

## **Premax Electro-Hydraulic Servo Control System**

### **Features:**

**Reliable**

**Easy to Use**

**Advanced, Powerful Control Functions**

**High Cost-Effective**

The Premax VT-6008 electro-hydraulic servo control system can meet the testing control requirements of a single hydraulic actuating cylinder, and also can carry on multi-channel and multi-actuator servo control by further extension. The Premax control system makes the repetitive and boring test task easier based on the convenient operation of Windows application software, powerful auxiliary functions, the system powerful functional wizard and the testing report auto-generating function.

The Premax testing parameter configuration is easy and strict, and the system interface to PC is USB2.0. More importantly, the user can adjust the control configuration when the test is going on and correct the configuration parameters appropriately when some emergencies happen. Once an emergency happens, the user should press down the break button on the panel to interrupt the control and test produce, and ensure the safety of testers, specimens and other associated equipment.

### **Powerful Control Functions**

The Premax electro-hydraulic servo controller can realize the inner PID control based on the spool displacement and the hydraulic actuator displacement (inner PID loop), and also can realize the outer digital control based on online iteration. The inner PID loop can optimize the system performance with maximum limit, and the outer iterative digital control with powerful test software can realize a whole series of vibration modes including random vibration control, sine vibration control, typical shock control, shock response spectrum control, compound vibration control, road

simulation control, seismic simulation control, et al.

### **High Flexibility**

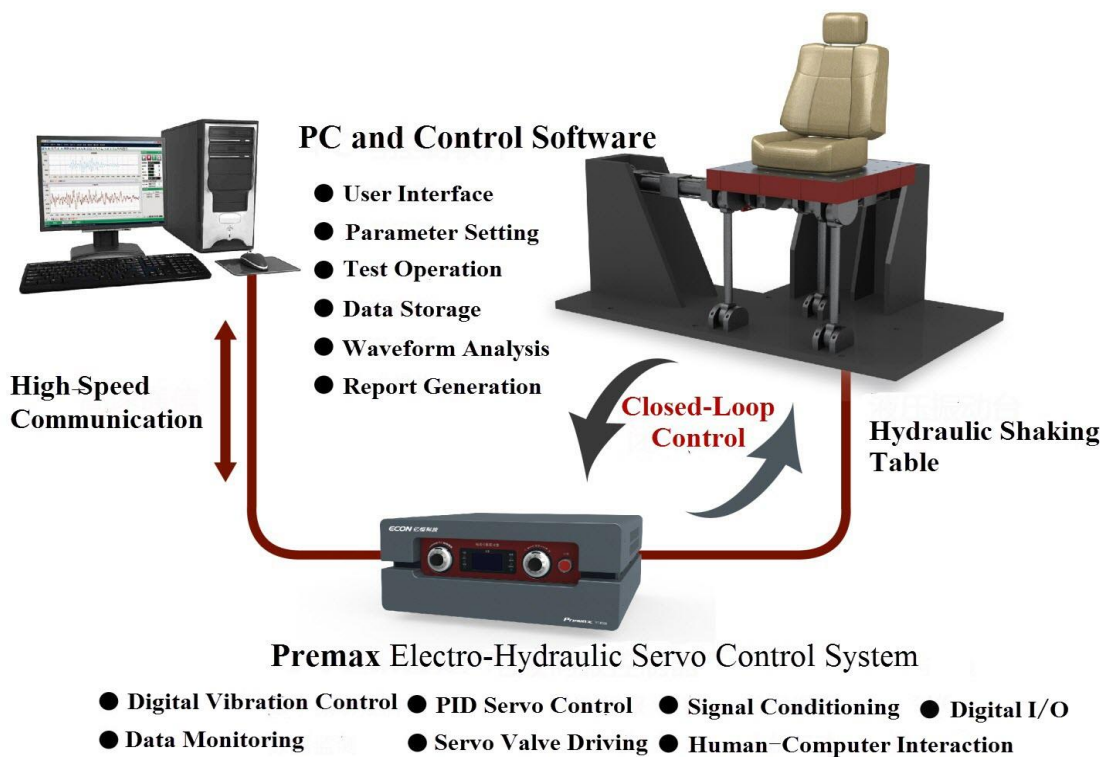
The Premax controller can complete multiple control and test task based on the same hardware platform through different test module configuration to satisfy the different-content dynamic test needs. It also can be configured the corresponding hardware and software through module design according to user demands.

