Compact Hydraulic System for Energy Savings and High Precision

POWER Meister
POWER Meister
Compact Hydraulic System
• Superior Energy Savings
• High Precision

AC servo motor controls rotational speed and direction of pump.
Generates flow and pressure to match the operating cycle of machinery and to stop during idle times.

Incredible energy savings by only operating when necessary.
Position, Speed and Pressure are controlled with great precision by using a high-speed digital processing servo controller.

Advantages of Hydraulics:
• Powerful
• Control

Advantages of Servo System:
• High Repeatability
• Energy Savings

Compact Combination of Hydraulic and Electric

Easy and high precision control of position, speed and pressure with energy savings
High Power: 30MPa (4350 PSI)
Pump Operates Only When Necessary for Energy Savings and Low Noise
Superior Energy Savings Compared to Conventional Hydraulic Systems
High-Speed Processing of the Servo Controller Makes Positioning on the Order of µm Possible (0.001mm or 0.000039")
Compact All-in-One Design Saves Space (Select either vertical or horizontal set up)
Precision Control of Position, Speed and Pressure by Our Original Feedback System

**Principle of Operation**

Rotating the motor clockwise brings hydraulic fluid to the head side of the cylinder which lifts the table.

Reversing the motor brings hydraulic fluid to the rod side and pushes the cylinder down.

The rotational direction of the pump controls the direction of the cylinder, and the rotational speed controls the speed.
System Configuration (Standard)

The hydraulic unit responds to the signals to operate the cylinder (position, speed and pressure) that are sent from the Machine Controller to the Servo Controller. The Servo Controller receives feedback from sensors and accurately controls the cylinder so the deviation from the signal is 0. A feedback system using position and pressure sensors make it possible to accurately control Position, Speed and Pressure.

POWER Meister Features

1. Hydraulic Unit (UPS)
2. Servo Controller (EPD)
3. Servo Amplifier (For AC motor of 1)
4. Motor Cable (3m, 5m or 10m) (10, 16 or 32 feet)
5. Encoder Cable (3m, 5m or 10m) (10, 16 or 32 feet)
Hydraulic Unit (UPS)

Space-Saving Design
In-line AC servo motor, hydraulic pump and reservoir. Relief valve and other valves are included in base unit. A port is discharge port when pump rotates counterclockwise (viewed from AC servo motor). B port is discharge port when pump rotates clockwise. Piping are only between A&B ports of unit and ports of cylinder. Due to rotation of AC servo motor, cylinder can be extended or retracted.

Options
• Level Switch
• Temperature Switch
• Shut-off Valve
• Differential Pressure Valve

Servo Controller (EPD)

Easy and Precise Control by High-Speed Calculation
Position sensor and pressure sensor feedback signals. According to load of cylinder, servo controller command to servo amplifier with calculating direction of rotation and rotation speed. Through high-speed calculation of servo controller, it is possible to operate cylinder easily and precisely with command and feedback control.

The servo controller features an automatic changeover control mode function as standard. In accordance with actual load conditions, speed control and pressure control or position control and pressure control are automatically selected. Therefore, it is not necessary to control timing by changing the control modes with the host controller, and changing from speed control to pressurizing control can be done smoothly. This function can realize pressurizing control that does not generate surge pressure at the time of changeover. Contact signals from the host controller can also change the control modes.

Servo Amplifier (EPA)
The servo amplifier communicates with the servo motor. The pump is driven according to command of rotation speed from servo controller.
Reference Data

- Pressure: Pressure Command Voltage - Pressure Characteristic (0-100%)
  - 30Mpa (4350 psi) at 10V
  - Minimum Pressure: 0.15 MPa (22 psi)
  - Maximum Pressure: 30 Mpa (4350 psi)

- Speed: Speed Command Voltage - Speed Characteristic (0-100%)
  - 1500 min⁻¹ at 10V
  - Minimum Speed: 50 min⁻¹
  - Maximum Speed: 1500 min⁻¹
  - (In case of oil motor as actuator)

- Pressure: Sine Wave Response
  - Sinewave of 1Hz Command Range of Wave 10-90%

- Speed: Sine Wave Response
  - Sinewave of 1Hz Command Range of Wave 10-90%

- Hold Pressure: Electric Power Consumption Characteristic
  - At 3045 psi, 1.2HP=64% Savings

Application Examples and Results

Metalforming Machines
Compact machine space, precise measures to manufacture.

