

Compact Hydraulic System for Energy Savings and High Precision

POWER Meister



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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:

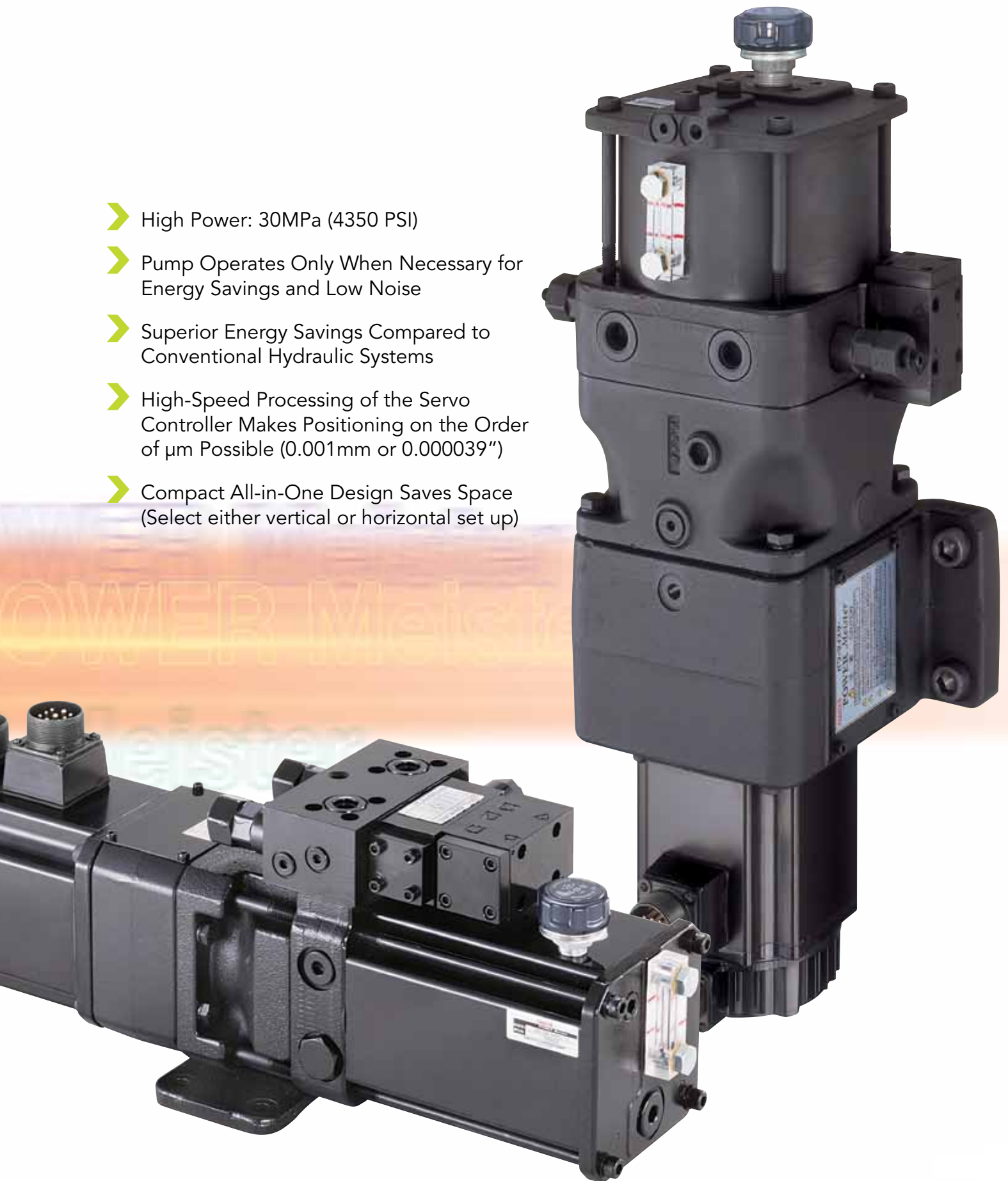
- High Repeatability
- Energy Savings

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)



