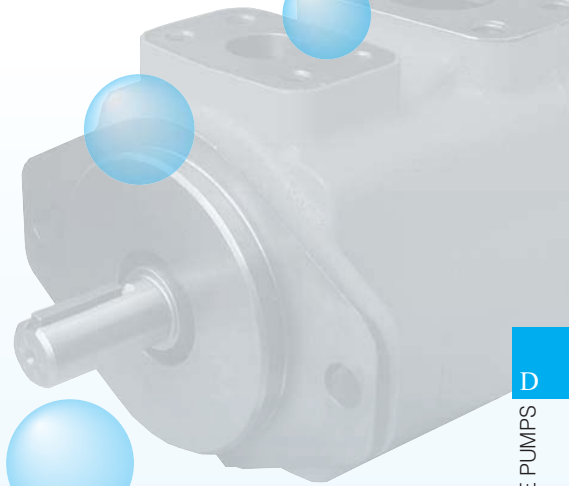


D



VANE PUMPS

	Model No.	Operating pressure MPa {kgf/cm ² }		Discharge rate* ¹ L/min				Permissible rotational speed min ⁻¹	Page
		Maximum	Rated	1	10	100	1000		
DS	DS10P	7 {70}	7 {70}					600 to 1800	D-2
MD	Motor pumps incorporating a DS10P								D-4
DP	DP 10								
	DP200	17.5 {175}	14 {140}						D-6
	DP300								
DV*	DVS	9 {90}	7 {70}					600 to 1800 (1 to 5 V) 600 to 1500 (6 V)	D-10
	DVM	8.5 {85}						600 to 1500 (1 to 4 V) 600 to 1200 (5 V)	
	DVL	7 {70}						600 to 1200	

Note: *¹ The discharge rates indicated are the values at the rated pressure.
The discharge rates indicated are the values at a rotational speed of 1800 min⁻¹ for the DP/DS series and of 1200 min⁻¹ for the DV series.

	Model No.	Operating pressure MPa {kgf/cm ² }		Discharge rate* ² L/min				Permissible rotational speed min ⁻¹	Page
		Maximum	Minimum	1	10	100	1000		
DE	DE10	14.1 {141} to 17.6 {176}	0.7 {7}	3.8 L/min@17.6 MPa (DE10-1)		37.8 L/min@14.1 MPa (DE10-7)		600 to 1800	D-16
	DE20	15.5 {155} to 17.6 {176}		32.2 L/min@17.6 MPa (DE20-6)		72 L/min@15.5 MPa (DE20-13)			
DEV	DEV20	14 {140} to 21 {210}		8.6 L/min@14 MPa (DEV20-2)		77 L/min@14 MPa (DEV20-14)			
	DEV25			50 L/min (DEV25-10)		109 L/min (DEV25-21)			
	DEV35	17.2 {172}			127 L/min (DEV35-25)		196 L/min (DEV35-38)		D-23
	DEV45				208 L/min (DEV45-42)		308 L/min (DEV45-60)		

Note: *² The discharge rates indicated are the values at the maximum pressure and at an input rotational speed of 1800 min⁻¹.

Compact Single Stage Vane Pump



Features

- **Low noise**
Large suction port reduces the suction resistance and realizes low-noise operation.
- **High efficiency**
The cushion plate system keeps the side clearances constant at all times and maintains stable high efficiency without burn or wear even in the high speed range.
- **Low pulsation**
The cam ring minimizes the fluctuation of the discharge rate and achieves quiet operation sound and stable performance with little pulsation.

Nomenclature

※ - DS ※※ P - 20 - ※
 1 2 3 2 4 5

1 Applicable fluid code

No designation: Petroleum-based hydraulic fluid, water-glycol hydraulic fluid
 Water/oil emulsion type hydraulic fluid
 F: Phosphate ester hydraulic fluid

2 Model No.

DS_P: Compact single stage vane pump

3 Pump capacity code

11: DS11 type
 12: DS12 type
 13: DS13 type
 14: DS14 type

4 Design No.

(The design No. is subject to change)

5 Direction of rotation, when viewed from the shaft end

No designation: Clockwise (rightward)
 L: Counterclockwise (leftward)

* The direction of rotation (rightward or leftward) cannot be changed.