Caulking Machines and Press Fitting Machines
Control power and position of caulking to maintain quality control, conventional positioning mechanism not needed. Eliminates the inconsistency of work done by hand.

Grinding Machines
Precise position of start to grind, energy saving to maintain constant pressure for long periods.

Precision Press Machines
Smooth change from high speed to process without surge pressure, for improved quality of products. Less cycle time.

Straightening Machines
Energy saving, low noise, reduced fluid, saving space by integrating unit into machine. Less logistics costs.

Other Applications
Other applications include those requiring compact machines, and high load machines which are incapable of using ball screws.
Hydraulic Unit Specifications

- **Electric Motor**: AC servo motor (0.5~7.5kW) (0.7~10.0HP)
- **Piston Pump**: (2.0~15.8 cm³/rev) (0.12~0.96 in³/rev)
- **Ambient Temperature/Humidity**: 0~+40°C (32~104°F) / 20~90% RH
- **Fluid Temperature**: 5~60°C (41~140°F)
- **Recommended Fluid**: ISO VG32~68 (VG 46 recommended)
- **Range of Viscosity**: 20~200 mm²/s (cSt)
- **Cleanliness Level**: NAS class 10
- **Setting Range of Relief Valve**: 3.5~30MPa (508~4350 psi)
- **Maximum Pressure**: 30MPa (4350 psi)
- **Color**: Black

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**Model Code**

![Model Code Diagram]

- **UPS-0A**
  - **Model**: UPS-0A-20, UPS-0A-20, UPS-0A-50, UPS-0A-70
  - **Motor Output**: kW (HP)
  - **Volume**: cm³/rev (in³/rev)
  - **Max Rotational Speed**: min⁻¹ (Note 1)
  - **Max Flow**: E/min (GPM)
  - **Rated Pressure**: MPa (psi)
  - **Max Operation Pressure**: MPa (psi)
  - **Reservoir Lit (Gallon)**
  - **Allowable Flow Change**: Lit (Gallon)

- **UPS-1A**
  - **Model**: UPS-1A-10, UPS-1A-20, UPS-1A-30, UPS-1A-40
  - **Motor Output**: kW (HP)
  - **Volume**: cm³/rev (in³/rev)
  - **Max Rotational Speed**: min⁻¹ (Note 1)
  - **Max Flow**: E/min (GPM)
  - **Rated Pressure**: MPa (psi)
  - **Max Operation Pressure**: MPa (psi)
  - **Reservoir Lit (Gallon)**
  - **Allowable Flow Change**: Lit (Gallon)

**Note 1**: Operating pressure at maximum rotational speed may be limited by the motor output characteristic.

**Note 2**: Theoretical flow under no load.

**Note 3**: Rated pressure is (available) pressure at rated torque of motor, maximum operating pressure is pressure output at 150% torque. If this pressure exceeds 30MPa (4350 psi), the maximum operating pressure of the hydraulic unit is limited to below 30MPa (4350 psi).

**Note 4**: Operating conditions may limit the maximum rotational speed and operating pressure to values lower than those shown in the table above.

**Note 5**: Fluid temperature is affected by operating environment, operation method, load conditions, etc. Please check machine temperature during actual operation. If temperature exceeds what is recommended, please contact NACHI (cooling system may be recommended).
### Servo Controller Specifications

