

NACHI Hydraulic Valves

Features

- ① Maximum operating pressure of 21 to 35MPa {214 to 357kgf/cm²} provides smooth operation at high pressures. Low leakage for high efficiency.
- ② Extremely stable performance across all pressure ranges.
- ③ Conformance with ISO recommended dimensions for most gasket installations enables a high degree of international compatibility.
- ④ A highly reliable and quiet wet type solenoid valve series is available when the noise and reliability issues of solenoid valves are a problem.
- ⑤ A comprehensive pipe-less series provides the ultimate in compact design and reliability.

Installation and Maintenance

- ① Installation is possible in horizontal, vertical, and diagonal configurations. However, the spool must be oriented horizontally in the case of a solenoid valve or hydraulic switching solenoid valve no-spring type.
- ② Precision finish the mounting surface to a surface roughness of 1.6a and degree of flatness of 0.01mm.

- ③ Make sure that the return piping from the hydraulic valve to the tank is below the fluid level surface.
- ④ Be sure to use only specified bolts on hydraulic valves. Use bolts of 12.9 strength classification or equivalent.
- ⑤ Installation bolts are not included with any modular valves, the SS, SA, SF, SNH, SL, SE, SED, and SAW G01 size solenoid valves, the DMA-G01 manual valve, or with sub plates. Bolts are included with gasket type valves other than those mentioned above.
- ⑥ Use O-rings with a hardness of Hs-90 for valve gasket O-rings.

Management of Hydraulic Operating Fluid

- ① Use mineral oil-based hydraulic operating fluid.
- ② See pages N-1 and N-2 for information about the viscosity of the operating fluid you need to use.
- ③ When using phosphate ester base operating fluid, include "P-" at the beginning of the model number. When using water- or glycol-based hydraulic operating fluid, refer to pages N-4 through N-6 for details on applicable models. Contact your

agent for information about other fire-resistant hydraulic fluids and special fluids.

- ④ Foreign matter in the hydraulic operating fluid can lead to frequent valve operation problems. Use a 25 μ m line filter to protect against contamination.

Terms Used in This Catalog

The following describes the meanings of the following terms used in this catalog:

- **Rated Flow Rate:**
Specific guaranteed flow rate under certain fixed conditions
- **Maximum Flow Rate:**
Maximum flow rate that satisfies valve function
- The following are the ratings that apply to the seal part list.
JIS standard B2401 (O-ring)
JIS standard B2407 (backup ring)
SAE standard AS568 (O-ring)
- Pipe apertures mentioned in this catalog that are indicated as "G*/**" comply with JIS B2351 O-ring seal systems.

Calculation of Hydraulic Valve Pressure Loss

Use the following formula to convert pressure loss values for each hydraulic valve in accordance with changes in operating fluid viscosity.

$$\Delta P_2 = \left(\frac{v_2}{v_1}\right)^{1/4} \cdot \Delta P_1$$

ΔP_1 : Pressure loss MPa {kgf/cm²} at for kinematic viscosity v_1

ΔP_2 : Pressure loss MPa {kgf/cm²} at for kinematic viscosity v_2

v_1 : Kinematic viscosity mm²/s

v_2 : Kinematic viscosity mm²/s

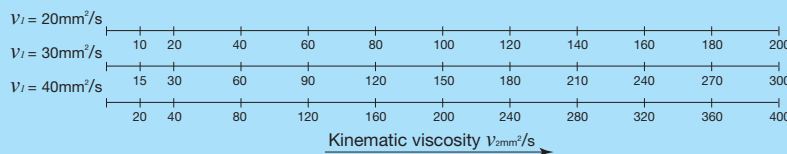
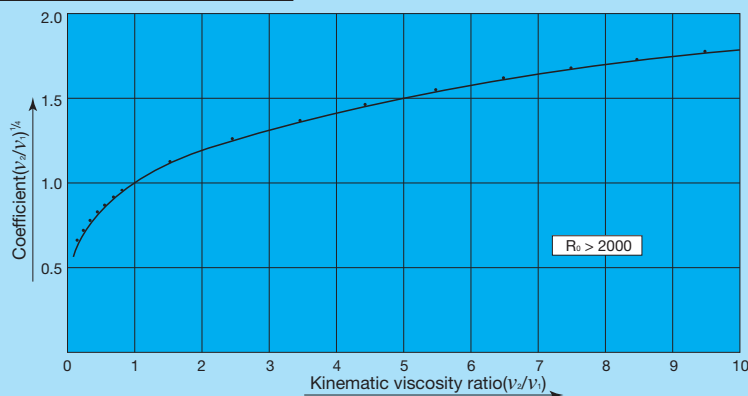
The graph on the right shows coefficient values $(v_2/v_1)^{1/4}$ kinematic viscosity ratios (v_1/v_2) .

<Example>

For a value whose pressure loss at the rated flow rate when $v_1 = 30$ mm²/s is $\Delta P_1 = 0.3$ MPa{3.1 kgf/cm²}, a change in viscosity to $v_2 = 90$ mm²/s produces a pressure loss of $(v_2/v_1) = 3$. According to the graph on the right, coefficient $(v_1/v_2)^{1/4} = 1.3$.

Accordingly :

$$\Delta P_2 = 1.3\Delta P_1 = 1.3 \times 0.3\text{MPa}\{3.1\text{kgf/cm}^2\} = 0.39\text{MPa}\{4.03\text{kgf/cm}^2\}$$



Factory Default Handle Setting

The following are the factory default pressure and flow rate settings for handles (screws) on adjustable valves.