Specifications

Model No.	[Conditions] Input rotational speed: 1800 min ⁻¹ , Fluid used: equivalent to ISO VG32, Fluid temperature: 40°C									
	Discharge rate L/min				Shaft input kW					
	0.4 MPa {4 kgf/cm ² }	3 MPa {30 kgf/cm ² }	5 MPa {50 kgf/cm ² }	7 MPa {70 kgf/cm ² }	0.4 MPa {4 kgf/cm ² }	1 MPa {10 kgf/cm ² }	3 MPa {30 kgf/cm ² }	5 MPa {50 kgf/cm ² }	7 MPa {70 kgf/cm ² }	
DS 11P	5.0	4.5	4.1	3.9	0.15	0.28	0.55	0.82	1.1	
DS 12P	7.7	7.2	6.7	6.5	0.20	0.40	0.75	1.12	1.5	
DS 13P	12.6	11.8	11.5	11.0	0.25	0.50	1.05	1.55	2.1	
DS 14P	22.1	21.2	20.5	20.0	0.35	0.77	1.65	2.50	3.4	

Refer to Page D-13 for the conditions of use for models compatible with flame-resistant hydraulic oil and to Page D-14 to 15 for other notes on handling.

Mass (kg)

Pump model	Flange mount type	Foot support mount type
DS1×P	3	4.4

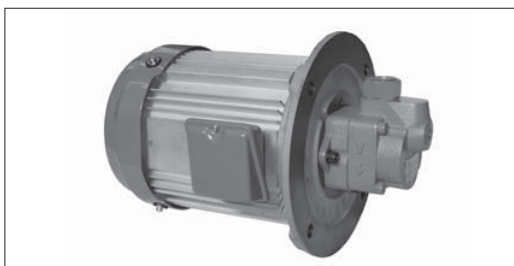
Foot support model codes

- Foot supports are not provided with the pump. Order them separately as required by specifying the model code given in the table below.

Pump model	Foot support model codes
DS1×P	DS-10M

Refer to Page S-3 for the dimensions of the foot supports.

Motor Pumps



Features

- These are motor pumps that integrate a DS10P type vane pump and an electric motor in one body. Adoption of a direct coupling system enables one-touch assembly without couplings, protective covers, a pump base, or even centering work.

Nomenclature

⊗ - MD ⊗ ⊗ - 50
 1 2 3 4 5

1 Applicable fluid code

No designation: Petroleum-based hydraulic fluid, water-glycol hydraulic fluid
 Water/oil emulsion type hydraulic fluid
 F: Phosphate ester hydraulic fluid

2 Model No.

MD: Compact single stage vane pump

3 Pump capacity code

1: DS11P
 2: DS12P
 3: DS13P
 4: DS14P

4 Motor output

1: 0.75 kW-4P
 2: 1.5 kW-4P
 3: 2.2 kW-4P

5 Design No.

(The design No. is subject to change)

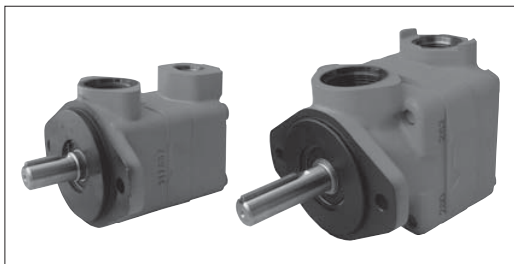
Specifications

Model No.	Pump					Motor			
	Pump model	Discharge rate (at no load) L/min		Maximum operating pressure MPa {kgf/cm ² }		Output (number of poles) kW (4P)	Rated current A		
		50 Hz	60 Hz	50 Hz	60 Hz		200 V (50 Hz)	200 V (60 Hz)	220 V (60 Hz)
MD11	DS11P	4.1	5.0	5.2 {52}	4.4 {44}	0.75	3.7	3.4	3.3
MD21	DS12P	6.4	7.7	3.6 {36}	3.0 {30}				
MD22				7.0 {70}	7.0 {70}	1.5	6.8	6.2	6.3
MD32	DS13P	10.5	12.6	5.6 {56}	4.7 {47}				
MD33				7.0 {70}	7.0 {70}	2.2	9.6	9.0	8.4
MD43	DS14P	18.4	22.1	5.2 {52}	4.3 {43}				

