Vickers®

Fluid-Cooled AC Motorpump for Boeing's 747-400, 757, 767 & 777

Model MPEV3-056-6 Series

Powering Business Worldwide

Eaton's Vickers® AC electric motor-driven hydraulic pump, model MPEV3-056-6 series, was developed for Boeing's fuel-efficient 757 and 767 aircraft which emphasize performance, reliability and maintainability in every area of the airframe and system design. Engineered with these goals in mind, these aircraft have proven to be among the most advanced and efficient commercial aircraft today.

This motorpump provides hydraulic power for inflight operation and system ground operation on Boeing's 747-400, 757, 767 and 777 aircraft.

Selected by many of the leading airlines, Eaton's Vickers model MPEV3-056-6 motorpump will help lower operational costs and increase reliability.

Model MPEV3-056-6 electric motorpump is a high performance, low-noise unit designed to provide customers with long life and low operating cost. The motorpump consists of an AC motor and variable-displacement inline hydraulic pump, inlet boost pump and cooling flow pump.

The inlet boost pump is included in the motorpump to supply supercharge to the inline pump in the event the reservoir pressure drops to atmospheric pressure. Additionally, it supplies the flow to cool the pump-shaft seal and the electric motor stator, rotor and bearing.

ELECTRIC MOTOR

The fluid-cooled electric motor is a jacketed eight-pole 6000 rpm, 400Hz induction-type motor which converts electrical energy to rotary shaft motion to drive the boost pump, cooling flow pump and inline piston pump.

The electric motor housing serves as the cooling jacket for the motor by providing a flow path to direct fluid flow across a heat exchanger. The fluid enters the heat exchanger from a volute on the upstream side of the jacket and exits into a volute, which is 180 degrees opposite in symmetry on the downstream side, promoting uniform cross flow in the heat exchanger. Virtually all the heat generated by the motorpump is absorbed by the hydraulic fluid passing through the unit. Another advantage in using a fluid-cooled design is a significant reduction in the noise level because cooling fans and associated airflow noise are eliminated.

HYDRAULIC PUMP

The hydraulic pump is a 0.56 cu in/rev (7.9 ml/rev) variable displacement unit designed for continuous operation in a 3000 psi (207 bar) aircraft hydraulic system.

The nine-piston pump is designed to provide 12 gpm (45.42 L/min) flow without compromising the integrity of the compact rotating group. Utilizing the nine-piston configuration with pulsation-dampening chamber has the additional benefit of producing extremely low input-pressure ripple from the basic pumping element. The reduction in the pressure ripple has aided in decreasing the noise level, improving structural integrity, providing longer pump life, and improving pump control stability.

PUMP CONTROLS

Two separately acting control devices are used to regulate pump delivery as a function of system pressure:

1. A constant-horsepower compensator, active in the range of 1200 psi (8274 kPa) to 2850 psi (19651 kPa).

2. A flat cut-off compensator, active in the range of 2850 psi (19651 kPa) to 3050 psi (21030 kPa).

At pressure below 1200 psi (8274 kPa) both compensators are inactive and the pump operates at full displacement.

Additionally, a fluid bypass valve is incorporated into the pump to reduce the starting load on the electric motor under low temperature starting conditions.

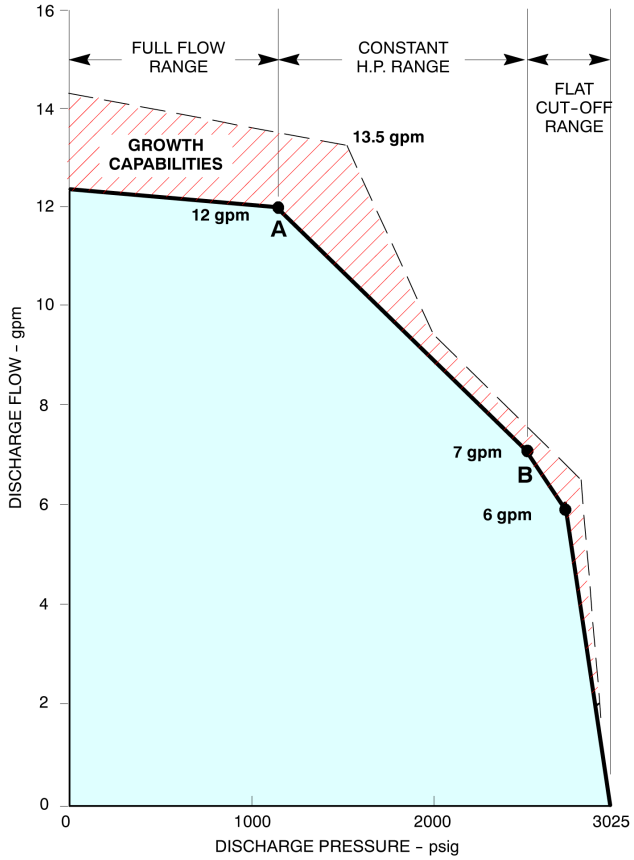
As pressure in the outlet port builds up to the setting of the constant-horse-power compensator (1200 psi/8274 kPa), fluid is metered to the constant-horsepower actuator piston. The metered fluid causes the actuator piston to extend and repositions the yoke to a decreased angle. This action shortens the stroke of the pistons within the cylinder block bores and reduces outlet flow.

