MODULAR ELECTROHYDROSTATIC ACTUATION SYSTEM

A COMPACT, ENERGY EFFICIENT AND HIGH FORCE ALTERNATIVE TO TRADITIONAL ACTUATION SYSTEMS.

WHAT MOVES YOUR WORLD
If demanding motion systems and highly flexible designs are required, then Moog expertise is here to assist you. Through our collaborative approach, our creativity and first class technology, we help you to solve even the most complex motion tasks, increase the performance of your products and create solutions that far exceed today’s expectations.
Moog has designed its compact Electrohydrostatic Actuation System (EAS) to generate largely linear motion by means of the electrohydrostatic pump unit, comprised of a variable speed servo motor and a fixed or variable displacement pump along with a manifold and cylinder. The energy input into the power train is provided by a servo drive.

These building blocks make up Moog’s Modular EAS, a dynamic and attractive solution for the industrial machine manufacturing market that combines the best of two worlds, electrohydraulic (EH) and electromechanical (EM) actuation. Automation engineers moving toward electromechanical actuation in pursuit of energy efficiency and environmental cleanliness and seeking to combine this with the high-power density of electrohydraulic actuation, will find the modular EAS an attractive solution.

Our global engineering teams can help customers select and integrate these standardized modules as building blocks able to meet a range of unique application requirements across a number of industries. If desired, the system modules can be modified by our engineering experts to meet specific customer requirements, however specialized. The modular EAS is a key future technology that is suitable for a broad range of applications.

**Advantages**

The modular EAS is highly flexible with good scalability and variability that can be easily adapted to most types of industrial manufacturing machinery. The system’s interfaces are standardized to facilitate simplified machine design. Our engineering experts assess both the onsite installation conditions and module dimensions in advance, meaning that machine design can be identified early in the project planning phase. All system spare parts are also standardized, resulting in simple, fast maintenance and reduced machine down time for our customers.
TECHNOLOGY OVERVIEW

In EM actuation systems a frequency-controlled servo motor drives a mechanical actuator via a mechanical gearbox. In EH resistance control systems, a central hydraulic power unit (HPU) drives one or more hydraulic actuators (cylinder, hydraulic motor), controlled by servo valves. Electrohydrostatic actuation systems feature a frequency-controlled servo motor that drives a hydraulic actuator via hydrostatic transmission, thereby combining the advantages of EM and EH technology. Principally, this allows for the electrical coupling of several machine axes in a common electrical intermediate circuit (DC-Bus), and enables demand driven energy distribution that includes an energy recovery capability. Combining EM and EH technology also improves application safety, with the optional use of safety certified servo drives and/or a certified hydraulic safety valve enabling the creation of a safety-oriented application up to performance level e (Ple).

Applications

The EAS is suitable for a range of industrial manufacturing machinery. It can be used on metal pressing applications from forging, powder and sheet metal presses to hot forming, punching and isostatic press machines. The system can also be used successfully in wood and paper milling, testing and power generation applications as a result of good decentralization of the machine axes. The EAS can deliver high-performance to the industrial marine sector, on operational mobile machinery and on injection and blow molding machinery in the plastics sector. It simultaneously reduces oil requirements for HPUs by between 50 and 90 %, thereby reducing machine cost of ownership significantly.

<table>
<thead>
<tr>
<th>Features</th>
<th>Benefits</th>
</tr>
</thead>
<tbody>
<tr>
<td>High force capability and force density</td>
<td>Provides an attractive alternative to EH and EM actuation</td>
</tr>
<tr>
<td>Low noise emission</td>
<td>Quiet machine operation</td>
</tr>
<tr>
<td>Environmentally clean due to 50 to 90 % lower oil requirement</td>
<td>Lowers maintenance and operating costs</td>
</tr>
<tr>
<td>Small number of components</td>
<td>Reduced risk of breakdown and faster maintenance</td>
</tr>
<tr>
<td>Offsite testing and commissioning</td>
<td>Short commissioning times</td>
</tr>
<tr>
<td>Decentralized system</td>
<td>Eliminates any need for a large HPU and reduces piping; lowers machine footprint</td>
</tr>
<tr>
<td>4-quadrant operation</td>
<td>Low energy consumption due to energy recuperation and power on demand</td>
</tr>
<tr>
<td>Effective energy management system</td>
<td>Reduces infeed from grid</td>
</tr>
<tr>
<td>Low mass inertia of the EPU</td>
<td>High dynamics</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>
MODULAR EAS SCOPE OF DELIVERY