Mass (kg)

Model No.	Mass kg
MD11	19
MD21	
MD22	34
MD32	
MD33	41
MD43	

Compact Medium-pressure Vane Pump



Features

- The straight vane type structure realizes compact and lightweight design which brings greater cost effectiveness. These vane pumps with a maximum pressure of 17.2 MPa are suited to various applications in industrial machinery.

Nomenclature

※ - DE ※ ※ - ※ - ※ - 10
 1 2 3 4 5 6 7

1 Applicable fluid code

No designation: Wear-resistant hydraulic fluid
 Water-glycol hydraulic fluid
 F: Phosphate ester hydraulic fluid

2 Model No.

DE: Compact medium-pressure vane pump

3 Pump capacity code

10: DE10 (3.3 to 22.8 cm³/rev)
 20: DE20 (19.5 to 42.4 cm³/rev)

4 Pump capacity (cm³/rev)

	DE10	DE20
1:	3.3	6: 19.5
2:	6.6	7: 22.8
3:	9.8	8: 26.5
4:	13.1	9: 29.7
5:	16.4	11: 36.4
6:	19.5	12: 39
7:	22.8	13: 42.4

5 Direction of rotation, when viewed from the shaft end

R: Clockwise (rightward)
 L: Counterclockwise (leftward)

6 Installation types

No designation: Without foot support
 B: Foot support mount

7 Design No.

(The design No. is subject to change)

Specifications and masses

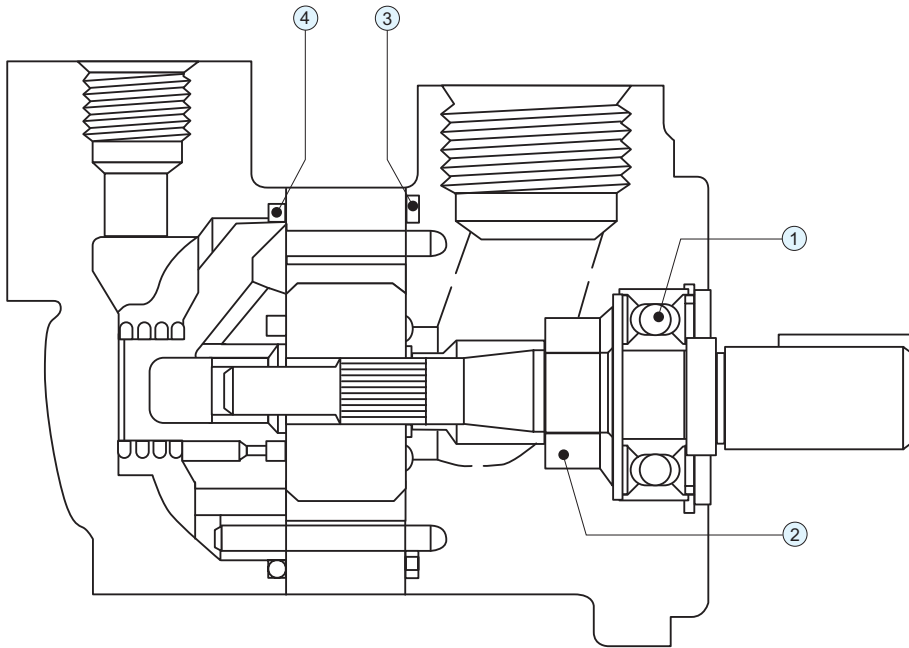
Model No.	Displacement volume cm ³ /rev	Maximum pressure* MPa	Minimum pressure MPa	Minimum rotational speed min ⁻¹	Maximum rotational speed* min ⁻¹	Mass kg	
						Without foot support	With foot support
DE10-1	3.3	17.2	0.7	600	1800	5	7
DE10-2	6.6						
DE10-3	9.8						
DE10-4	13.1						
DE10-5	16.4						
DE10-6	19.5	15.2					
DE10-7	22.8	13.8					
DE20-6	19.5	17.2					
DE20-7	22.8						
DE20-8	26.5						
DE20-9	29.7						
DE20-11	36.4						
DE20-12	39	15.2					
DE20-13	42.4						