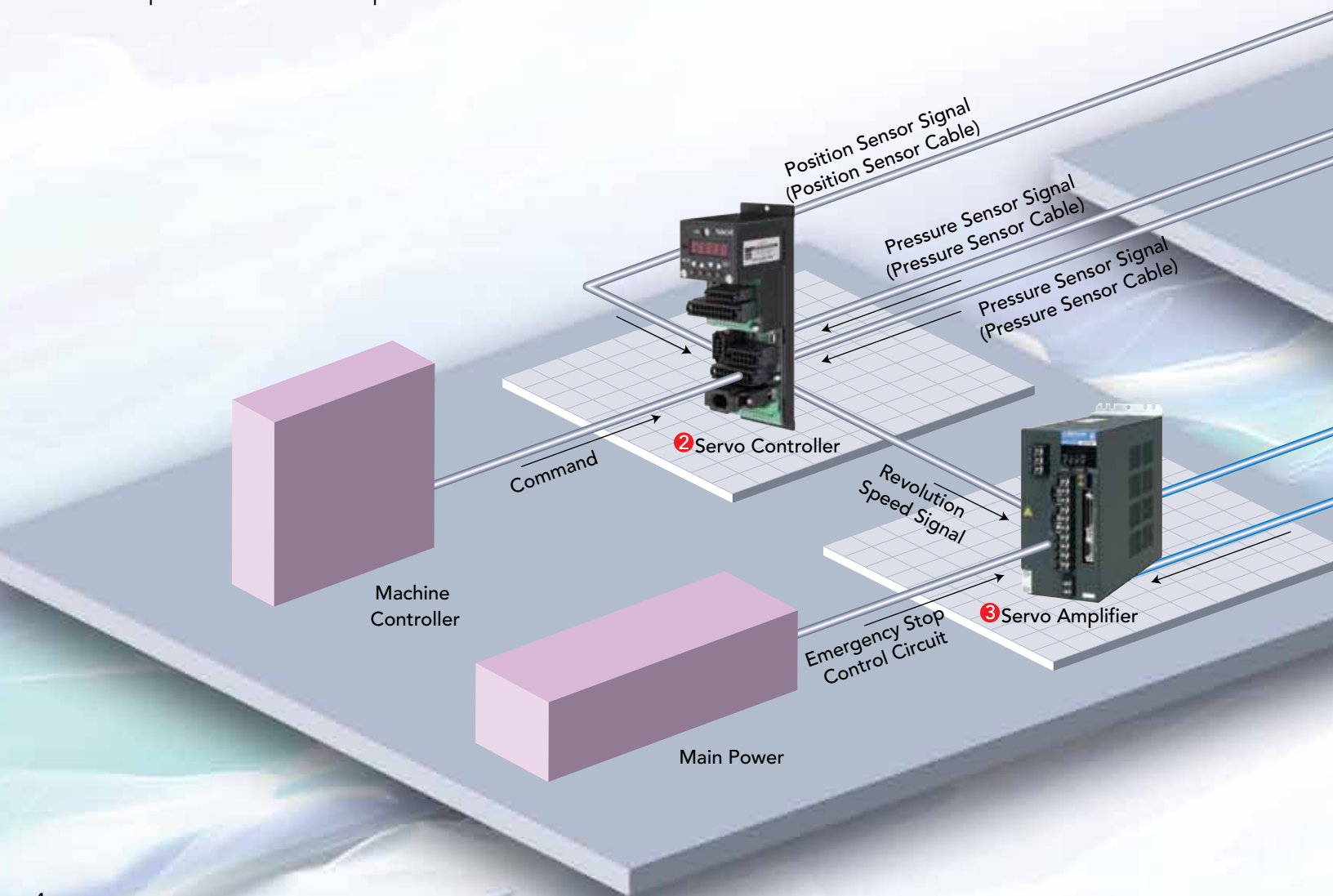
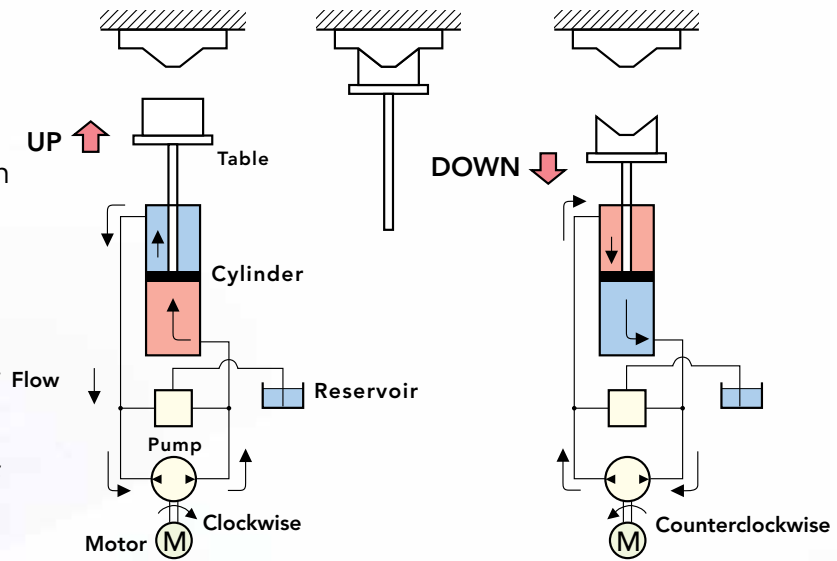
Precision Control of Position, Speed and Pressure by Our Original Feedback System

► Principle of Operation

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

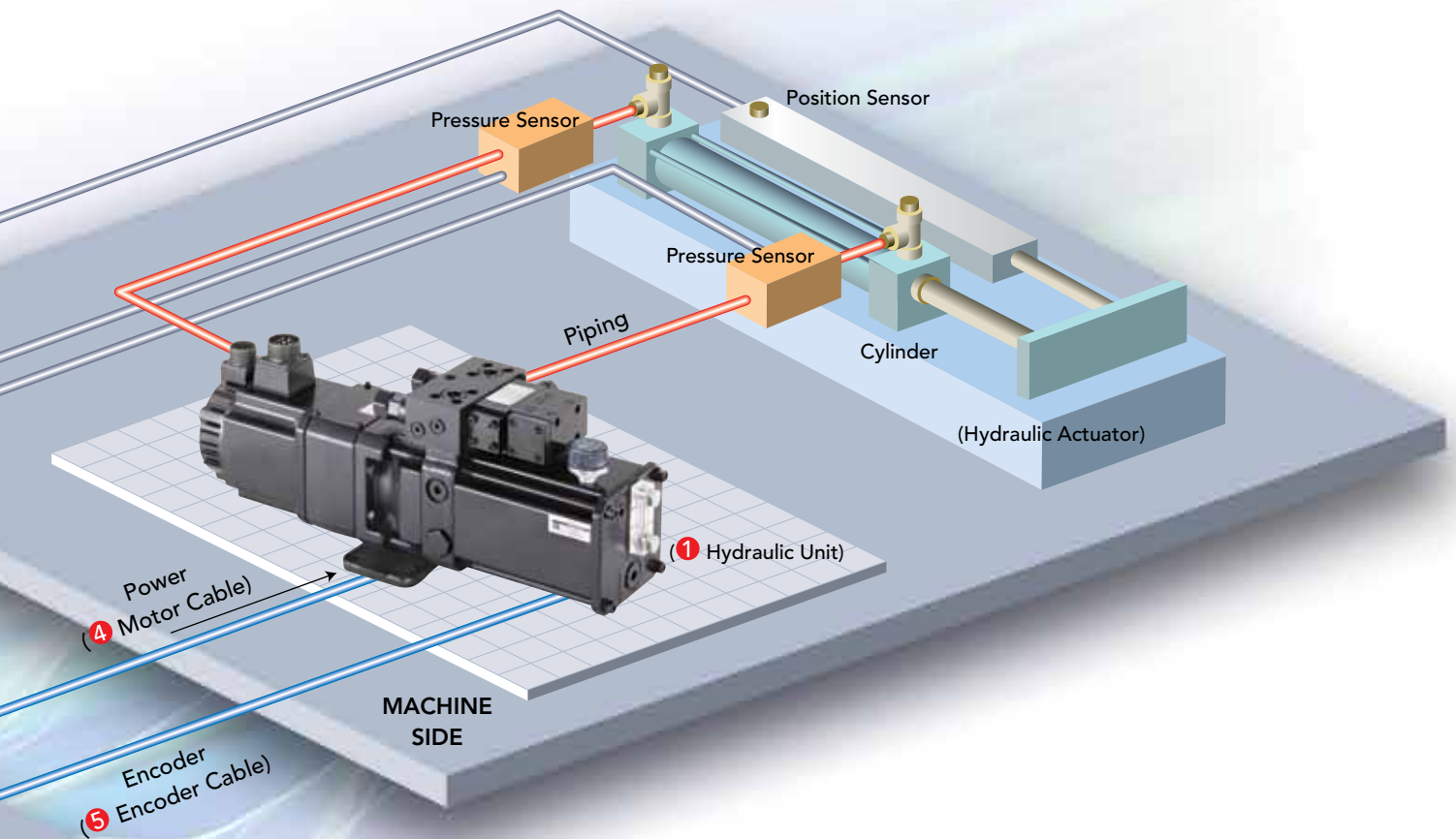
Reversing the motor brings hydraulic fluid to the rod side of the cylinder and pushes the cylinder down.