<table>
<thead>
<tr>
<th>Source Voltage/Consumption</th>
<th>DC24V±15% / Under 10W is needed</th>
<th>Separate power supply for sensor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ambient Temperature/Humidity</td>
<td>0~+55°C (32~131°F) / Under 90% RH</td>
<td></td>
</tr>
<tr>
<td>Control</td>
<td>Control of position, speed and pressure for cylinder</td>
<td>Automatic change function of control mode</td>
</tr>
<tr>
<td>Speed Command</td>
<td>Analog voltage DC±10V/Max cylinder speed (*1)</td>
<td>Expand cylinder by + voltage, contract by - voltage</td>
</tr>
<tr>
<td>Pressure Command</td>
<td>Analog voltage DC±10V/Max pressure (*2)</td>
<td>Pressure head side by + voltage, pressure rod side by - voltage</td>
</tr>
<tr>
<td>Position Command</td>
<td>Select contact signal to set positions (4 contacts). Select target position by bit pattern of 4 contacts. Controller calculates function of speed for targeted position.</td>
<td>Set target position, max speed and accelerated and decelerated speed in inside parameter in advance.</td>
</tr>
<tr>
<td>Input Signal (Contact Signal)</td>
<td>Servo ON, alarm reset, outer change signal for control mode. Original point search start signal, LS for back original point, LS for near original points.</td>
<td></td>
</tr>
<tr>
<td>Output Signal</td>
<td>Alarm, servo ready, control mode monitor; reference print search complete/in position (with output), correspond with pressure</td>
<td></td>
</tr>
<tr>
<td>Pressure Sensor Input</td>
<td>Analog voltage 0.5<del>4.5V or 1</del>5V (2ch)</td>
<td>Use pressure sensor with responsiveness under 1ms</td>
</tr>
<tr>
<td>Position Sensor Input</td>
<td>90°C phase difference (2 phase). Reference position pulse (line receiver input) or analog voltage 0~10V.</td>
<td>If using position sensor for pulse output, necessary to do original point search after power-up.</td>
</tr>
<tr>
<td>Operation Panel</td>
<td>5 digit indicator, 4-key input, selector switch.</td>
<td>Set and indication of data, trial operation function</td>
</tr>
</tbody>
</table>

### Servo Amplifier Specifications

<table>
<thead>
<tr>
<th>Hydraulic Unit (UPS)</th>
<th>Motor Output kW (HP)</th>
<th>Servo Amplifier</th>
<th>Note</th>
</tr>
</thead>
<tbody>
<tr>
<td>UPS-00A-05</td>
<td>0.5 (0.7)</td>
<td>EPA-PD1-10-R050-8647B</td>
<td>Built-in regenerative resistor, attached connector for wiring</td>
</tr>
<tr>
<td>UPS-00A-10</td>
<td>1.0 (1.3)</td>
<td>EPA-PD1-10-R100-8647B</td>
<td>Built-in regenerative resistor, attached connector for wiring</td>
</tr>
<tr>
<td>UPS-00A-15</td>
<td>1.5 (2.0)</td>
<td>EPA-PD1-10-R150-8647B</td>
<td>Built-in regenerative resistor, attached connector for wiring</td>
</tr>
<tr>
<td>UPS-00A-20</td>
<td>2.0 (2.7)</td>
<td>EPA-PD1-10-R200-8647B</td>
<td>Built-in regenerative resistor, attached connector for wiring</td>
</tr>
<tr>
<td>UPS-00A-25</td>
<td>2.5 (3.4)</td>
<td>EPA-PD1-10-R250-8647B</td>
<td>Built-in regenerative resistor, attached connector for wiring</td>
</tr>
<tr>
<td>UPS-1A+05</td>
<td>0.5 (0.7)</td>
<td>EPA-PD1-10-YV290-8647B</td>
<td>Built-in regenerative resistor (cable connector not included)</td>
</tr>
<tr>
<td>UPS-1A+10</td>
<td>1.0 (1.3)</td>
<td>EPA-PD1-10-YV440-8647B</td>
<td>Built-in regenerative resistor (cable connector not included)</td>
</tr>
<tr>
<td>UPS-1A+15</td>
<td>1.5 (2.0)</td>
<td>EPA-PD1-10-R550-8647B</td>
<td>Built-in regenerative resistor, attached connector for wiring</td>
</tr>
<tr>
<td>UPS-1A+20</td>
<td>2.0 (2.7)</td>
<td>EPA-PD1-10-R750-8647B</td>
<td>External regenerative resistor, attached connector for wiring</td>
</tr>
</tbody>
</table>

(Note 1) Source: 3 phase AC200~230V 50/60Hz
(Note 2) Separate motor cable and encoder cables are needed to connect the servo motor of the hydraulic unit and the servo amplifier.
(Note 3) An auxiliary external regenerative resistor may need to be added in some operating conditions if the built-in or external regenerative resistor is not sufficient. Contact NACHI for more details about your operating conditions.