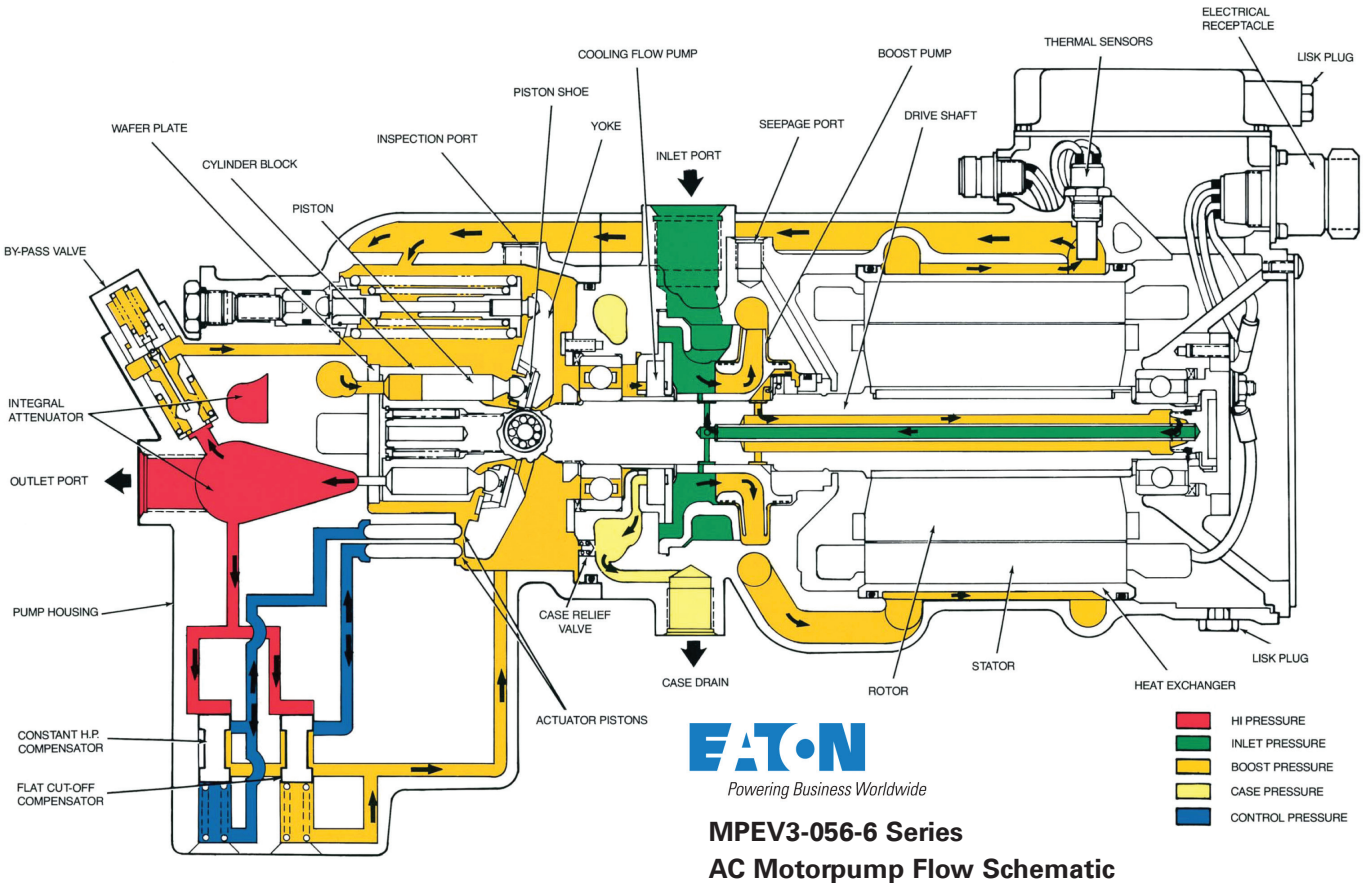
As outlet pressure continues to increase, yoke angle and pump output flow continue to decrease. At 2850 psi (19651 kPa), outlet fluid is metered through the flat cut-off compensator to the other yoke actuator piston. Extension of this piston moves the yoke to the "zero flow" position until an aircraft system demand for flow is initiated.

Upon demand, outlet pressure decreases to a value that allows the yoke-control springs to override metered fluid pressure to yoke actuator pistons. This allows yoke angle to increase as necessary to satisfy system demand.

