FLR112-1EBNH | 7516-309 | • | | • | | | • | | • | • |
| FLR112-1EDNH | 7516-308 | • | | • | | | | • | • | • |
| FLR112-1LNNH | 7516-410 | • | | | • | • | | | • | • |
| FLR112-1LBNH | 7516-049 | • | | | • | | • | | • | • |
| FLR112-1LDNH | 7516-204 | • | | | • | | | • | • | • |

Note:(4) 1/8" - 27 NPTF pipe plugs are included with every [H] assembly.

FLR2 SERIES, LINE TYPE CARTRIDGE FILTER

| Order Code | Bill of Material # | Port Type | | Element Micron | | | By-Pass Spring | | Indicator | Indicator Ports Machined and Plugged [H] |
|--------------|--------------------|----------------|------------------------------------|-----------------|-----------------|----------------------|----------------|------------|-----------|--|
| | | 1-1/2" NPT [1] | SAE 4-Bolt Flange & 1-1/4" NPT [9] | 10 Shielded [E] | 33 Shielded [L] | 165 (200 Sq. In) [S] | 5 PSI [B] | 15 PSI [D] | None [N] | |
| FLR215-1EDNH | 7263-023 | • | | • | | | | • | • | • |
| FLR215-1LDNH | 7263-026 | • | | | • | | | • | • | • |
| FLR215-1SBNH | 7263-028 | • | | | | • | • | | • | • |
| FLR215-9LBNH | 7263-352 | | • | | • | | | • | • | • |
| FLR215-9LDNH | 7263-338 | | • | | • | | | • | • | • |
| FLR215-9SBNH | 7263-339 | | • | | | • | • | | • | • |

Note:(4) 1/8" - 27 NPTF pipe plugs are included with every [H] assembly.

FLR3 SERIES, LINE TYPE CARTRIDGE FILTER



FLR3 Series

| Order Code | Bill of Material # | Port Type | | Element Micron | | By-Pass Spring | | Indicator | Inlet / Outlet Location |
|--------------|--------------------|----------------|--|-----------------|----------------------|----------------|------------|-----------|---|
| | | 1-1/4" NPT [1] | | 33 Shielded [L] | 165 (200 Sq. In) [S] | 5 PSI [B] | 15 PSI [D] | None [N] | Top In, Bottom Out [F] Side In, Bottom Out [E] |
| FLR312-1LDNF | 7264-050 | • | | • | | | • | • | F |
| FLR312-1SBNE | 7264-024 | • | | | • | • | | • | E |

Note: Indicator ports machined and plugged.

FLR4 SERIES, LINE TYPE DUAL ELEMENT CARTRIDGE FILTER



FLR4 Series

| Order Code | Bill of Material # | Port Type | | Element Micron | | | By-Pass Spring | | Indicator | Indicator Ports Machined and Plugged [H] |
|--------------|--------------------|------------------------------------|--|-----------------|-----------------|----------------------|----------------|------------|-----------|--|
| | | SAE 4-Bolt Flange & 1-1/2" NPT [5] | | 10 Shielded [E] | 33 Shielded [L] | 165 (200 Sq. In) [S] | 5 PSI [B] | 15 PSI [D] | None [N] | |
| FLR415-5EDNH | 7267-239 | • | | • | | | | • | • | • |
| FLR415-5LDNH | 7267-240 | • | | | • | | | • | • | • |
| FLR415-5SBNH | 7267-238 | • | | | | • | • | | • | • |

Note:(4) 1/8" - 27 NPTF pipe plugs are included with every [H] assembly.

