

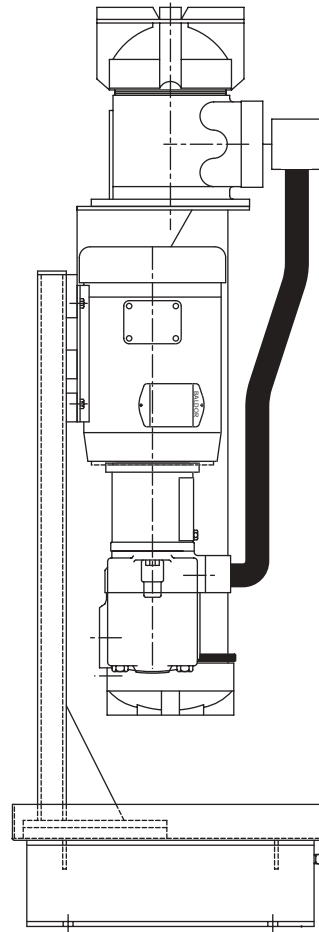
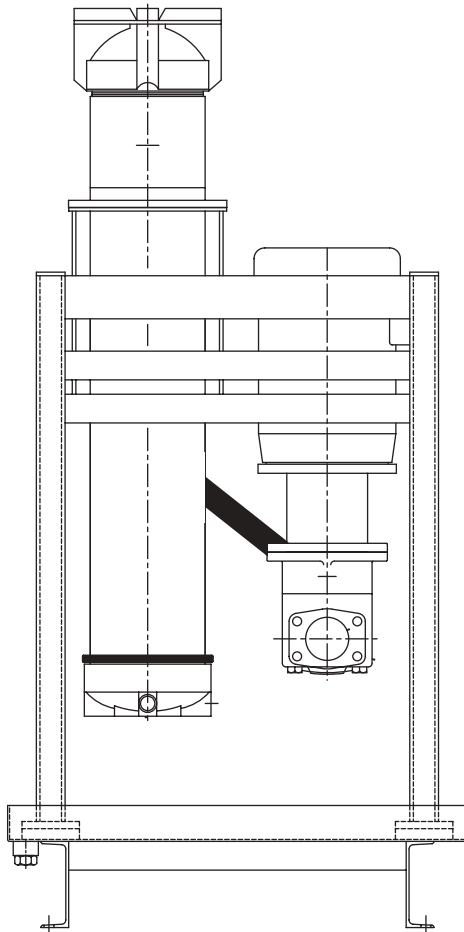
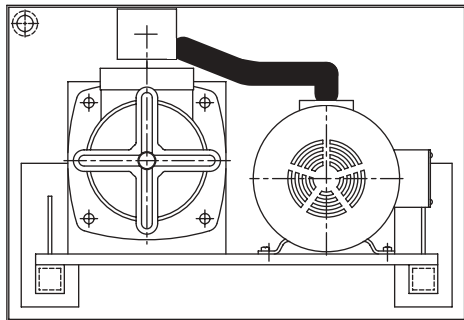
EATON

Vickers

Off-Line Filtration Unit

Technical Data

Flows to 150 USgpm (568 L/min)



VICKERS[®]

Table of Contents

| | |
|--|----|
| Description | 4 |
| OLF Components | 5 |
| Target Cleanliness Level | 6 |
| Monitoring System Cleanliness | 8 |
| Housing Flow Data | 9 |
| Filter Element Flow Data | 10 |
| OLF Families | |
| V15 | |
| 5 USgpm (19L/min) - V15 Series | 11 |
| HV6R | |
| 31.5 USgpm (119 L/min) - HV6R Series | 12 |
| 57 USgpm (216 L/min) - HV6R Series | 13 |
| 90 USgpm (341 L/min) - HV6R Series | 14 |
| 120 USgpm (454 L/min) - HV6R Series | 15 |
| 150 USgpm (568 L/min) - HV6R Series | 16 |
| HV3R | |
| 19.5 USgpm (74 L/min) - HV3R Series | 17 |
| 31.5 USgpm (119 L/min) - HV3R Series | 18 |
| OFR60 | |
| 19.5 USgpm (74 L/min) - OFR60 Series | 19 |
| 31.5 USgpm (119 L/min) - OFR60 Series | 20 |
| OFRS60 | |
| 19.5 USgpm (74 L/min) - OFRS60 Series | 21 |
| 31.5 USgpm (119 L/min) - OFRS60 Series | 22 |
| HS22 | |
| 57 USgpm (216 L/min) - HS22 Series | 23 |
| 90 USgpm (341 L/min) - HS22 Series | 24 |
| OFR120 | |
| 57 USgpm (216 L/min) - OFR120 Series | 25 |
| 90 USgpm (341 L/min) - OFR120 Series | 26 |
| Installation Dimensions | |
| 5 USgpm | 27 |
| 19.5 USgpm | 28 |
| 31.5 USgpm | 29 |
| 57 USgpm | 31 |
| 90 USgpm | 33 |
| 120 USgpm | 35 |
| 150 USgpm | 36 |
| Replacement Elements | 37 |

General Information

General Description

Vickers Off-Line Filtration units (OLF) provide 24 hour filtration, flushing and transfer of oil for existing in-plant machinery. Each unit can be matched to individual systems to provide on-site filtration for any application.

There are six "families" of OLF's, based on the pump size in each unit. Pump flows range from 5 USgpm (19 L/min) to 150 USgpm (568 L/min). A number of different pump/motor and filter combinations comprise each "family."

This unique design incorporates a hydraulic pump, electric motor and return line filter mounted on a compact sized, heavy gauge steel frame. 19.5 USgpm and larger frames incorporate a custom drip stand to eliminate any possible spillage.

The Off-Line Filtration unit can be integrated into existing systems via convenient electrical and hose connections.

Features and Benefits

- The Vickers Off-Line Filtration unit removes particles from new or used oil to protect system components from failures caused by contamination.
- The inclusion of proper contamination control devices, such as the Off-Line Filtration unit, helps to avoid expensive downtime and maintenance costs.
- The off-line feature virtually eliminates equipment downtime due to filter cleaning or replacement. The unit can be serviced without interrupting the machine cycle.
- Each unit can be easily installed utilizing hydraulic hoses and an electrical source.

NOTE

Placement of inlet and outlet hoses at a maximum separation in the system/reservoir allows for greater filtering efficiency.

- The reliability of Vickers pumps and standard motors makes each unit easy to maintain. Most unit maintenance involves only replacing filter elements.
- The number of different pump, motor and filter options allow you to match a filtration unit to your individual system needs.
- By matching system needs, you will be able to set and achieve target cleanliness levels. These cleanliness levels will work toward achieving systemic contamination control — clean fluid and improved hydraulic system reliability.

Fluid Cleanliness

Proper fluid condition is essential for long life of hydraulic components and systems. Hydraulic fluid must have the correct balance of cleanliness and additives for protection against wear of components.

Contaminant particles come in all shapes and sizes and are made up of a wide variety of materials. The majority are abrasive, so when they interact with surfaces they plough and cut fragments from critical surfaces in the components. This abrasive wear and surface fatigue accounts for almost 90% of hydraulic failures.

Determining System Needs

The versatility of OLF units combined with the reliability of Vickers components brings you one step closer to maximum system efficiency. Target fluid cleanliness can be achieved by matching the filter, the element and the flow through the loop to system requirements. There are three factors which determine which OLF is right for your application:

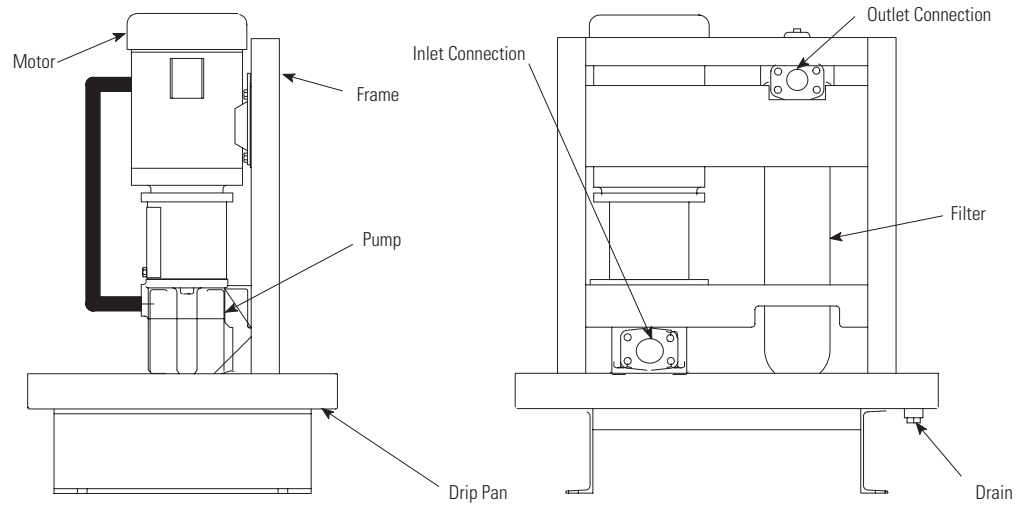
- Target Cleanliness Level
- Filter Selection
- Loop Flow

References

- Low & High Pressure Filters V-FF-MC-0001-E1
- The Systematic Approach to Contamination Control 561

Description

Off-Line Filtration System



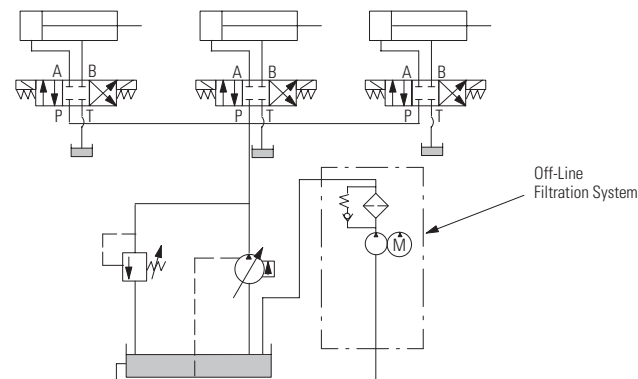
Pump/Filter Combinations

The following chart lists the various pump and filter combinations within the six "families" of OLFs.

Refer to the installation dimensions after each pump size grouping.

| PUMP FLOW RATING USGPM (L/MIN) | FILTER SERIES | | | | | | |
|-----------------------------------|---------------|------|------|--------|---------|---------|------|
| | V15 | HV6R | HV3R | OFR60S | OFR120S | OFRS60S | HS22 |
| 5.0 (19) | X | - | - | - | - | - | - |
| 19.5 (74) | - | - | X | X | - | X | - |
| 31.5 (119) | - | X | X | X | - | X | - |
| 57 (216) | - | X | - | - | - | - | X |
| 90 (341) | - | X | - | - | X | - | X |
| 120 (454) | - | X | - | - | - | - | - |
| 150 (568) | - | X | - | - | - | - | - |

Typical System Schematic



OLF Components

Filters

V15

- Ultra high efficiency membrane element technology Beta₂>1000
- Compact design
- Water removal elements available
- 20 micron element available for gear box applications
- High capacity elements (200 grams)

HV6R

- Designed to comply with ANSI specifications and ISO cleanliness standards.
- Easy to remove cap to facilitate element change and minimize spillage.
- Vent and drain ports to facilitate maintenance and system start-up.
- Visual, electrical, and electrical indicators with light options for system design flexibility.
- High efficiency replacement elements in standard configurations (C-Pak) and deep pleat elements for maximum service life (L-Pak).

HS22

- Available with Vickers R-pak media.
- Simple spin-on element design for easy maintenance.
- H₂O-Pro Water Removing Element available.

HV3R

- Designed to comply with ANSI specifications and ISO cleanliness standards.
- Visual, electrical, and electrical indicators with light options for system design flexibility
- Fully serviceable without tools
- Zero leak by-pass valve construction.
- Wide range of element lengths for maximum design flexibility
- High efficiency replacement elements in standard configurations (C-Pak) to meet Target Cleanliness Levels
- High collapse elements available for non-bypass applications.

OFR60/120 Series

- Two bowl length options.
- Visual indicator is standard.
- Electrical indicator also available.
- Bypass valve is standard.
- Replacement elements available in either C-pak or single layer construction.

OFRS60 Series

- Available with Vickers proprietary R-pak media.
- Simple spin-on element design for easy maintenance.
- Optional bypass valves prevent excessive pressure drop and accidental element collapse.
- Six available ports for use as gauge and/or diagnostic ports.
- H₂O-Pro Water Removing Element available.

Pumps

15V Series Single Vane

- 5 USgpm (19 L/min) capacity @3 bar.

V20 Series Single Vane

- 19.5 USgpm (74 L/min) capacity @7 bar (100 psi), 2-bolt flange mounted, straight keyed shaft

25V Series Single Vane

- 31.5 USgpm (119 L/min) capacity @7 bar (100 psi), 4-bolt flange port connection, straight keyed shaft

35V Series Single Vane

- 57 USgpm (216 L/min) capacity @7 bar (100 psi), 4-bolt flange port connection, straight keyed shaft

45V Series Single Vane

- 90 USgpm (341 L/min) capacity @7 bar (100 psi), 4-bolt flange port connection, straight keyed shaft

4525V Series Double Vane

- 121 USgpm (458 L/min) capacity @7 bar (100 psi), 4-bolt flange port connection, straight keyed shaft

4535V Series Double Vane

- 147 USgpm (556 L/min) capacity @7 bar (100 psi), 4-bolt flange port connection, straight keyed shaft Motor The OLF is driven by one of four different electric motors running at 1800 rpm. Each is foot mounted utilizing an F2 mount.

Motor

The 19.5 to 150 USgpm OLF is driven by one of four different electric motors running at 1800 rpm. Each is foot mounted utilizing an F2 mount.

The OLF 15V is driven by one of 3 AC motor options.

Target Cleanliness Level

Setting a Target Cleanliness Level

All hydraulic and lubrication systems should have a target cleanliness level for that system clearly stated in their engineering documentation. This target should be set after considering the components in the system (including the fluid), the typical operation and start-up temperatures, the duty cycle, the system's required useful life and safety issues. As the actual cleanliness level of the fluid varies by sampling point within the system (i.e. reservoir, pressure line, return line etc.), the target cleanliness level is assumed to be set for the return line, unless stated otherwise. The following chart and procedure has been prepared to help design and maintenance engineers set a target cleanliness level. The cleanliness level recommendations are based on engineering evaluations (including materials, critical clearances and machining tolerances) and practical field experiences with Vickers and other brands of hydraulic or load bearing components.