### **High Cost-Effective**

The Premax electro-hydraulic servo control system is applicable to kinds of hydraulic actuators and is customized for hydraulic vibration test platform. It has high efficiency and professional match.

## Premax Control System

The Premax VT-6008 control system consists of PC, Premax electro-hydraulic servo controller and hydraulic shaking table. The PC is used to install and operate the control software. The Premax electro-hydraulic servo controller is used for data transmission, conversion and valve driving. Finally, implement the vibration test on the hydraulic shaking table.



## PC and Control Software

The Premax hydraulic vibration control software is installed on the PC. The program installation is simple and convenient. The vibration test can be easily built by the test procedure of the Premax hydraulic vibration control software in the screen window, and also can be built by importing an existing vibration test in which the testing configuration parameters can be accessed and there is no need to configure them item by item at every turn. The user can easily import the already saved and

configured parameters. The test schedule can help the user edit the vibration testing process easily and when implement a same pattern of vibration control tests, the test schedule can finish a set of vibration controlling and testing tests continuous.

## **Premax electro-hydraulic servo controller**

The Premax electro-hydraulic servo controller implements high-speed communication with PC through USB. And the outer closed-loop control is realized by DSP processor. The PC and the controlling loop are independent, which ensure the system is real-time and high efficient.

The valve driving module can drive a 2-stage or 3-stage valve, and output voltage or current signal according to the valve demand.

The Premax electro-hydraulic servo controller has various signal conditioning and input coupling mode, and every channel is configured independent voltage amplifier, which can support one IEPE or TEDS sensor.

**Front Control Panel Layout:**



- ① P-Gain Adjustment Knob: P control of hydraulic actuator (hydraulic cylinder);
- ② LCD: Display the static position of the hydraulic actuator (unit: V);
- ③ Zero (Offset) Knob: Adjust the zero setting knob to position the piston at the middle of hydraulic cylinder (system zero);
- ④ Emergency Button: Stop the servo system running in any emergency situation;
- ⑤ 、 ⑥
- ⑥ Dither Signal Frequency and Amplitude Adjustment Knob: Add dither signal in the control signal to improve system characteristics;
- ⑦ Servo Valve Step Excitation Button: Step signal for the servo valve (3-stage);
- ⑧ Servo Valve P-Gain Knob: Proportional control knob for the servo valve (3-stage valve);
- ⑨ Servo Valve I- Gain Knob: Integral control knob for the servo valve (3-stage);
- ⑩ Servo Valve D- Gain Knob: Derivative control knob for servo valve (3-stage);

- ⑪ Servo Valve Zero-Offset Knob: Zero offset adjustment for the servo valve (3-stage);
- ⑫ Hydraulic Actuator I-Gain Knob: Integral control knob for the hydraulic actuator;
- ⑬ Hydraulic Actuator D-Gain Knob: Derivative control knob for the hydraulic actuator;
- ⑭ Hydraulic Actuator Step Excitation Button: Step signal for the hydraulic actuator (3-stage);
- ⑮ Monitoring Channel Interface: Data acquisition interface to external monitoring equipment; Dither Signal, Valve displacement and Actuator displacement.