### Servo Controller Option

**Spacer**

FZV-8676-02A-01

Using this spacer, installation is same as with old type controller.

EPD-PD2-10(A)-D2-10
**Cable Kit Specifications**

**Motor Cable Kits**  
JAQ-05 ACM-S200-L-8649

- **Plug type**: Straight Plug, L Plug  
- **Applied Motor**:  
  - 050: 0.5kW (0.7HP)  
  - 150: 1.5kW (2.0HP)  
  - 250: 2.2kW (2.9HP)  
  - 450: 4.4kW (5.9HP)  
- **Motor Cable Type**:  
  - A Port (G3/8)  
  - B Port (G1/2)

- **Cable Kits**  
  - **PC Cable Kits**  
  - **Motor Cable Kits**

- **Cable Length**:  
  - 03: 3m (10 feet)  
  - 05: 5m (16.6 feet)

**Encoder Cable Kits**  
JAQ-05 ACE-S-L-8648

- **Plug type**: Straight Plug, L Plug  
- **Type**:  
  - S: 0.5, 1.0, 1.5, 2.0, 5.5, 7.5kW  
  - YV: 2.9, 4.4 kW (3.9, 5.9HP)  
- **Encoder Cable Length**:  
  - 03: 3m (10 feet), 05: 5m (16.6 feet), 10: 10m (33.3 feet)

**PC Cable Kits**  
JAQ-03 PMC-8654A

- **PC Cable Type**:  
  - Options C and S and tank options H and S.

**Installation Dimensions**

**UPS-00A Series**  
Option : Without option S (Shut Off Valve)

- **UPS-00A-**H**** (Horizontal type)
- **UPS-00A-**V**** (Vertical type)

(Note 1) Dimensions in (parentheses) and two dot chain lines are for circuit options C and S and tank options H and S.

(Note 2) Does not include circuit or tank options or weight of hydraulic fluid.

(Note 3) Install the air breather face up.
Option : With option S (Shut Off Valve)

**UPS-00A-*H****S4** (Horizontal type)

**UPS-00A-*V****S4** (Vertical type)

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**UPS-A/1A Series**

**UPS-00A-**H**** (Horizontal type)**

<table>
<thead>
<tr>
<th>L</th>
<th>A</th>
<th>L</th>
<th>B</th>
<th>LC</th>
<th>LD</th>
<th>LE</th>
<th>LF</th>
<th>LG</th>
</tr>
</thead>
<tbody>
<tr>
<td>UPS-0A-</td>
<td>220</td>
<td>171</td>
<td>6.3</td>
<td>120</td>
<td>4.72</td>
<td>229</td>
<td>8.91</td>
<td>462</td>
</tr>
<tr>
<td>UPS-1A-</td>
<td>429</td>
<td>160</td>
<td>6.29</td>
<td>244</td>
<td>9.60</td>
<td>684</td>
<td>26.92</td>
<td>703</td>
</tr>
<tr>
<td>UPS-1A-</td>
<td>405</td>
<td>184</td>
<td>7.24</td>
<td>195</td>
<td>7.67</td>
<td>708</td>
<td>27.67</td>
<td>727</td>
</tr>
<tr>
<td>UPS-1A-</td>
<td>405</td>
<td>267</td>
<td>10.51</td>
<td>271</td>
<td>10.86</td>
<td>731</td>
<td>28.34</td>
<td>810</td>
</tr>
<tr>
<td>UPS-1A-</td>
<td>407</td>
<td>332</td>
<td>13.07</td>
<td>856</td>
<td>33.70</td>
<td>875</td>
<td>34.68</td>
<td>902</td>
</tr>
</tbody>
</table>

**Note 1** Dimensions in (parentheses) and two dot chain lines are for circuit options C and S and tank options H and S.

**Note 2** Does not include circuit or tank options or weight of hydraulic fluid.

**Note 3** Install the air breather face up.