NOTE

Vickers components are designed and manufactured to high standards that maximize their dirt tolerance. Special materials, surface preparations and flow paths are utilized to ensure reliable operation. However, Vickers and all other brands of components operate best on properly cleaned fluids. Vickers has prepared these recommendations to help users of hydraulic and oil lubricated machines maximize the in-service life of their individual components and the total system.

VICKERS RECOMMENDED CLEANLINESS CODE CHART

| Pumps | | | |
|--|-----------------|------------------|--------------|
| Pressure (psi) | <2000 | 2000-3000 | 3000+ |
| Fixed Gear | 20/18/15 | 19/17/15 | |
| Fixed Vane | 20/18/15 | 19/17/14 | 18/16/13 |
| Fixed Piston | 19/17/15 | 18/16/14 | 17/15/13 |
| Variable Vane | 18/16/14 | 17/15/13 | |
| Variable Piston | 18/16/14 | 17/15/13 | 16/14/12 |
| Valves | | | |
| Pressure (psi) | <3000 | 3000+ | |
| Directional (solenoid) | 20/18/15 | 19/17/14 | 19/17/14 |
| Pressure Control (modulating) | | 19/17/14 | 19/17/14 |
| Flow Controls (standard) | | 19/17/14 | 19/17/14 |
| Check Valves | 20/18/15 | | 20/18/15 |
| Cartridge Valves | | 18/16/13 | 17/15/12 |
| Prefill | 20/18/15 | | 19/17/14 |
| CMX | 18/16/14 | | 17/15/13 |
| H.R.C. | | 18/16/13 | 17/15/12 |
| Proportional Directional (throttle valves) | | 17/15/12 | 16/14/11* |
| Proportional Pressure Controls | | 17/15/12 | 16/14/11* |
| Proportional Flow Controls | | 17/15/13 | 17/15/13 |
| Proportional Cartridge Valves | | 17/15/12 | 16/14/11* |
| Servo Valves | | 16/14/11* | 15/13/10* |
| Actuators | | | |
| Pressure (psi) | <1000 | <3000 | 3000+ |
| Cylinders | 20/18/15 | 20/18/15 | 20/18/15 |
| Vane Motors | 20/18/15 | 19/17/14 | 18/16/13 |
| Axial Piston Motors | 19/17/14 | 18/16/13 | 17/15/12 |
| Gear Motors | 21/19/17 | 20/18/15 | 19/17/14 |
| Radial Piston Motors | 20/18/14 | 19/17/13 | 18/16/13 |
| Cam Wave Motors | 18/16/14 | 17/15/13 | 16/14/12* |
| Hydrostatic Transmissions | | | |
| Pressure (psi) | <1000 | <3000 | 3000+ |
| Hydrostatic Transmissions (in-loop fluid) | 17/15/13 | 16/14/12* | 16/14/11* |
| Bearings | | | |
| Ball Bearing Systems | 15/13/11* | | |
| Roller Bearing Systems | 16/14/12* | | |
| Journal Bearings (high speed) | 17/15/13 | | |
| Journal Bearings (low speed) | 18/16/14 | | |
| General Industrial Gearboxes | 17/15/13 | | |

* Requires precise sampling practices to verify cleanliness levels.

Target Cleanliness Level (cont.)

How to Set a Target Cleanliness Level

Using Vickers Recommended Cleanliness Code Chart, determine the cleanest fluid (lowest code) required by any component in the system. All components that draw fluid from a common reservoir should be considered to be part of the same system even if their operations are independent or sequential (i.e. a central power unit running several different machines). The pressure rating for the system is the maximum system pressure achieved by the machine during a complete cycle of operation.

For any system where the fluid is not 100% petroleum oil, set the target one Range Code cleaner for each particle size. Example: If the cleanest code required was a 17/15/13 and water glycol is the system fluid, the target becomes 16/14/12.

If any two or more of the following conditions are experienced by the machine or system, set the target cleanliness level lower for each particle size.

- Frequent cold starts at less than 0 F (-18° C).
- Intermittent operation with fluid temperatures over 160 F (71° C).
- High vibration/shock operation.
- Critical dependence on the system as part of a process operation.

For example, if this system was expected to cold start in Alaska and a failure could stop the plant production, the target cleanliness would become 15/13/11.

Using this three step procedure, the system target cleanliness code is now set.

Viscosity Corrections for Pressure Drop

Important: If the system fluid's specific gravity (SG) is greater than 0.9 (for example, water glycol), the element pressure drop (ΔP) should be corrected.

The element flow curves can be adjusted using the following equations:

$$\text{Adjusted Clean } \Delta P_{\text{Element}} = \frac{\text{Actual viscosity in cP}}{29} \times \Delta P_{\text{curve}}$$

$$\text{Actual viscosity in cSt}/32 \times \text{Actual SG} \div 0.9 \times \Delta P_{\text{curve}}$$

$$\text{Actual viscosity in SUS}/150 \times \text{Actual SG} \div 0.9 \times \Delta_{\text{curve}}$$

A good "rule of thumb": To ensure satisfactory element life, the clean element pressure drop should generally be less than or equal to 40 percent of the indicator's rated differential pressure:

$$\Delta P_{\text{Element}} \leq 0.4 \times \Delta P_{\text{Indicator}}$$

The best way to extend element service life is to minimize ingress (vents, seals, cylinder rods) and maintain system cleanliness at or below the Target Cleanliness Level.

Filter Selection

Now that you have established the target cleanliness code, it is time to select the grade of filter and the flow rate through the filter that will achieve the required target cleanliness. The following target cleanliness and media grade charts assume the system will experience "average" ingress and that maintenance of the system will be consistent with current technology. If in operation the system is running dirtier than expected, corrective actions should be initiated. Suggested corrective actions are:

1. Check the indicator to see if the filters are on by-pass.
2. Check the sources of ingress and correct problems.
3. Check that the filters are positioned properly to see maximum fluid flow.
4. Consider using a finer grade of media.
5. Add a filter to the system.
6. Increase the OLF flow.

The system cleanliness is a factor of flow rate through the filter and filter efficiency. The OLF 15V uses the combination of very high filter efficiency and relatively low flow. This unit should be used on systems containing less than 500 gallons of hydraulic fluid. For "normal" industrial applications such as plastic injection molding, a cleanliness level of 16/14/11 can be expected.

For heavily contaminated environments, such as steel mills, a cleanliness of 19/16/13 can be expected.

TARGET CLEANLINESS

| | | |
|----------|---|---|
| 16/14/12 | 03 | – |
| 17/15/13 | 03 | 03 |
| 18/16/14 | 05 | 03 |
| 19/17/15 | 05 or 10 | 05 |
| | Recirculating loop at 20% of system volume per minute | Recirculating loop at 10% of system volume per minute |

Monitoring System Cleanliness

Confirming and Monitoring Achievement of Target Cleanliness

Once the target cleanliness level has been set and the filters have been selected and located in the system, the last and ongoing step is to confirm and monitor that the target cleanliness is being achieved. The best way to confirm the target is being reached is to take a representative sample from the return line, ahead of the filter and send it to a qualified laboratory that reports particle counting per ISO 4406 (modified to include 2m counts).

Quality laboratories, like the Vickers Fluid Analysis Service report the cleanliness level with range codes corresponding to 2m, 5m and 15m. From this information, it is possible to determine that the hydraulic or lubrication system has the clean fluid it needs for long dependable operation.

New developments in the environmental sciences have resulted in passage of laws

concerning the disposal of used hydraulic or lubrication fluids. Cost conscious users of petroleum products have discovered that it is far more cost effective to extend useful oil life by as much as 4-6 times through better contamination control and Systemic Contamination Control practices, thereby avoiding the high costs of frequent replacement and disposal of aged fluids. For more detailed information on how you can realize these savings contact a Vickers distributor trained in Systemic Contamination Control.

Taking a Representative Sample

Taking a representative sample is very exact science. Generally, the right place to sample a system is in the return line directly ahead of the return line filter. It is good system design to install a permanent sampling valve in that location. Alternate locations for sampling are to take a reservoir sample using a vacuum pump and clean tubing or sampling from the pressure line directly downstream from the pump. An important factor with reservoir sampling is to be sure the end of the sampling tube is about half way down into the fluid, otherwise "stratification" within the reservoir can cause the sample to be non-representative.

In all sampling situations it is critical that the system be in operation or just shut down when the sample is taken. This assures that the fluid is turbulent and that the contamination in the system is circulating and available to be captured in the sample bottle.

Once the cleanliness level has been achieved and confirmed, normal maintenance practices dictate that a system be resampled at regular intervals to reconfirm that the proper cleanliness level is being maintained. If the cleanliness level code value rises, meaning the system is running dirtier than it should, the first thing to check is if new ingress is entering the system. Check to be sure that all access doors are closed and that the vent filters are fitted and operational. Next, check to see if the filters are on bypass; if so, replace them with the genuine Vickers filter elements. Lastly, it may be necessary to add a filter to the system or increase the OLF flow.

After any maintenance changes are made with the system, a new sample should be taken to confirm that the target cleanliness level is still being maintained.

Housing Flow Data

Housing Pressure Drop
mm (inch)

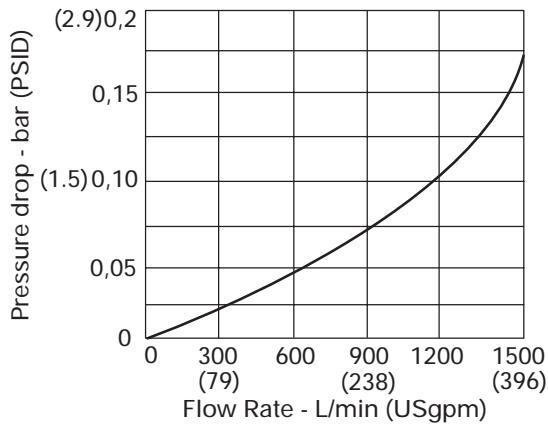
There are six different filter housing series for the OLF's: HV6R, HV3R, HS22, OFR60S, OFRS120S and OFRS60.

The pressure drop information below gives specific housings and flow rates (19.5, 31.5, 57, 90, 120 and 150 USgpm).

Flow versus pressure drop: 150 SUS (32 cSt) oil with specific gravity of 0.9. (See page 7 for specific gravity corrections for pressure drop.)

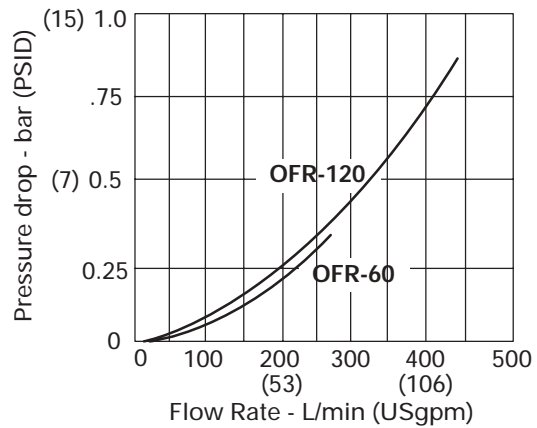
HV6R Series

Housing



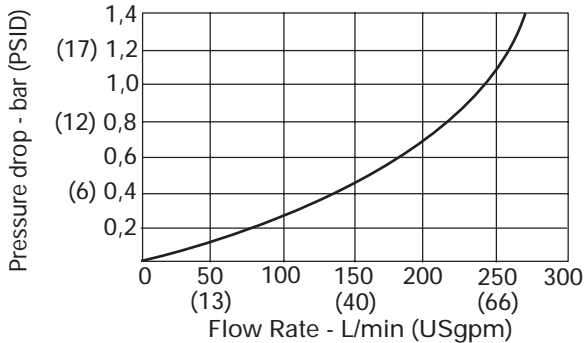
OFR60/120 Series

Housing

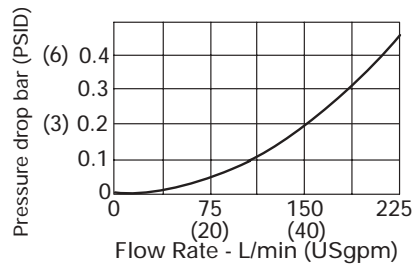


HV3R Series

Housing

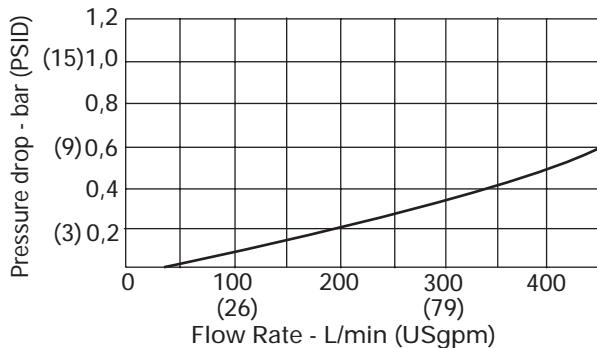


OFRS60 Series



HS22 Series

Housing



Filter Element Flow Data

Filter Element Flow
Data
mm (inch)

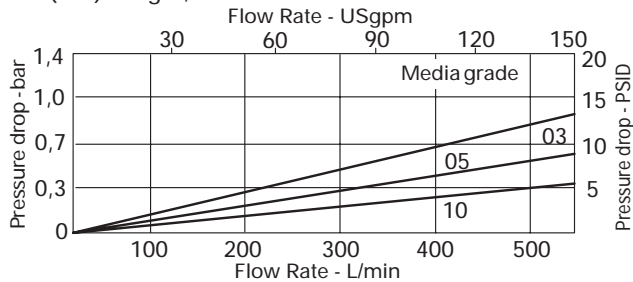
There are four different filter element replacement series for the OLF's: V041, V3R, V405 and V021.

The pressure drop information below is shown at flow rates which match the OLF's pump flow USgpm (L/min): 19.5 (74), 31.5 (119), 57 (216), 90 (341), 120 (454) and 150 (568)

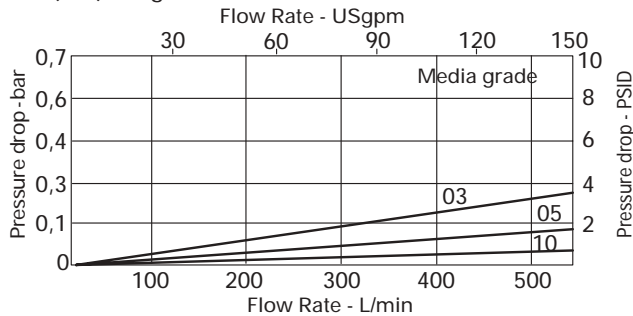
Flow versus pressure drop: 150 SUS (32 cSt) oil with specific gravity of 0.9. (See page 7 for viscosity correction and specific gravity corrections for pressure drop.)