The Modular EAS's standardized modules provide a wide number of options. To ensure that the system meets application requirements we combine these options with standard components like the cylinder, which can be customized if desired.

The system's smallest scope of delivery consists of a basic manifold and an EPU delivered as an assembled and tested unit.

The Modular EAS also contains a standardized small boost HPU optimized for the EAS, along with a servo drive, a motion controller and motion control software.

The full scope of delivery is detailed in the diagram below.
MODULE: BASIC MANIFOLD WITH EPU

The basic manifold includes the hydraulic system’s main functions such as overload and pump anti-cavitation protection, as well as the hydraulic interfaces for a small boost HPU. This module also includes the EPU and the cylinder. Both the components and the system design are adapted and optimized to the EPU’s drive power. The EAS system’s peak and continuous power does not depend on the basic manifold, but on the EPU and the drives used.

Performance of Basic Manifold Module

<table>
<thead>
<tr>
<th>Basic manifold</th>
<th>Max. pump flow [l/min (gpm)]</th>
<th>Max pressure [bar (psi)]</th>
<th>Max. power [kW]</th>
</tr>
</thead>
<tbody>
<tr>
<td>EAS019</td>
<td>85 (22.5)</td>
<td>350 (5,000)</td>
<td>50</td>
</tr>
<tr>
<td>EAS032</td>
<td>118 (31.2)</td>
<td>350 (5,000)</td>
<td>67</td>
</tr>
<tr>
<td>EAS080</td>
<td>216 (57.1)</td>
<td>350 (5,000)</td>
<td>126</td>
</tr>
<tr>
<td>EAS140</td>
<td>322 (85.1)</td>
<td>350 (5,000)</td>
<td>183</td>
</tr>
<tr>
<td>EAS250</td>
<td>450 (118.9)</td>
<td>350 (5,000)</td>
<td>262</td>
</tr>
</tbody>
</table>

The hydraulic system can be adapted to specific machinery requirements with a number of possible options. These options include safety related functions (to meet DIN EN ISO 16092 standard requirements), such as safe set up and load protection of the hanging axes. They also include the EPU’s displacement adjustment, decompression, motor oil cooling among others.

Due to the hydraulic system’s flexible configuration, the compact basic manifold can be flanged or piped onto systems with equal area or differential cylinders, with a number of possible alignments.
## MODULE: BASIC MANIFOLD WITH EPU

Dimensions including Attachments

<table>
<thead>
<tr>
<th>Basic manifold</th>
<th>A [mm (in)]</th>
<th>B [mm (in)]</th>
<th>C [mm (in)]</th>
<th>D(^1) [mm (in)]</th>
</tr>
</thead>
<tbody>
<tr>
<td>EAS019</td>
<td>400 (15.7)</td>
<td>280 (11.0)</td>
<td>415 (16.3)</td>
<td>447 - 729 (17.6 - 28.7)</td>
</tr>
<tr>
<td>EAS032</td>
<td>380 (15.0)</td>
<td>370 (14.6)</td>
<td>405 (15.9)</td>
<td>472 - 754 (18.6 - 29.7)</td>
</tr>
<tr>
<td>EAS080</td>
<td>510 (20.1)</td>
<td>400 (15.7)</td>
<td>405 (15.9)</td>
<td>715 - 851 (28.1 - 33.5)</td>
</tr>
<tr>
<td>EAS140</td>
<td>630 (24.8)</td>
<td>480 (18.9)</td>
<td>515 (20.3)</td>
<td>864 - 987 (34.0 - 38.9)</td>
</tr>
<tr>
<td>EAS250</td>
<td>610 (24.0)</td>
<td>530 (20.1)</td>
<td>515 (20.3)</td>
<td>936 - 1,264 (36.9 - 49.8)</td>
</tr>
</tbody>
</table>