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)

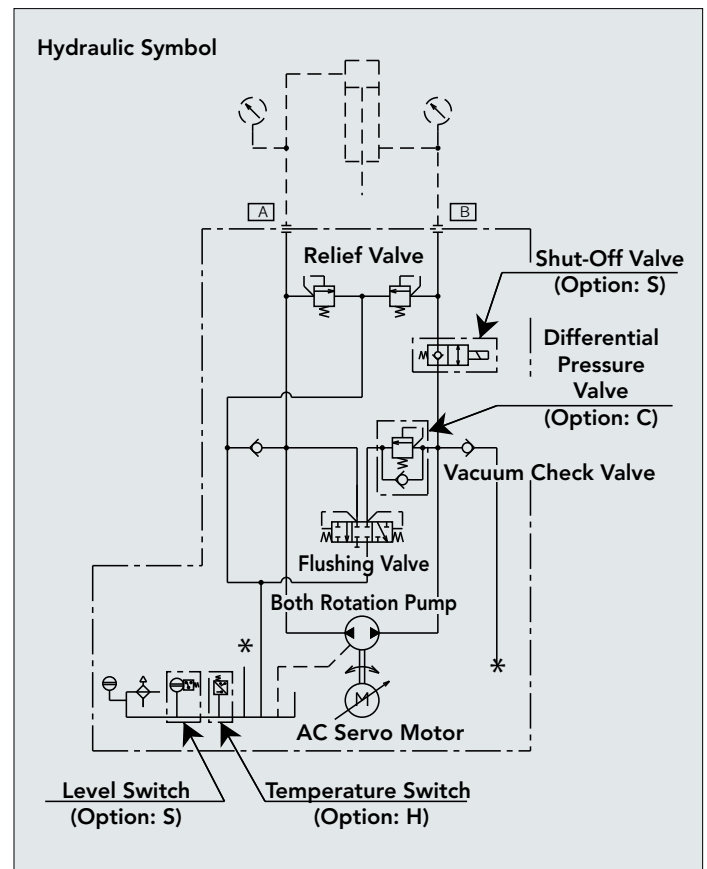
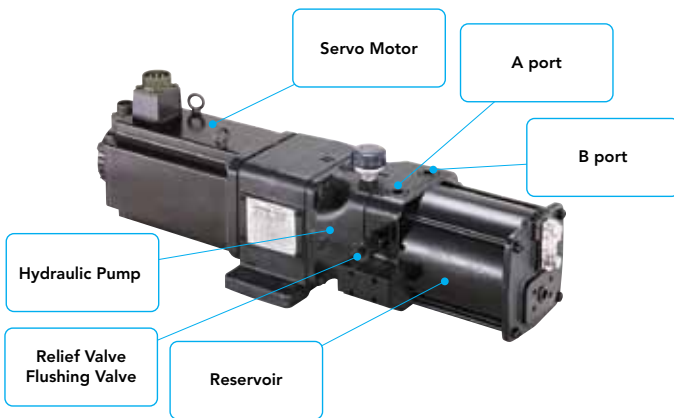
► Hydraulic Unit (UPS)

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

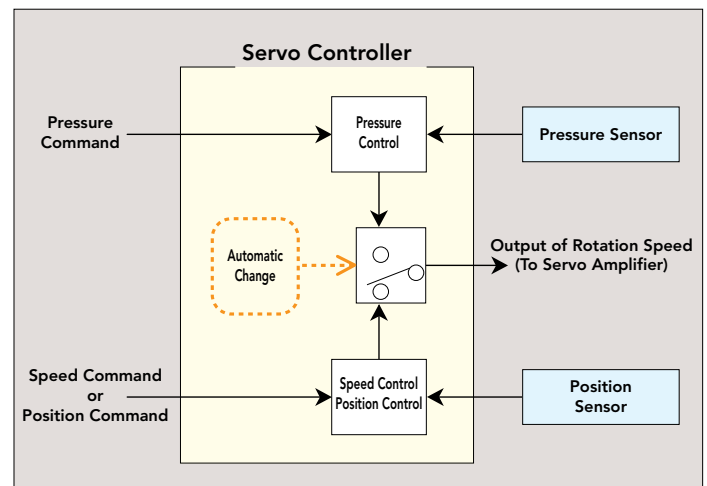


► Servo Controller (EPD)

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.

