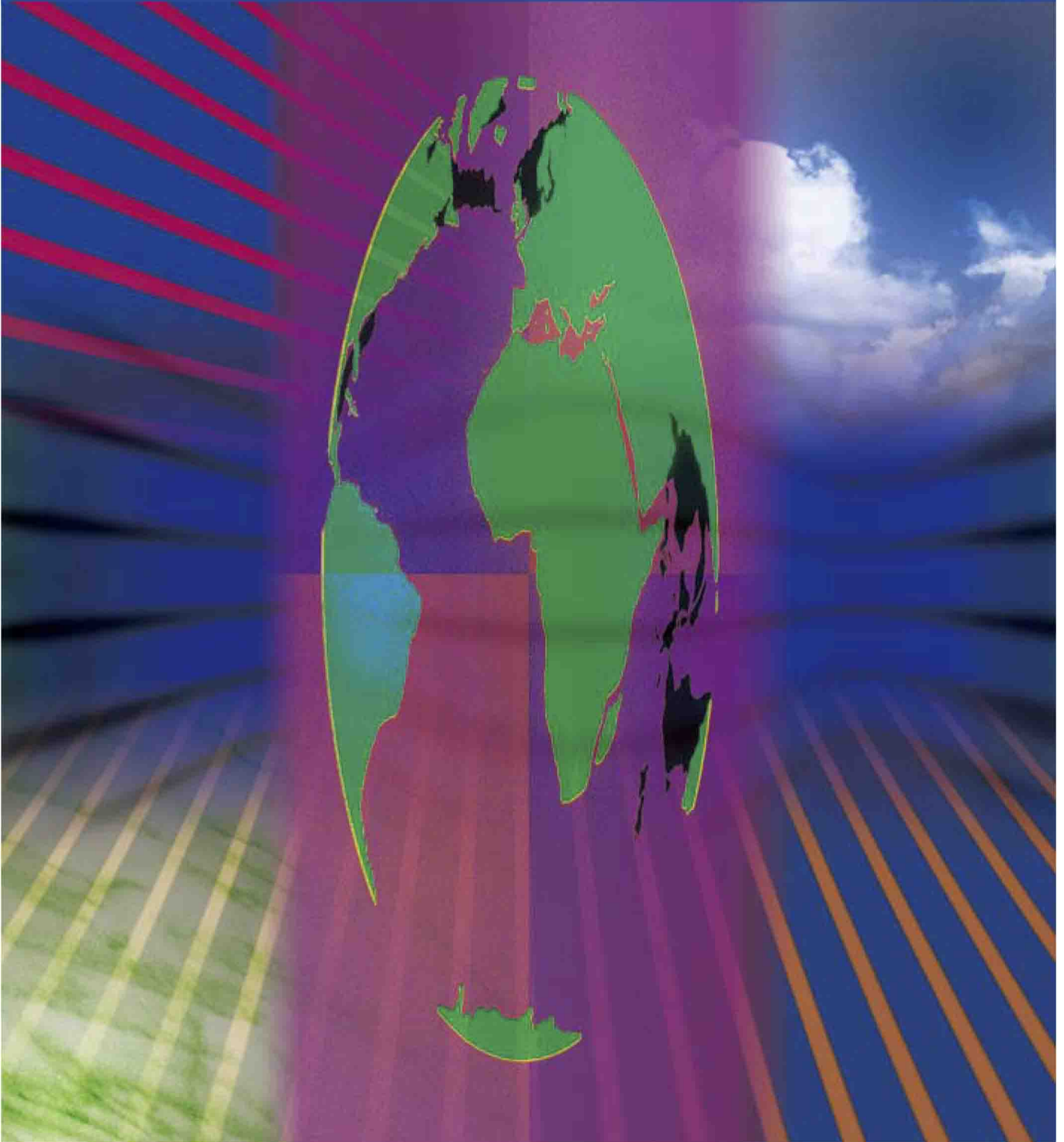


# Hydraulic Equipment



**YUKEN KOGYO CO., LTD.**

# YUKEN PRODUCTS FOR EVERY NEED

As a specialized manufacturer of hydraulic equipment, Yuken is trying hard to meet our customers' various requirements with a continuous effort to develop new products and improve the existing products.

This catalogue is compiled to introduce the line-up of Yuken's products.

It does not represent detailed technical information such as dimensions, specifications and characteristics of each and every product Yuken manufactures. If you require such information, please contact us or ask our sales representative for the "Engineering Information Catalogue" or "Product Catalogue" which are prepared separately.



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Fukuroda Factory

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Friendly, Intelligent, Powerful

# Piston Pumps

## ARL1 Series Variable Displacement Piston Pumps

The ARL1 series piston pumps are compact, low noise, and high efficiency pressure compensator type piston pumps based on the proven technology and reliability of Yuken's "A series/AR series" piston pumps. These pumps cover the small displacement range from 6.2 to 16.3 cm<sup>3</sup> /rev.



## AR Series Variable Displacement Piston Pumps

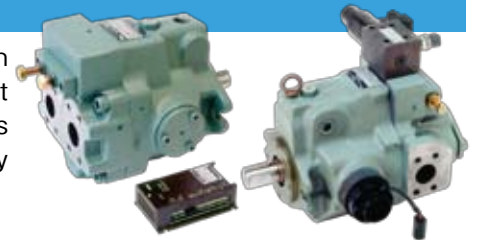
These AR series pumps have been developed on the basis of the same design concept as A series pumps which are renowned for high efficiency and low noise level.

Using an aluminum body, the size of the pump is more compact and the mass is considerably reduced. The noise level has also been reduced.



## A Series Variable Displacement Piston Pumps

The A series variable displacement piston pumps are high efficiency swash plate type piston pumps developed using Yuken's unique technology to meet customers' needs for energy efficient and low noise solutions. These pumps support a wide variety of displacement sizes and control types and are widely used in various hydraulic systems.



## A3H Series Variable Displacement Piston Pumps

These A3H Series variable displacement piston pump offer high pressure, high efficiency, high speed and low noise features. This pump series has been developed using Yuken's unique design concept and cumulative technologies.

They are suitable for use with construction machinery and various industrial machinery ranging from presses to injection moulding machines.



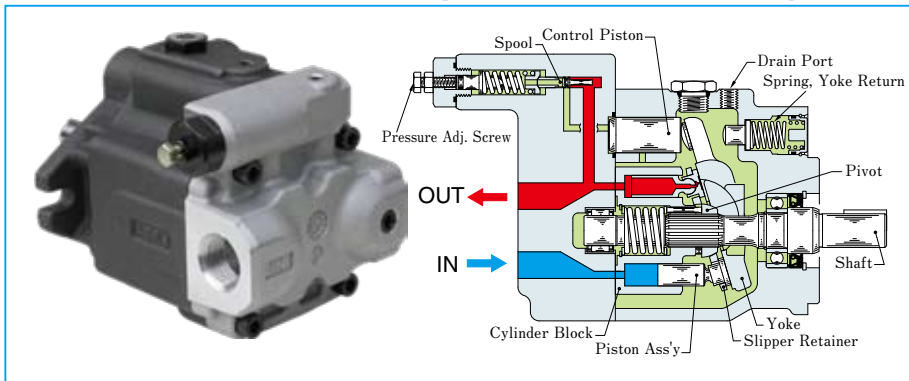
## A7H Series Variable Displacement Piston Pumps

The A7H series variable displacement piston pumps offer a displacement of 180,270 cm<sup>3</sup>/rev with a rated pressure of 35 MPa and a maximum pressure of 40 MPa, supporting high pressure / high flow applications. The non-drive side of these pumps can be connected to an additional pump with SAE connection to provide a combined pump.



Pump Type	Maximum Operating Pressure MPa	Geometric Displacement cm <sup>3</sup> /rev														
		1	2	5	10	20	50	100	200	300						
"ARL1" Series Piston Pumps	7			ARL1-6	ARL1-8	ARL1-12	ARL1-16									
"AR" Series Variable Displacement Piston Pumps	16				AR16	AR22										
"A" Series Variable Displacement Piston Pumps	21		A10													
		A16														
	16				A22											
	21				A37	A45	A56									
		A70														
	28							A90	A100	A145	A220					
Double Pumps	28			A16	A22	A37	A56							Inboard Pump (Driven End)		
Variable / Fixed Double Pumps	28			A16	A22	A37	A56	A70	A90	A145				Inboard Pump (Driven End)		
"A3H" Series Variable Displacement Piston Pumps	35				A3H16	A3H37	A3H56	A3H71	A3H100	A3H145	A3H180					
"A7H" Series Variable Displacement Piston Pumps	40									A7H180				A7H265		

## “ARL1” Series Variable Displacement Piston Pumps



### Control Type

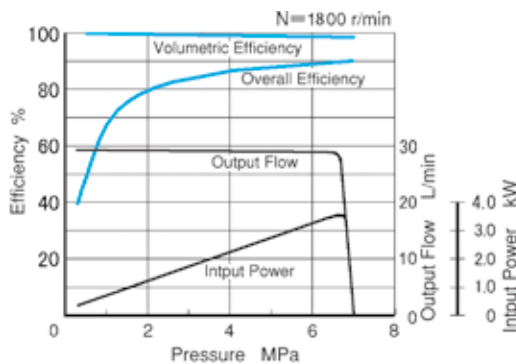
Control Type	Graphic Symbols
“01” Pressure Compensator Type	
	Performance Characteristics

### Features

- Compact size

The “ARL1” series variable displacement piston pumps are designed to offer 40% reduction in weight and capacity and significantly smaller in size and lighter in mass compared with the “AR” series piston pumps.

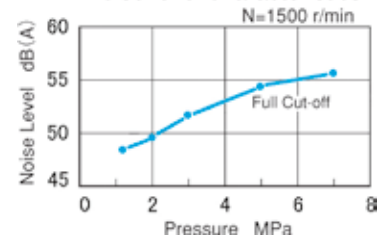
“ARL1-16” type performance characteristics



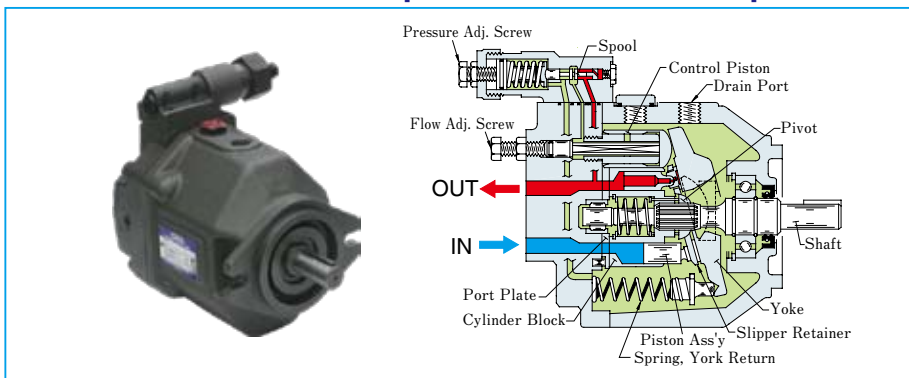
- Low noise level

The noise level of the ARL1 pump is as low as 55dB(A) [at 7MPa full cut-off pressure and 1500r/min] measured one metre horizontally away from the pump head cover.

noise level characteristics



## “AR” Series Variable Displacement Piston Pumps



### Control Type

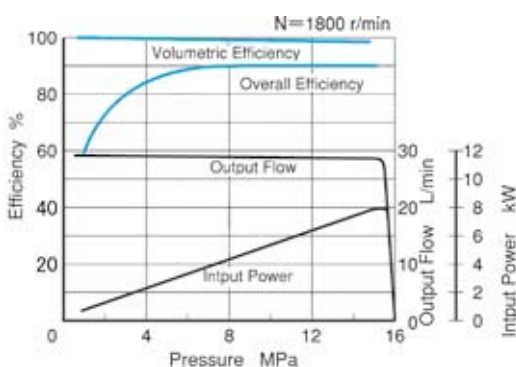
Control Type	Graphic Symbols
“01” Pressure Compensator Type	
	Performance Characteristics

### Features

- High efficiency

At 16MPa loaded pressure and 1800 r/min rotating speed, volumetric efficiency is over 98% and overall efficiency is more than 90%.