* Values with wear-resistant hydraulic fluid

- Foot supports are not provided with the pump. Order them separately as required by referring to Page S-2.
- Refer to Pages D-31 and 32 for the conditions of use for models compatible with flame-resistant hydraulic oil and for other notes on handling.
- Refer to Page S-3 for the machining dimensions of coupling holes.

Sectional structural diagram

DE10, 20



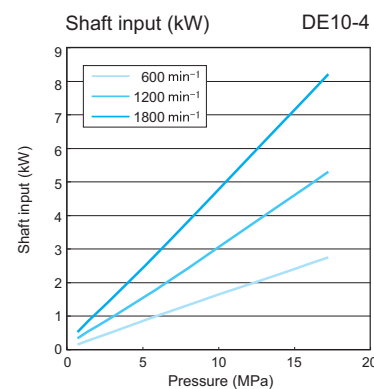
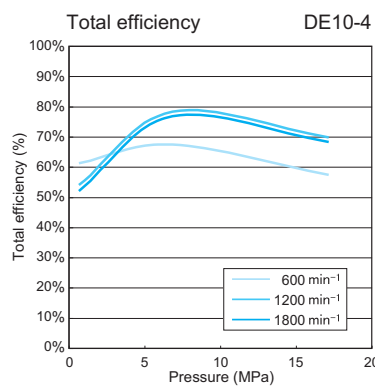
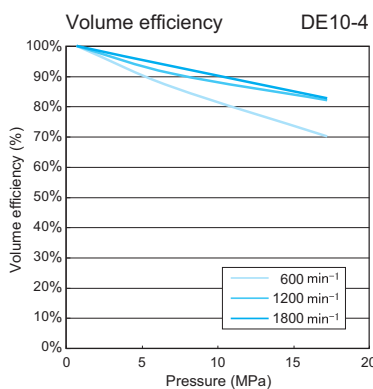
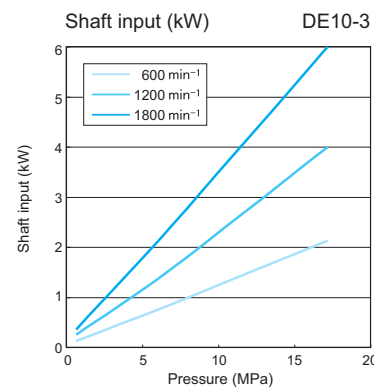
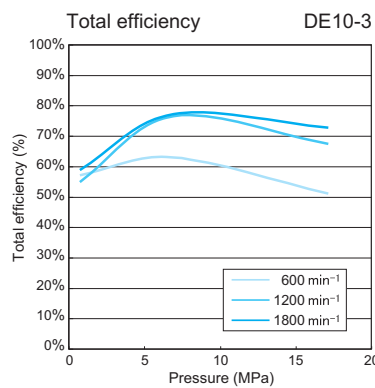
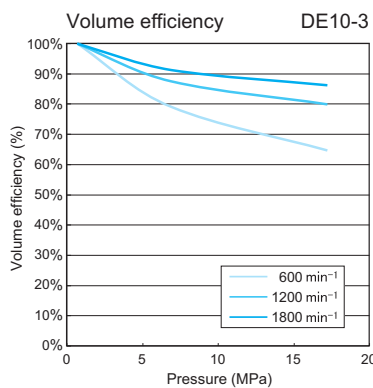
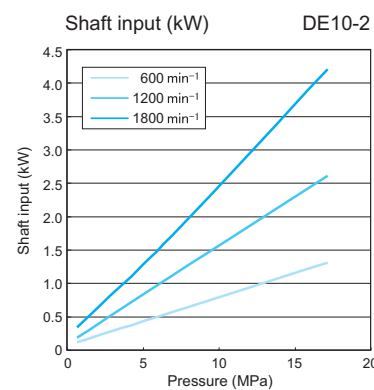
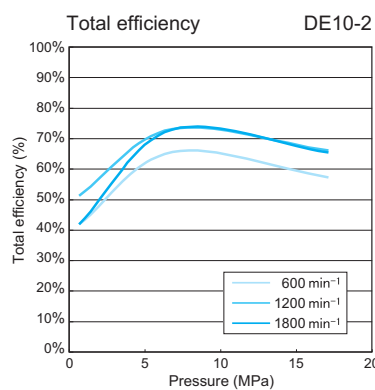
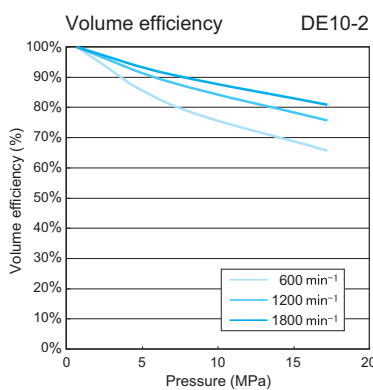
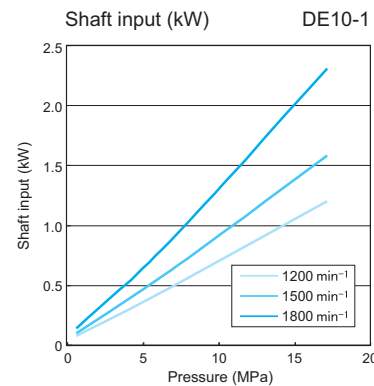
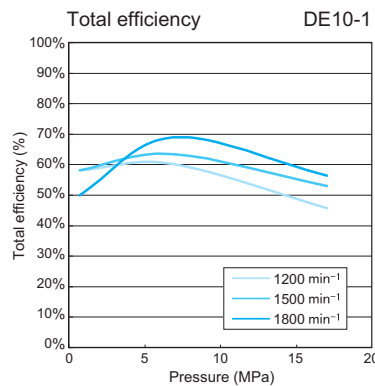
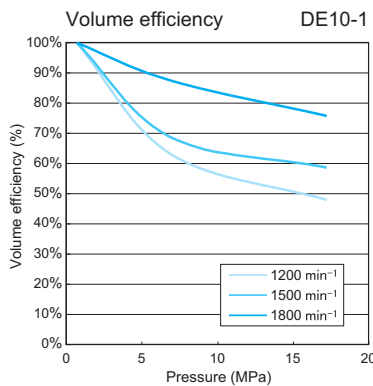
DE10 Seal/bearing table