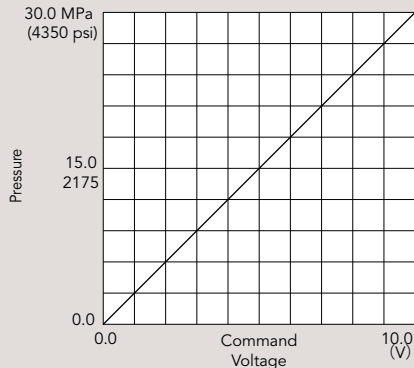


► Servo Amplifier (EPA)

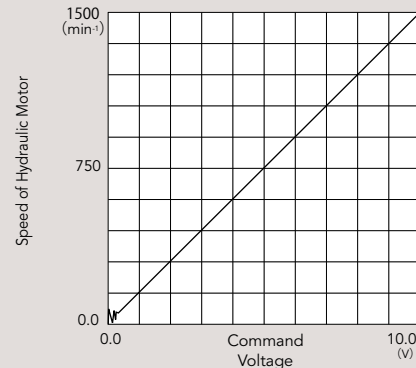
The servo amplifier communicates with the servo motor. The pump is driven according to command of rotation speed from servo controller.

Reference Data

■ Pressure: Pressure Command Voltage - Pressure Characteristic (0-100%) ■ Speed: Speed Command Voltage- Speed Characteristic (0-100%)

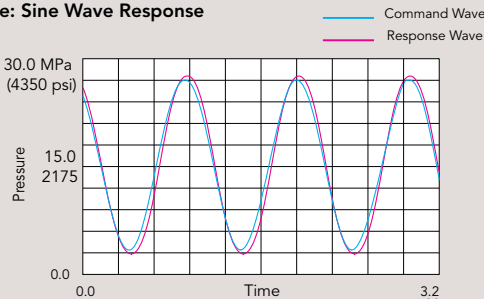


30MPa (4350 psi) at 10V Minimum Pressure: 0.15 MPa (22 psi)
Command of 0V→10V→0V Maximum Pressure: 30 MPa (4350 psi)



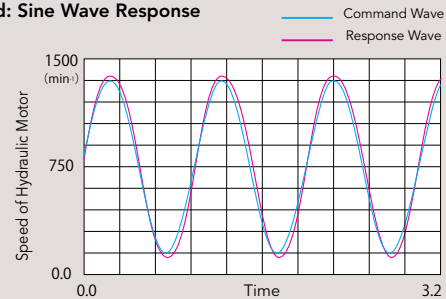
1500 min⁻¹ at 10V Minimum Speed: 50 min⁻¹
Command of 0V→10V→0V Maximum Speed: 1500 min⁻¹
(In case of oil motor as actuator)

■ Pressure: Sine Wave Response



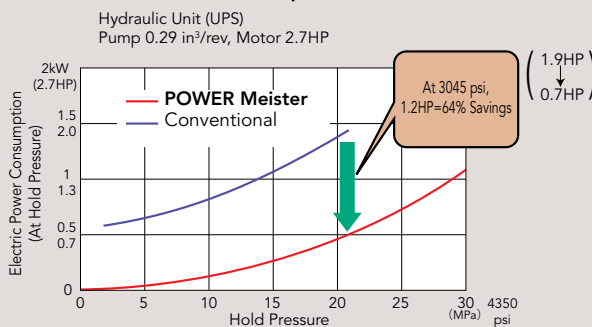
Sine Wave of 1HZ Command
Range of Wave 10-90%

■ Speed: Sine Wave Response



Sine Wave of 1HZ Command
Range of Wave 10-90%
(In case of oil motor as actuator)

■ Hold Pressure: Electric Power Consumption Characteristic



Ref. 2.2kW unipump (variable piston pump)
Consumption at full cut off (N=1.800 min⁻¹)

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.

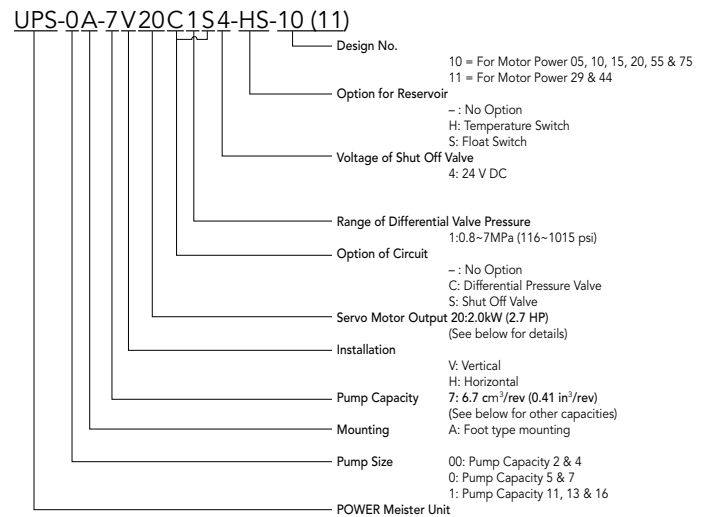
Other Applications

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 cm ³ /rev) (0.12~0.96 in ³ /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 mm ² /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

▶ Model Code



■ UPS-00A

Model	Motor Output kW (HP)	Volume cm ³ /rev (in ³ /rev)	Max Rotational Speed min ⁻¹ (Note 1)	Max Flow ℓ/min (Note 2) (GPM)	Rated Pressure MPa (Note 3) (psi)	Max Operation Pressure MPa (Note 4) (psi)	Reservoir Lit. (Gallon)	Allowable Flow Change Lit. (Gallon)
UPS-00A-2*05	0.5 (0.7)	2.0 (0.12)	3000	6.0 (1.59)	6.7 (972)	10.0 (1450)	V : 1.9 (.50)	V : 0.6 (0.15)
UPS-00A-4*05		4.0 (0.24)		12.0 (3.17)	3.3 (479)	5.0 (725)	H : 1.5 (.40)	H : 0.3 (0.11)
UPS-00A-2*10	1.0 (1.3)	2.0 (0.12)	3000	6.0 (1.59)	13.4 (1943)	20.0 (2900)	V : 1.9 (.50)	V : 0.6 (0.15)
UPS-00A-4*10		4.0 (0.24)		12.0 (3.17)	6.7 (972)	10.0 (1450)	H : 1.5 (.40)	H : 0.3 (0.11)
UPS-00A-2*15	1.5 (2.0)	2.0 (0.12)	3000	6.0 (1.59)	20.0 (2900)	30.0 (4350)	V : 1.9 (.50)	V : 0.6 (0.15)
UPS-00A-4*15		4.0 (0.24)		12.0 (3.17)	10.0 (1450)	15.0 (2175)	H : 1.5 (.40)	H : 0.3 (0.11)
UPS-00A-2*20	2.0 (2.7)	2.0 (0.12)	3000	6.0 (1.59)	25.4 (3683)	30.0 (4350)	V : 1.9 (.50)	V : 0.6 (0.15)
UPS-00A-4*20		4.0 (0.24)		12.0 (3.17)	12.7 (1842)	19.0 (2755)	H : 1.5 (.40)	H : 0.3 (0.11)