“AR16” type performance characteristics

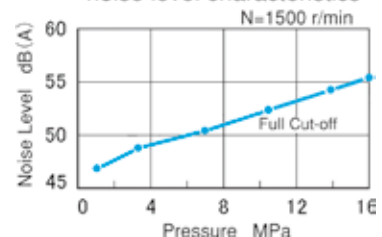


- Low noise level

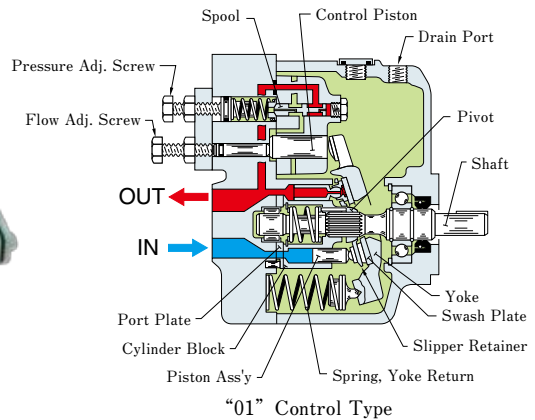
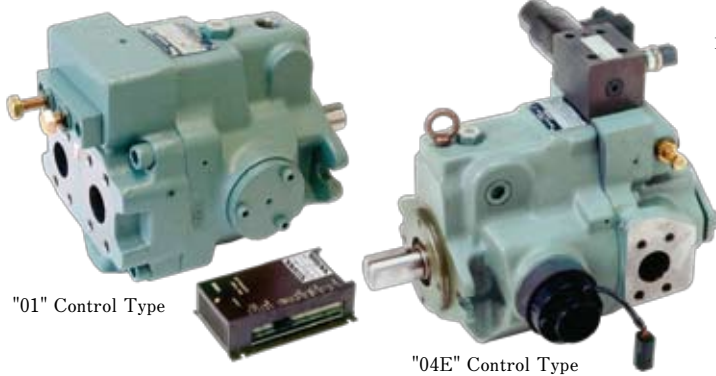
The noise level of the ARL1 pump is as low as 55dB(A) [at 7MPa full cut-off pressure and 1500r/min] measured one metre horizontally away from the pump head cover.

“AR16” type

noise level characteristics



# "A" Series Variable Displacement Piston Pumps

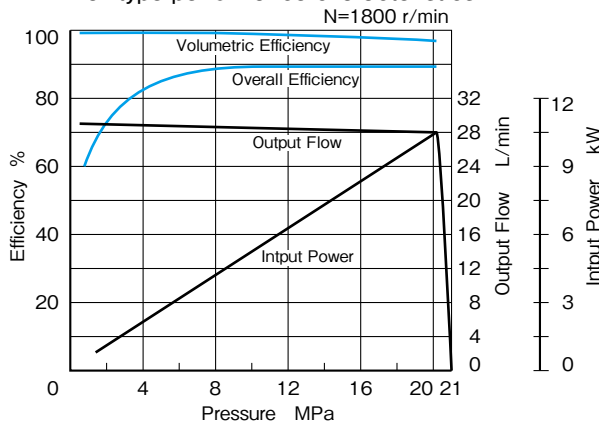


## Features

● High efficiency

At 16MPa loaded pressure and 1800 r/min rotating speed, volumetric efficiency is over 98% and overall efficiency is more than 90%.

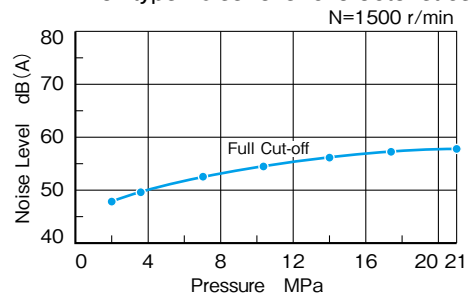
"A16" type performance characteristics



● Low noise level

The noise level of the A16 pump is as low as 57.3dB(A) [at 21MPa full cut-off pressure and 1500r/min] measured one metre horizontally away from the pump head cover.

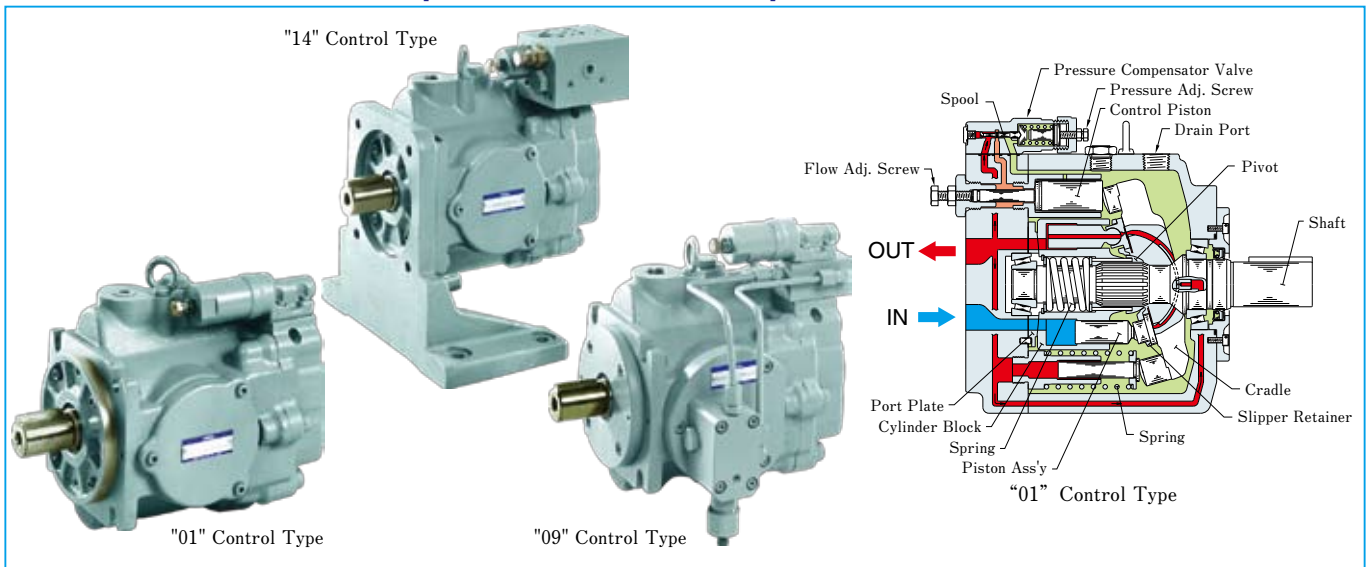
"A16" type noise level characteristics



## Control Type

Control Type	Graphic Symbols	Performance Characteristics	Control Type	Graphic Symbols	Performance Characteristics
"01" Pressure Compensator Type			"05" Two-Pressure Two-Flow Control Type by System Pres.		
"02" Solenoid - two Pressure Control Type			"06" Two-Pressure Two-Flow Control Type with Solenoid Valve		
"03" Pressure Compensator with Unloading Type			"07" Pilot Pressure Control Type Pressure Compensator		
"04" Proportional Electro - Hydraulic Load Sensing Type			"09" Constant Power Control Type		
"04E" Electro - Hydraulic Proportional Pressure & Flow Control Type			Simple Two-Pressure Two-Flow Control Type		
"04EH" Electro - Hydraulic Proportional Pressure & Flow Control Type (OBE Type)					

# "A3H" Series Variable Displacement Piston Pumps

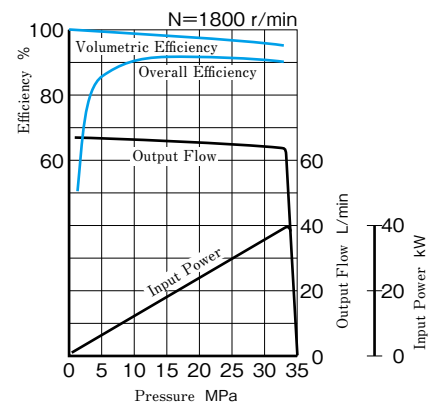


## Control Type

Control Type	Graphic Symbols	Performance Characteristics
"01" Pressure Compensator Type		
"09" Constant Power (Torque) Control Type		
"14" Load Sensing Type		
"55" Simple Two-Pressure Two-Flow Control Type		

## Features

- High performance at maximum pressure 35MPa  
Volumetric efficiency is over 95% and overall efficiency is more than 90% at 1800 r/min.



- Compact size  
A3H series are compact in size because output / mass ratio is large.

## Specifications

Model Numbers	Geometric Displacement cm <sup>3</sup> / rev	Minimum Adj. Flow cm <sup>3</sup> / rev	Operating Pres. MPa		Shaft Speed Range r/min		Mass kg ( 01 Control type )	
			Rated	Intermittent	Max.	Min.	Flange Mtg.	Foot Mtg.
A3H16-※R※KK <sup>(1)</sup>	16.3	8	28	35	3600	600	14.5	23.4
A3H37-※R※KK	37.1	16			2700	600	19.5	27.0
A3H56-※R※KK	56.3	35			2500	600	25.7	33.2
A3H71-※R※KK	70.7	45			2300	600	35.0	42.5
A3H100-※R※KK	100.5	63			2100	600	44.6	72.6
A3H145-※R※KK	145.2	95			1800	600	60.0	88.0
A3H180-※R※KK	180.7	125			1800	600	70.4	98.4

(1) The "A3H16" model does not support the "09" control type.

A through drive type to which a driven pump can be connected is also available. Contact us for details.

# "A7H" Series Variable Displacement Piston Pumps

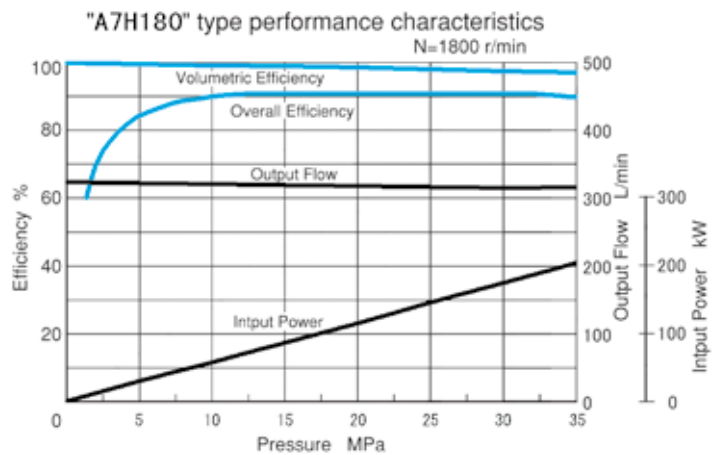


## ■ Features

- **High Pressure–Large Volume Displacement**  
Adding to current A3H series, 180 + 270 cm<sup>3</sup>/rev displacement with rated pres. 35 MPa, Max. pres. 40 MPa pumps are now available.
- **Optional Through Drive**  
Optional through drive allow an auxiliary or outboard pump (SAE Standard) to be directly mounted.
- **Fire-Resistant Fluids**  
Water-Glycols and Polyol Ester Type are applicable under certain condition.
- **High performance at maximum pressure 40 MPa**  
Volumetric efficiency is over 95% and overall efficiency more than 90% at 1800 r/min.