V0411 Series Filter Elements

16 (406) Length, Code 5

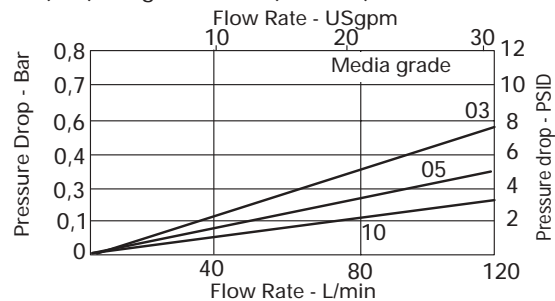


39 (991) Length, Code 8

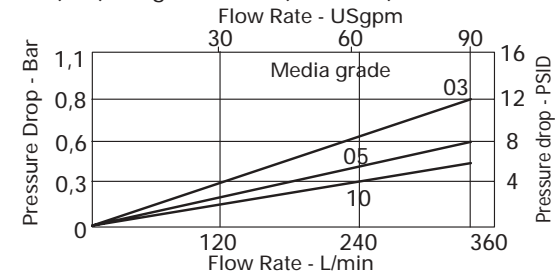


V4051 Series Filter Elements

9 (229) Length, Code 3 (OFR60S)

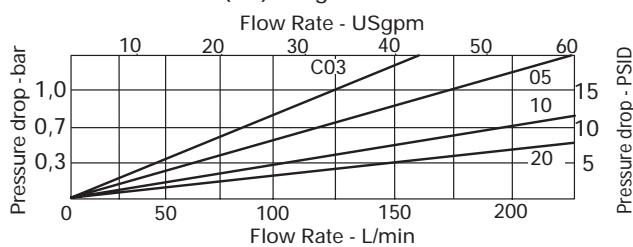


18 (457) Length, Code 6 (OFR120S)

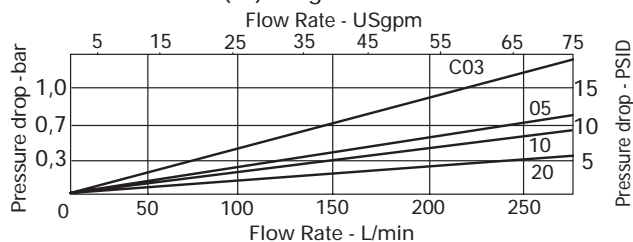


V3R Series Filter Elements

C-Pak Element 173 (6.8) Length

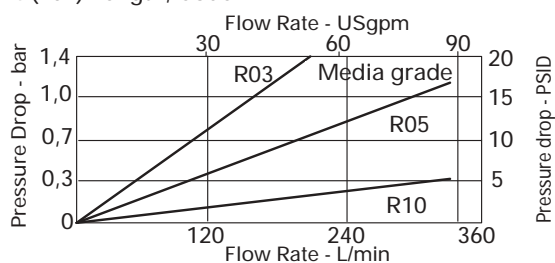


C-Pak Element 356 (14) Length

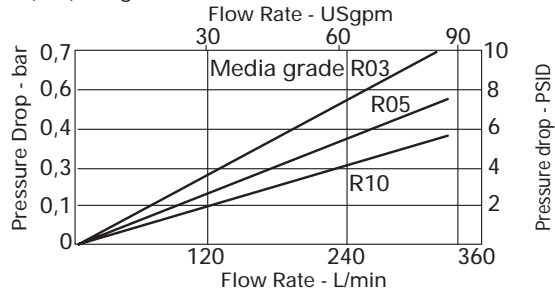


V0211 Series Filter Elements

4 (102) Length, Code 1



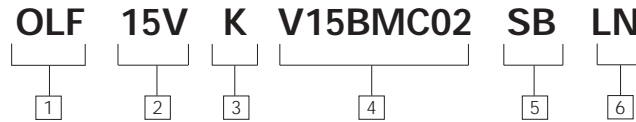
8 (203) Length, Code 2



V15 Series Filter

5 GPM (19 L/min) Flow

For dimensional information, see page 27



1 Model Series
Off Line Filtration Unit

2 Pump Type
15V -15 L/m Vane Pump
(at 50Hz)

3 Motor Voltage
K - 115 Volt AC, 1 Phase, 60 Hz
M - 220 Volt AC, 1 Phase, 50 Hz
N - 220/440 Volt AC, 3 Phase,
50 or 60 Hz

4 Filter Element
V15BMC02 - 2 Micron Filter
Element
V15BMW02 - 2 Micron and
Water
Removal
Element
V15BMC20 - 20 Micron
Element
V15BMW20 - 20 Micron and
Water
Removal
Element

5 Port Size
SB - 1-5/16-12 Straight
Thread SAE-16
(For 1" Tube)
BB - G-1 BSPP Thread

6 Indicator options*

**First Designator -
Indicator Type**

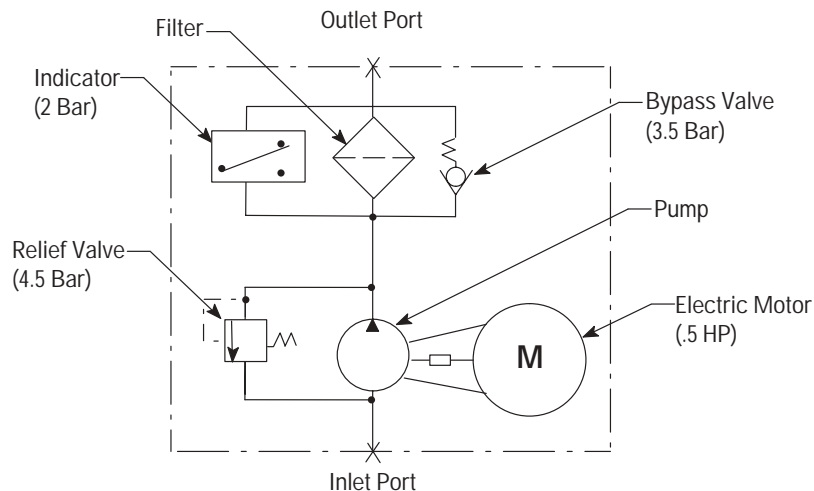
J - No Indicator (plug)
L - Visual 30 PSI
R - Electrical 30 PSI

**Second Designator -
Electrical Receptical**

B - Brad Harrison
H - Hirshman
J - Hirshman
with 24 volt light
K - Hirshman
with 115 volt light
L - Hirshman
with 230 volt light
N - No Connector - use with
visual indicators and "J"

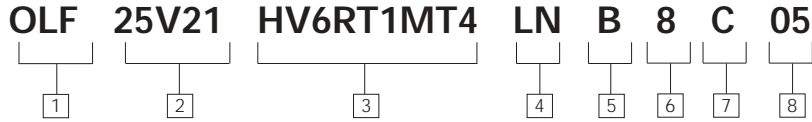
*Refer to Catalog V-FF-MC-0001-E1

mm (inch)



HV6R Series
Filter
25V21 Series
Pump
31.5 GPM
(119 L/min) Flow

For dimensional information, see page 30



1 Model Series
Off Line Filtration Unit

2 Vane Pump
25V21A1A22-R

3 Filter Series
HV6RT1MT4

4 Indicator options
First Designator - Indicator Type

- J - No Indicator (plug)
- L - Visual 30 PSI
- R - Electrical 30 PSI

Second Designator - Electrical Receptical

- B - Brad Harrison
- H - Hirshman
- J - Hirshman with 24 volt light
- K - Hirshman with 115 volt light
- L - Hirshman with 230 volt light
- N - No Connector - use with visual indicators and "J"

5 Seal material

- B - Buna-N
- V - Viton-A

Viton is a registered trademark of E.I. DuPont

6 Element length **Assembly length**

| | mm (inch) | mm (inch) |
|---|-----------|-------------|
| 5 | 407 (16) | 472 (18.6) |
| 8 | 981 (39) | 1056 (41.6) |

7 Element construction

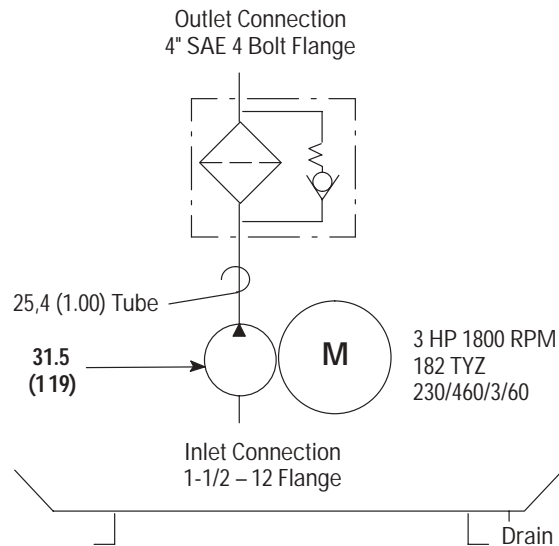
- C - Standard Construction
- L - Deep pleat construction

8 Fluid cleanliness rating
Target fluid cleanliness

| Code | level |
|------|--------------------|
| 03 | 16/14/12 or better |
| 05 | 18/16/14 or better |
| 10 | 20/18/15 or better |
| 20 | 22/19/16 or better |

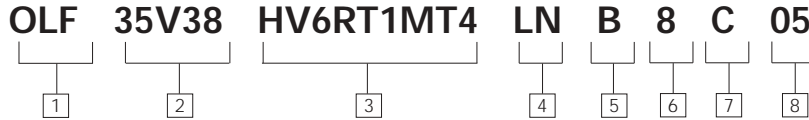
The table assumes limited ingress/single pass of pump flow through element. For detailed assistance, see "The Systemic Approach to Contamination Control" or contact your local Eaton representative.

mm (inch)



HV6R Series Filter 35V38 Series Pump 57 GPM (216 L/min) Flow

For dimensional information, see page 32



1 Model Series
Off Line Filtration Unit

2 Vane Pump
35V38A1A22-R

3 Filter Series
HV6RT1MT4

4 Indicator options
First Designator - Indicator Type

- J - No Indicator (plug)
- L - Visual 30 PSI
- R - Electrical 30 PSI

Second Designator - Electrical Receptical

- B - Brad Harrison
- H - Hirshman
- J - Hirshman with 24 volt light
- K - Hirshman with 115 volt light
- L - Hirshman with 230 volt light
- N - No Connector - use with visual indicators and "J"

5 Seal material

- B - Buna-N
 - V - Viton-A
- Viton is a registered trademark of E.I. DuPont*

6 Element length
mm (inch)

| | | |
|---|----------|-------------|
| 5 | 407 (16) | 472 (18.6) |
| 8 | 981 (39) | 1056 (41.6) |

7 Element construction

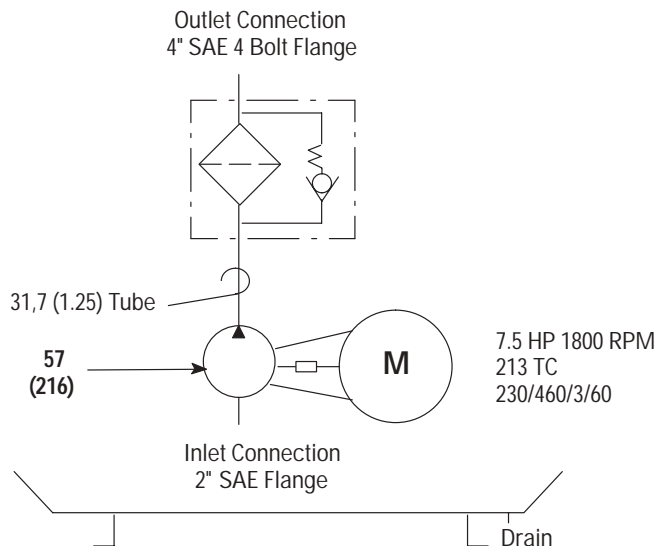
- C - Standard Construction
- L - Deep pleat construction

8 Fluid cleanliness rating
Target fluid cleanliness level

| | |
|-------------|---------------------------------------|
| Code | Target fluid cleanliness level |
| 03 | 16/14/12 or better |
| 05 | 18/16/14 or better |
| 10 | 20/18/15 or better |
| 20 | 22/19/16 or better |

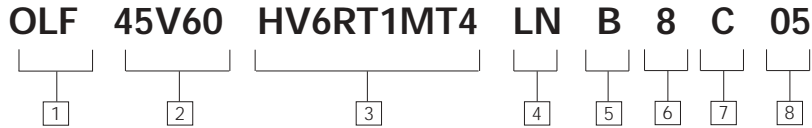
The table assumes limited ingestion/single pass of pump flow through element. For detailed assistance, see "The Systemic Approach to Contamination Control" or contact your local Eaton representative.

mm (inch)



**HV6R Series
Filter
45V60 Series
Pump
90 GPM
(341 L/min) Flow**

For dimensional information, see page 34



1 Model Series
Off Line Filtration Unit

2 Vane Pump
45VOA1A22-R

3 Filter Series
HV6RT1MT4

4 Indicator options
First Designator - Indicator Type

- J** - No Indicator (plug)
- L** - Visual 30 PSI
- R** - Electrical 30 PSI

Second Designator - Electrical Receptical

- B** - Brad Harrison
- H** - Hirshman
- J** - Hirshman with 24 volt light
- K** - Hirshman with 115 volt light
- L** - Hirshman with 230 volt light
- N** - No Connector - use with visual indicators and "J"

5 Seal material

- B** - Buna-N
- V** - Viton-A

Viton is a registered trademark of E.I. DuPont

6 Element length **Assembly length**

| | mm (inch) | mm (inch) |
|----------|-----------|-------------|
| 5 | 407 (16) | 472 (18.6) |
| 8 | 981 (39) | 1056 (41.6) |

7 Element construction

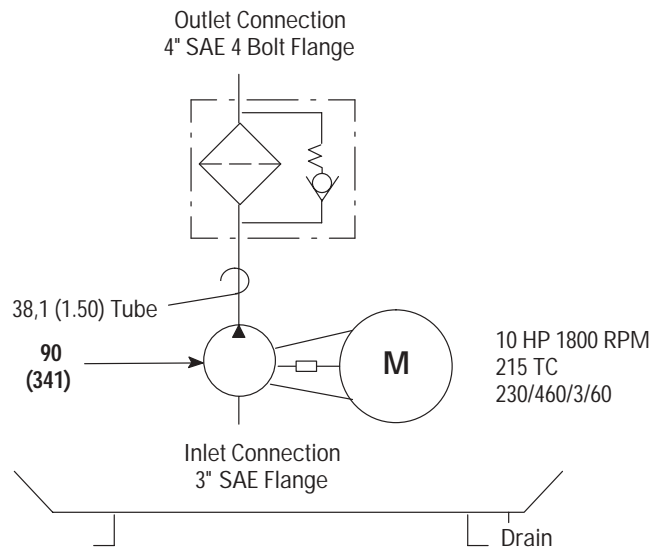
- C** - Standard Construction
- L** - Deep pleat construction