Filters

FMR5 SERIES, LINE TYPE MEDIUM PRESSURE CARTRIDGE FILTER

| Order Code | Bill of Material # | Port Type | | Element | By-Pass Spring | | | Indicator | Indicator Ports Machined and Plugged [H] |
|--------------|--------------------|-------------------|---------------------------------------|---------------|----------------|------------|------------|-----------|--|
| | | 1-1/2" NPT [12-1] | SAE 4-Bolt Flange & 1-1/4" NPT [15-5] | 10 Micron [E] | None [N] | 20 PSI [E] | 45 PSI [H] | None [N] | |
| FMR512-1EENH | 11876-003 | • | | • | | • | | • | • |
| FMR515-5EENH | 11876-002 | | • | • | | • | | • | • |
| FMR515-5EHNH | 11876-004 | | • | • | | | • | • | • |

FSP FILTER HEADS

| Order Code | Bill of Material # | Filter Model | | | Description |
|-------------------------|--------------------|--------------|--------|--------|--|
| | | FSP107 | FSP212 | FSP415 | |
| CL-FSP107-HEAD | 13650-886 | • | | | Case Lot of 12 FSP107 Filter Heads (with 3/4" NPT Porting) |
| CL-FSP212-HEAD Porting) | 13650-887 | | • | | Case Lot of 12 FSP212 Filter Heads (with 1-1/4" NPT |
| CL-FSP415-HEAD | 13650-888 | | | • | Case Lot of 12 FSP415 Filter Heads (with 1-1/2" NPT Porting) |

"CL" signifies Case Lots of 12 filter heads. These heads do NOT include the filter element.

FSP1 SERIES, LINE TYPE SPIN-ON FILTER

| Order Code | Bill of Material # | Port Type | Element Micron | | By-Pass Spring | | Indicator | Indicator Ports | |
|--------------|--------------------|--------------|----------------|--------|----------------|------------|-----------|-----------------|-----------|
| | | 3/4" NPT [1] | 10 [E] | 33 [L] | 5 PSI [B] | 15 PSI [D] | None [N] | None [N] | 1 & 4 [X] |
| FSP107-1EDNN | 7266-003 | • | • | | | • | • | • | |
| FSP107-1EDNX | 7266-115 | • | • | | | • | • | | • |
| FSP107-1LBNN | 7266-005 | • | | • | • | • | • | • | |
| FSP107-1LBNX | 7266-114 | • | | • | • | • | • | | • |
| FSP107-1LDNN | 7266-006 | • | | • | | • | • | • | |
| FSP107-1LDNX | 7266-113 | • | | • | | • | • | | • |

Note: (2) 1/8" - 27 NPTF pipe plugs are included with every [X] assembly.

FSP2 SERIES, LINE TYPE SPIN-ON FILTER

| Order Code | Bill of Material # | Port Type | | Element Micron | | By-Pass Spring | | | | Indicator | Indicator Ports Machined and Plugged [H] |
|--------------|--------------------|----------------|------------|----------------|--------|----------------|-----------|------------|------------|-----------|--|
| | | 1-1/4" NPT [1] | SAE 20 [2] | 10 [E] | 25 [J] | None [N] | 5 PSI [B] | 15 PSI [D] | 25 PSI [F] | None [N] | |
| FSP212-1ENNH | 7517-069 | • | | • | | • | | | | • | • |
| FSP212-1EBNH | 7517-158 | • | | • | | | • | | | • | • |
| FSP212-1EDNH | 7517-124 | • | | • | | | | • | | • | • |
| FSP212-1EFNH | 7517-133 | • | | • | | | | | • | • | • |
| FSP212-1JDNH | 7517-125 | • | | | • | | | • | | • | • |
| FSP212-2EDNH | 7517-089 | | • | • | | | | • | | • | • |

Note: (4) 1/8" - 27 NPTF pipe plugs are included with every [H] assembly.



FSP1 Series



FSP2 Series

Filters

FSP4 SERIES, LINE TYPE DUAL SPIN-ON FILTER

| Order Code | Bill of Material # | Port Type | | Element Micron | | By-Pass Spring | | | Indicator | Indicator Ports Machined and Plugged [H] | |
|--------------|--------------------|---------------------------------------|---------------|----------------|--------|----------------|-----------|------------|------------|--|----------|
| | | SAE 4 Bolt Flange & 1-1/2" NPT [15-2] | SAE 24 [15-5] | 10 [E] | 25 [J] | None [N] | 5 PSI [B] | 15 PSI [D] | 25 PSI [F] | | None [N] |
| FSP415-5ENNH | 23422-008 | | • | • | | • | | | | • | • |
| FSP415-5EDNH | 23422-003 | | • | • | | | | • | | • | • |
| FSP415-5EFNH | 23422-009 | | • | • | | | | • | | • | • |
| FSP415-5JBNH | 23422-010 | | • | | • | | • | | | • | • |
| FSP415-2JBNH | 23422-006 | • | | | • | | • | | | • | • |
| FSP415-2EDNH | 23422-007 | • | | • | | | | • | | • | • |