## ■ Control Type

Control Type	Graphic Symbols	Performance Characteristics
"01" Pressure Compensator Type		
"09" Constant Power Control Type		
"09R" Constant Power Control Type with External Pilot		



## ■ Specifications

Series Numbers	Geometric Displacement cm <sup>3</sup> /rev	Operating Pressure MPa		Shaft Speed Range r/min		Temperature Range °C	Viscosity Range mm <sup>2</sup> /s	Approx Mass kg	
		Rated	Intermittent	Rated	Max.			Flange Mtg.	Foot Mtg.
A7H180	180	35	40	1800	1900	-20 - +80	10-1000	150 "01"	220 "01"
								154 "09"	224 "09"
A7H265	270	35	40	1200	1600			220 "01"	310 "01"
								224 "09"	314 "09"

## ■ Specifications for Special Fluids

Type of Fluids	Series Number	Operating Pressure MPa		Shaft Speed Range r/min		Temperature Range °C	Viscosity Range mm <sup>2</sup> /s
		Rated	Intermittent	Rated	Max.		
Water-Glycols	M-A7H180	21	25	1800	1800	10-50	20-1000
	M-A7H265			1200	1200		
Polyol ester Type	P-A7H180	35	40	1800	1900	10-70	10-1000
	P-A7H265			1200	1600		



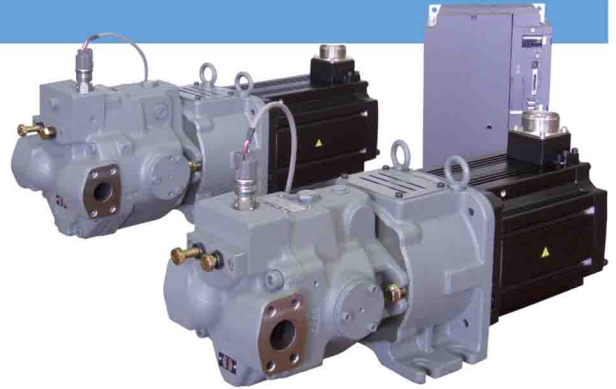
Friendly, Intelligent, Powerful

# AC Servo Motor Driven Pumps

Revolution  
Control System

## ASR Series AC Servo Motor Driven Pumps

The ASR series provides variable flow by driving a piston pump directly with an AC servo motor and controlling the rotational speed in a range from zero to the maximum level. This series allows for precise control of flow / pressure by using a dedicated AMSR controller. It also offers excellent response and repeatability.



## ASE Series AC Servo Motor Driven Pumps

The ASE series pumps inherit the basic concept of the shaft speed control from the ASR series pumps and offer high cost performance. The pumps of this series offer easy shaft speed control for systems that do not require as much precision, response, or repeatability as the ASR series pumps offer. With the output flow and the discharge pressure controlled by a dedicated AMSE controller, precision, response and repeatability of systems using the ASE series pumps have been improved compared with those using conventional variable displacement piston pumps.

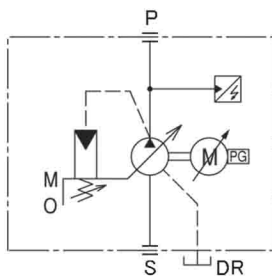


### Specifications

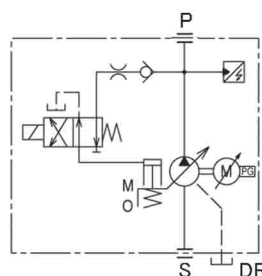
\*) depends on pump displacement

Model	ASR1-C	ASR2-C	ASR3-E, G	ASR5-G, J	ASR10-J, M	ASE3	ASE5	ASE10	ASE15W
Max. Flow L/min	39.5	55.5	92.3	129	200	80.8	132.7	205.4	302
Max. Operating Pres. MPa	21	16	21	21	21	17.5	17.5	17.5	17.5 (21*)
Min. Adj. Pres. MPa	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Motor Output kW	4.5	4.5	6 to 8	8 to 11	11 to 15	11	20	35	35
Mass (Pump + Motor) kg	54	54	80 to 89	94 to 177.5	213 to 233	75	123	190	241.5
Input Signal Voltage	0 to + 10V DC (Max.)								
Monitor Output Voltage	0 to + 10V DC								
Sequence I/O	Photo Coupler Input 8ch/Open Collector Output 6ch					Photo Coupler Input 8ch/Open Collector Output 5ch			
Power Supply	3-Phase AC 200 to 230 V/3-Phase AC 380 to 480 V, 50/60 Hz							3-Phase AC 380 to 480 V 50/60 Hz	

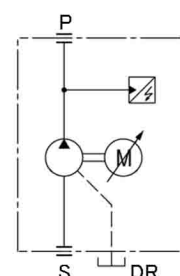
### Graphic Symbols



ASR  
Single Displacement Type

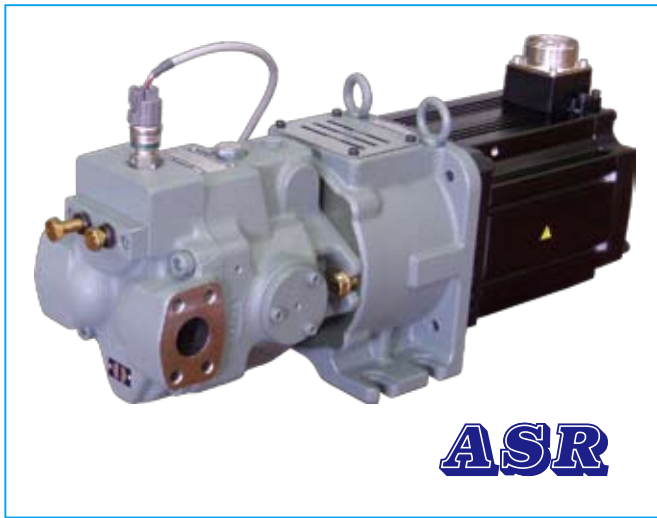


ASR  
Dual Displacement Type



ASE

# “ASR” Series AC Servo Motor Driven Pumps

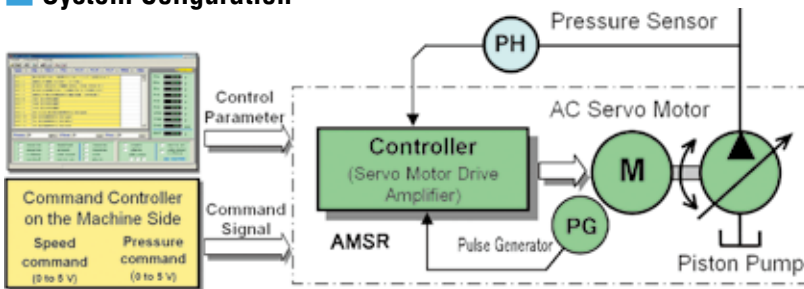


## Features

- **High Performance**  
Special high power servo motor (SPM) and variable displacement piston pump → Improved ultralow speed molding & continuous pressure holding performance and excellent repeatability.
- **High response**  
Ultra precise molding by high response injection with a high-efficiency piston pump.
- **Energy saving**  
Powerconsumption less than half that of hydraulic machines and equivalent to that of full electric machines, with reduced standby power consumption  
→ Dual displacement models allow more compact system designs.
- **Less wiring**  
Wire saving and miswiring prevention through the integration of the controller/driver and the use of special cables.
- **Large flow**

The AMSR controller has a combination function that supports operation with large flow up to 3200 L/min (ASR10 × 16 units).

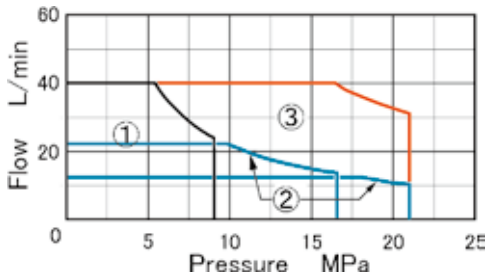
## System Configuration



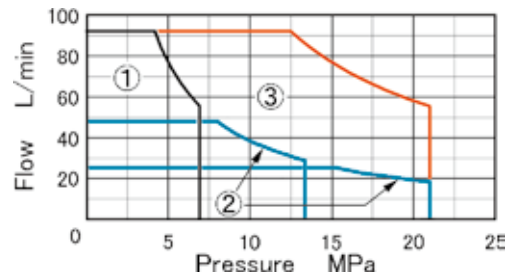
A feedback loop is by the AMSR controller that computes deviations between control signals from the machine side (speed and pressure commands) and sensor signals to drive the AC servo motor accordingly. Control parameters can be set digitally by using dedicated software. The AC servo motor is selected according to the torque and shaft speed required to drive the hydraulic pump. The selection of an appropriate motor for the load condition is important.

## Sample of Pressure–Flow Diagram

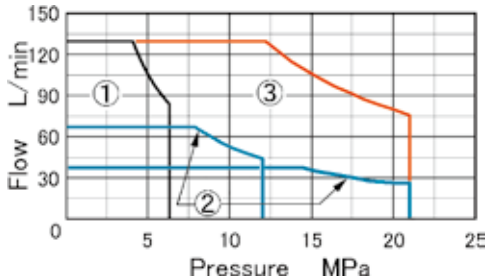
### ASR1-C



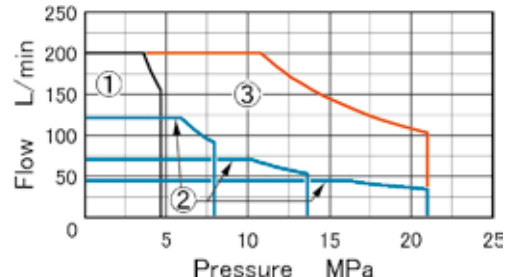
### ASR3-G



### ASR5-J



### ASR10-M

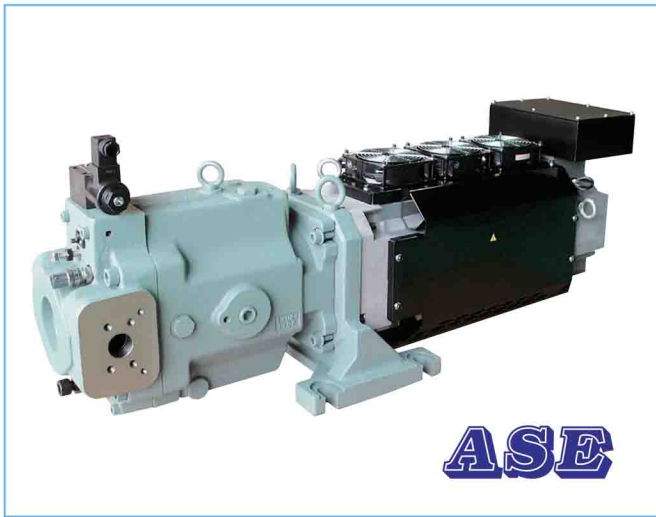


## Model Number Designation

ASR3	—4	G	—H	X	S	A100*1	N*1	—A	00	—11
Series Numbers	Power Supply Voltage	Power Capacity	Max. Operating Pres.	Flow Setting	Port Direction	Coil Type for Solenoid Operated Directional Valve	Electrical Conduit Connection for Solenoid Operated Directional Valve	Function Selection	Parameter Number	Design Number
ASR1	None: AC200V 4: AC400V	C	H: 21 MPa	X: Single Displacement Type W: Dual Displacement Type	S: Side None: Axial	AC A100: AC100V A120: AC120V A200: AC200V A240: AC240V DC None: DC24V D12: DC12V D48: DC48V AC (AC → DC) R100: AC100V R200: AC200V	None: Terminal Box N: Plug-in Connector (Optional)	A: Single B: Combination (Single Operation Allowed)	00: Standard	11
ASR2		C	C: 16 MPa							11
ASR3		E, G	H: 21 MPa							11
ASR5		G, J								11
ASR10		J, M								12

\*1 Apply to only Flow Setting "W".