8 Fluid cleanliness rating
Target fluid cleanliness

| Code | level |
|-----------|--------------------|
| 03 | 16/14/12 or better |
| 05 | 18/16/14 or better |
| 10 | 20/18/15 or better |
| 20 | 22/19/16 or better |

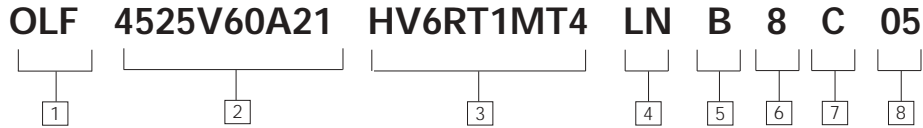
The table assumes limited ingress/single pass of pump flow through element. For detailed assistance, see "The Systemic Approach to Contamination Control" or contact your local Eaton representative.

mm (inch)



**HV6R Series
Filter
4525V Series
Pump
120 GPM
(454 L/min) Flow**

For dimensional information, see page 35



1 Model Series
Off Line Filtration Unit

2 Vane Pump
4525V60A211AD22-R

3 Filter Series
HV6RT1MT4

4 Indicator options
First Designator - Indicator Type

- J** - No Indicator (plug)
- L** - Visual 30 PSI
- R** - Electrical 30 PSI

Second Designator - Electrical Receptical

- B** - Brad Harrison
- H** - Hirshman
- J** - Hirshman with 24 volt light
- K** - Hirshman with 115 volt light
- L** - Hirshman with 230 volt light
- N** - No Connector - use with visual indicators and "J"

5 Seal material

- B** - Buna-N
- V** - Viton-A

Viton is a registered trademark of E.I. DuPont

| 6 Element length | Assembly length |
|-------------------------|------------------------|
| mm (inch) | mm (inch) |
| 5 - 407 (16) | 472 (18.6) |
| 8 - 981 (39) | 1056 (41.6) |

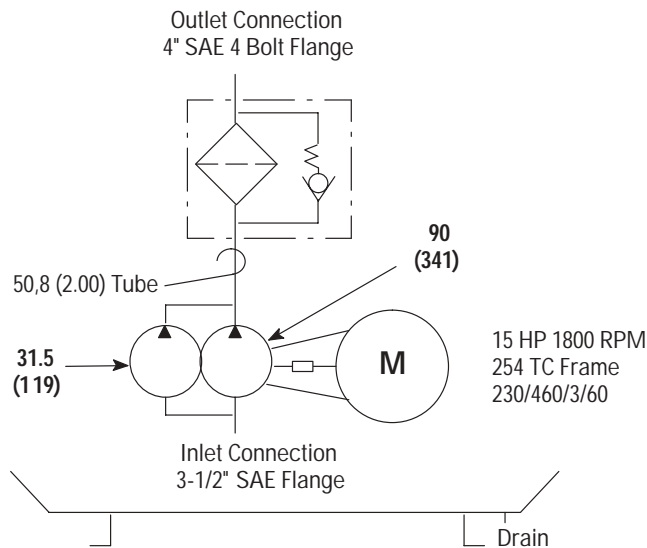
7 Element construction

- C** - Standard Construction
- L** - Deep pleat construction

| 8 Fluid cleanliness rating | Target fluid cleanliness level |
|-----------------------------------|---------------------------------------|
| 03 | 16/14/12 or better |
| 05 | 18/16/14 or better |
| 10 | 20/18/15 or better |
| 20 | 22/19/16 or better |

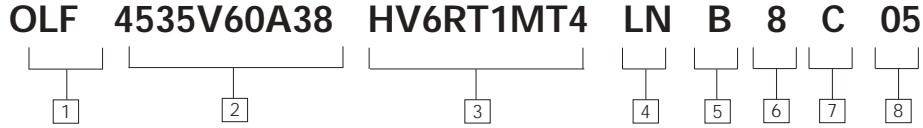
The table assumes limited ingestion/single pass of pump flow through element. For detailed assistance, see "The Systemic Approach to Contamination Control" or contact your local Eaton representative.

mm (inch)



HV6R Series
Filter
4535V Series
Pump
150 GPM
(568 L/min) Flow

For dimensional information, see page 36



1 Model Series
Off Line Filtration Unit

2 Vane Pump
4535V0A381AD22-R

3 Filter Series
HV6RT1MT4

4 Indicator options
First Designator - Indicator Type

- J - No Indicator (plug)
- L - Visual 30 PSI
- R - Electrical 30 PSI

Second Designator - Electrical Receptical

- B - Brad Harrison
- H - Hirshman
- J - Hirshman with 24 volt light
- K - Hirshman with 115 volt light
- L - Hirshman with 230 volt light
- N - No Connector - use with visual indicators and "J"

5 Seal material

- B - Buna-N
- V - Viton-A

Viton is a registered trademark of E.I. DuPont

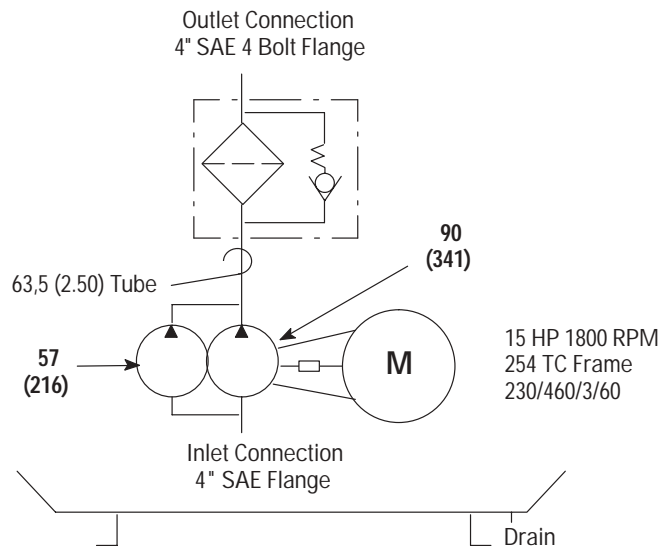
| 6 | Element length | Assembly length |
|---|----------------|-----------------|
| | mm (inch) | mm (inch) |
| 5 | 407 (16) | 472 (18.6) |
| 8 | 981 (39) | 1056 (41.6) |

7 Element construction
C - Standard Construction
L - Deep pleat construction

| 8 | Fluid cleanliness rating | Target fluid cleanliness |
|---|--------------------------|--------------------------|
| | Code | level |
| | 03 | 16/14/12 or better |
| | 05 | 18/16/14 or better |
| | 10 | 20/18/15 or better |
| | 20 | 22/19/16 or better |

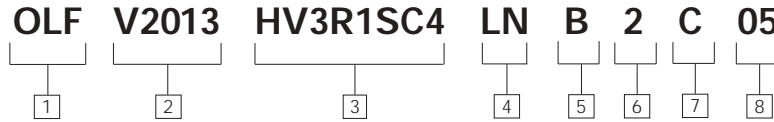
The table assumes limited ingress/single pass of pump flow through element. For detailed assistance, see "The Systemic Approach to Contamination Control" or contact your local Eaton representative.

mm (inch)



**HV3R Series
Filter
V2013 Series
Pump
19.5 GPM
(74 L/min) Flow**

For dimensional information, see page 28



1 Model Series
Off Line Filtration Unit

2 Vane Pump
V201S13R1A-11

3 Filter Series
HV3R1SC4

4 Indicator options
First Designator - Indicator Type
J - No Indicator (plug)
L - Visual 30 PSI
R - Electrical 30 PSI

Second Designator - Electrical Receptical

- B** - Brad Harrison
- H** - Hirshman
- J** - Hirshman with 24 volt light
- K** - Hirshman with 115 volt light
- L** - Hirshman with 230 volt light
- N** - No Connector - use with visual indicators and "J"

5 Seal material

- B** - Buna-N
 - V** - Viton-A
- Viton is a registered trademark of E.I. DuPont*

| 6 Element length | Assembly length |
|------------------|-----------------|
| mm (inch) | mm (inch) |
| 2 - 173 (6.8) | 266 (10.47) |
| 4 - 356 (14) | 447 (17.6) |

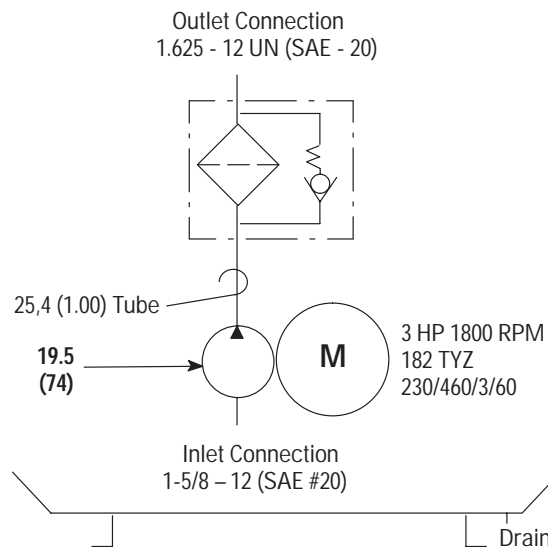
7 Element construction
C - 250 PSI Low Collapse

8 Fluid cleanliness rating
Target fluid cleanliness level

| Code | Target fluid cleanliness level |
|------|--------------------------------|
| 03 | 16/14/12 or better |
| 05 | 18/16/14 or better |
| 10 | 20/18/15 or better |
| 20 | 22/19/16 or better |

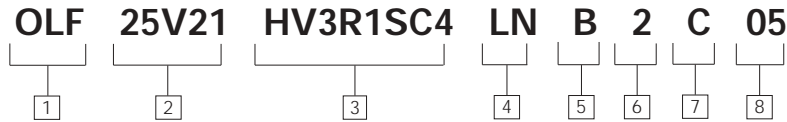
The table assumes limited ingress/single pass of pump flow through element. For detailed assistance, see "The Systemic Approach to Contamination Control" or contact your local Eaton representative.

mm (inch)



HV3R Series
Filter
25V21 Series
Pump
31.5 GPM
(119 L/min) Flow

For dimensional information, see page 29



1 Model Series
Off Line Filtration Unit

2 Vane Pump
25V21A1A22-R

3 Filter Series
HV3R1SC4

4 Indicator options
First Designator - Indicator Type
J - No Indicator (plug)
L - Visual 30 PSI
R - Electrical 30 PSI

Second Designator - Electrical Receptical

B - Brad Harrison
H - Hirshman
J - Hirshman with 24 volt light
K - Hirshman with 115 volt light
L - Hirshman with 230 volt light
N - No Connector - use with visual indicators and "J"

5 Seal material

B - Buna-N
V - Viton-A
Viton is a registered trademark of E.I. DuPont

| 6 Element length | Assembly length |
|------------------|-----------------|
| mm (inch) | mm (inch) |
| 2 - 173 (6.8) | 266 (10.47) |
| 4 - 356 (14) | 447 (17.6) |

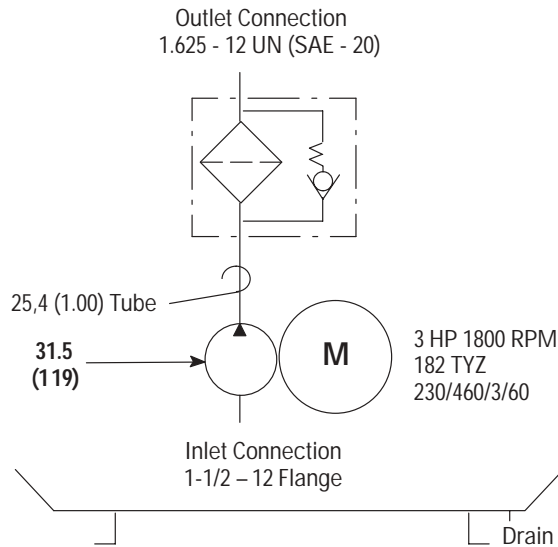
7 Element construction
C - 250 PSI Low Collapse

8 Fluid cleanliness rating
Code **Target fluid cleanliness level**

| | |
|-----------|--------------------|
| 03 | 16/14/12 or better |
| 05 | 18/16/14 or better |
| 10 | 20/18/15 or better |
| 20 | 22/19/16 or better |

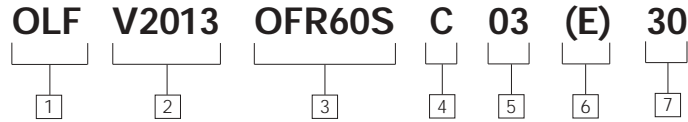
The table assumes limited ingestion/single pass of pump flow through element. For detailed assistance, see "The Systemic Approach to Contamination Control" or contact your local Eaton representative.

mm (inch)



OFR60 Series
 Filter
 V2013 Series
 Pump
 19.5 GPM
 (74 L/min) Flow

For dimensional information, see page 28



1 Model Series
 Off Line Filtration Unit

2 Vane Pump
 V201S13R1A-11

3 Filter Series
 OFR60S*****

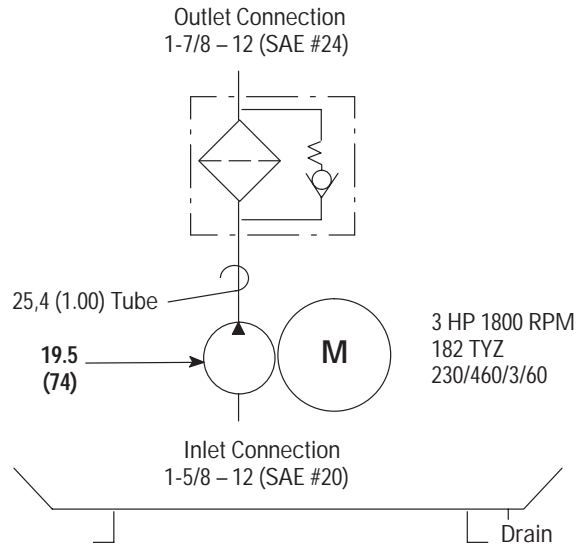
4 Element Construction
 C - C-Pak

5 Target Fluid Cleanliness Rating
03 -16/14/12 or better
05 -18/16/14 or better
10 -20/18/15 or better

6 Indicator
Omit – Mechanical 25 PSID
E – Electrical 25 PSID

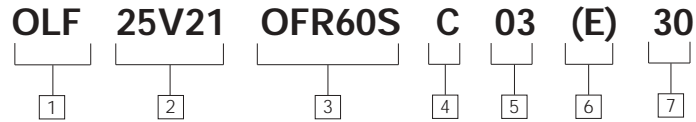
7 Design
Note - See page 35 for replacement elements

mm (inch)