The "two-step" pressure and flow-control arrangement provides a constant horsepower-type control that limits hydraulic power output to a predetermined value and maintains this power at a nearly constant level within a given flow and pressure range. At the same time, motor power requirements are controlled within a specified input current limit.

MPEV3-056 PUMP CHARACTERISTICS





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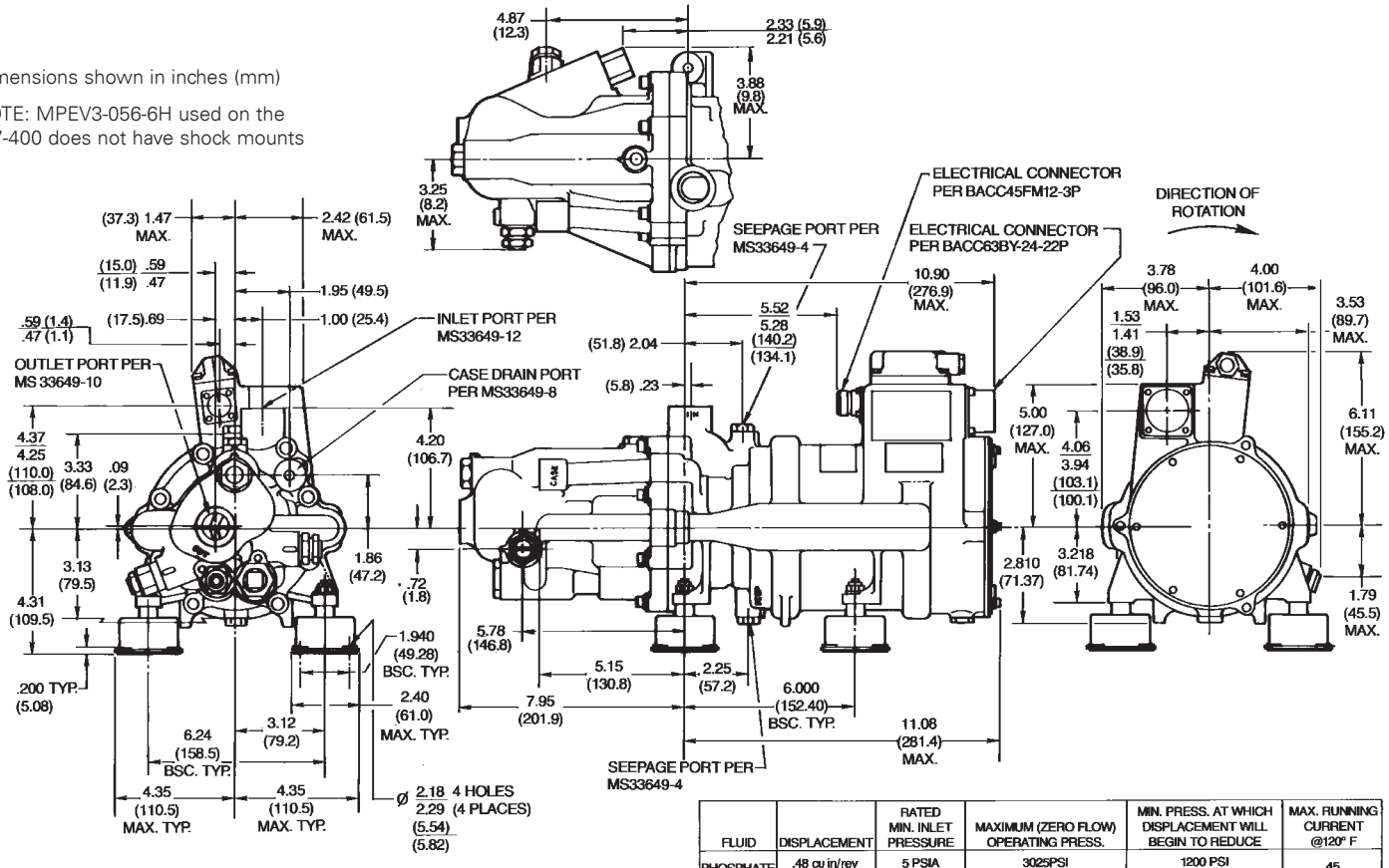
MPEV3-056-6 Series
AC Motorpump Flow Schematic

Dimensions shown in inches (mm)

NOTE: MPEV3-056-6H used on the 747-400 does not have shock mounts



FLUID	DISPLACEMENT	RATED MIN. INLET PRESSURE	MAXIMUM (ZERO FLOW) OPERATING PRESS.	MIN. PRESS. AT WHICH DISPLACEMENT WILL BEGIN TO REDUCE	MAX. RUNNING CURRENT @120° F
PHOSPHATE ESTER	.48 cu in/rev	5 PSIA	3025PSI	1200 PSI	45 AMPERES
	7.9 mL/rev	0.34 bar Abso.	208 bar	82.5 bar	

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