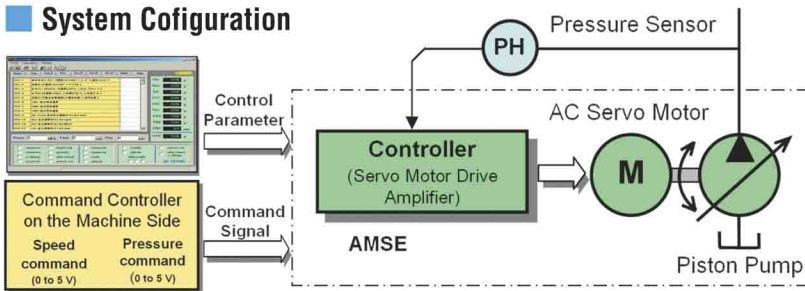
# “ASE” Series AC Servo Motor Driven Pumps



## Features

- Less wiring/high reliability  
Uses sensor-less rotational speed control.
- Space saving/compactness  
Integrated motor pump unit.
- Larger motor output  
(compared with other products in the same flow capacity range)  
Max. motor output is 11 to 35 kW (@ASE15W).
- Easy maintenance  
Adopting a cartridge fan and desorption terminals.
- Reduced electrical noise  
Using environmentally friendly EMC filter.
- Large flow  
Up to 4800 L/min with AMSE combination function and 16 units of ASE15W.

## System Configuration

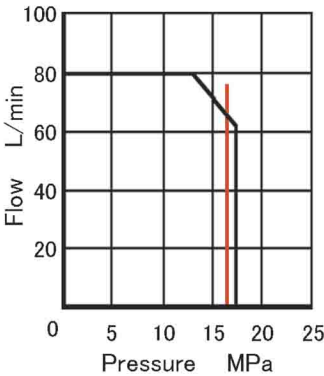


A feedback loop is by the AMSE controller that computes deviations between control signals from the machine side (speed and pressure commands) and sensor signals to drive the AC servo motor accordingly. Control parameters can be set digitally by using dedicated software. The AC servo motor is selected according to the torque and shaft speed required to drive the hydraulic pump. The selection of an appropriate motor for the load condition is important.

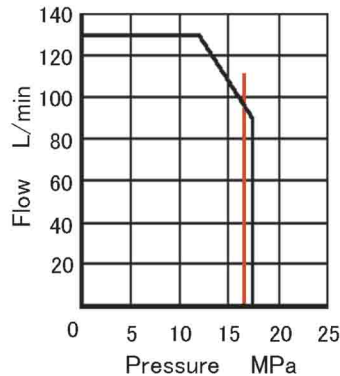
## Sample of Pressure-Flow Diagram

- ① Allowable continuous operating pressure: 11 MPa or less
- ② —Max. continuous operating time: 60 s

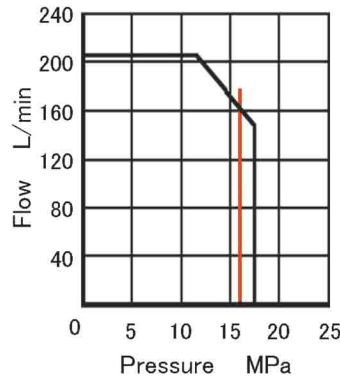
● ASE3-4AA-G80



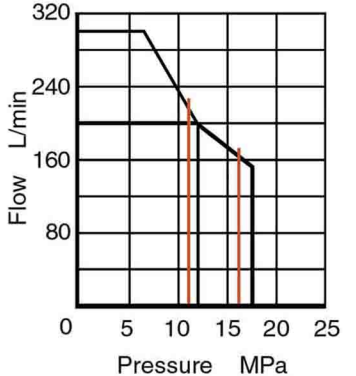
● ASE5-4BZ-G130



● ASE10-4CE-G200



● ASE15W-4CE-G150/100



## Model Number Designation

ASE3	-4	AA	-G	80	S	A100*2	N*2	-A	00	31
Series Numbers	Power Supply	Power Capacity	Max. Operating Pres.	Max. Flow	Port Position	Coil Type for Solenoid Operated Directional Valve	Electrical Conduit Connection for Solenoid Operated Directional Valve	Function Selection	Parameter Number	Design Number
ASE3	None: AC200V 4: AC400V	AA	G: 17.5 MPa	80: 80.8 L/min*1	S: Horizontal B: Vertical	AC A100: AC100V A120: AC120V A200: AC200V A240: AC240V DC None: DC24V D12: DC12V D48: DC48V AC (AC → DC) R100: AC100V R200: AC200V	None: Terminal Box N: Plug-in Connector (Optional)	A: Single B: Combination (Single Use Allowed)	00: Standard	31
ASE5		BZ		130: 132.7 L/min*1						31
ASE10	CE	200: 205.4 L/min*1		21						
ASE15W	4: AC400V	CE		W: User Setting 120/90: Large Flow (Sol OFF) 120 cm <sup>3</sup> /rev Small Flow (Sol ON) 90 cm <sup>3</sup> /rev				B: Combination (Single Use Allowed)	10	

\*1 In case of Max. Operating Revolution.

\*2 Apply to only Series Numbers "ASE15W".

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# Vane Pumps

## PV2R Series Vane Pumps

These pumps have been developed especially for low noise operation. To comply with a wide range of applications including the injection moulding machines, PV2R Series pumps provide a wide range of output flows, from 5.8 to 237cm<sup>3</sup>/rev.



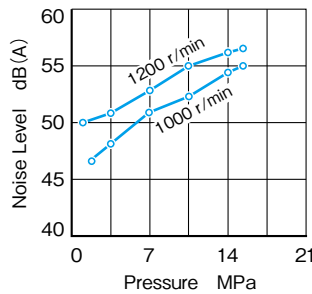
- Model .....PV2R1, PV2R2, PV2R3, PV2R4 and Double Pumps.
- Max. Operating Pressure .....21MPa
- Geometric Displacement .....PV2R1 : 5.8~31/PV2R2 : 41.3~64.7  
PV2R3 : 76.4~115.6/PV2R4 : 136~237cm<sup>3</sup>/rev

### Noise Level

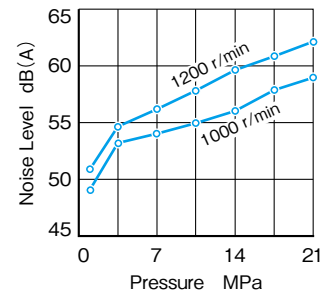
#### ● Measuring condition

- Fluid viscosity : 20mm<sup>2</sup>/s
- Measurement position : One metre horizontally away from pump head cover
- Background noise : 40dB(A)

#### ● PV2R1-31

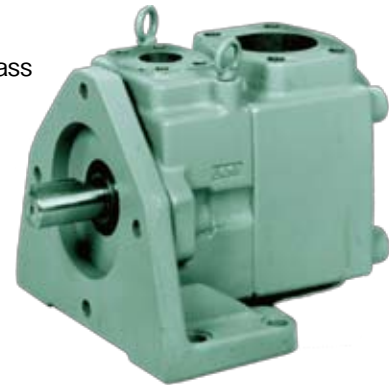


#### ● PV2R2-65



## PV2R4A Series Vane Pumps

These Pumps have been developed to meet space-saving requirements. The pumps have achieved a reduction of 50% in volume and 40% in mass compared to conventional "PV2R4" pumps.



- Model ..... PV2R4A and Duple Pumps
- Max. Operating Pressure ..... 17.2 MPa
- Geometric Displacement ..... 138.5/162.6/194.4 cm<sup>3</sup>/rev

Pump Type	Maximum Operating Pressure MPa	Output Flow L/min at 1200 r/min at No-Load										
		1	2	5	10	20	50	100	200	500	800	
Single Pumps	7					50T	150T					
"PV2R" Series Single Pumps	21					PV2R1	PV2R2	PV2R3	PV2R4			
"PV2R" Series Double Pumps	21			Small Volume		PV2R1	PV2R2	PV2R3				
						Large Volume	PV2R2	PV2R3	PV2R4			
"PV2R4A" Series Single Pumps	17.2									PV2R4A		
"PV2R24A/34A" Series Double Pumps	21					Small Volume	PV2R2	PV2R3				
	17.2									Large Volume	PV2R4A	

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# Pressure Control Valves

Various type of pressure control valves are available, from relief valves to pressure switches, to control the pressure at a desired level in the hydraulic system.



## Low Noise Type Pilot Operated Relief Valves

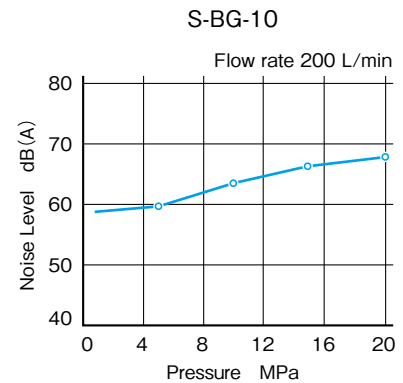
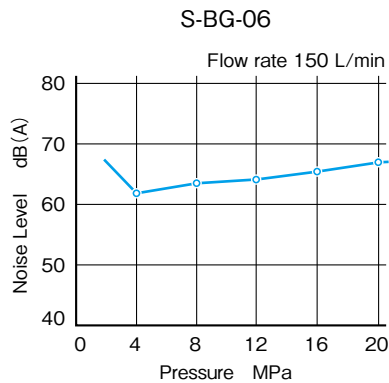
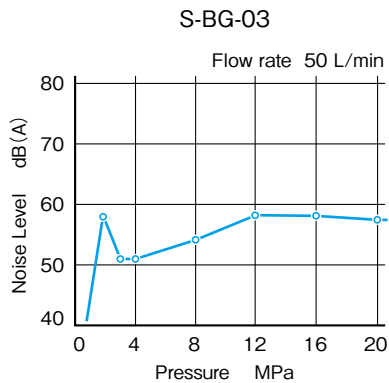
Yuken's pilot operated relief valves here have been particularly developed as low noise type. To protect the pumps and control valves from an excessive pressure, these valves are used to control the pressure in the hydraulic system at a constant level. The remote control and unloading can be done by using the vent circuit.



### Noise Level

#### Measuring condition

- Fluid viscosity : 35mm<sup>2</sup>/s
- Measuring position : At one metre back from the valve front.
- Tank line back pressure : 0.1MPa



Valve Type	Maximum Operating Pressure MPa	Max. Flow L/min															
		1	2	3	5	10	20	30	50	100	200	300	500	1000	2000		
Remote Control Relief Valves	25	DT/DG-01															
Direct Type Relief Valves	21	DT/DG-02															
Pilot Operated Relief Valves	25	BT/BG 03 06 10 16 24															
Low Noise Type Relief Valves	25	S-BG 03 06 10															
Solenoid Controlled Relief Valves	25	BST/BSG 03 06 10 16															
Low Noise Type Sol. Cont. Relief Valves	25	S-BSG 03 06 10															
Brake Valves	25	UBGR 03 06 10															
H/HC Type Pres. Control Valves	21	HT · HG/HCT · HCG 03 06 10 16															
Pres. Reducing & Check Valves	21	RT · RG/RCT · RCG 03 06 10 16															
Pres. Reducing & Relieving Valves	25	RBG 03 06															
Unloading Relief Valves	21	BUCG 03 06 10															
Pressure Switches	35																

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# Flow Control Valves

These valves control the reciprocating and rotating speed of hydraulic actuators. A variety of flow control valves including pressure and/or temperature-compensated flow control valves are available.