■ UPS-0A

Model	Motor Output kW (HP)	Volume cm ³ /rev (in ³ /rev)	Max Rotational Speed min ⁻¹ (Note 1)	Max Flow ℓ/min (Note 2) (GPM)	Rated Pressure Cont. MPa (Note 3) (psi)	Max Operation Pressure Short Time MPa (Note 4) (psi)	Reservoir Lit. (Gallon)	Allowable Flow Change Lit. (Gallon)
UPS-0A-5*20	2.0 (2.7)	4.7 (0.29)	2500	11.7 (3.10)	11.2 (1624)	16.8 (2436)	3.0 (0.80)	V : 0.6 (0.15)
UPS-0A-7*20		6.7 (0.41)		16.7 (4.42)	8.0 (1160)	11.9 (1726)		H : 0.4 (0.11)

■ UPS-1A

Model	Motor Output kW (HP)	Volume cm ³ /rev (in ³ /rev)	Max Rotational Speed min ⁻¹ (Note 1)	Max Flow ℓ/min (Note 2) (GPM)	Rated Pressure MPa (Note 3) (psi)	Max Operation Pressure MPa (Note 4) (psi)	Reservoir Lit. (Gallon)	Allowable Flow Change Lit. (Gallon)
UPS-1A-11*29	2.9 (3.9)	11.0 (0.67)	2500	27.5 (7.28)	9.5 (1378)	14.3 (2073)	4.5 (1.20)	V : 1.2 (0.32)
UPS-1A-13*29		12.9 (0.79)		32.2 (8.52)	8.1 (1175)	12.2 (1769)		H : 0.6 (0.16)
UPS-1A-16*29		15.8 (0.96)		39.5 (10.45)	6.6 (957)	10.0 (1450)		
UPS-1A-11*44	4.4 (5.9)	11.0 (0.67)	2500	27.5 (7.28)	14.6 (2117)	21.8 (3161)	4.5 (1.20)	V : 1.2 (0.32)
UPS-1A-13*44		12.9 (0.79)		32.2 (8.52)	12.4 (1798)	18.6 (2697)		H : 0.6 (0.16)
UPS-1A-16*44		15.8 (0.96)		39.5 (10.45)	10.1 (1465)	15.2 (2204)		
UPS-1A-11*55	5.5 (7.4)	11.0 (0.67)	2500	27.5 (7.28)	17.9 (2596)	26.9 (3900)	4.5 (1.20)	V : 1.2 (0.32)
UPS-1A-13*55		12.9 (0.79)		32.2 (8.52)	15.3 (2219)	22.9 (3320)		H : 0.6 (0.16)
UPS-1A-16*55		15.8 (0.96)		39.5 (10.45)	12.5 (1813)	18.7 (2711)		
UPS-1A-11*75	7.5 (10.0)	11.0 (0.67)	2500	27.5 (7.28)	24.6 (3567)	30.0 (4350)	4.5 (1.20)	V : 1.2 (0.32)
UPS-1A-13*75		12.9 (0.79)		32.2 (8.52)	21.0 (3045)	30.0 (4350)		H : 0.6 (0.16)
UPS-1A-16*75		15.8 (0.96)		39.5 (10.45)	17.1 (2480)	25.7 (3727)		

(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.

Contact NACHI for more information.

If your application requires long-term, continuous pressurized operation, please contact NACHI.

(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

Model: EPD-PD3-10 -D2-20

Source Voltage/ Consumption		DC24V±15% / Under 10W is needed	Separate power supply for sensor
Ambient Temperature/ Humidity		0~+55°C (32~131°F) / Under 90% RH	
Control		Control of position, speed and pressure for cylinder	Automatic change function of control mode
Command Input	Speed Command	Analog voltage DC±10V/Max cylinder speed (*1) Expand cylinder by + voltage, contract by - voltage	(*1) Set by parameter
	Pressure Command	Analog voltage DC±10V/Max pressure (*2) Pressure head side by + voltage, pressure rod side by - voltage	(*2) Set by trimmer
	Position Command	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. Keep position.	Set target position, max speed and accelerated and decelerated speed in inside parameter in advance.
Input Signal (Contact Signal)		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.	
Output Signal		Alarm, servo ready, control mode monitor, reference print search complete/in position (with output), correspond with pressure	
Pressure Sensor Input		Analog voltage 0.5~4.5V or 1~5V (2ch)	Use pressure sensor with responsiveness under 1ms
Position Sensor Input		90°C phase difference (2 phase). Reference position pulse (line receiver input) or analog voltage 0~10V.	If using position sensor for pulse output, necessary to do original point search after power-up. • Position sensor for pulse output: Under 1µm of resolution. • Position sensor for analog voltage output: Under 2ms responsiveness.
Servo Amplifier Signal I/F		Output: Motor rotation speed command (Analog voltage DC±10V). Servo ON. Servo alarm reset. Input: Servo alarm, servo ready.	Resolving power
Operation Panel		5 digit indicator, 4-key input, selector switch.	Set and indication of data, trial operation function

Connector and pin to connect controller are attached.