OFR60 Series
Filter
25V21 Series
Pump
31.5 GPM
(119 L/min) Flow

For dimensional information, see page 29



1 Model Series
Off Line Filtration Unit

3 Filter Series
OFR60S*****

5 Target Fluid Cleanliness Rating
03 - 16/14/12 or better
05 - 18/16/14 or better
10 - 20/18/15 or better

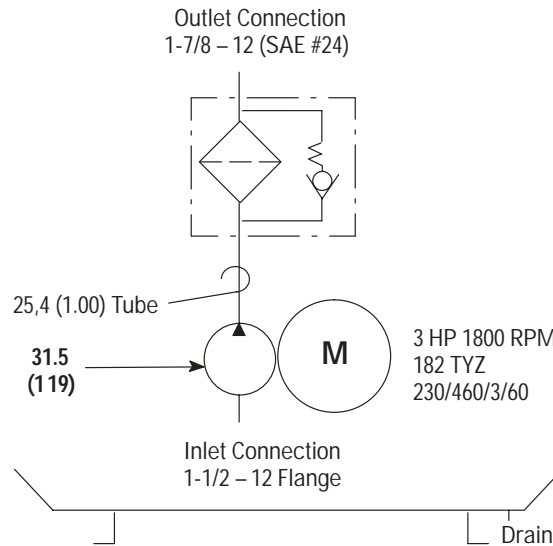
6 Indicator
Omit - Mechanical 25 PSID
E - Electrical 25 PSID

2 Vane Pump
25V21A1A22-R

4 Element Construction
C - C-Pak

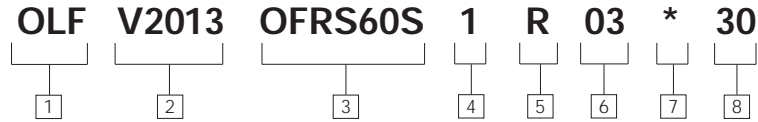
7 Design
Note - See page 35 for replacement elements

mm (inch)



OFRS60 Series
Filter
V2013 Series
Pump
19.5 GPM
(74 L/min) Flow

For dimensional information, see page 28



1 Model Series
Off Line Filtration Unit

2 Vane Pump
V201S13R1A-11

3 Filter Series
OFRS60S*****

4 Element Length
mm (inch)
1 - 178 (7)
2 - 279 (11)

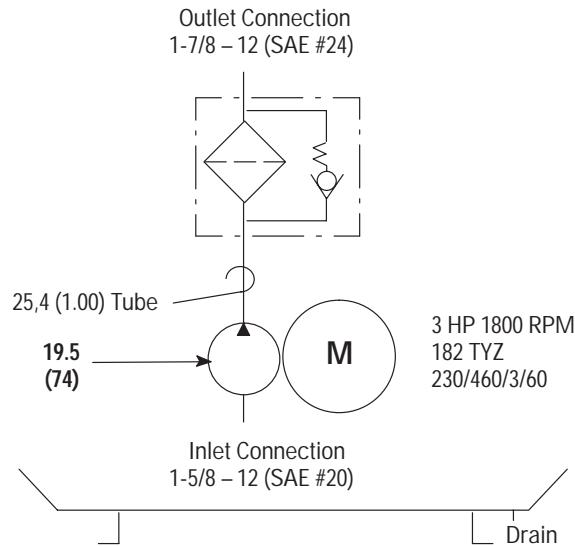
5 Element Construction
R - R-pak

6 Target Fluid Cleanliness Rating
03 - 16/14/12 or better
05 - 18/16/14 or better
10 - 20/18/15 or better

7 Pressure Gauge Option
P - Pressure gauge
Blank - Omit if not required

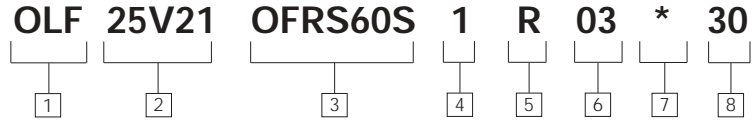
8 Design
Note - See page 35 for replacement elements

mm (inch)



OFRS60 Series
Filter
25V21 Series
Pump
31.5 GPM
(119 L/min) Flow

For dimensional information, see page 29



1 Model Series
Off Line Filtration Unit

2 Vane Pump
25V21A1A22-R

3 Filter Series
OFRS60S*****

4 Element Length
mm (inch)
1 - 178 (7)
2 - 279 (11)

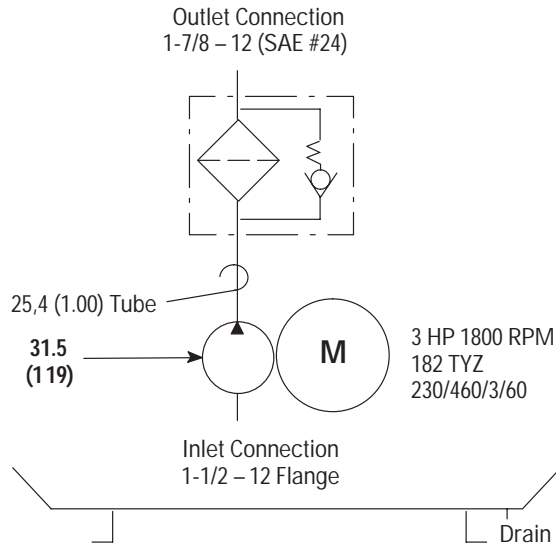
5 Element Construction
R - R-pak

6 Target Fluid Cleanliness Rating
03 - 16/14/12 or better
05 - 18/16/14 or better
10 - 20/18/15 or better

7 Pressure Gauge Option
P - Pressure gauge
Blank - Omit if not required

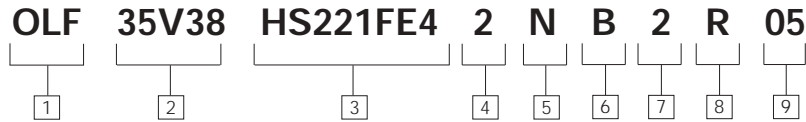
8 Design
Note - See page 35 for replacement elements

mm (inch)



HS22 Series
Filter
35V38 Series
Pump
57 GPM
(216 L/min) Flow

For dimensional information, see page 31



1 Model Series
Off Line Filtration Unit

2 Vane Pump
35V38A1A22-R

3 Filter Series
HS221FE4

4 Indicator options
1 - No indicator
2 - 0 - 200 PSI gauge
4 - 0 - 60 PSI gauge

5 Receptical
N - None

6 Seal material
B - Buna-N

7 Canister length Assembly length
mm (inch) mm (inch)
1 - 184 (7) 253 (10)
2 - 286 (11) 355 (14)

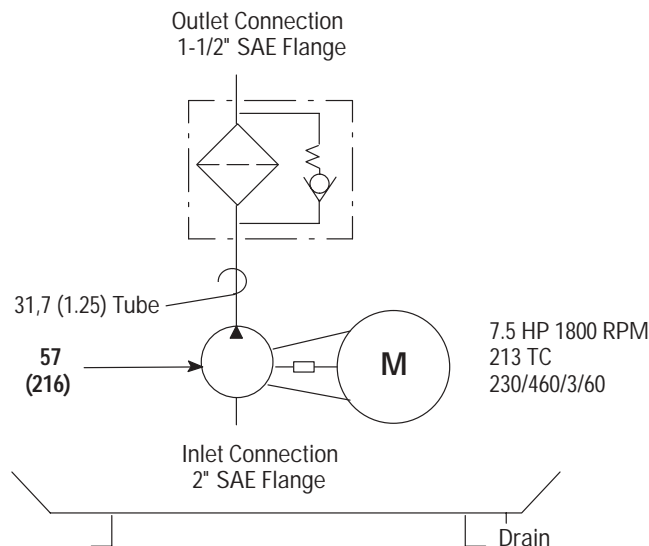
8 Element construction
R - Standard construction
(3, 5, 10, 20 Micron)
W - Water removal
(10 Micron only)

8 Fluid cleanliness rating
Target fluid cleanliness level

| Code | Target fluid cleanliness level |
|------|--------------------------------|
| 03 | 16/14/12 or better |
| 05 | 18/16/14 or better |
| 10 | 20/18/15 or better |
| 20 | 22/19/16 or better |

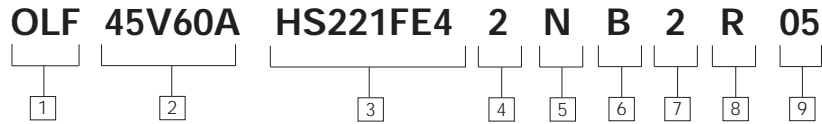
The table assumes limited ingress/single pass of pump flow through element. For detailed assistance, see "The Systemic Approach to Contamination Control" or contact your local Eaton representative.

mm (inch)



HS22 Series
Filter
45V60 Series
Pump
90 GPM
(341 L/min) Flow

For dimensional information, see page 33



1 Model Series
Off Line Filtration Unit

2 Vane Pump
45V60A1A22-R

3 Filter Series
HS221FE4

4 Indicator options
1 - No indicator
2 - 0 - 200 PSI gauge
4 - 0 - 60 PSI gauge

5 Receptical
N - None

6 Seal material
B - Buna-N

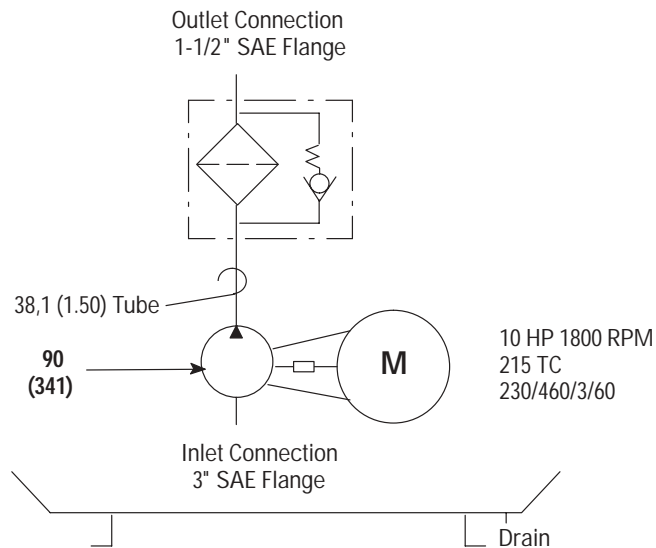
7 Canister length Assembly length
mm (inch) mm (inch)
1 - 184 (7) 253 (10)
2 - 286 (11) 355 (14)

8 Element construction
R - Standard construction
(3, 5, 10, 20 Micron)
W - Water removal
(10 Micron only)

8 Fluid cleanliness rating
Target fluid cleanliness level
Code level
03 16/14/12 or better
05 18/16/14 or better
10 20/18/15 or better
20 22/19/16 or better

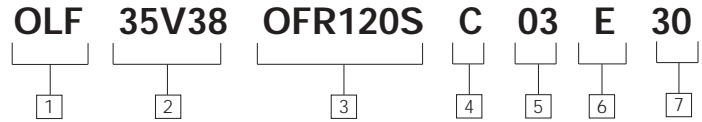
The table assumes limited ingress/single pass of pump flow through element. For detailed assistance, see "The Systemic Approach to Contamination Control" or contact your local Eaton representative.

mm (inch)



OFR120 Series
 Filter
 35V38 Series
 Pump
 57 GPM
 (216 L/min) Flow

For dimensional information, see page 31



1 Model Series
 Off Line Filtration Unit

2 Vane Pump
 35V38A1A22-2

3 Filter Series
 OFR120F*****

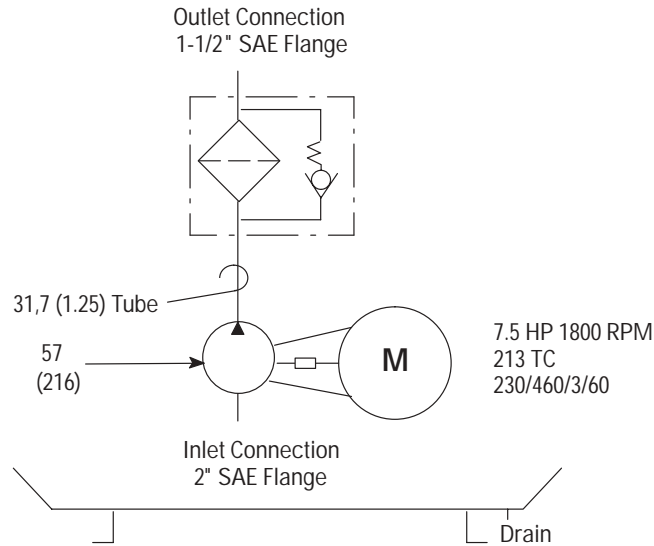
4 Element Construction
 C - C-Pak

5 Target Fluid Cleanliness Rating
 03 -16/14/12 or better
 05 -18/16/14 or better
 10 -20/18/15 or better

6 Indicator
 Omit – Mechanical 25 PSID
 E – Electrical 25 PSID

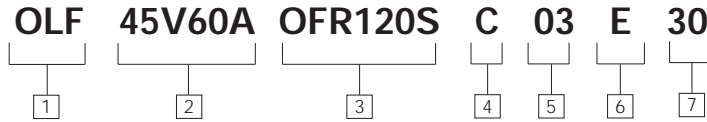
7 Design
 Note - See page 35 for replacement elements

mm (inch)