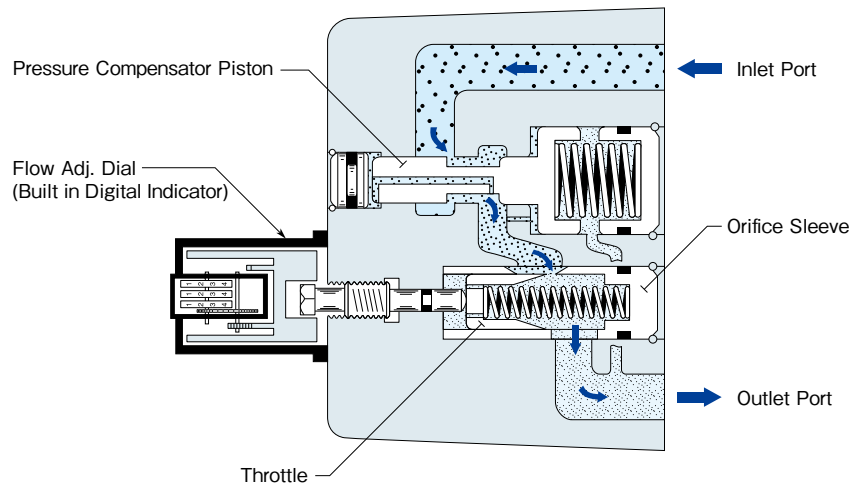


## Flow Control Valves/Flow Control and Check Valves

These valves are pressure and temperature compensating type valves and maintain a constant flow rate independent of changes in system pressure (load) and temperature (viscosity of the fluid). These features allow them to control the speed of the actuator precisely. The valves with an integral check valve allow a controlled flow and reverse free flow. Repeated resetting can be made easily with a digital readout.



### Flow Control Valves



Valve Type	Maximum Operating Pressure MPa	Max. Flow L/min																
		1	2	3	5	10	20	30	50	100	200	300	500	1000	2000	3000	5000	
Flow Control (& Check) Valves	21					01		02		03	06	10						
Flow Control & Relief Valves	25									03	06	10						
Pilot Operated Flow Control Valves	21							02		03	06	10						
Pilot Operated Flow Cont. & Check Valves	21							02		03	06	10						
Restrictors	25							03		06	10	16						(Rated Flow)
One Way Restrictors	25							03		06	10	16						(Rated Flow)
Throttle (& Check) Modules	25							01		03								
Deceleration (& Check) Valves	21							03		06	10							
Feed Control Valves	14							01	03	04								
Needle Valves	35																	

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# Directional Control Valves

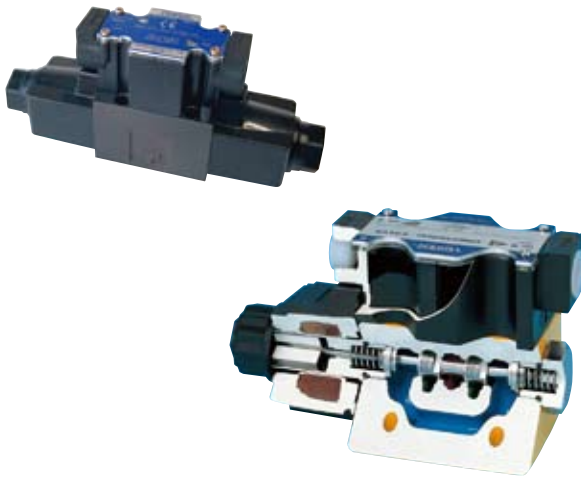
These valves control the flow direction in the hydraulic circuit. The various directional valves ranging from the solenoid operated directional valves to the check valves which conform to JFPS Standard (The Japan Fluid Power Standard) are available to meet the variety in customers' needs.



Valve Type	Maximum Operating Pressure MPa	Max. Flow L/min										
		1	2	5	10	20	50	100	200	500	1000	2000
Solenoid Operated Directional Valves	25	DSG-005/007										
	35	DSG-01										
	31.5	DSG-03										
Solenoid Controlled Pilot Operated Directional Valves	21	DSHG-01										
	25	DSHG-03										
	31.5	DSHG 04 06 10										
	21	DSHF 10 16 24 32 (Rated Flow)										
Shockless Type Proportional Directional and Flow Control Valves	25	EDFG-01										
"G" Series Shockless Type Directional Valves	25	G-DSG 01 03										
		G-DSHG 04 06										
Poppet Type Solenoid Operated Directional Valves	31.5	DSL.G-01										
Multi Purpose Control Valves	25	DSLHG 04 06 10										
Solenoid Operated Poppet Type Two-Way Valves	14	CDS※-03										
Shut-off Type Solenoid Operated Directional Valves	25	DSPC/DSPG 01 03										
Pilot Operated Directional Valves	31.5	DHG 04 06 10										
Manually Operated Directional Valves	21	Threaded connection (DMT) 03 06 10										
	31.5	Sub-plate mounting (DMG) 01 03 04 06 10										
Mechanically Operated Directional Valves	7	Rotary type DR <sup>T</sup> <sub>G</sub> -02										
	25	Cam operated (DC <sup>T</sup> <sub>G</sub> ) 01 03										
Check Valves	25	In-line (CIT) 02 03 06 10 (Rated Flow)										
		Right angle (CRT/CRG) 03 06 10 (Rated Flow)										
		Right angle, Flanged connection (CRF) 10 16 24 (Rated Flow)										
Pilot Controlled Check Valves	25	Threaded connection (CP※T) Sub-plate mounting (CP※G) 03 06 10 (Rated Flow)										
		Flanged connection (CP※F) 10 16 (Rated Flow)										

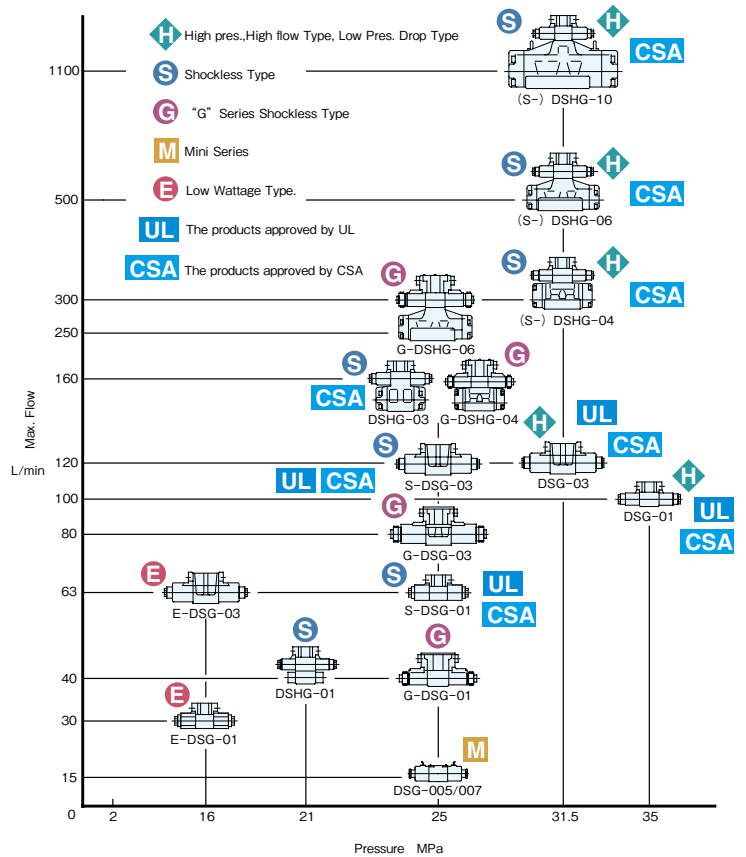
## Solenoid Operated Directional Valves / Solenoid Controlled Pilot Operated Directional Valves

The following is our full range of solenoid operated directional valves and solenoid controlled pilot operated directional valves.



### WIDE RANGE OF MODELS

Choose the optimum valve from a large selection to meet your needs.



## Shockless Type Proportional Directional and Flow Control Valves / Amplifiers

Shockless type proportional and flow control valves have been developed by employing the basic design concept of "G" series solenoid operated directional valves.

The maximum speed of actuators can be controlled optionally as the shockless type directional and flow control valves have maximum flow rate adjustment functions, features which are not available on the "G" series solenoid operated directional valves.

The power amplifiers for use with the shockless type directional and flow control valves have digital setting systems allowing for excellent operational maneuverability and repeatability. They offer two types of slop mode ; "SLOPE CONSTANT" and "TIME CONSTANT", and nine different types of shockless curves (one straight line slope and eight waveforms). The optimum setting can be selected to suit any load condition.

### Shockless Type Proportional Directional and Flow Control Valves

- Model ..... EDFG-01
- Rated Flow ..... 30L / min
- Max. Operating Pres. 25MPa



### Amplifier

- Model ..... AMN-G
- Power Supply ..... DC 24V (20~30V)
- Max. Input Power ..... 35W







## Series Shockless Type Solenoid Operated Directional Valves

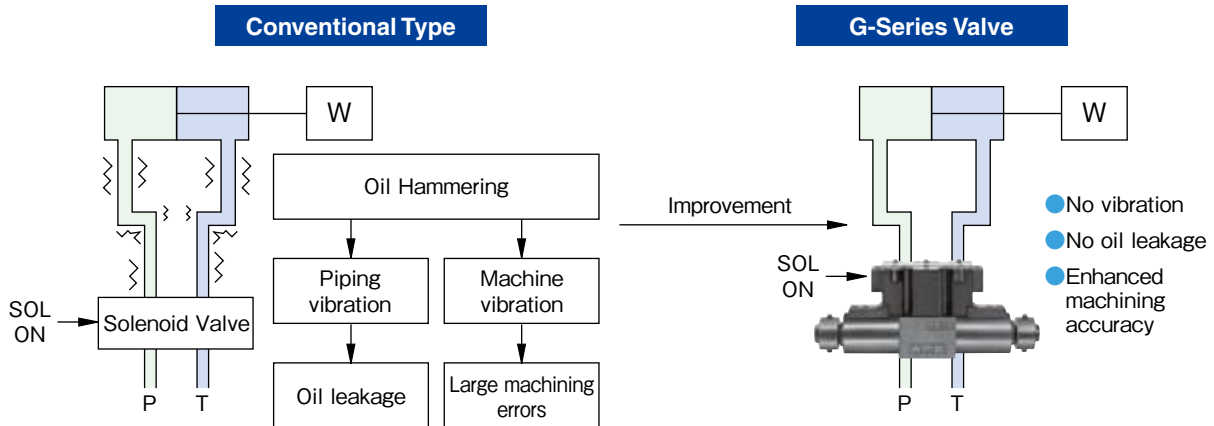
The G series solenoid operated directional valve reduces any shocks that may arise when starting machinery or shifting the spool.

These valves feature less pipe leakage and offer more accurate control and improve the reliability of the machinery on which they are used.