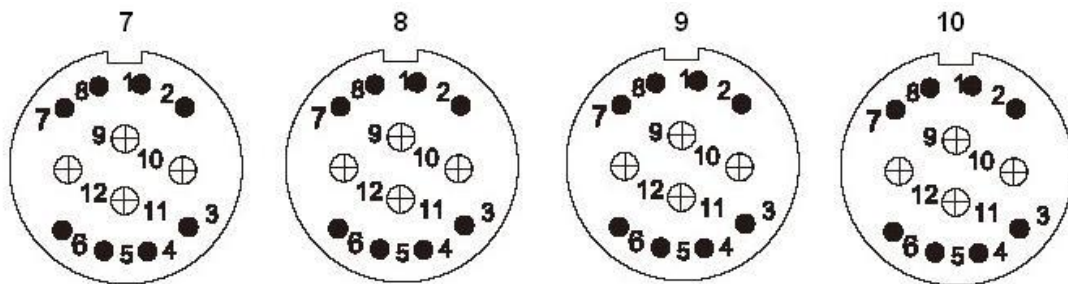
**Notes:** ⑤—⑮ is used by the professional debugging engineer, and is locked in non-debugging situation. Please contact Econ company for debugging, and don't change the system settings arbitrarily.

**Rear Control Panel Layout:**



- ① - ⑥ Acceleration Signal Monitoring Interface: BNC monitoring interface which support IEPE and TEDS sensors;
- ⑦ Acceleration Signal Control Interface: 12-pin circular connector interface, support PCB and ENDEVCO variable-capacitance sensors;
- ⑧ Hydraulic Actuator Displacement Signal Interface: 12-pin circular connector interface, support LVDT sensors, slide rheostat sensors, secondary-instrument power supply sensors, et al.
- ⑨ Servo Valve Displacement Signal Interface: 12-pin circular connector interface, support LVDT sensors;
- ⑩ Servo Valve Driving Signal Interface: 12-pin circular connector interface, support 2-stage and 3-stage valve driving;
- ⑪ USB Interface: Implement high-speed communication with PC by USB;
- ⑫ Power Switch: Turn on the power switch after ensuring all the connections are normal;
- ⑬ Ground Pole: Connect the ground pole to the safe ground;
- ⑭ Power Socket: Connect the power supply;
- ⑮ , ⑯ Digital I/O Interface: 37-pin I/O interface for digital signal input and output;

**⑦-⑧ Circular Connector Interface :**



**⑦ Acceleration Signal Control Interface**

- 1、 Input signal (Negative) -;
- 2、 Input signal (Positive) +, measurement range: -10V~+10V;
- 3、 NC (Not Connected);
- 4、 NC;
- 5、 NC;
- 6、 NC;
- 7、 NC;
- 8、 NC;
- 9、 Power output + (Positive);

- 10、 GND;
- 11、 Power output - (Negative);
- 12、 GND.

**Notes:**

Support 2 power supply modes: single power +24V and double power  $\pm 15V$ ;

Single power +24V:

In the single power +24V mode, 9-pin outputs 24V, 11-pin outputs 0V, 10-pin and 12-pin can be vacant (NC), suggest connect 10-pin and 12-pin to the 11-pin;

Double power  $\pm 15V$ :

In the double power  $\pm 15V$  mode, 9-pin outputs +15V, 11-pin outputs -15V, and 10-pin or 12-pin can be taken as one ground line (GND), suggest connect 10-pin and 12-pin together.

**⑧ Hydraulic Actuator Displacement Signal Interface:**

- 1、 4-20mA input signal: - (Negative);
- 2、 4-20mA input signal: + (Positive);
- 3、 LVDT signal input: + (Positive);      LVDT
- 4、 LVDT signal input: - (Negative);
- 5、 LVDT excitation signal output;
- 6、 LVDT excitation signal output;
- 7、 Input + (Positive) for slide rheostat;
- 8、 Input - (Negative) for slide rheostat;
- 9、 Power output + (Positive); (24 V、 15V)
- 10、 GND;
- 11、 Power output - (Negative);
- 12、 GND

**Notes:**

LVDT excitation signal output modes: 5V (default), 15V, 24V;

Support 2 power supply modes: single power +24V and double power  $\pm 15V$ ;

Single power +24V:

In the single power +24V mode, 9-pin outputs 24V, 11-pin outputs 0V, 10-pin and 12-pin can be vacant (NC), suggest connect 10-pin and 12-pin to the 11-pin;

Double power  $\pm 15V$ :

In the double power  $\pm 15V$  mode, 9-pin outputs +15V, 11-pin outputs -15V, and 10-pin or 12-pin can be taken as one ground line (GND), suggest connect 10-pin and 12-pin together.