OFR120 Series
 Filter
 45V60 Series
 Pump
 90 GPM
 (341 L/min) Flow

For dimensional information, see page 33



1 **Model Series**
 Off Line Filtration Unit

2 **Vane Pump**
 45V60A1A22-R

3 **Filter Series**
 OFR120F*****

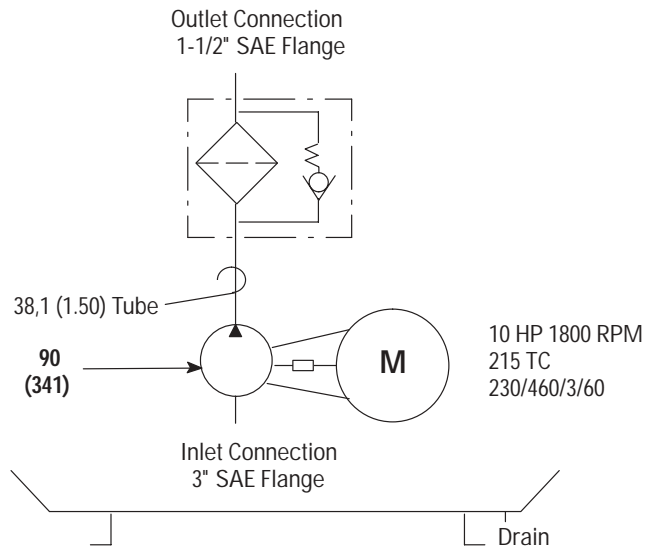
4 **Element Construction**
 C - C-Pak

5 **Target Fluid Cleanliness Rating**
 03 - 16/14/12 or better
 05 - 18/16/14 or better
 10 - 20/18/15 or better

6 **Indicator**
 Omit - Mechanical 25 PSID
 E - Electrical 25 PSID

7 **Design**
Note - See page 35 for replacement elements

mm (inch)



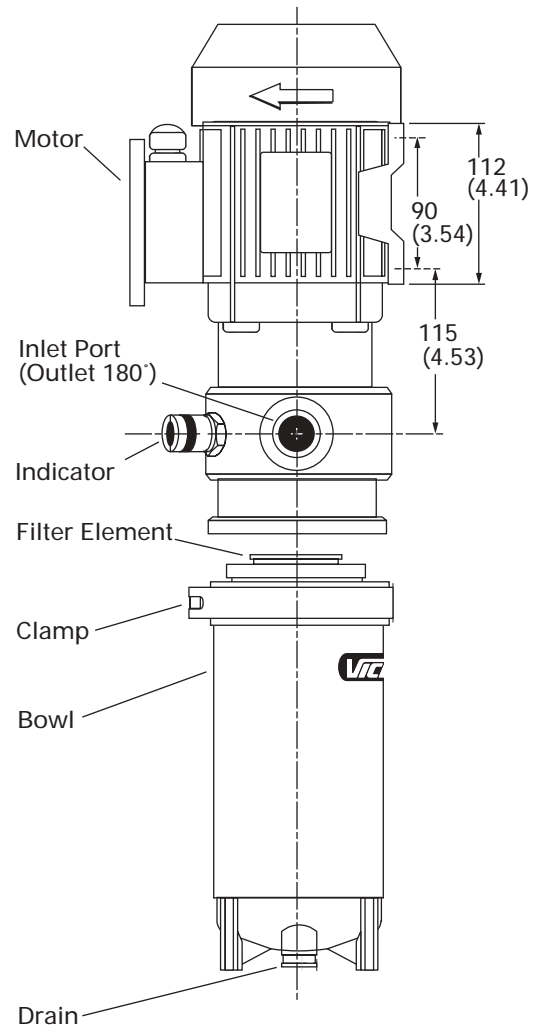
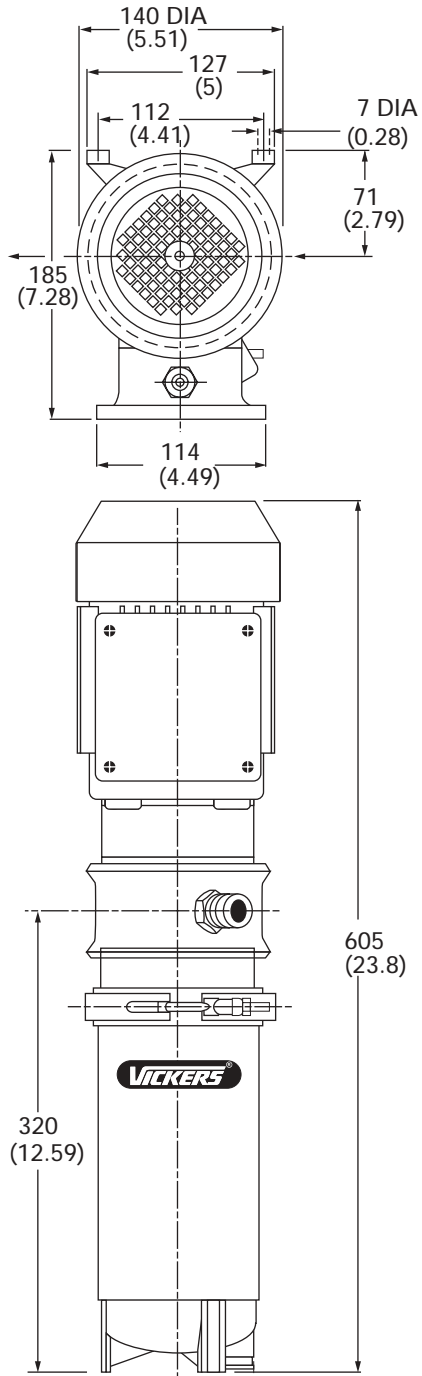
Installation Dimensions

5 USgpm (19L/min) Flow

15V Series

Inlet and Outlet Port Size

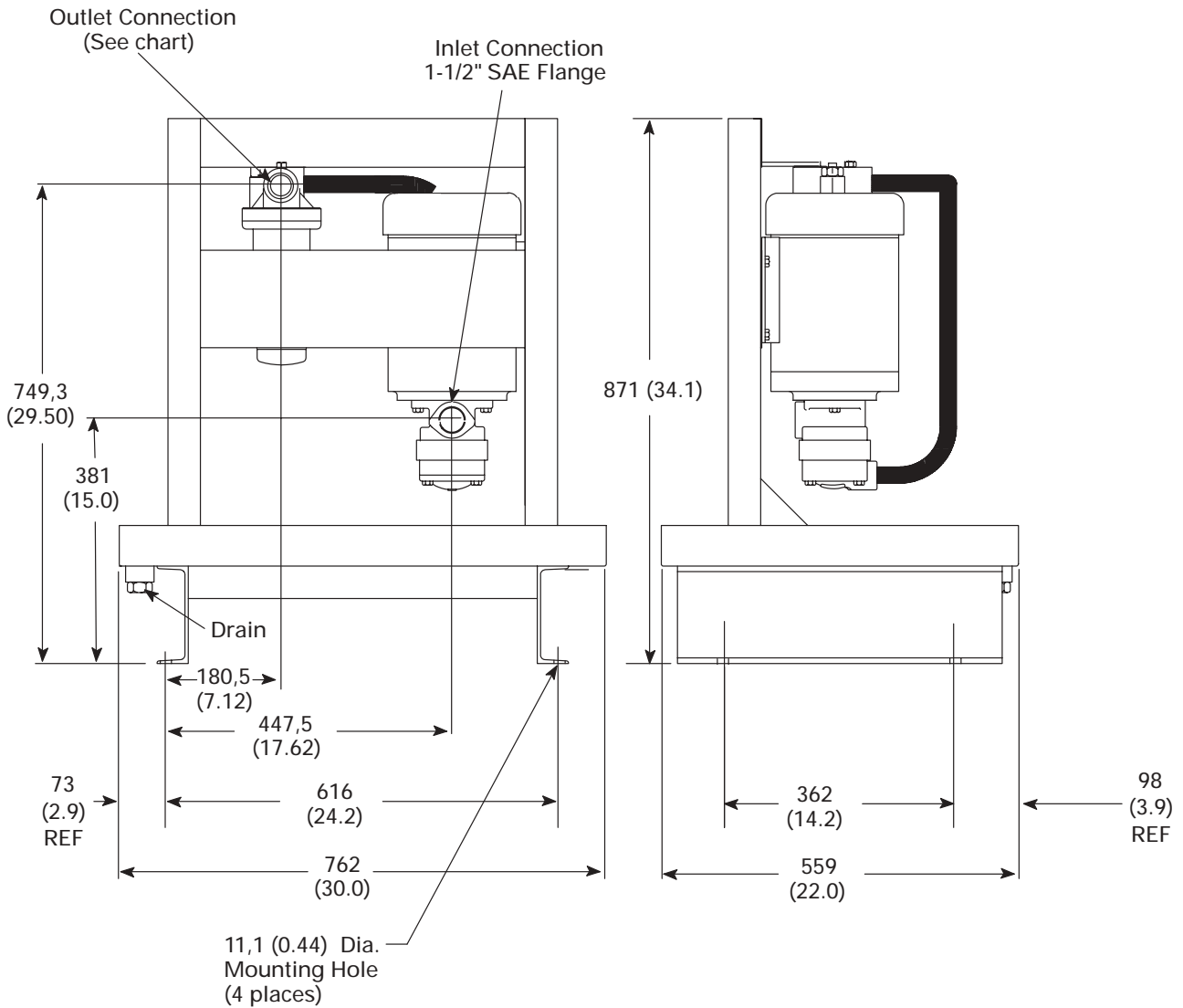
| MODEL CODE | SIZE |
|------------|--------------------|
| SB | 1-5/16-12 (SAE-16) |
| BB | G-1 BSPP |



Installation Dimensions

19.5 USgpm (74 L/min) Flow

HV3R Series
OFR60 (not shown)
OFRS60 (not shown)

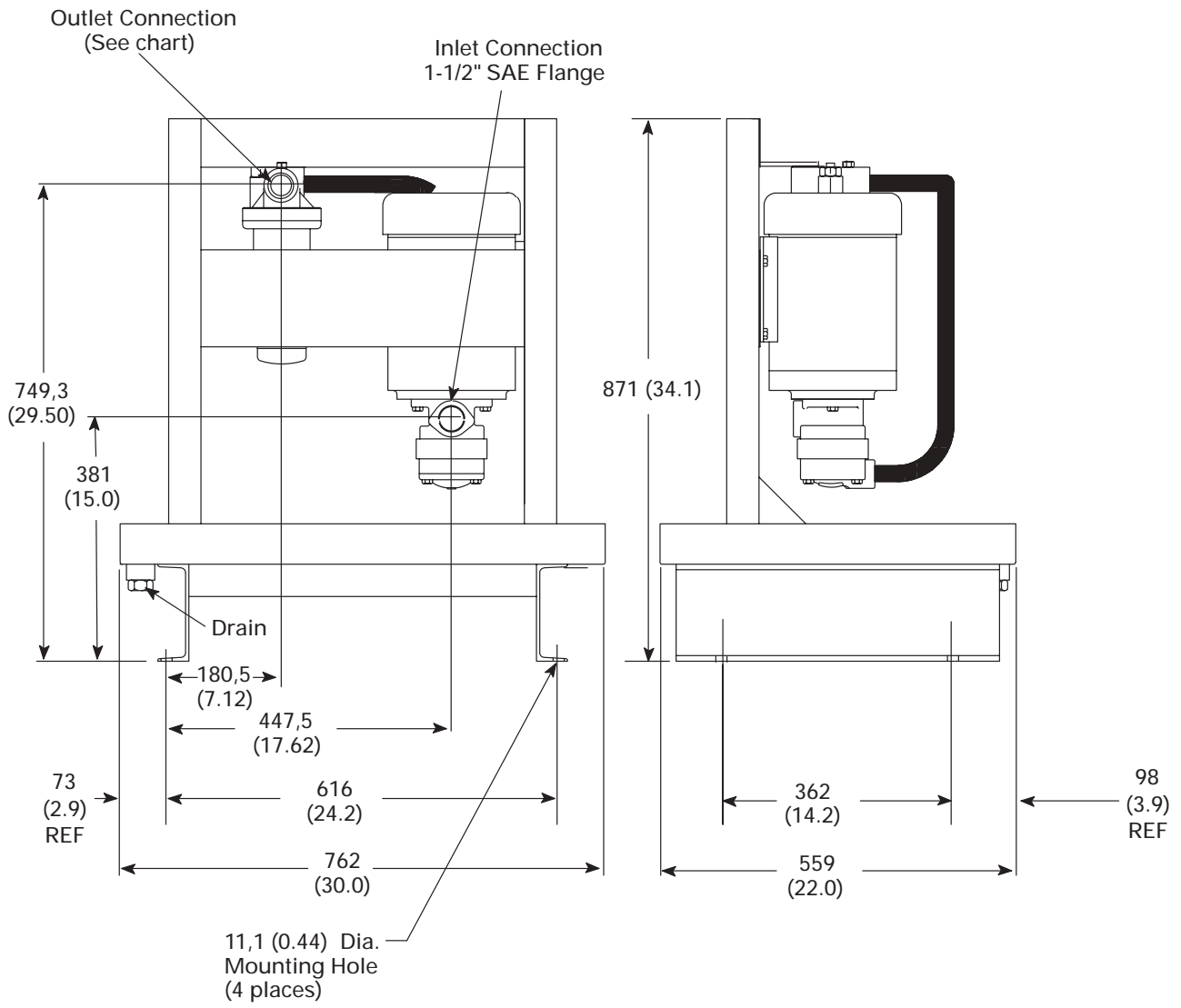


| FILTER | OUTLET |
|--------|---------------------|
| HV3R | 1-5/8-12 (SAE - 20) |
| OFR60 | 1-7/8-12 (SAE - 24) |
| OFRS60 | 1-7/8-12 (SAE - 24) |