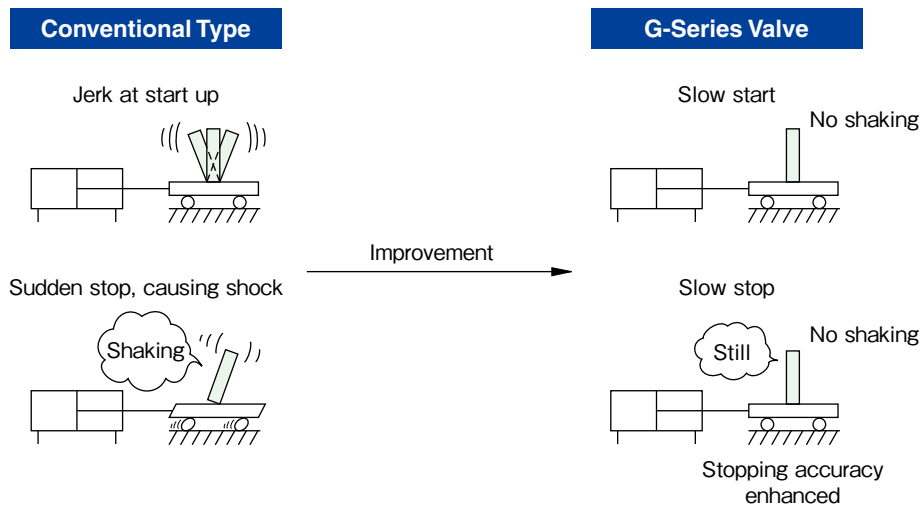


### ● Your valuable machines are protected from vibration and shocks

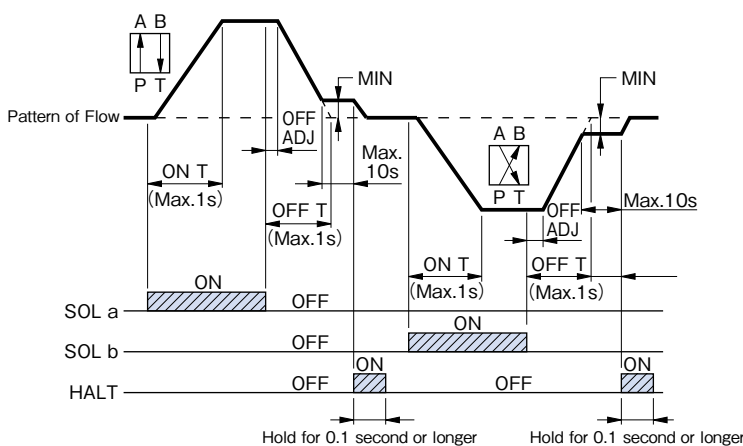
- Shocks caused by acceleration and deceleration are reduced.



- Oil hammering during spool shifting is reduced.



- Relationships between SOL signals and flow patterns

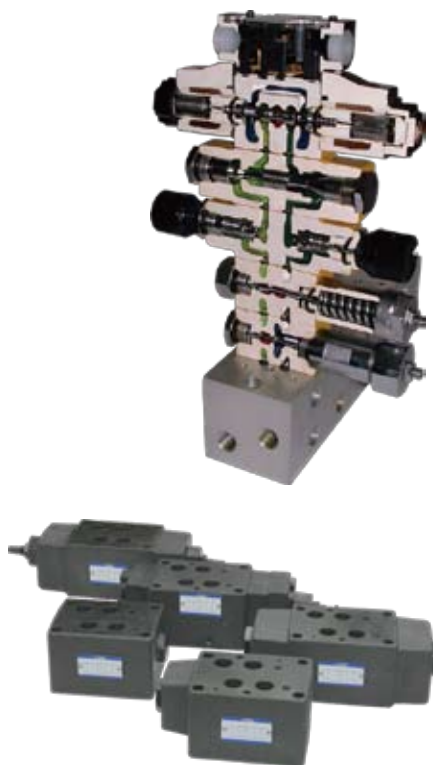


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# Modular Valves

YUKEN MODULAR VALVES are designed to simplify hydraulic systems, to eliminate the use of pipe connections and to save space, time and costs. The modular valves have standardized interfaces (ISO 4401, CETOP, NFPA) and thickness in accordance with each valve size. Any hydraulic circuit can be created by stacking the modular valves in the correct sequence one upon another and bolting the various stacks to a common manifold base.

- Modular valves remarkably minimize the installation area and space.
- No expert skill is required to assemble. Changes or additions to the circuit can be easily and quickly carried out.
- Problems such as oil leaks, vibration and noise which may arise from pipes and tubes are minimized because pipes and tubes are not necessary.
- The simple installation method of modular valves allows for easy maintenance.



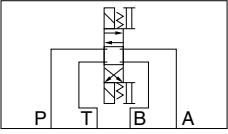
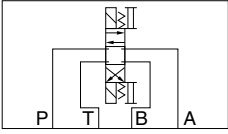
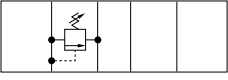
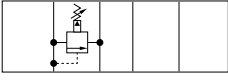
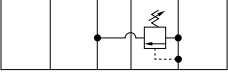
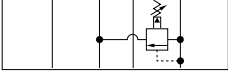
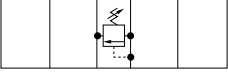
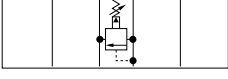
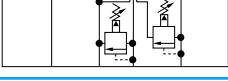
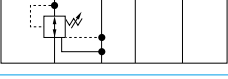
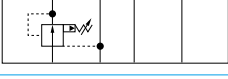
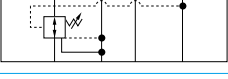

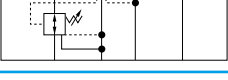

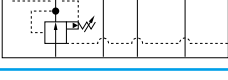
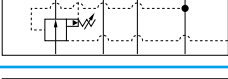

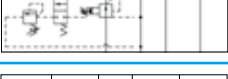
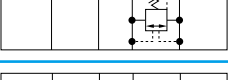
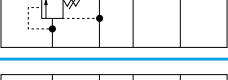
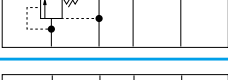
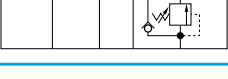
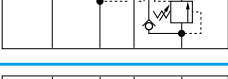
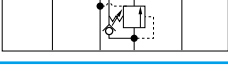
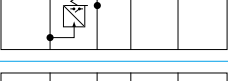
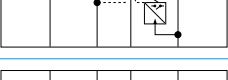
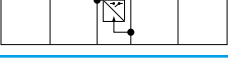
## Stacking Example

Valve Type	Maximum Operating Pressure MPa	Max. Flow L/min										
		1	2	5	10	20	50	100	200	500	1000	
005/007 Series Modular Valves	25	[Flow range up to 10 L/min]										
01 Series Modular Valves	31.5	[Flow range up to 50 L/min, with star at 50]										
03 Series Modular Valves	25	[Flow range up to 100 L/min, with star at 100]										
04 Series Modular Valves	35	[Flow range up to 200 L/min]										
06 Series Modular Valves	25	[Flow range up to 500 L/min]										
10 Series Modular Valves	25	[Flow range up to 1000 L/min]										

★Max Flow for Throttle and Check Modular Valves.

## List of 005/007/01/03 Series Modular Valves (Pressure Controls)

● Pressure Controls

Name	Graphic Symbols	Model Numbers	Graphic Symbols	Model Numbers
		"005/007/01" Series		"03" Series
Solenoid Operated Directional Valves		DSG-005 DSG-007 DSG-01		DSG-03
Relief Modular Valves		MBP-005		MBP-03
		MBA-01		MBA-03
		MBB-01		MBB-03
	—	—		MBW-03
Reducing Modular Valves		MRP-005 MRP-007 MRP-01		MRP-03
		MRA-01		MRA-03
		MRB-01		MRB-03
Reducing Modular Valves for Low Pressure Setting	—	—		MRLP-03
	—	—		MRLA-03
	—	—		MRLB-03
Reducing Modular Valves for Tow Pressures Setting		MRDP-01	—	—
Brake Modular Valves		MBR-01	—	—
Sequence Modular Valves		MHP-01		MHP-03
Counterbalance Modular Valves		MHA-01		MHA-03
	—	—		MHB-03
Pressure Switch Modular Valves		MJP-01-M	—	—
		MJA-01-M		
		MJB-01-M		

## List of 005/007/01/03 Series Modular Valves (Flow Controls, Directional Controls, Others)

### ● Flow Controls

Name	Graphic Symbols				Model Numbers
	P	T	B	A	
Flow Control Modular Valves					MFP-01 MFP-03
Flow Control and Check Modular Valves					MFA-01-X MFA-03-X
					MFA-01-Y MFA-03-Y
					MFB-01-X MFB-03-X
					MFB-01-Y MFB-03-Y
					MFW-01-X MFW-03-X
					MFW-01-Y MFW-03-Y
Temperature Compensated Throttle and Check Modular Valves					MSTA-01-X MSTA-03-X
					MSTB-01-X MSTB-03-X
					MSTW-01-X MSTW-03-X
Throttle Modular Valves					MSP-01 MSP-03
Throttle and Check Modular Valves					MSCP-01 MSCP-03
					MSA-005-X MSA-007-X MSA-01-X MSA-03-X
					MSA-005-Y MSA-007-Y MSA-01-Y MSA-03-Y
					MSB-005-X MSB-007-X MSB-01-X MSB-03-X
					MSB-005-Y MSB-007-Y MSB-01-Y MSB-03-Y
					MSW-005-X MSW-007-X MSW-01-X MSW-03-X
					MSW-005-Y MSW-007-Y MSW-01-Y MSW-03-Y
					MSW-01-XY
					MSW-01-YX

### ● Directional Controls

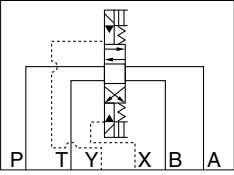
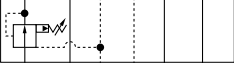
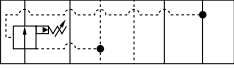

Name	Graphic Symbols				Model Numbers
	P	T	B	A	
Check Modular Valves					MCP-005 MCP-01 MCP-03
					MCA-03
					MCB-03
					MCT-01 MCT-03
Anti-Cavitation Modular Valves					MCPT-03
					MAC-01 MAC-03
Pilot Operated Check Modular Valves					MPA-01 MPA-007 MPA-007
					MPB-005 MPB-007 MPB-01 MPB-03
					MPW-005 MPW-005 MPW-01 MPW-03

### ● Modular Plates and Mounting Bolts

Name	Graphic Symbols				Model Numbers
	P	T	B	A	
End Plates					MDC-005-A MDC-007-A MDC-01-A MDC-03-A
					MDC-01-B MDC-03-B
Connecting Plates					MDS-01-PA
					MDS-01-PB
					MDC-01-AT
Base Plates					MMC-005 MMC-007 MMC-01 MMC-03
					MBK-005 MBK-007 MBK-01 MBK-03

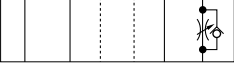
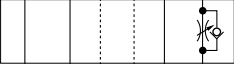



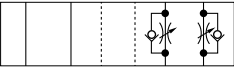
## List of 04/06/10 Series Modular Valves (Pressure Controls, Flow Controls, Directional Controls)

### ● Pressure Controls

Name	Graphic Symbols	Model Numbers
Solenoid Controlled Pilot Operated Directional Valves		DSHG-04
		DSHG-06
		DSHG-10
Reducing Modular Valves		MRP-04
		MRP-06
		MRP-10
		MRA-04
		MRA-06
		MRA-10
		MRB-04
		MRB-06
		MRB-10


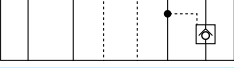
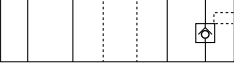
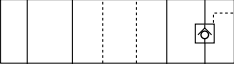
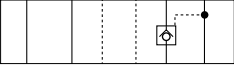
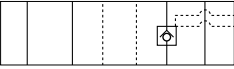
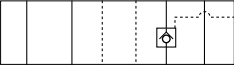



### ● Flow Controls

Name	Graphic Symbols	Model Numbers
Throttle and Check Modular Valves		MSA-04-X
		MSA-06-X
		MSA-10-X
		MSA-04-Y
		MSA-06-Y
		MSA-10-Y
		MSB-04-X
		MSB-06-X
		MSB-10-X
		MSB-04-Y
		MSB-06-Y
		MSB-10-Y
	MSW-04-X	
	MSW-06-X	
	MSW-10-X	
	MSW-04-Y	
	MSW-06-Y	
	MSW-10-Y	



### ● Directional Controls

Name	Graphic Symbols	Model Numbers
Check Modular Valves		MCP-04
		MCT-04
Pilot Operated Check Modular Valves		MPA-04
		MPA-06
		MPA-10
		MPA-06 ※-※- X
		MPA-10 ※-※- X
		MPA-06 ※-※- Y
		MPA-10 ※-※- Y
		MPB-04
		MPB-06
		MPB-10
	MPB-06 ※-※- X	
	MPB-10 ※-※- X	
	MPB-06 ※-※- Y	
	MPB-10 ※-※- Y	
	MPW-04	
	MPW-06	
	MPW-10	
Mounting Bolt Kits	—	MBK-04 MBK-06 MBK-10