Note:(4) 1/8" - 27 NPTF pipe plugs are included with every [H] assembly.

FBR1 SERIES, FILTER BREATHER

| Order Code | Bill of Material # | Adapter Type | | 10 Micron Element [E] 52 CFM |
|-------------------------|--------------------|--------------|----------------------|------------------------------|
| | | [12] Welded | [14] 3/4" NPT Nipple | |
| CL-45003 (FBR1-12E) | 16009-004 | • | | • |
| CL-45005 (FBR1-14E) | 16009-006 | | • | • |
| CL-45001 (Element Only) | 16009-002 | | | • |

"CL" signifies Case Lots of 12 filter breathers. Although individual breathers/elements are marked with a "K", they are only sold in Case Lots.

FBR2 SERIES, FILTER BREATHER

| Order Code | Bill of Material # | Nipple Type | Element (10 Micron) | | By-Pass Spring |
|----------------------------|--------------------|-------------|---------------------|---------------|--------------------------|
| | | | [04] - 52 CFM | [06] - 60 CFM | [Code] Pressure Setting |
| CL-45025 (FBR2-04A) | 16038-001 | 3/4" NPT | • | | [A] 5 PSI |
| CL-45026 (FBR2-04B) | 16038-002 | 3/4" NPT | • | | [B] 11 PSI |
| CL-45027 (FBR2-04D) | 16038-003 | 3/4" NPT | • | | [D] 20 PSI |
| CL-45028 (FBR2-04E) | 16038-004 | 3/4" NPT | • | | [E] 30 PSI |
| CL-45029 (FBR2-04F) | 16038-005 | 3/4" NPT | • | | [F] 40 PSI |
| CL-45030 (FBR2-04X) | 16038-006 | 3/4" NPT | • | | [X] 0 PSI |
| CL-45031 (FBR2-06A) | 16038-007 | 3/4" NPT | | • | [A] 5 PSI |
| CL-45032 (FBR2-06B) | 16038-008 | 3/4" NPT | | • | [B] 11 PSI |
| CL-45033 (FBR2-06D) | 16038-009 | 3/4" NPT | | • | [D] 20 PSI |
| CL-45034 (FBR2-06E) | 16038-010 | 3/4" NPT | | • | [E] 30 PSI |
| CL-45035 (FBR2-06F) | 16038-011 | 3/4" NPT | | • | [F] 40 PSI |
| CL-45036 (FBR2-06X) | 16038-012 | 3/4" NPT | | • | [X] 0 PSI |
| CL-45001 (4" Element Only) | 16009-002 | | • | | Replacement Element Only |
| CL-22001 (6" Element Only) | 03629-002 | | | • | Replacement Element Only |

"CL" signifies Case Lots of 12 filter breathers. Although individual breathers/elements are marked with a "K", they are only sold in Case Lots.



FBR2 Series

Filters

FST2 SERIES, SUMP TYPE FILTER

| Order Code | Bill of Material # | Port Type | | Element Micron (10 Micron - 300 Sq. In.) [T] | By-Pass Spring (5 PSI) [B] |
|------------|--------------------|----------------------|----------------------|--|----------------------------------|
| | | 1-1/2" NPT [15-1] | 1-1/4" NPT [12-1] | | |
| FST215-1TB | 7265-011 | • | | • | • |
| FST212-1TB | 7265-004 | | • | • | • |

"CL" signifies Case Lots of 12 elements. Although individual elements are marked with a "K", they are only sold in Case Lots.