▶ Servo Amplifier Specifications

Hydraulic Unit (UPS)	Motor Output kW (HP)	Servo Amplifier	Note
UPS-00A- * $\frac{1}{2}$ 05	0.5 (0.7)	EPA-PD1-10-R050-8647B	Built-in regenerative resistor, attached connector for wiring
UPS-00A- * $\frac{1}{2}$ 10	1.0 (1.3)	EPA-PD1-10-R100-8647B	Built-in regenerative resistor, attached connector for wiring
UPS-00A- * $\frac{1}{2}$ 15	1.5 (2.0)	EPA-PD1-10-R150-8647B	Built-in regenerative resistor, attached connector for wiring
UPS-00A- * $\frac{1}{2}$ 20	2.0 (2.7)	EPA-PD1-10-R200-8647B	Built-in regenerative resistor, attached connector for wiring
UPS-0A- * $\frac{1}{2}$ 20	2.0 (2.7)	EPA-PD1-10-R200-8647B	Built-in regenerative resistor, attached connector for wiring
UPS-1A- * * $\frac{1}{2}$ 29	2.9 (3.9)	EPA-PD1-10-YV290-8647B	Built-in regenerative resistor (cable connector not included)
UPS-1A- * * $\frac{1}{2}$ 44	4.4 (5.9)	EPA-PD1-10-YV440-8647B	Built-in regenerative resistor (cable connector not included)
UPS-1A- * * $\frac{1}{2}$ 55	5.5 (7.4)	EPA-PD1-10-R550-8647B	Built-in regenerative resistor, attached connector for wiring
UPS-1A- * * $\frac{1}{2}$ 75	7.5 (10.0)	EPA-PD1-10-R750-8647B	External regenerative resistor, attached connector for wiring

(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

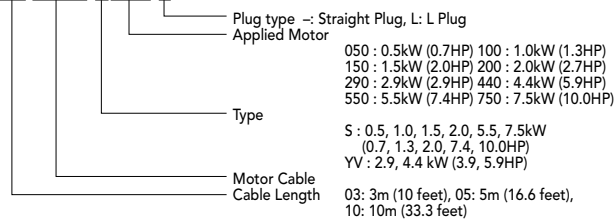
Using this spacer, installation is same as
with old type controller.

EPD-PD2-10(-A)-D2-10

▶ Cable Kit Specifications

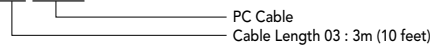
■ Motor Cable Kits

JAQ-05 ACM-S200-L-8649



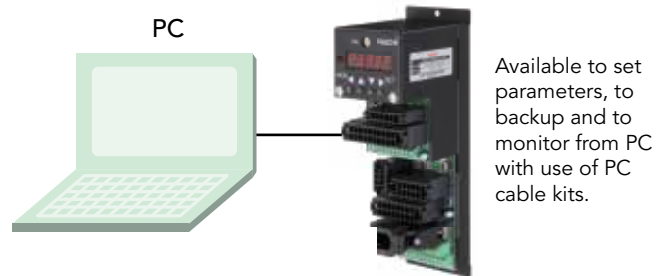
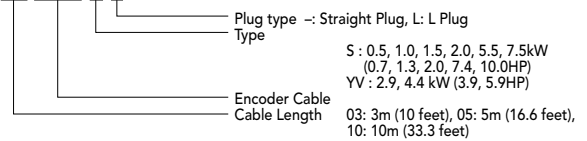
■ PC Cable Kits

JAQ-03 PMC-8654A



■ Encoder Cable Kits

JAQ-05 ACE-S-L-8648

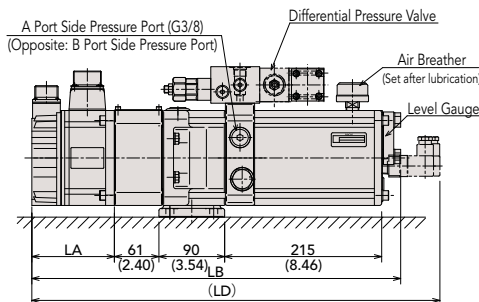
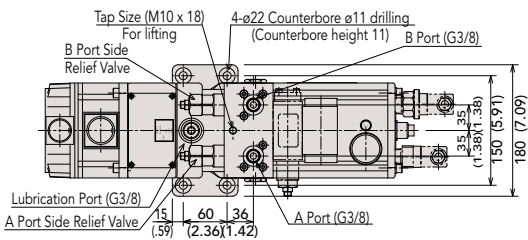


▶ Installation Dimensions

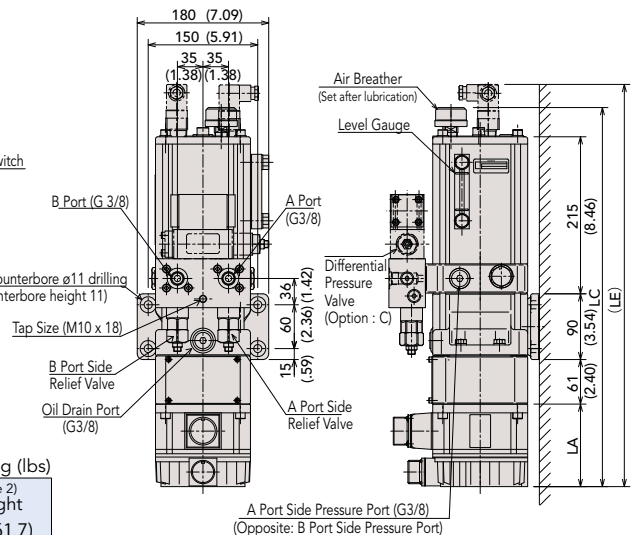
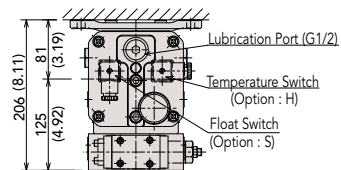
■ UPS-00A Series

Option : Without option S (Shut Off Valve)

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



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



mm (inch) / kg (lbs)