\(^1\)Length D varies depending on the EPU used. Minimum and maximum length given.
MODULE: HIGH-SPEED MANIFOLD

The High-Speed Manifold extends the basic system by way of a hydraulic gearbox with cylinders having more than two active areas, such as a working and a balancing cylinder. Cylinder areas are adapted in order to achieve the customer’s specific transmission ratio. High-speed functionality can be reached with just one differential cylinder and a regenerative hydraulic circuit.

The hydraulic gearbox ratio is determined by the cylinders’ area ratio and the EPU’s displacement adjustment. The hydraulic system accommodates a broad range of area ratios to achieve high-speed movement with low force, and slow movement with high force (see graph “High Force / High Speed Area Ratio at Maximum EAS Basic Manifold Power”). As standard, the cylinder area ratios (see table “Area / Speed / Force Ratio of Cylinder”) have been designed as high-speed modules for the basic manifold. This transmission can be combined with the EPU’s dual or proportional displacement to achieve additional, distinct or proportional transmission operating points.

---

**Area / Speed / Force Ratio of Cylinder**

<table>
<thead>
<tr>
<th>High-Speed Manifold Interface 1:</th>
<th>High-Speed Manifold Interface 2:</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>EAS series</strong></td>
<td><strong>EAS series</strong></td>
</tr>
<tr>
<td>S1</td>
<td>M2</td>
</tr>
<tr>
<td>EAS019 x = 15</td>
<td>EAS140 x = 7</td>
</tr>
<tr>
<td>EAS032 x = 7</td>
<td>EAS250 x = 4</td>
</tr>
<tr>
<td>EAS080 x = 4</td>
<td>x = 10</td>
</tr>
<tr>
<td>x &gt; 20</td>
<td>x = 15</td>
</tr>
<tr>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

x = area ratio of cylinder

---

**High Force / High Speed Area Ratio at Maximum EAS Basic Manifold Power**

Max. EAS Basic Manifold Power Range

---

**Mechanic Coupling of all Cylinders**

---

**Working Cylinder**

---

**Balance Cylinder**

---

**High Speed Manifold**

---

**Boost HPU**

---

**Basic Manifold + EPU**

---

**High Speed Function**

---

**High Force Function**

---

**Mechanic Coupling of all Cylinders**

---

**Force**

---

**x**

---

**x * V_{fmax}**

---

**Speed**

---

**V_{fmax}**

---

**F_{max}**

---

**Max. EAS Basic Manifold Power Range**

---
MODULE: HIGH SPEED MANIFOLD

Dimensions High Speed Manifold plus EPU

<table>
<thead>
<tr>
<th>EAS019</th>
<th>S1</th>
<th>A [mm (in)]</th>
<th>490 (19.3)</th>
<th>B [mm (in)]</th>
<th>535 (21.1)</th>
<th>C [mm (in)]</th>
<th>415 (16.3)</th>
<th>D [mm (in)]</th>
<th>447 – 729 (17.6 – 28.7)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>M1</td>
<td>570 (22.4)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>L1</td>
<td>685 (27.0)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>EAS032</td>
<td>S1</td>
<td>460 (18.1)</td>
<td></td>
<td>620 (24.4)</td>
<td></td>
<td>405 (15.9)</td>
<td></td>
<td>472 – 754 (18.6 – 29.7)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>M1</td>
<td>480 (18.9)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>L1</td>
<td>685 (27.0)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>EAS080</td>
<td>S1</td>
<td>520 (20.5)</td>
<td></td>
<td>650 (25.6)</td>
<td></td>
<td>405 (15.9)</td>
<td></td>
<td>715 – 851 (28.1 – 33.5)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>M1</td>
<td>545 (21.5)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>L1</td>
<td>685 (27.0)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>EAS140</td>
<td>M2</td>
<td>630 (24.8)</td>
<td></td>
<td>780 (30.7)</td>
<td></td>
<td>515 (20.3)</td>
<td></td>
<td>864 – 987 (34.0 – 38.9)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>L2</td>
<td>695 (27.4)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>EAS250</td>
<td>M2</td>
<td>650 (25.6)</td>
<td></td>
<td>830 (32.7)</td>
<td></td>
<td>515 (20.3)</td>
<td></td>
<td>936 – 1,264 (36.9 – 49.8)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>L2</td>
<td>695 (27.4)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