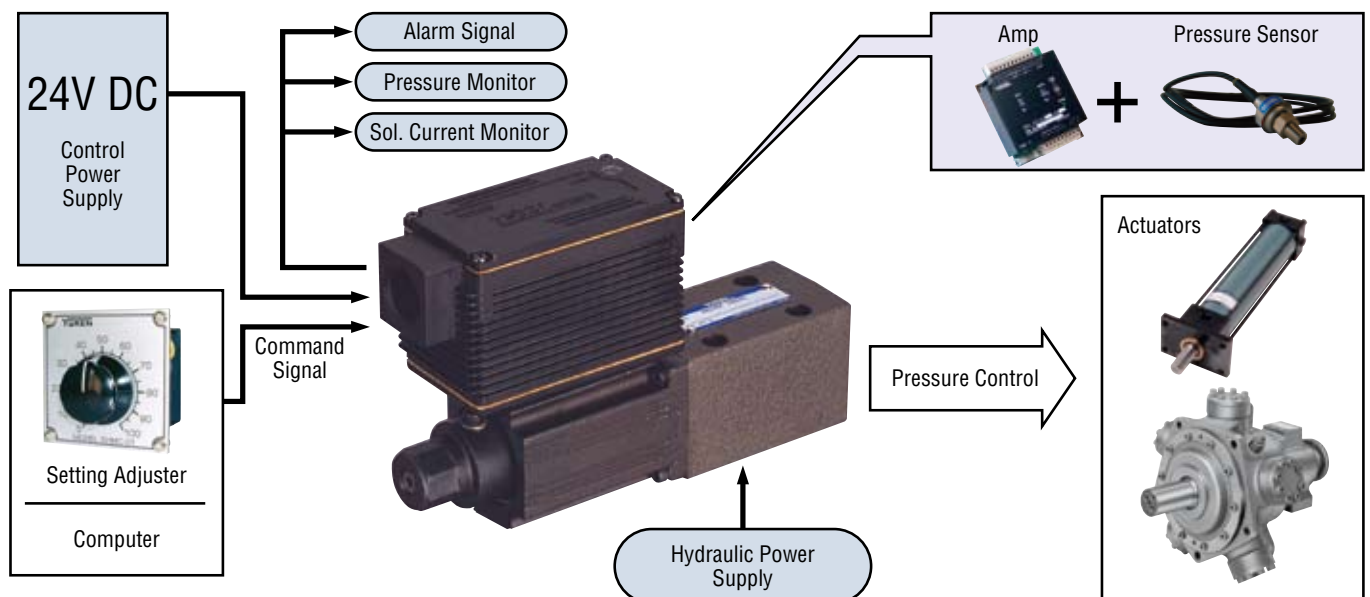
# Proportional Electro-Hydraulic Controls

## **EH** Series Proportional Electro-Hydraulic Control Valves

The EH Series on-board electronic proportional controls are compound electro-hydraulic products which merge the latest electronic and sensor technology with Yuken's reputable E Series proportional controls. Yuken has realized an industry leading position by creating compact hydraulic equipment that features high precision and reliability by unifying the amplifier, and sensor, all of which are required for proportional or servo control systems.



- Proportional control systems or servo systems can be easily structured by simply preparing the power source (DC) for controls and command signals along with the hydraulic source.  
Amplifiers exclusively used for the system or separately installed control panels are unnecessary.
- By using built-in sensors;
  - (1) pressure and orifice openness, which can be converted to flow rate, can be detected and controlled remotely.
  - (2) along with a compound amplifier, a closed loop system can be structured.
  - (3) sensor output signals or deviation signals at structuring closed loop system can be monitored.
- Disadvantages seen in ordinary hydraulic systems in which hydraulic components, sensors and amplifiers are interconnected with each other but installed separately are eliminated.



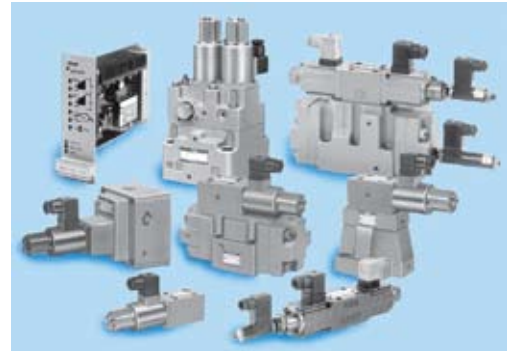
Valve Type	Maximum Operating Pressure MPa	Max. Flow L/min																
		1	2	3	5	10	20	30	50	100	200	300	500	1000				
Pilot Relief Valves	24.5	EHDG-01																
Pressure Control Valves	SB1110 : 24.5 SB1190 : 7.0									SB1110	SB1190							
Relief Valves	24.5	EHBG										03	06	10				
Reducing & Relieving Valves	24.5	EHRBG											06	10				
Flow Control (& Check) Valves	03 : 20.6 06 : 24.5	EHFG/EHFCG											03	06				
Flow Control & Relief Valves	24.5	EHFBG											03	06	10			
High Flow Series Flow Control & Relief Valves	24.5	EHFBG												03	06			
Directional & Flow Cont. Valves	25	EHDG								01	03							
High Response Type Directional & Flow Cont. Valves	15.7	EHDG												04	06			

Note) Setting adjusters are also available.

## Series Proportional Electro-Hydraulic Control Valves

Proportional valves are able to control the system pressure or flow proportionally through a controlled input current from the amplifier.

Our product line includes “high response type valves” that provide ultimately improved response using closed loop control that proportional control valves can offer.



Valve Type	Maximum Operating Pressure MPa	Max. Flow L/min																
		1	2	3	5	10	20	30	50	100	200	300	500	1000				
Pilot Relief Valves	24.5	EDG-01																
Relief Valves	24.5			EBG						03	06	10						
Reducing & Relieving Valves	24.5	ERBG								06	10							
Flow Control (& Check) Valves	20.6	EFG/EFCG (40Ω Series)						02		03	06	10						
	24.5	EFG/EFCG (10Ω Series)								03	06							
Flow Control & Relief Valves	24.5	EFBG (40Ω-10Ω Series)								03	06	10						
		EFBG (10Ω-10Ω Series)								03	06	10						
		EFBG (High Flow Series)									03	06						
High Response Type Flow Control & Relief Valves	25	ELFBG-03																
Directional & Flow Cont. Valves	25	EDFG-01																
Directional & Flow Cont. Valves	25	EDFHG								03	04	06						
High Response Type Proportional Directional and Flow Control Valves	31.5	ELDFG						01		03								
	35	ELDFHG								03	04	06						

Note) Power amplifiers and setting adjusters are also available.

## Amplifiers

Amplifier Type	Model Numbers	Applicable to Control Valve
DC Input	AME-D-10-※-20	Pressure or Flow Control (For 10Ω Sol.)
	AME-D-40-※-40	Flow Control (For 40Ω Sol.)
	AME-D2-H1-※-12	Flow Control and Relief (For 40Ω -10Ω Sol.)
	AME-D2-1010-※-11	Flow Control and Relief (For 10Ω -10Ω Sol.)
DC Input-Feedback	SK1022-※-※-11	Pressure or Flow Control (For 10Ω Sol.)
	AME-DF-S-※-22	Flow Control (For 10Ω Sol.)
Slow Up-Down	AME-T-S-※-22	Flow Control (For 40Ω Sol.)
DC Input For DC Power 24V DC	SK1015-11	Pressure or Flow Control (For 10Ω Sol.)
	AMN-D-10	
	AMN-W-10	
	SK1091-D24-10	Directional and Flow Control
DC Input with Minor Feedback	AMN-L-01-※-※-10	High Response Type Directional and Flow Control
	AMB-EL-※-※-※-※-10	
Shockless	AMN-G-10	Shockless Directional and Flow Control

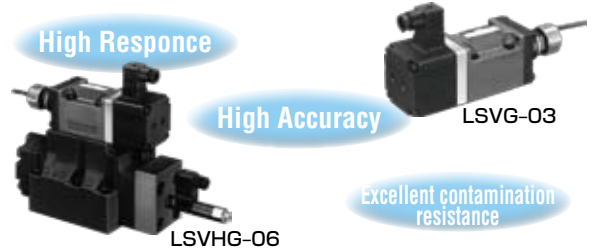


Friendly, Intelligent, Powerful

# Linear Servo Valves

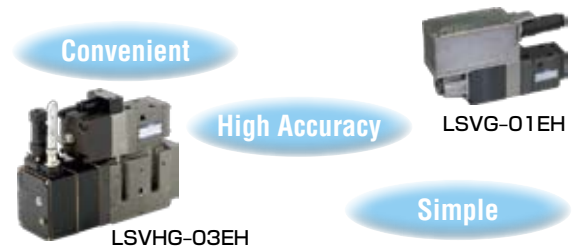
## High-speed Linear Servo Valves/Servo Amplifiers

High-speed linear servo valves have outstanding features of high response and exceptional contamination resistance. These features are achieved by the compact and powerful linear motor which directly drives the spool and gives electric feedback of the spool position. These valves have garnered an excellent reputation since their launch by Yuken in 2001.



## On-board Electronics Type Linear Servo Valves

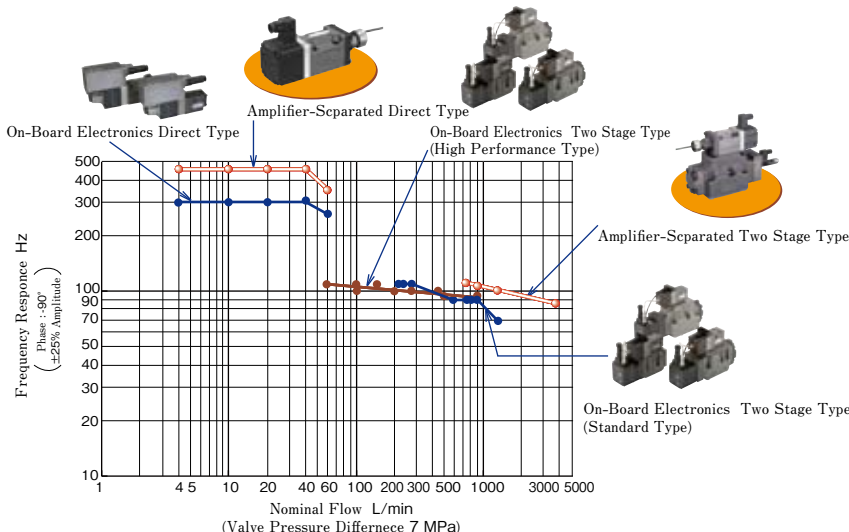
On-board electronics type linear servo valves have been developed based on high-speed linear servo valves, but with a focus on downsizing the pilot valve. The integration of the exclusive amplifier and the linear servo valve create a high performance valve in a compact package which greatly improves user-friendliness.