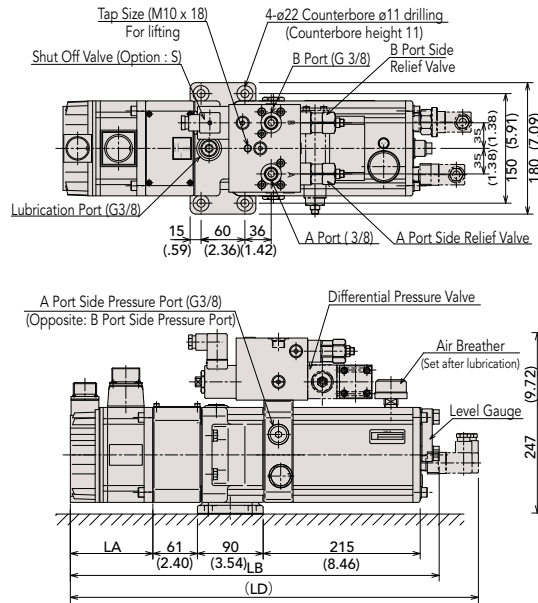
UPS Model	LA	LB	LC	LD	LE	(Note 2) Weight
UPS-00A-* $\sqrt{05}$	113 (4.45)	505 (19.88)	519 (20.43)	559 (20.01)	551 (21.69)	28 (61.7)
UPS-00A-* $\sqrt{10}$	133 (5.24)	525 (20.67)	539 (21.22)	579 (22.80)	571 (22.48)	30 (66.2)
UPS-00A-* $\sqrt{15}$	152 (5.98)	544 (21.42)	558 (21.97)	598 (23.54)	590 (23.23)	31 (68.4)
UPS-00A-* $\sqrt{20}$	171 (6.73)	563 (22.17)	577 (21.93)	617 (24.29)	609 (23.98)	33 (72.8)

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

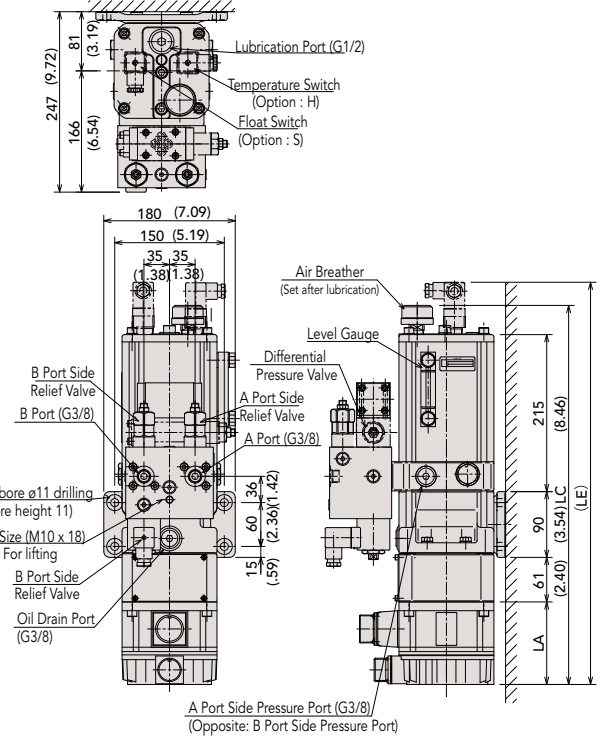
(Note 2) Does not include circuit or tank options or weight of hydraulic fluid.

(Note 3) Install the air breather face up.