1) Length D varies depending on the EPU used. Minimum and maximum length given.
# HYDRAULIC SYSTEM

## General Technical Data

<table>
<thead>
<tr>
<th>EAS series</th>
<th>EAS019</th>
<th>EAS032</th>
<th>EAS080</th>
<th>EAS140</th>
<th>EAS250</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maximum pump flow for Basic Manifold</td>
<td>85 l/min (22.5 gpm)</td>
<td>118 l/min (31.2 gpm)</td>
<td>216 l/min (57.1 gpm)</td>
<td>322 l/min (85.1 gpm)</td>
<td>450 l/min (118.9 gpm)</td>
</tr>
<tr>
<td>Standard area ratio for High Speed Manifold</td>
<td>&lt;15 ... &gt;20</td>
<td>7 ... &gt;20</td>
<td>4 ... 20</td>
<td>7 ... 15</td>
<td>4 ... 10</td>
</tr>
<tr>
<td>Maximum system pressure</td>
<td>350 bar (5,000 psi)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maximum pump housing pressure</td>
<td>10 bar (145 psi)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### EPU motor pump unit

- **Pump version**: Radial piston pump, fixed, dual or proportional displacement
- **Motor version**: Brushless servo motor, natural or liquid (water/oil) cooled

### Temperature range

- **Ambient**: -15 to +60 °C (5 to 140 °F)
- **Fluid**: -15 to +80 °C (5 to 176 °F)

### Seal material

NBR (standard), FKM

### Preload system

Open preload system, closed circuit on request

### Operating fluid

Mineral oil according to DIN 51524, HFD and others upon request

### Viscosity

Permissible viscosity operational range from 12 to 100 mm²/s (12 to 100 cSt). Recommended hydraulic fluid viscosity class VG 46 to VG 100 according to ISO 3448. Maximum viscosity 500 mm²/s (500 cSt) during start-up with electric motor at 1,800 rpm

### System filtration

- NAS 1638, class 9
- ISO 4406 class 20/18/15; obtained with filter fineness of $\beta_{20} = 75$

### Standard pressure sensor

0 to 400 bar, 4 to 20 mA, M12 x 1

### Standard temperature sensor

-25 to 100 °C (-13 to 148 °F), 4 to 20 mA, M12 x 1

### Mounting option to cylinder

Flange mounting or piping

### Mounting option to frame

Flange mounting interface

### Installation position

Any

### Installation note

To avoid pump damage the housing pressure $p_L$ must not exceed the pressure in the low-pressure line ($p_A$ or $p_B$) by more than 1 bar. Design the drain line with the lowest possible pressure losses. Preload pressure on the boost HPU should be monitored.
Moog’s small Boost Hydraulic Power Unit for EAS systems is a compact and modular system, comprised only of standardized components while also having a small footprint. The HPU includes the EAS system’s 5 µm filter and water-cooling unit and operates with low noise levels (<63 dBA).