## Specifications

Valve Type	Max. Operating Press. MPa	Nominal Flow L/min (Valve Pressure Difference 7 MPa)											Frequency Response ±25% Amplitude 90° Phase Hz	Step Response 0→100% ms	Spool Type	
		1	2	5	10	20	30	40	60	750	900	1300				3800
High-Speed Linear Servo Valves (Amplifier-Separated Type)	Direct Type	35	LSVG-03 4, 10, 20, 40, 60											450, 350	2,3	Neutral Zero lap
	Two Stage Type	35	LSVHG-04 750											110	8	2:10% Overlap 2P: Zero lap (Dual Flow Gain) 4O:A,B,T Connection
		900:35 1300:31.5	LSVHG-06 900, 1300											105, 100	8,10	
On-Board Electronic Type Linear Servo Valves (Standard Type)	Direct Type	35	LSVHG-10 3800											85	15	Neutral Zero lap
	Two Stage Type	35	LSVG-01EH 4, 10, 20											300	3	
		35	LSVG-03EH 40, 60											310, 260	3,4	
		31.5	LSVHG-03EH 230, 210, 270											110	7,8	2:10% Overlap 2L:2% Overlap (Linear Flow Gain) 2P:Zero lap (Dual Flow Gain) 4O:A,B,T Connection 4J:A,B,T Connection (Neutral)
		35	LSVHG-04EH 580, 750											90	11	
On-Board Electronic Type Linear Servo Valves (High Performance Type)	Two Stage Type	820,900:35 1300:31.5	LSVHG-06EH 820, 1300											90, 70	11,15	S:1% Overlap
		31.5	LSVHG-03EH-※-S 60, 100, 160											110	7	
		35	LSVHG-04EH-※-S 100, 200, 280, 450											100	11	
		35	LSVHG-06EH-※-S 500, 900											95	12	

## Frequency Response Chart





## High-speed Linear Servo Valves/Servo Amplifiers

Linepu covering a high response of 450 Hz (direct type)/a high flow of 3800 L/min (two stage type) !

High precision and fast responsiveness are achieved by driving the spool directly using a compact, powerful linear motor as well as by feedback of the spool position.

### ● High accuracy

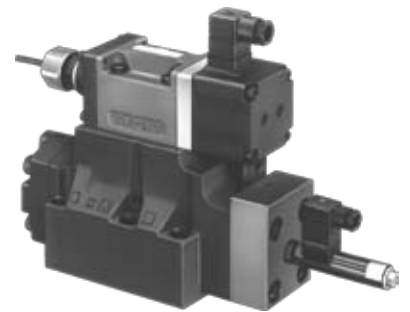
These valves have a low hysteresis of 0.1 % or less, achieving high accuracy. They allow the main unit to operate with much higher repeatability.

### ● High response characteristics

The valves provide significantly high levels of step and frequency responses; the step response is 2 ms, and the frequency response is 450 Hz (for LSVG-03). Thus, the valves ensure that the main unit can achieve unprecedented high response.

### ● Excellent contamination resistance

Compared to conventional servo valves for which the permissible contamination level is up to NAS 1638 class 7, the direct type servo valves can accept the contamination level of up to class 10.



Two Stage Type — LSVHG-06



Direct Type — LSVG-03

Linear Servo Amplifiers — AMLS

## On-board Electronics Type Linear Servo Valves

Introducing new direct type models (LSVG-01EH/03EH): Wider range of products !

On-board electronics type linear servo valves have been developed based on the high-speed linear servo valves while aiming at downsizing the pilot valve and improving user-friendliness by integrating the exclusive amplifier and the high-speed linear servo valve compactly.

### ● High accurate, simple and convenient — Ideal on-board electronics type linear servo valves

#### Convenient

Fault diagnosis is easy to conduct with the alarm indication when the command signal and the spool position differ due to abnormality in the system.

Colour	Description of Alarm Indicator
Green	Indication of power supply (Normal operation)
Red	Deviation alarm for the pilot valve
Yellow	Deviation alarm for the main valve

#### High Accuracy

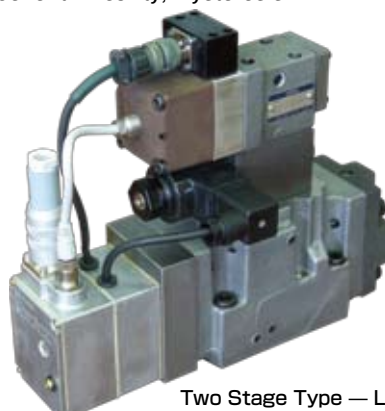
Closed loop control by the combination of the position sensors for the pilot valve and the main valve in the compact amplifiers ensures excellent linearity, hysteresis and stability on control.

#### Simple

Highly accurate hydraulic control can be obtained only by supplying 24 V DC power and inputting a command signal voltage of 0 to  $\pm 10V$ , 0 to  $\pm 10mA$  and 4 to 20 mA.



Direct Type — LSVG-01EH



Two Stage Type — LSVHG-04EH  
with Fail-Safe Solenoid Operated Valve



# Energy-Saving Hydraulic Units and Controllers

## ● Substantial energy saving of hydraulic units has been achieved by the inverter drive.

Hydraulic units equipped with variable displacement pumps feature greater energy-saving than those with fixed displacement pumps.

Yuken's energy-saving hydraulic units and controllers utilize rotational frequency control with an inverter. This innovative configuration solves the problem of efficiency losses suffered by induction motors operating at light loads and ensures significant energy savings.



### Efficiency Characteristics of Induction Motors

- At Rated Output : Maximum Efficiency
- At light-load : Significant Efficiency loss

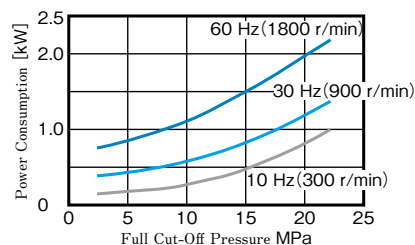
## ● Rotational frequency control is effective for reducing power loss.

Extensive energy saving is possible by detecting a load pressure with the pressure sensor and keeping the motor rotation at the optimum level required for pressure holding. Based on the concept above, the following two different types of inverter-driven system and packages have been developed.

- Energy-saving control system for hydraulic units (Energy saving controller)
  - For modification of existing hydraulic units to energy-saving type
- Equipped with the variable displacement piston pump <YA-e Pack>

### ● Example of Reduction of Power Consumption with Rotational Frequency Control

Combination of the AR22 Piston Pump and 7.5 kW Motor



## Energy-saving control system for hydraulic units (Energy saving controller)

Energy-saving effects can be achieved by adding the controller, the pressure sensor, and the inverter to an existing unit and carrying out simple adjustments.

### System Configuration

The following 5 monitoring figures can be indicated.

- ① Input voltage or pressure for Pressure sensor
- ② Inverter output (r/min)
- ③ Simple arithmetic figure for Power (kW)
- ④ Sequence input code
- ⑤ Alarm output code

Controller for setting rotational frequency of the inverter  
AMC-IV-2-10

Pressure Sensor



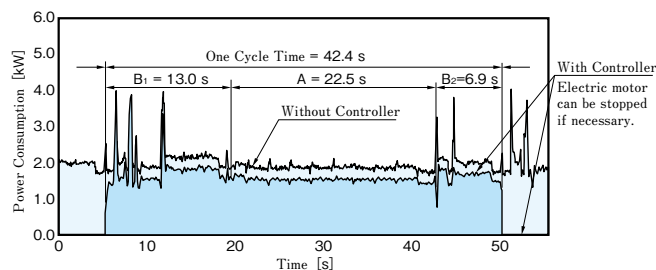
Inverter



Existing Hydraulic Power Unit

- Applicable Induction Motor : 0.75 to 7.5 kW
- Applicable Pump : Variable displacement Piston Pump

### Example of Reduction Rate of Power Consumption (Machining line for auto parts)



Symbol	Status	Average of Power Consumption		
		Without Controller	With Controller	Reduction Rate
<b>A</b>	Standby	1.80 kW	1.47 kW	Approx. 18%
<b>B1 + B2</b>	Actual Work	2.01 kW	1.69 kW	Approx. 16%

### Specifications

- Model ..... AMC-IV-2-10
- Output Voltage for Inverter ... Select one of the following voltage (0 to +5 V, +1 to +5 V, +0.5 to +5 V)
- Input Voltage for Pressure Sensor ... Select one of the following voltage (0 to +5 V, +1 to +5 V, +0.5 to +5 V)
- Power Supply for Pressure Sensor ... +5 V
- Voltage for Power Source ..... AC 100/200 V
- Power Consumption ..... Less than 6 VA
- Ambient Temperature ..... 0 to 50 °C

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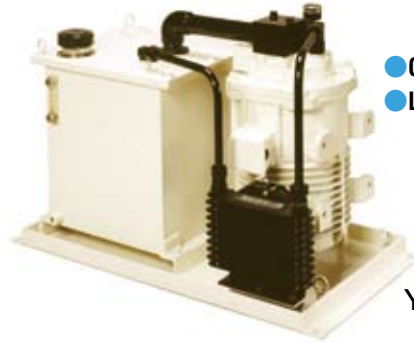
# Standard Hydraulic Power Units

These hydraulic power units achieve energy-saving operation with a high efficiency piston pump.



- Compact and lightweight
- Low noise level

YF Pack



- Compact and lightweight
- Low noise level

YP Pack



YA Pack

● **Wide assortment of models**

A total of 31 models are available according to the combination of the built-in pump, the reservoir capacity, and the motor output, so that the most suitable model can be selected.

● **Facilitating the configuration of the control circuit**

With 21 different options (incorporating a base plate, etc.), a wide variety of control circuits can be easily configured.



- Compact and lightweight
- Low noise level

**YA-Light**

YA Series L Pack

Hydraulic Power Unit Type	Model Numbers	Max. Operating Pressure MPa	Reservoir Capacity L						Geometric Displacement cm <sup>3</sup> /rev					Electric Motor kW×4P			
			1	2	5	10	20	50	100	200	1	2	5		10	20	50
Standard Hydraulic Power Unit YF Pack	YF10	16															0.75/1.5
	YF16																
Standard Hydraulic Power Unit YP Pack	YP10	7/16															0.75/1.5
	YP16	16															1.5/2.2
	YP22																2.2/3.7
	YP37																3.7/5.5
Standard Hydraulic Power Unit YA Pack	YA10	7/16															0.75/1.5/2.2/3.7
	YA16																1.5/2.2/3.7/5.5/7.5
	YA22																2.2/3.7/5.5/7.5
	YA37	7														3.7/5.5/7.5	
Standard Hydraulic Power Unit YA Series L Pack	YAL8	3.5/7															0.75/1.5
	YAL16																1.5/2.2
Energy-Saving Hydraulic Power Unit YA-e Pack	E-YA10	7/16															2.2/3.7
	E-YA16																1.5/2.2/3.7/5.5/7.5
	E-YA22																2.2/3.7/5.5/7.5
	E-YA37	7														3.7/5.5/7.5	
Energy-Saving Control System for Hydraulic Unit	AMC-IV	—	—						—					—			

# Worldwide YUKEN Affiliated Companies and Distributors

■ Affiliated Company ● Distributor ◆ Service Center

## ARGENTINA

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Av.85 No.1113 (B1650HWG) San Martin,  
Buenos Aires  
Tel. 11-4754-6000  
Fax.11-4755-9093

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◆ **ACT Corporation (Australia) Pty. Ltd.**  
5 Woordabind Street, Runcorn  
QLD4113, Australia  
Tel. 07-3841-5788  
Fax.07-3841-4088

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Europastr.5,  
A-3442 Tulln-Langenrohr  
Tel. 272-66990  
Fax.272-66991

## BELGIUM

◆ **Vameco B. V. B. A.**  
Zeepeelderijstraat 5-postbus 62  
Diksmuide 8600  
Tel. 150-0117  
Fax.150-4117

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◆ **Yutec Hidraulica Ltda.**  
Rua Tiburcio de Souza, 1621  
Itaim Paulista Sao Paulo S.P.  
CEP:08140-000  
Tel. 011-2025-5555  
Fax.011-2568-7327

◆ **Hidracomp Componentes Hidraulicos Ltda.**  
Rua Dr. Edgard Magalhaes Noronha,  
704-Vila Nova York, Cep 03480-000  
Sao Paulo S.P.  
Tel. 011-2721-1113  
Fax.011-2721-9302

## CANADA

◆ **Drive Products Inc.**  
1665 Shawson Drive, Mississauga,  
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Fax.905-564-5799

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Fax.0512-5699-2100

◆ **Yuken Kogyo(Shanghai) Co., Ltd.**  
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