Installation Dimensions

31.5 USgpm (119 L/min) Flow

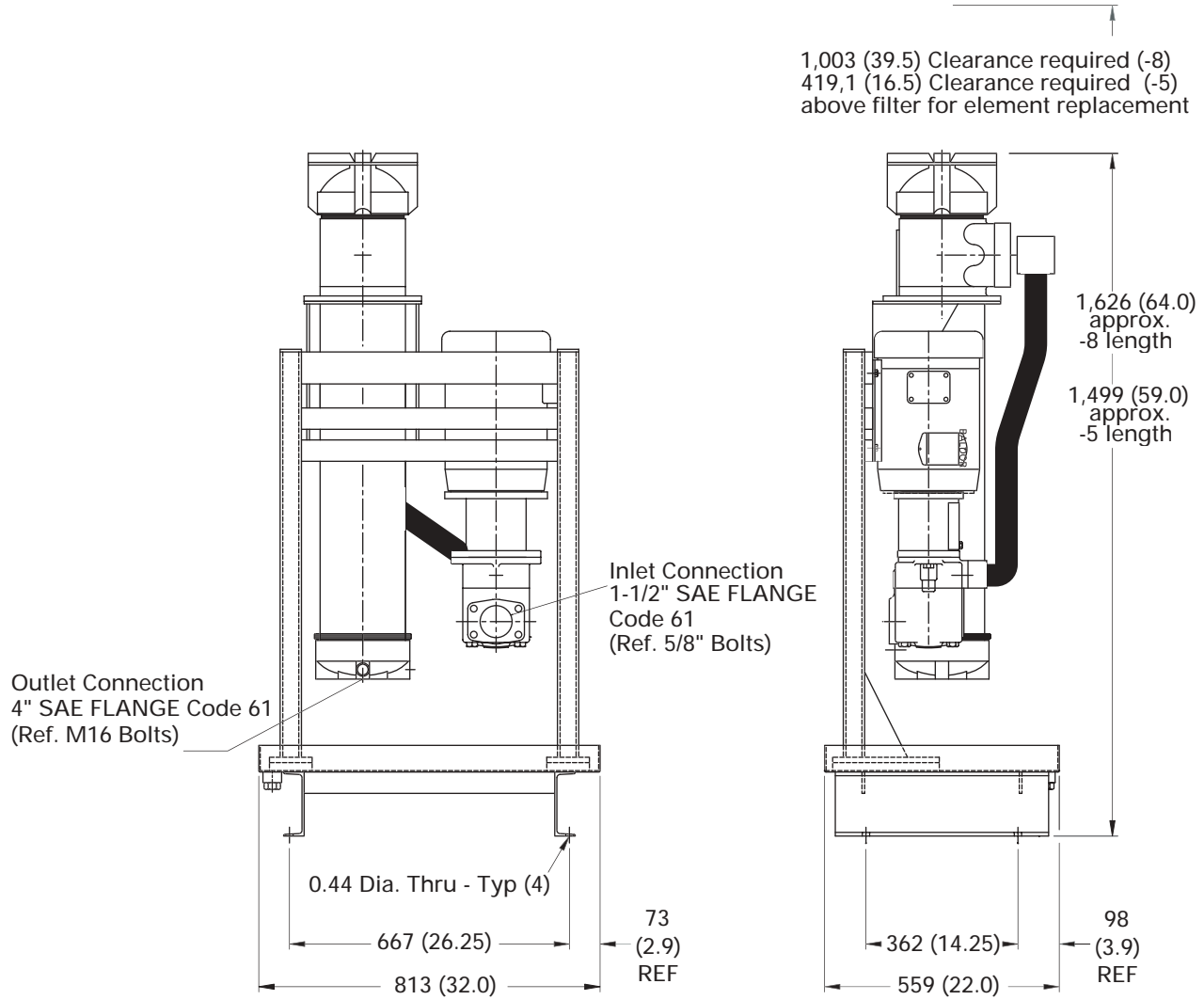
HV3R Series
OFR60 (not shown)
OFRS60 (not shown)



| FILTER | OUTLET |
|--------|---------------------|
| HV6R | 4" SAE Flange |
| HV3R | 1-5/8 - 12 |
| OFR60 | 1-7/8-12 (SAE - 24) |
| OFRS60 | |

Installation Dimensions 31.5 USgpm (119 L/min) Flow

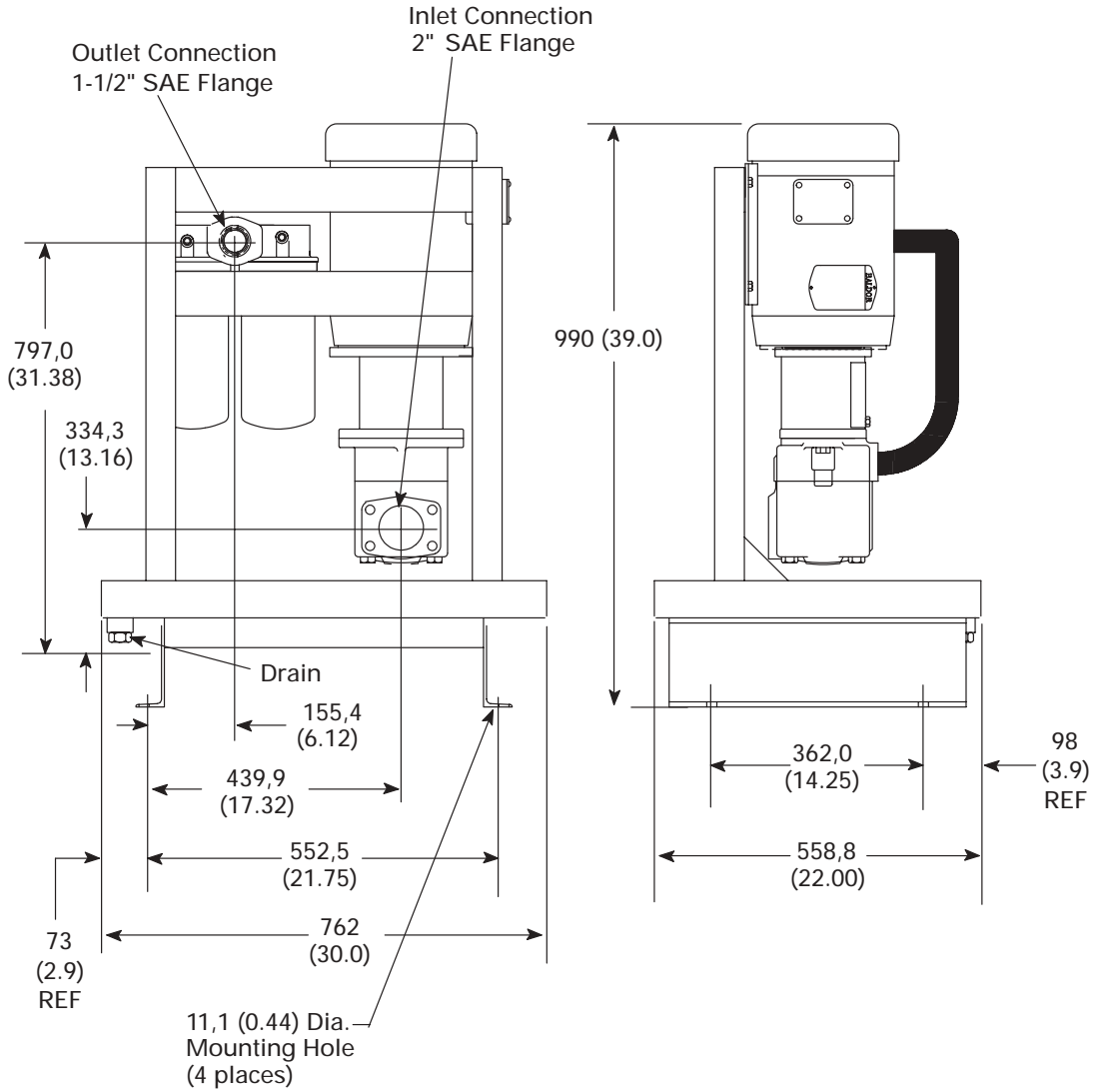
HV6R Series



Installation Dimensions

57 USgpm (216 L/min) Flow

HS22 Series
and OFR120 (not shown)

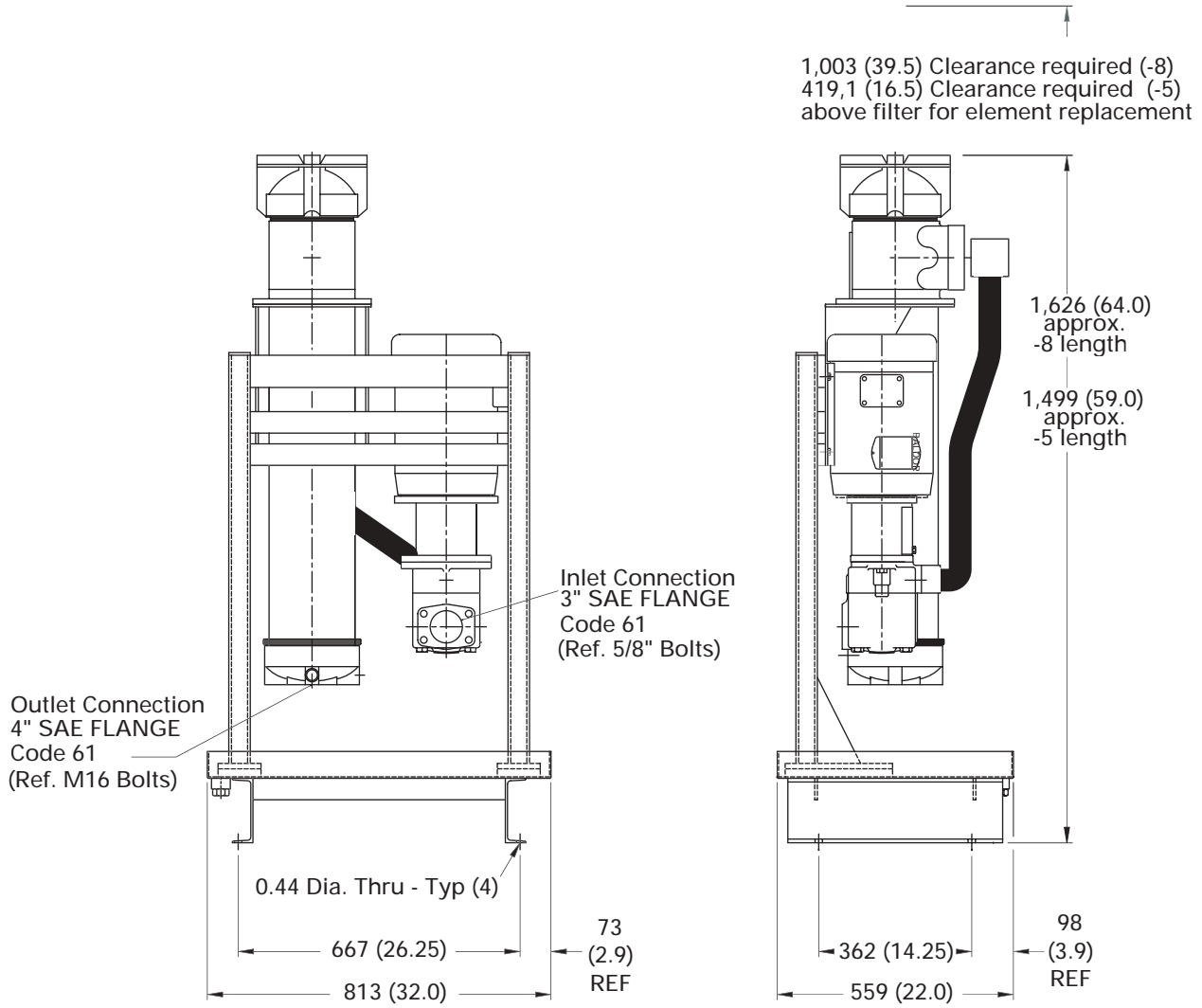


| FILTER | OUTLET |
|--------|-------------------|
| HV6R | 4" SAE Flange |
| HS22 | 1-1/2" SAE Flange |
| OFR120 | 1-1/2" SAE Flange |

Installation Dimensions

57 USgpm (216 L/min) Flow

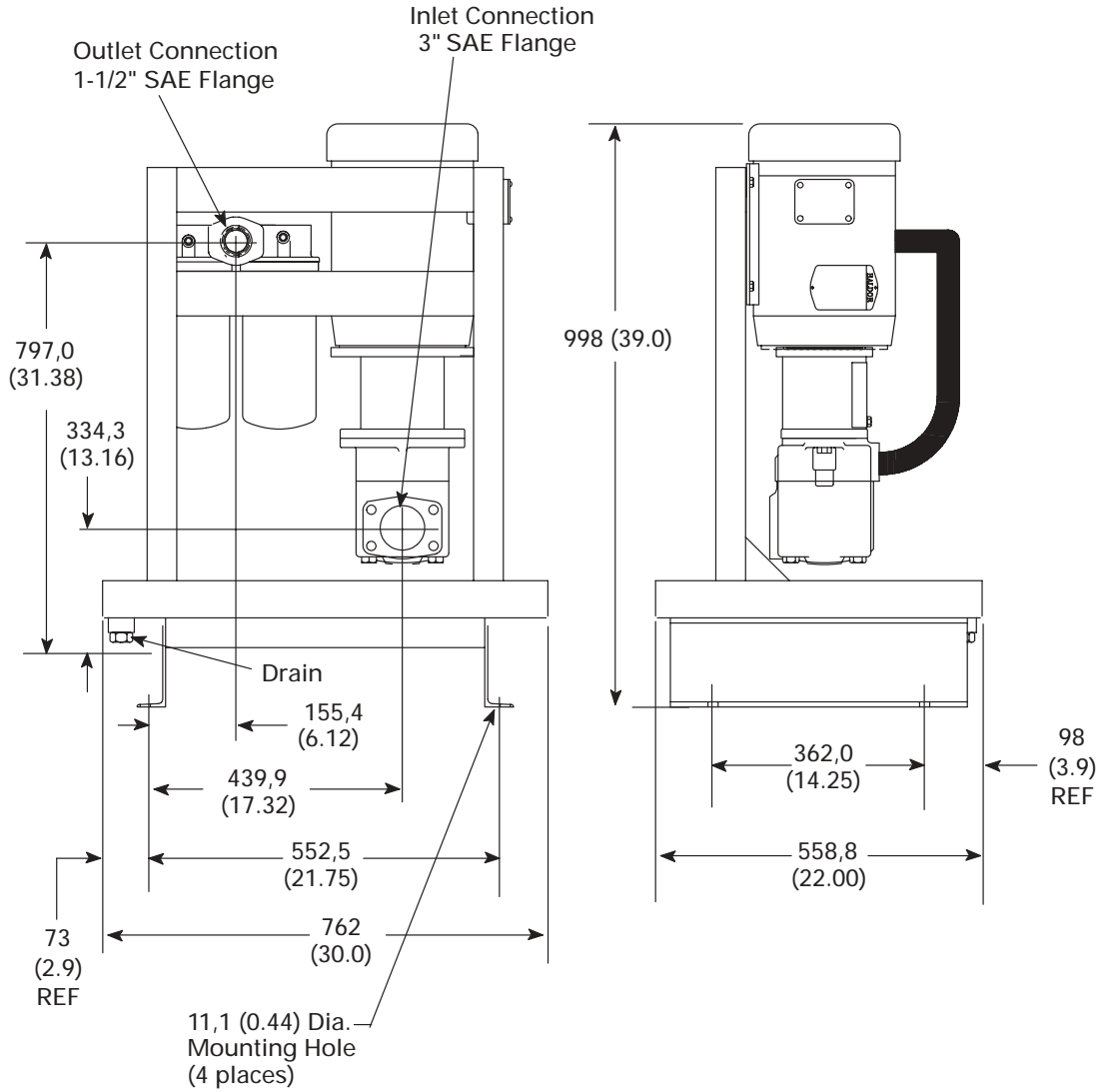
HV6R Series



Installation Dimensions

90 USgpm (341 L/min) Flow

HS22 Series
and OFR120 (not shown)