Part No.	Name	Specifications	Material	Quantity
1	Bearing	6203	-	1
2	Oil seal	Special part	NBR	1
3	O-ring	AS568-143	NBR	1
4	O-ring	AS568-144	NBR	1

DE20 Seal/bearing table

Part No.	Name	Specifications	Material	Quantity
1	Bearing	6204	-	1
2	Oil seal	Special part	NBR	1
3	O-ring	AS568-236	NBR	1
4	O-ring	Special part	NBR	1

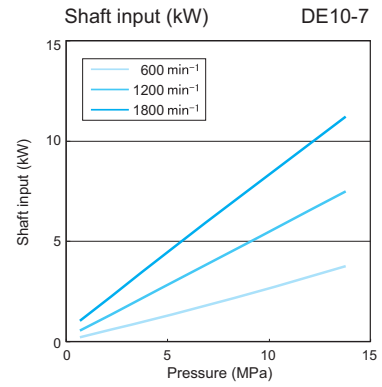
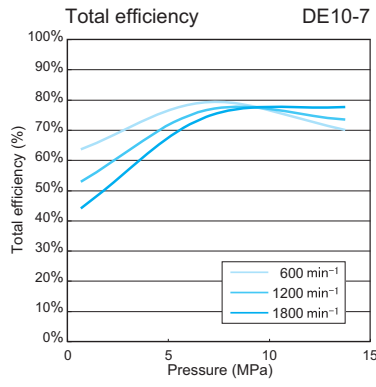
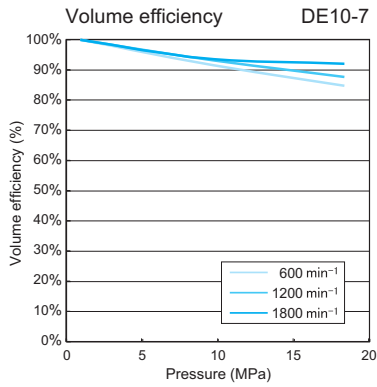
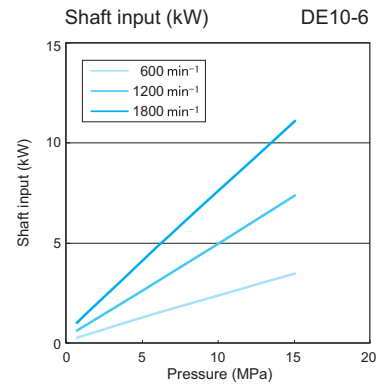
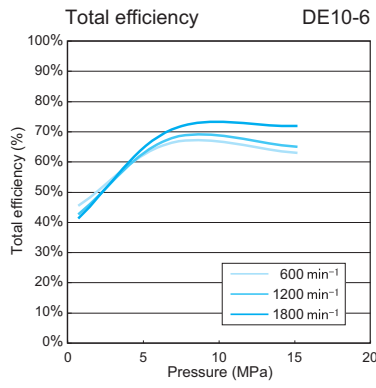
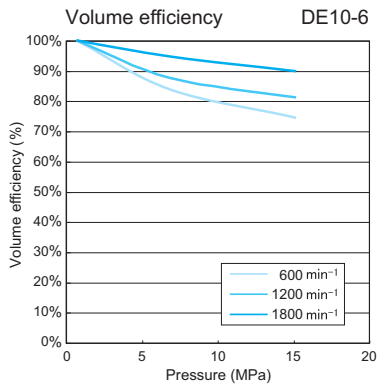