Hydraulic Schematic

General Technical Data and Dimensions

<table>
<thead>
<tr>
<th>HPU Size</th>
<th>HPU40</th>
<th>HPU70</th>
<th>HPU100</th>
<th>HPU160</th>
<th>HPU250</th>
</tr>
</thead>
<tbody>
<tr>
<td>Art. No.</td>
<td>X800-12509</td>
<td>X800-12510</td>
<td>X800-12511</td>
<td>X800-12512</td>
<td>X800-12513</td>
</tr>
<tr>
<td>Tank size</td>
<td>40 l</td>
<td>70 l</td>
<td>100 l</td>
<td>160 l</td>
<td>250 l</td>
</tr>
<tr>
<td>Max. flow @ 50Hz</td>
<td>9 l/min (2.4 gpm)</td>
<td>14 l/min (3.7 gpm)</td>
<td>27 l/min (7.1 gpm)</td>
<td>36 l/min (9.5 gpm)</td>
<td>60 l/min (15.9 gpm)</td>
</tr>
<tr>
<td>Cooling power</td>
<td>5 kW</td>
<td>8 kW</td>
<td>15 kW</td>
<td>20 kW</td>
<td>30 kW</td>
</tr>
<tr>
<td>Pressure</td>
<td>9-16 bar (130.5 – 232.1 psi)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Motor speed</td>
<td>1,450 rpm</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Oil tray WAR</td>
<td>Optional</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A [mm (in)]</td>
<td>768 (30.2)</td>
<td>893 (35.2)</td>
<td>1,070 (42.1)</td>
<td>1,270 (50.0)</td>
<td></td>
</tr>
<tr>
<td>B [mm (in)]</td>
<td>625 (24.6)</td>
<td>720 (28.3)</td>
<td>850 (33.5)</td>
<td>950 (37.4)</td>
<td></td>
</tr>
<tr>
<td>C [mm (in)]</td>
<td>829 (32.6)</td>
<td>923 (36.3)</td>
<td>966 (38.0)</td>
<td>1,068 (42.0)</td>
<td>1,163 (45.8)</td>
</tr>
<tr>
<td>D [mm (in)]</td>
<td>979 (38.5)</td>
<td>1,073 (42.2)</td>
<td>1,116 (43.4)</td>
<td>1,218 (48.0)</td>
<td>1,313 (51.7)</td>
</tr>
<tr>
<td>Pipe VS-Port</td>
<td>12L</td>
<td>15L</td>
<td>18L</td>
<td>22L</td>
<td>28L</td>
</tr>
<tr>
<td>Pipe T-Port</td>
<td>15L</td>
<td>18L</td>
<td>22L</td>
<td>28L</td>
<td>35L</td>
</tr>
<tr>
<td>Recommended viscosity</td>
<td>20 to 200 mm²/s (cSt)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Viscosity</td>
<td>15 to 500 mm²/s (cSt)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ambient temperature</td>
<td>0 to 50 °C (0 to 122 °F)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Water entry temperature</td>
<td>30 °C (86 °F)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mains supply</td>
<td>400 V / 50 Hz</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Surface treatment</td>
<td>Oil tray and tank primed. Colored tank cover is optional</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
ELECTROHYDROSTATIC PUMP UNIT (EPU)

The EPU is a highly integrated, compact alternative to traditional hydraulic solutions. It can operate in 2- or 4-quadrant operations and has a mechanical interface which allows it to be connected directly to hydraulic manifolds.

## General Technical Data

<table>
<thead>
<tr>
<th>EPU series</th>
<th>019</th>
<th>032</th>
<th>080</th>
<th>140</th>
<th>250</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maximum flow</td>
<td>85 l/min (22.5 gpm)</td>
<td>118 l/min (31.2 gpm)</td>
<td>216 l/min (57.1 gpm)</td>
<td>322 l/min (85.1 gpm)</td>
<td>450 l/min (118.9 gpm)</td>
</tr>
<tr>
<td>Maximum pressure ports A and B</td>
<td>350 bar (5,000 psi)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maximum housing pressure</td>
<td>10 bar (145 psi)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Pump version</strong></td>
<td>Radial piston pump, fixed, dual or proportional displacement</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Motor version</strong></td>
<td>Brushless servo motor, natural or liquid cooled (oil/water)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Temperature range