FST2 Series

FST3 SERIES, SUMP TYPE FILTER

| Order Code | Bill of Material # | Male Tank Connection | Female Pump Connection | Element Micron | By-Pass Spring |
|--------------------------|--------------------|----------------------|------------------------|----------------|----------------|
| CL-45010 (FST3-100-50) | 16037-001 | 1" NPT | 1/2" NPT | 140 Micron | None |
| CL-45011 (FST3-100-50A) | 16037-002 | 1" NPT | 1/2" NPT | 140 Micron | 3 PSI |
| CL-45012 (FST3-125-75) | 16037-003 | 1-1/4" NPT | 3/4" NPT | 140 Micron | None |
| CL-45013 (FST3-125-75A) | 16037-004 | 1-1/4" NPT | 3/4" NPT | 140 Micron | 3 PSI |
| CL-45014 (FST3-150-100) | 16037-005 | 1-1/2" NPT | 1" NPT | 140 Micron | None |
| CL-45015 (FST3-150-100A) | 16037-006 | 1-1/2" NPT | 1" NPT | 140 Micron | 3 PSI |
| CL-45016 (FST3-200-125) | 16037-007 | 2" NPT | 1-1/4" NPT | 140 Micron | None |
| CL-45017 (FST3-200-125A) | 16037-008 | 2" NPT | 1-1/4" NPT | 140 Micron | 3 PSI |
| CL-45018 (FST3-300-200) | 16037-009 | 3" NPT | 2" NPT | 140 Micron | None |
| CL-45019 (FST3-300-200A) | 16037-010 | 3" NPT | 2" NPT | 140 Micron | 3 PSI |
| CL-45020 (FST3-400-300) | 16037-011 | 4" NPT | 3" NPT | 140 Micron | None |
| CL-45021 (FST3-400-300A) | 16037-012 | 4" NPT | 3" NPT | 140 Micron | 3 PSI |

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Filter Condition Indicator Kits

| Order Code | Bill of Material # | Description |
|------------|--------------------|---|
| K-F-PSI | 8650-180 | Compound Indicator (Pressure) |
| K-F-VAC | 8650-181 | Vacuum Indicator (Suction) |
| PG-15 | 13130-001 | Tri-Color Pressure Gauge (for 15 PSI By-Passes) |
| PG-25 | 13131-001 | Tri-Color Pressure Gauge (for 25 PSI By-Passes) |
| VG-6 | 13132-001 | Tri-Color Vacuum Gauge (for 3 PSI By-Passes) |
| VS-06 | 23360-005 | VS-06 Vacuum Switch (3 PSI Setting) |
| VS-11 | 23360-006 | VS-11 Vacuum Switch (5.5 PSI Setting) |
| PS-50 | 23360-007 | PS-11 Pressure Switch (51-90 PSI Adjustment Range) |
| PS-90 | 23360-008 | PS-90 Pressure Switch (91-150 PSI Adjustment Range) |

For use with filter models FLR1, FLR2, FLR3, FLR4 and FSP1, FSP2, FSP4.



Tri-Color Gauges



Compound Indicators



Model PS/VS

Filters

BY-PASS SPRING ASSEMBLY KITS

| Order Code | Bill of Material # | Description | For Use in Model FSP107 | For Use In Models FLR1, FLR2, FLR4, FSP2, FSP4, FMR5 | For Use in Model FLR3 | For Use in Model FST2 |
|------------|--------------------|----------------|-------------------------|--|-----------------------|-----------------------|
| K-FSP1-5 | 8650-187 | 5 PSI By-Pass | • | | | |
| K-FSP1-15 | 8650-188 | 15 PSI By-Pass | • | | | |
| K-FSP1-20 | 8650-189 | 20 PSI By-Pass | • | | | |
| K-FLR3-3 | 8650-977 | 3 PSI By-Pass | | | • | |
| K-FLR3-5 | 8650-978 | 5 PSI By-Pass | | | • | |
| K-FLR3-9 | 8650-979 | 9 PSI By-Pass | | | • | |
| K-FLR3-15 | 8650-980 | 15 PSI By-Pass | | | • | |
| K-FLR3-25 | 8650-981 | 25 PSI By-Pass | | | • | |
| K-F250-3 | 8650-190 | 3 PSI By-Pass | | • | | • |
| K-F250-5 | 8650-191 | 5 PSI By-Pass | | • | | • |
| K-F250-9 | 8650-192 | 9 PSI By-Pass | | • | | • |
| K-F250-15 | 8650-193 | 15 PSI By-Pass | | • | | |
| K-F250-20 | 13650-836 | 20 PSI By-Pass | | • | | |
| K-F250-25 | 8650-194 | 25 PSI By-Pass | | • | | |
| K-F250-45 | 13650-837 | 45 PSI By-Pass | | • | | |