- ① Pressure Control Valve: Near the minimum control pressure
- ② Flow Control Valve: Near the minimum control flow rate

Note, however, that ER and ESR relief valves are set to rated pressures. For details, see the applicable pages for each type of valve.

Hydraulic Valve Selection Table

Pump Type	Name	Type Classification	Maximum Working Pressure MPa {kgf/cm ² }	Maximum Flow Rate ℓ/min											Page			
				1	2	5	10	20	50	100	200	500	1000	2000		5000		
Modular Valves	Relief modular valve	OR	25 {255}					01			03	04						D-13
	Brake modular valve	ORO	25 {255}		01					03								D-19
	Direct relief modular valve	ORD	25 {255}		01					03	04							D-23
	Pressure reducing modular valve	OG	25 {255}		01						03	04						D-28
	01 Size balance type Pressure reducing modular valve	OGB	25 {255}		01													D-35
	Reducing valve & modular valve	OG	25 {255}		01						03	04						D-37
	2-pressure reducing modular valve	OGS	25 {255}		01													D-44
	Sequence modular valve	OQ	25 {255}		01						03							D-47
	Counter balance modular valve	OCQ	25 {255}		01						03	04						D-50
	Pressure switching modular valve	OW	25 {255}		01													D-55
	Flow regulator modular valve	O(C)Y	25 {255}		01						03	04						D-58
	Flow control modular valve	O(C)F	25 {255}		01						03	04						D-66
	Check modular valve	OC(V)	25 {255}		01						03	04						D-72
	Pilot operated check modular valve	OCP	25 {255}		01						03	04						D-79
Solenoid Valves	SS wet type solenoid valve	SS	35 {357}					01				03					E-1	
	SA wet type solenoid valve	SA	35 {357}					01				03					E-13	
	SE lower power solenoid valve	SE	16 {163}					01				03					E-25	
	SED lower power solenoid valve	SED	16 {163}					01									E-32	
	SL wet type solenoid valve	SL	7 {71}					01									E-38	
	DSS(A) solenoid control valve	DSS DSA	35 {357}						04						06		E-45	
	Fine Solenoid Valve	SF	21 {214}					01									E-53	
	Non-leak Type Solenoid Valve	SNH	35 {357}					01			03	04	06				E-57	
	Directional control valve with monitoring switch	SAW	35 {357}					01									E-66	
Poppet type directional control valve with monitoring switch	SCW	21 {214}						03								E-75		
Pressure Control Valves	Relief valve	R	21 {214}							03		06	10				F-1	
	RI series relief valve	RI	35 {357}							03		06					F-5	
	Remote control valve	RC(D)	21 {214}	RC-02	RCD-02												F-8	
	Solenoid control relief valve	RSS(A)	21 {214}							03		06	10				F-10	
	RIS Series Solenoid control relief valve	RIS	35 {357}							03		06					F-15	
	Reducing (& check) valve	(C)G	21 {214}					03				06	10				F-18	

Note) Maximum operating pressure for the modular valve series is 35MPa {357kgf/cm²}.

Pump Type	Name	Type Classification	Maximum Working Pressure MPa {kgf/cm ² }	Maximum Flow Rate ℓ/min											Page			
				1	2	5	10	20	50	100	200	500	1000	2000		5000		
Pressure Control Valves	Balancing valve	GR	21 {214}			01				03							F-23	
	Pressure control (& check) valve	(C)Q	21 {214}			03					06	10					F-25	
Flow Control Valves	Throttle (& check) valve	(C)FR	21 {214}			03				06	10						G-1	
	FT type low control valve	(C)FT	21 {214}			02				03							G-4	
	F type control valve	(C)F	21 {214}					06					10				G-8	
	TN type flow control valve	(C)TN	10.5 {107}			02											G-11	
	TS type flow control valve	(C)TS	10.5 {107}			01											G-14	
	TL type flow control valve	TL(T)	7 {71}					03, 04										G-16
Direction Control Valves	Right angle check valve	CA	21 {214}			03				06	10						H-1	
	In-line check valve	CN	21 {214}			03				06	10						H-1	
	Pilot check valve	CP	21 {214}			03				06	10						H-4	
	Gauge cock	K ₂	42 {427}														H-7	
	DMA type manual valve	DMA	35 {357}			01				03							H-8	
Electro-hydraulic Proportional Control Valves	Pilot relief valve	EPR	35 {357}	01													I-2	
	Relief valve	ER	35 {357}				03				06						I-4	
	Relief and reducing valve	EGB	25 {255}			03				06							I-6	
	Flow control valve	(C)ES	21 {214}			02				03	06	10					I-8	
	Load response control valve	ESR	25 {255}				03				06	10					I-11	
	Flow direction control valve	ESD	25 {255}			01			03	04	06	10					I-14	
	Modular type reducing valve	EOG	25 {255}			01											I-22	
	Modular type flow control valve	EOF	21 {214}			01											I-24	
	Driver power amplifier	EMA EMC	-															I-26
	Driver power compact amplifier	EBA	-															I-30
	Compact multi-function power amplifier	EDA EDC	-															I-34
High-response Proportional Flow Control Valve	High-response proportional flow control valve	ESH	32 {327}			01				03	04	06					I-38	
	High-speed response proportional control valve amplifier	EHA	-														I-42	
Electro-hydraulic Servo Valves	NACHI-MOOG servo valve Driver servo amplifier	EA	-														I-44	
Other	Hydro-logic valve	HT, HF	28 {286}				06				10	16	24				J-1	