- **Ambient** | -15 to +60 °C (5 to 140 °F) |
- **Fluid** | -15 to +80 °C (5 to 176 °F) |

### Fluid

- **Operating fluid** | Mineral oil according to DIN 51524, HFD, others upon request |
- **Viscosity** | Permissible viscosity operational range from 12 to 100 mm²/s (12 to 100 cSt). Recommended hydraulic fluid viscosity class VG 46 to VG 100 according to ISO 3448. Maximum viscosity 500 mm²/s (500 cSt) during start-up with electric motor at 1,800 rpm. |

### System filtration

- NAS 1638, class 9 |
- ISO 4406, class 20/18/15; obtained with filter fineness of $\beta_{20} = 75$

### Installation position

- Any

### Installation note

To avoid pump damage the housing pressure $p_L$ must not exceed the pressure in the low-pressure line ($p_A$ or $p_B$) by more than 1 bar. The drain line should be designed with the lowest possible pressure losses.
POWER ELECTRONICS

Servo Drive / PSU Power Range

Module: AC-AC Servo Drive

A single axis servo drive is typically used for applications with independent hydraulic actuators, which is the simplest way of driving an EAS system. The electrical power train is contained in a compact housing, which leads to a small cabinet footprint and easy commissioning. While there is no energy feedback into the grid, the internal DC bus (565 VDC) can be combined with additional braking and decompression energy storage capacities.

Module: DC-AC Servo Drive with Power Supply Unit (PSU)

The DC-AC Servo Drive and the PSU can be used for efficient energy management in multi axis applications. Energy saving can be achieved by shifting energy between drives with a common and stabilized DC bus (650 VDC) or feeding energy back into the grid.

On each EPU axis one DC-AC Servo Drive can be combined with a shared DC bus, and it is also possible to share the DC bus with other, non-EAS applications, such as an electromechanically actuated ram.

Power for the EPU is provided by a modular drive solution. Our standard portfolio is made up of a single axis servo drive, and a multi axis version combined with a power supply unit (PSU). The standard range for the EAS is between 24 A and 450 A for the drives, and from 26 kW to 360 kW for PSUs (see graph above).

We provide several fieldbus interfaces (e.g. EtherCAT, CANopen, PROFIBUS/PROFINET) to comply with industry standards. For application safety needs, drives are available with built-in functional safety in compliance with the IEC/EN 61508, IEC/EN 62061, EN ISO 13849-1, IEC/EN 61800-5-2 standards.

A full range of accessories is also part of the Moog portfolio, and includes mains chokes and filters, as well as braking resistors, motor cables and resolver cables.
MODULE: MOTION CONTROL

We offer a complete range of motion control modules for electrohydraulic actuation systems. Linear hydrostatic actuators provide motion control that enables industrial applications to accurately position, press or hold parts and include:

- A force or pressure control loop
- A flow control loop
- A cylinder position control loop
- A cylinder position control loop with force limitation (F/x control loop)
- Pump leakage compensation
- Variable displacement EPU support.

To support the EAS Moog offers the following software:

- Firmware (integrated with a Moog Servo Drive)
- A software function block (integrated with a Moog MSC III Controller and other compatible platforms).

Typical Structure of EAS System Control Loop
ABOUT MOOG

Hydraulic Solutions
Since Bill Moog invented the first commercially viable servo valve in 1951, Moog has set the standard for world-class hydraulic technology. Today, Moog products are used in a variety of applications – providing high power, enhanced productivity and ever better performance for some of the world’s most demanding applications.

Electric Solutions
Clean operation, low noise generation, less maintenance and reduced power consumption make Moog electric solutions ideal for applications worldwide. Moog is the ideal partner for applications where transitioning technologies requires special expertise.

Hybrid Solutions
By incorporating the advantages of existing hydraulic and electric technologies - including modular flexibility, increased efficiency and cleanliness - into innovative hybrid solutions, Moog offers new performance potential in specialized applications.