**⑨ Servo Valve Displacement Signal Interface:**

- 1、 4-20mA input signal: - (Negative);
- 2、 4-20mA input signal: + (Positive);



- 3、 LVDT signal input: + (Positive); LVDT
- 4、 LVDT signal input: - (Negative);
- 5、 LVDT excitation signal output;
- 6、 LVDT excitation signal output;
- 7、 Input + (Positive) for slide rheostat
- 8、 Input - (Negative) for slide rheostat;
- 9、 Power output + (Positive)
- 10、 GND
- 11、 Power output - (Negative);
- 12、 GND.

**Notes:**

LVDT excitation signal output modes: 5V (default), 15V, 24V;

Support 2 power supply modes: single power +24V and double power  $\pm 15V$ ;

Single power +24V:

In the single power +24V mode, 9-pin outputs 24V, 11-pin outputs 0V, 10-pin and 12-pin can be vacant (NC), suggest connect 10-pin and 12-pin to the 11-pin;

Double power  $\pm 15V$ :

In the double power  $\pm 15V$  mode, 9-pin outputs +15V, 11-pin outputs -15V, and 10-pin or 12-pin can be taken as one ground line (GND), suggest connect 10-pin and 12-pin together.

**⑩ Servo Valve Driving Signal Interface:**

- 1、 NC;
- 2、 NC;
- 3、 GND;
- 4、 Driving Signal: Voltage driving or current driving;
- 5、 Enable Signal;
- 6、 GND, Voltage Driving;
- 7、 GND;
- 8、 GND, Current Driving;
- 9、 Power output + (Positive);
- 10、 GND;
- 11、 Power output - (Negative);
- 12、 GND.

**Notes:**

Support 2 valve driving modes: current driving (default) and voltage driving;

Current driving: 8-pin is the current GND;

Voltage driving: 6-pin is the voltage GND;

Different driving modes can be switched internally.

Support 2 power supply modes: single power +24V and double power  $\pm 15V$ ;

Single power +24V:

In the single power +24V mode, 9-pin outputs 24V, 11-pin outputs 0V, 10-pin and

12-pin can be vacant (NC), suggest connect 10-pin and 12-pin to the 11-pin;

Double power  $\pm 15V$ :

In the double power  $\pm 15V$  mode, 9-pin outputs +15V, 11-pin outputs -15V, and 10-pin or 12-pin can be taken as one ground line (GND), suggest connect 10-pin and 12-pin together.

## Hydraulic Shaking Table

The Premax controlled hydraulic shaking table has the features of high thrust, long stroke, low waveform distortion, stable and reliable working process, et al. which can truly reproduce the environment vibration of the specimen, so it can be widely used in the structure vibration-resistant field. The shaking table can accurately reproduce the control waveform and completely meet the requirements of vibration-resistant test.

## Hardware Index

### Input

Displacement Input Channel: 2 channels, 220k $\Omega$  input impedance;

Acceleration Input Channel: 8 channels, 220k $\Omega$  input impedance;

Resolution Ratio: 24 ADC;

Voltage Range:  $\pm 10$ ,  $\pm 1$ ,  $\pm 0.1V_{PEAK}$ ;

Filter: 1 analog filter, 1 160dB/octave digital filter;

Couple Mode: AC difference, AC single end, DC difference, DC single end, ICP;

Max Input:  $\pm 36 V_{PEAK}$ ;

Amplitude Accuracy: 0.08dB;

Channel Match: Amplitude 0.05dB, Phase  $\pm 0.5^\circ$  ;

SNR: >100dB;

Channel Crosstalk: <-100dB;

Harmonic Distortion: <-100dB;

### Output

Servo Valve Output Channel: 1 driving channel, 30 $\Omega$  output impedance;

Resolution Ratio: 24 DAC;

Dynamic Range: 110dB;

Output Range: Current: Max  $\pm 100mA$ ; Voltage: Max  $\pm 10V_p$ ;

Filter: 1 analog filter, 1 160dB/octave digital filter;;

Harmonic Distortion: <-100dB;