Mounting Kit



Model PS/VS

Filter Option Kits

| Order Code | Bill of Material # | Description |
|------------|--------------------|--|
| K-LF-MB | 8650-182 | Mounting Bracket for Model FLR3 |
| K-PF-2125 | 8650-183 | 4-Bolt Flange Adapter with 1-1/4" NPT for Models FLR2 & FMR5 |
| K-PF-2150 | 8650-184 | 4-Bolt Flange Adapter with 1-1/2" NPT for Models FLR2 & FMR5 |
| K-PF-4150 | 8650-185 | 4-Bolt Flange Adapter with 1-1/4" NPT for Model FLR4 & FSP4 |
| K-PF-4200 | 8650-186 | 4-Bolt Flange Adapter with 2" NPT for Model FLR4 & FSP4 |

Filters

Replacement Element Kits

| Order Code | Bill of Material # | Description | May Be Used In Filter Models | | | | | |
|------------|--------------------|-------------------------------------|------------------------------|------|------|--------------|------|------|
| | | | FLR1 FLR2 FLR4 | FLR3 | FSP1 | FSP2 FSP4 | FST2 | FMR5 |
| CL-22001 | 3629-002 | 10 Micron Paper | | | • | | | |
| CL-22002 | 3628-002 | 33 Micron Paper | | | • | | | |
| CL-23011 | 3632-002 | 220 Micron Woven Wire | • | • | | | • | |
| *CL-23014 | 6736-002 | 33 Micron Paper (Shielded) | • | | | | • | |
| *CL-23015 | 6737-002 | 10 Micron Paper (Shielded) | • | | | | • | |
| CL-23018 | 7649-002 | 10 Micron Paper (6.65" Long) | | | | • | | |
| CL-23019 | 7650-002 | 25 Micron Paper (6.65" Long) | | | | • | | |
| CL-23020 | 7651-002 | 3 Micron Paper (6.65" Long) | | | | • | | |
| CL-23062 | 13117-002 | 3 Micron Synthetic (10.65" Long) | | | | • | | |
| CL-23063 | 13117-004 | 10 Micron Synthetic (10.65" Long) | | | | • | | |
| CL-23026 | 7886-002 | 10 Micron Paper (Shielded) | • | | | | • | |
| CL-23027 | 7885-002 | 33 Micron Paper (Shielded) | • | | | | • | |
| CL-23044 | 8080-002 | 3 Micron Paper | • | | | | | |
| CL-23048 | 11828-001 | 5 Micron Fiberglass (Shielded) | • | | | | | |
| CL-24006 | 3635-002 | 10 Micron Paper (Shielded) | | • | | | | |
| CL-24007 | 3636-002 | 33 Micron Paper (Shielded) | | • | | | | |
| CL-25001 | 3630-002 | 165 Micron Woven Wire (200 Sq. In.) | • | • | | | • | |
| CL-25002 | 3631-002 | 165 Micron Woven Wire (300 Sq. In.) | • | • | | | • | |
| CL-23066 | 16045-002 | 10 Micron Paper | | | | | | • |

* Includes Element Housing Seal and Center Post Seal.

"CL" signifies Case Lots of 12 elements. Although individual elements are marked with a "K", they are only sold in Case Lots.