Option : With option S (Shut Off Valve)
UPS-00A-*H**S4 (Horizontal type)**

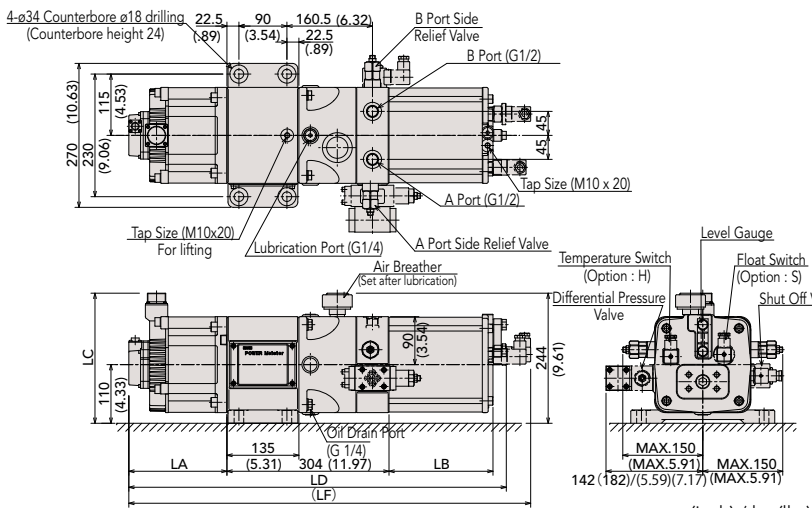


UPS-00A-*V**S4 (Vertical type)**

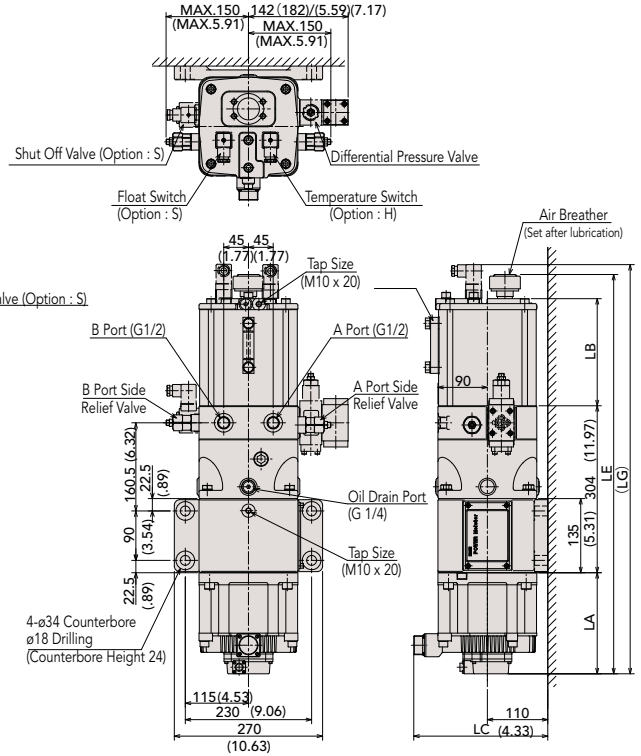


UPS-0A/1A Series

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



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



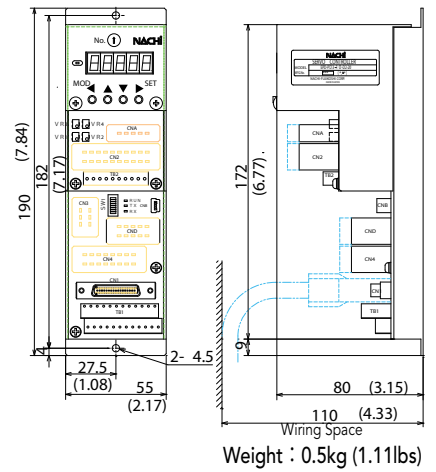
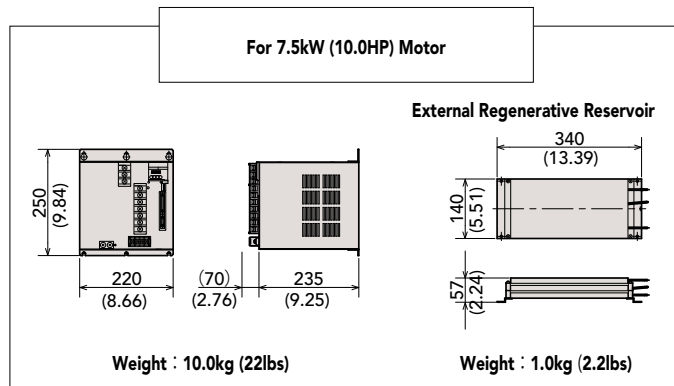
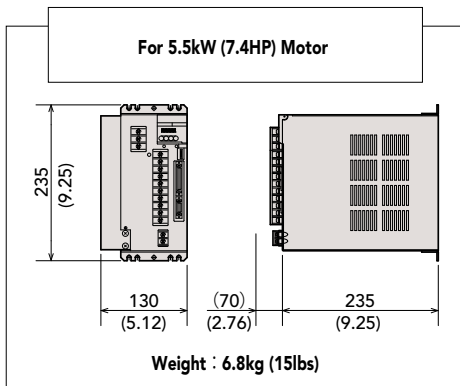
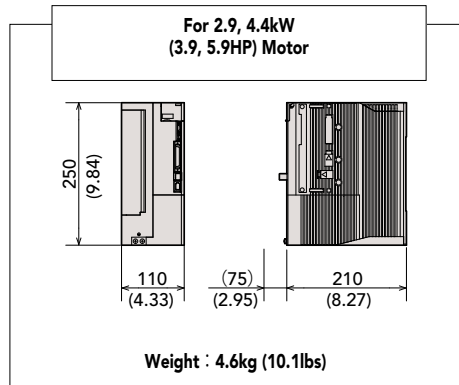
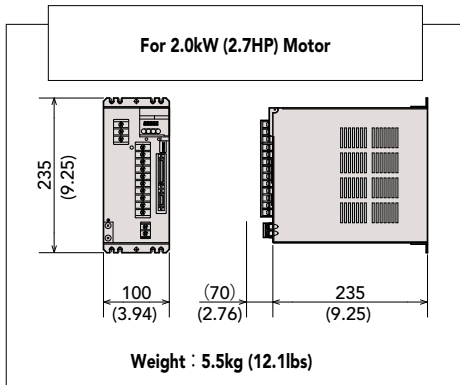
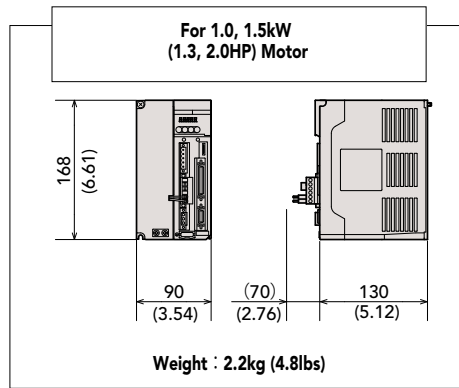
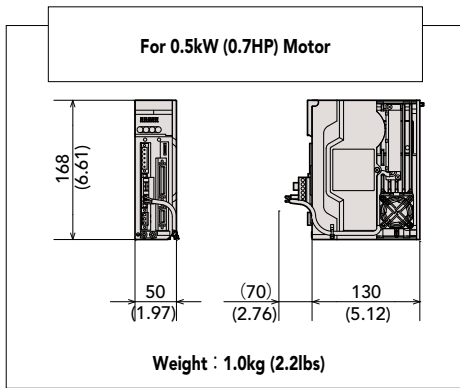
mm (inch) / kg (lbs)

UPS	L A	L B	LC	LD	LE	LF	LG	(Note 2) Weight
UPS-0A- * $\frac{1}{2}$ 20	171 (6.73)	120 (4.72)	229 (9.01)	620 (24.40)	639 (25.15)	666 (26.22)	657 (25.86)	52 (114.7)
UPS-1A- * $\frac{1}{4}$ 29	160 (6.29)		244 (9.60)	684 (26.92)	703 (27.67)	730 (28.74)	721 (28.38)	58 (127.9)
UPS-1A- * $\frac{3}{8}$ 44	184 (7.24)	195 (7.67)		708 (27.87)	727 (28.62)	754 (29.68)	745 (29.33)	62 (136.7)
UPS-1A- * $\frac{1}{2}$ 55	267 (10.51)		276 (10.86)	791 (31.14)	810 (31.88)	837 (32.95)	828 (32.59)	76 (174.2)
UPS-1A- * $\frac{3}{4}$ 75	332 (13.07)			856 (33.70)	875 (34.44)	902 (35.51)	893 (35.15)	87 (191.8)

(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.

■ Servo Amplifier

■ Servo Controller
EPD-PD3-10-D2-20



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