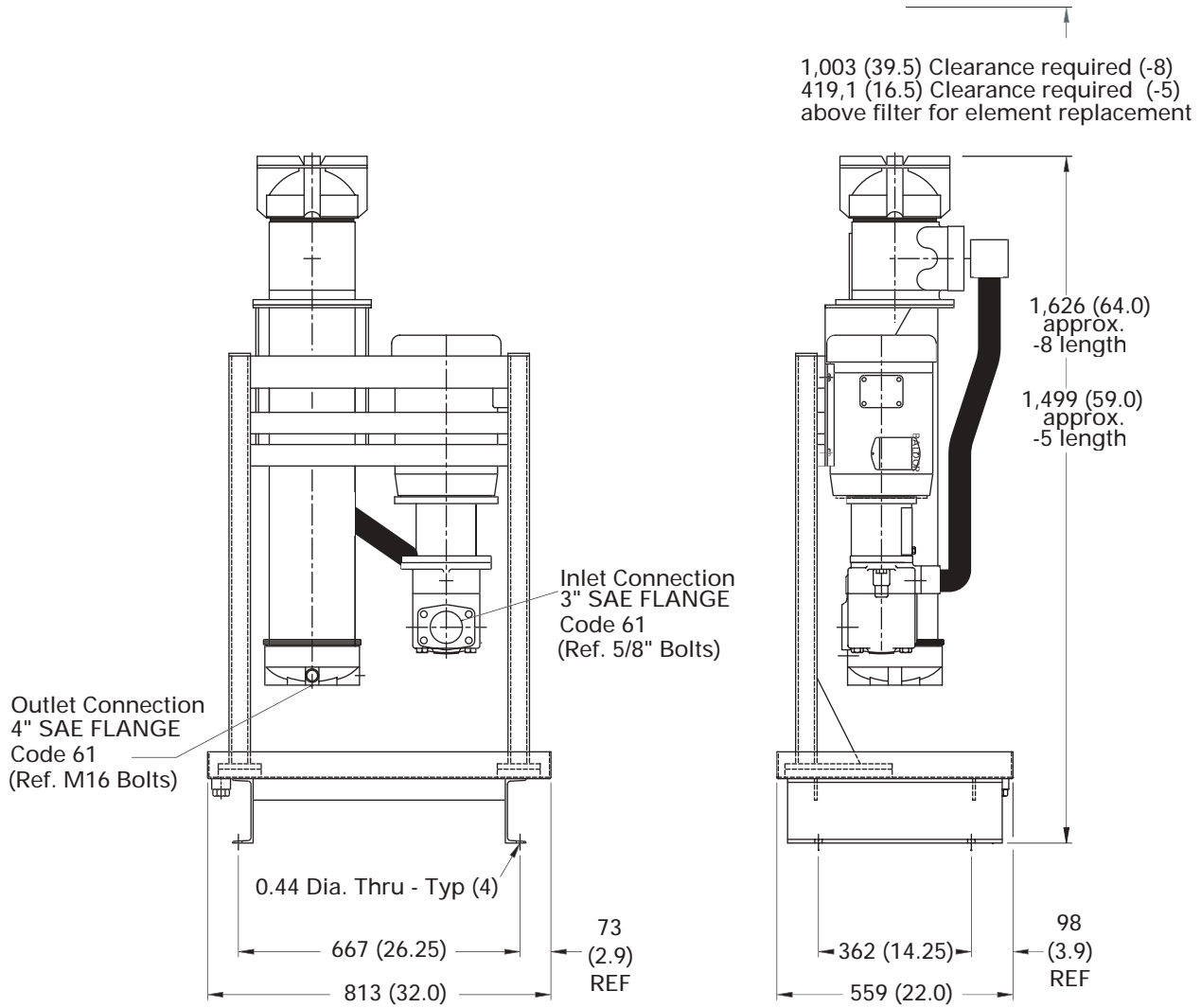


| FILTER | OUTLET |
|--------|-------------------|
| HV6R | 4" SAE flange |
| HS22 | 1-1/2" SAE flange |
| OFR120 | |

Installation Dimensions

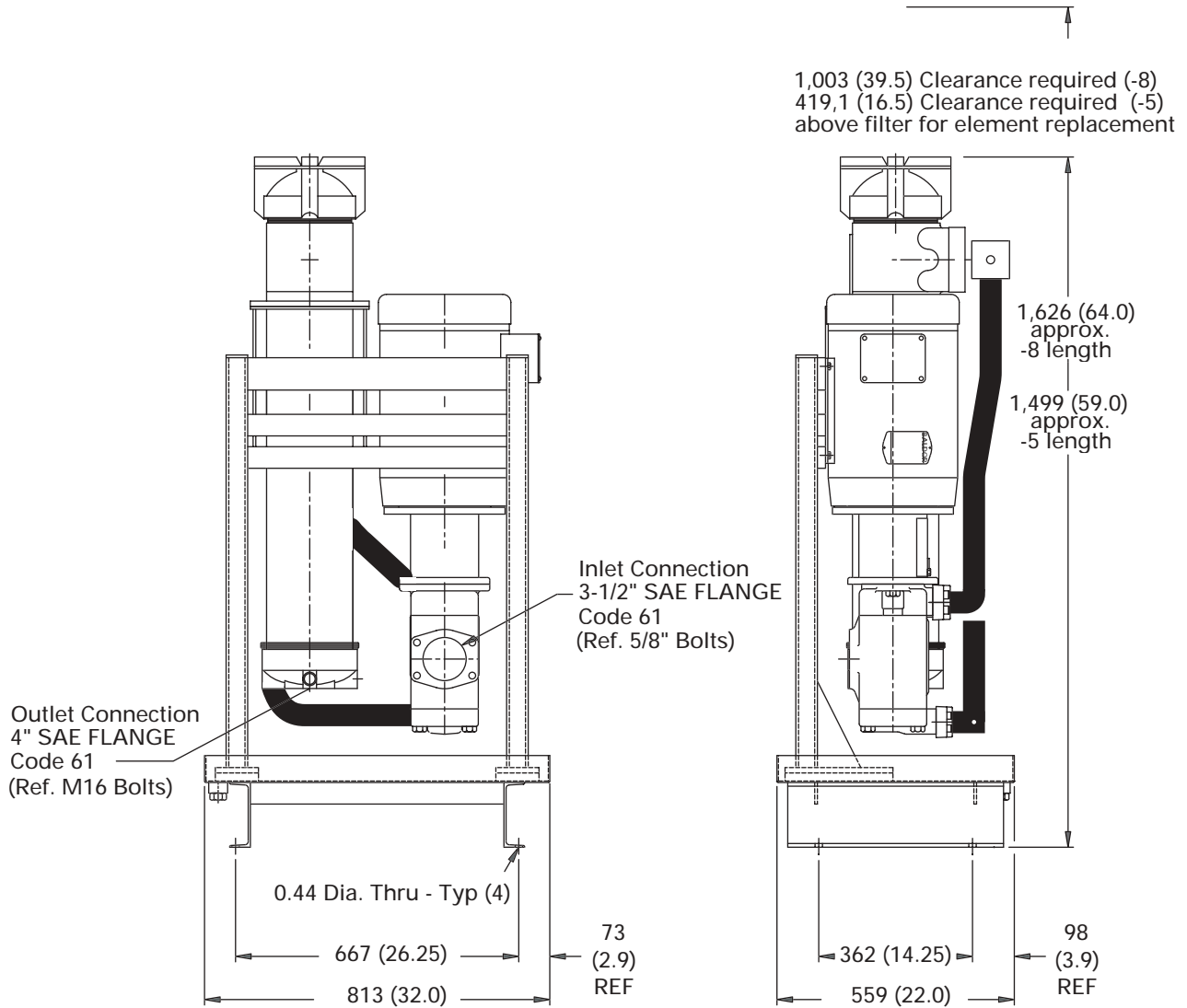
90 USGpm (341 L/min) Flow

HV6R Series



Installation Dimensions 120 USgpm (454 L/min) Flow

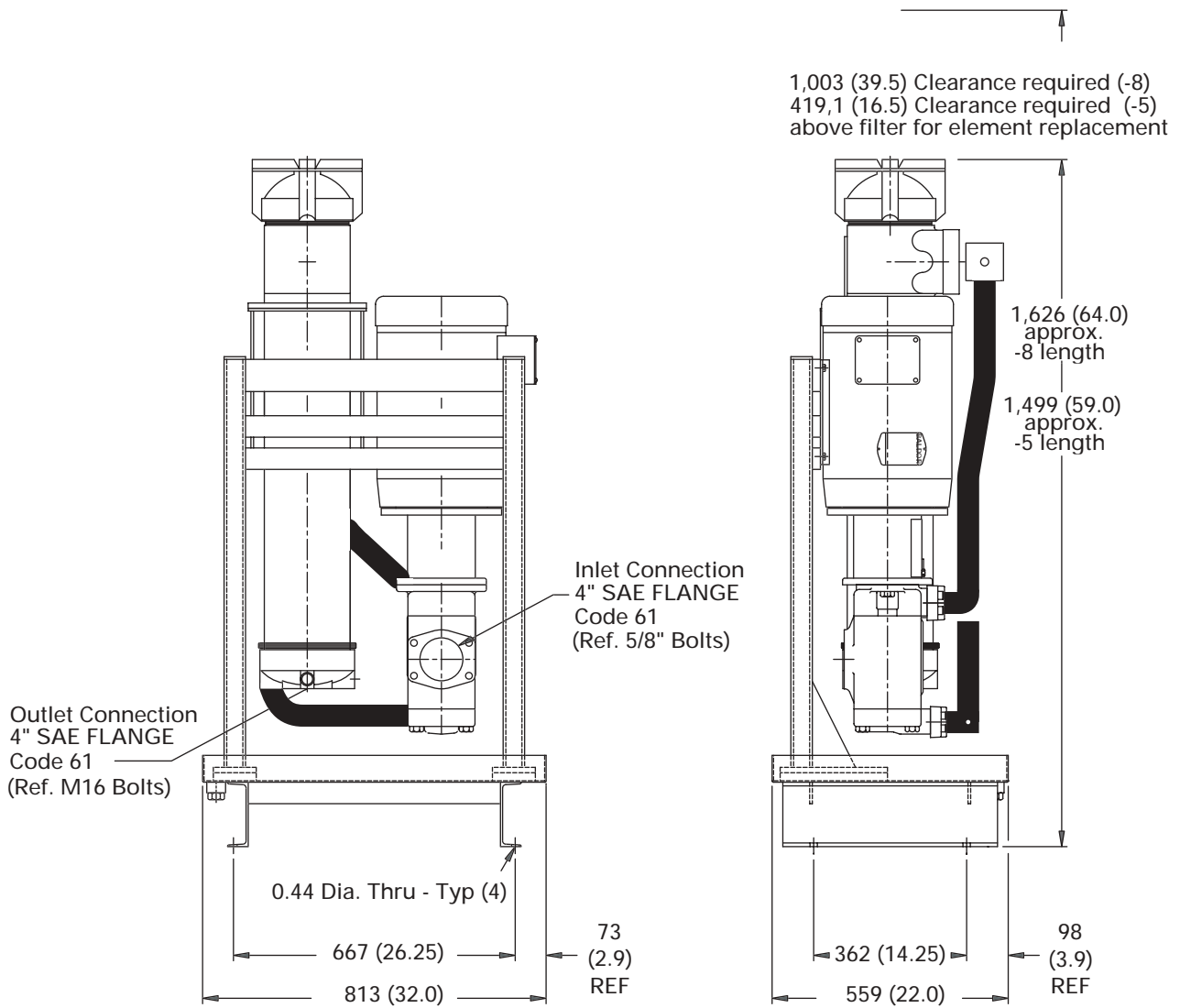
HV6R Series



Installation Dimensions

150 USgpm (568 L/min) Flow

HV6R Series



Replacement Filter Elements

| FILTER SERIES | LENGTH MM (INCH) | CODE | CONSTRUCTION | ELEMENT MODEL NUMBER MICRON | | |
|---------------|---------------------|------|--------------|--------------------------------|------------|------------|
| | | | | 03 | 05 | 10 |
| HV6R | 406 (16) | 5 | L Pak | V0411B5L03 | V0411B5L05 | V0411B5L10 |
| | | | C Pak | V0411B5C03 | V0411B5C05 | V0411B5C10 |
| | 991 (39) | 8 | L Pak | V0411B8L03 | V0411B8L05 | V0411B8L10 |
| | | | C Pak | V0411B8C03 | V0411B8C05 | V0411B8C10 |
| HV3R | 173 (6.8) | 2 | C Pak | V3RB2C03 | V3RB2C05 | V3RB2C10 |
| | 356 (14) | 4 | C Pak | V3RB4C03 | V3RB4C05 | V3RB4C10 |
| OFR60 | 229 (9) | 3 | C Pak | V4051B3C03 | V4051B3C05 | V4051B3C10 |
| OFRS60 | 178 (7) | 1 | R Pak | V0211B1R03 | V0211B1R05 | V0211B1R10 |
| | 279 (11) | 1 | R Pak | V0211B2R03 | V0211B2R05 | V0211B2R10 |
| HS22 | 178 (7) | 1 | R Pak | V0211B1R03 | V0211B1R05 | V0211B1R10 |
| | 279 (11) | 2 | R Pak | V0211B2R03 | V0211B2R05 | V0211B2R10 |
| OFR120 | 457 (18) | 6 | C Pak | V4051B6C03 | V4051B6C05 | V4051B6C10 |

| FILTER SERIES | ELEMENT MODEL NUMBER | | | |
|---------------|----------------------|------------|----------|-----------|
| | 02 | 02 + WATER | 20 | 20+ WATER |
| V15 | V15BMC02 | V15BMW02 | V15BMC20 | V15BMW20 |

Notes

Notes

Eaton
14615 Lone Oak Road
Eden Prairie, MN 55344
USA
Tel: 952 937-9800
Fax: 952 974-7722
www.hydraulics.eaton.com

Eaton
20 Rosamond Road
Footscray
Victoria 3011
Australia
Tel: (61) 3 9319 8222
Fax: (61) 3 9318 5714

Eaton
Dr.-Reckeweg-Str. 1
D-76532 Baden-Baden
Germany
Tel: (49) 7221 682-0
Fax: (49) 7221 682-788