Moog Global Support
Moog Global Support is our promise to offer world-class repair and maintenance services delivered expertly by our trained technicians. With the reliability only available from a leading manufacturer with facilities around the world, Moog offers you service and expertise you can count on to keep your equipment operating as it should. This promise offers many benefits to our customers including:

- Reduce your downtime by keeping critical machines running in peak performance
- Protect your investment by ensuring reliability, versatility and long-life of products
- Better plan your maintenance activities and make systematic upgrades
- Leverage our flexible programs to meet the unique service requirements of your facility.

Look to Moog for Global Support including:

- Repair services using OEM parts are performed by trained technicians to the latest specifications
- Stock management of spare parts and products to prevent unplanned downtime
- Flexible programs, tailored to your needs such as upgrades, preventative maintenance and annual/multi-year contracts
- On-site services bring the expertise to you, providing quicker commissioning, set-up and diagnostics
- Access to reliable services that are guaranteed to offer consistent quality anywhere in the world.

For more information on Moog Global Support visit www.moog.com/industrial
Moog designs a range of motion control products to complement those featured in this document. Moog also provides service and support for all of our products. For more information, contact the Moog facility closest to you.

### Australia
- **Australia**
  - +61 3 9561 6044
  - Service: +61 3 8545 2140
  - info.australia@moog.com
  - service.australia@moog.com

### Brazil
- **Brazil**
  - +55 11 3572 0400
  - info.brazil@moog.com
  - service.brazil@moog.com

### Canada
- **Canada**
  - +1 716 652 2000
  - info.canada@moog.com

### China
- **China**
  - +86 21 2893 1600
  - Service: +86 21 2893 1626
  - info.china@moog.com
  - service.china@moog.com

### France
- **France**
  - +33 1 4560 7000
  - Service: +33 1 4560 7015
  - info.france@moog.com
  - service.france@moog.com

### Germany
- **Germany**
  - +49 7031 622 0
  - Service: +49 7031 622 197
  - info.germany@moog.com
  - service.germany@moog.com

### Hong Kong
- **Hong Kong**
  - +852 2 635 3200
  - info.hongkong@moog.com

### India
- **India**
  - +91 80 4057 6666
  - Service +91 80 4057 6604
  - info.india@moog.com
  - service.india@moog.com

### Ireland
- **Ireland**
  - +353 21 451 9000
  - info.ireland@moog.com

### Italy
- **Italy**
  - +39 0332 421 111
  - Service 800 815 692
  - info.italy@moog.com
  - service.italy@moog.com

### Japan
- **Japan**
  - +81 46 355 3767
  - info.japan@moog.com
  - service.japan@moog.com

### Korea
- **Korea**
  - +82 31 764 6711
  - info.korea@moog.com
  - service.korea@moog.com

### Luxembourg
- **Luxembourg**
  - +352 40 46 401
  - info.luxembourg@moog.com

### Malaysia
- **Malaysia**
  - +60 3 2721 1000

### The Netherlands
- **The Netherlands**
  - +31 252 462 000
  - info.thenetherlands@moog.com
  - service.thenetherlands@moog.com

### Singapore
- **Singapore**
  - +65 677 36238
  - Service +65 651 37889
  - info.singapore@moog.com
  - service.singapore@moog.com

### Spain
- **Spain**
  - +34 902 133 240
  - info.spain@moog.com

### Sweden
- **Sweden**
  - +46 31 680 060
  - info.sweden@moog.com

### Turkey
- **Turkey**
  - +90 216 663 6020
  - info.turkey@moog.com

### United Kingdom
- **United Kingdom**
  - +44 (0) 1684 858000
  - Service +44 (0) 1684 278369
  - info.uk@moog.com
  - service.uk@moog.com

### USA
- **USA**
  - +1 716 652 2000
  - info.usa@moog.com
  - service.usa@moog.com

---

For product information, visit [www.moog.com/industrial](http://www.moog.com/industrial)
For service information, visit [www.moogglobalsupport.com](http://www.moogglobalsupport.com)