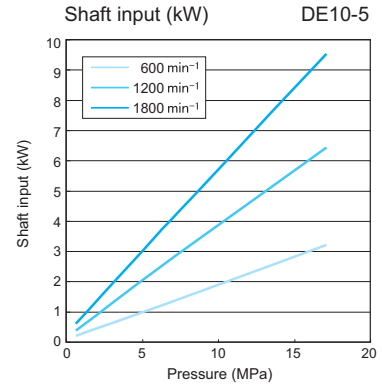
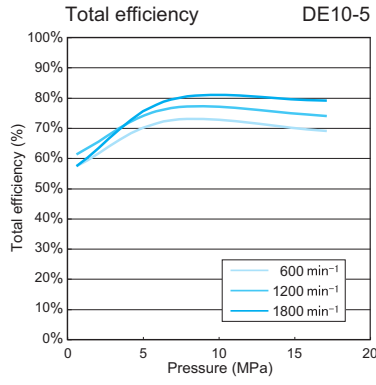
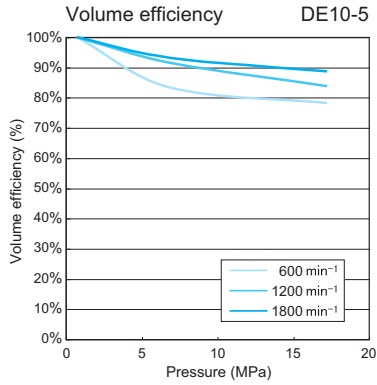
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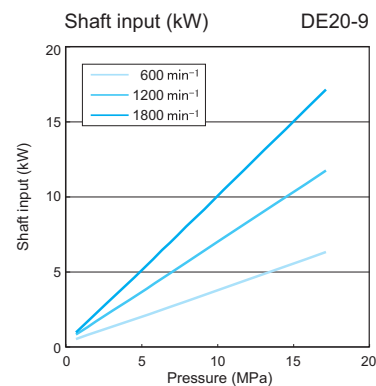
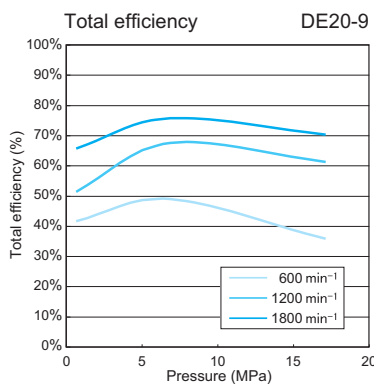
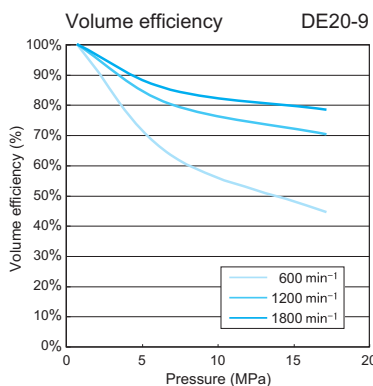
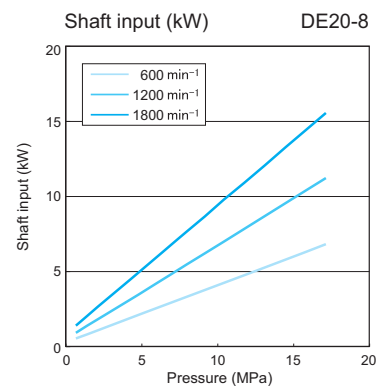
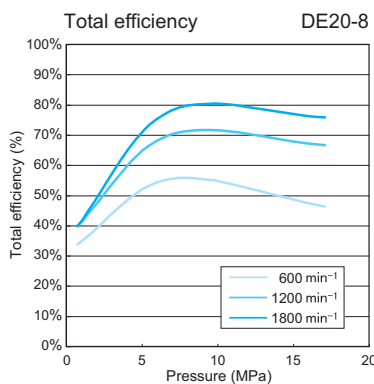
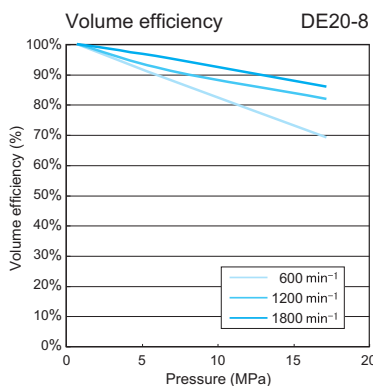
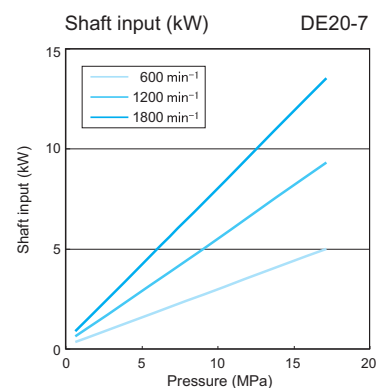
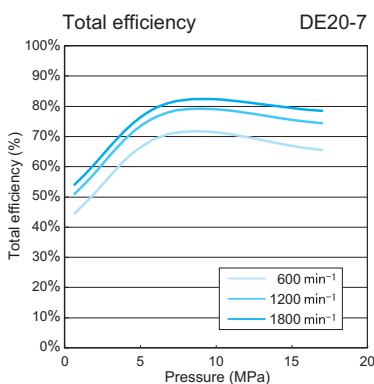
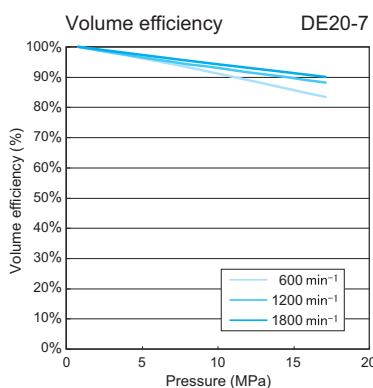
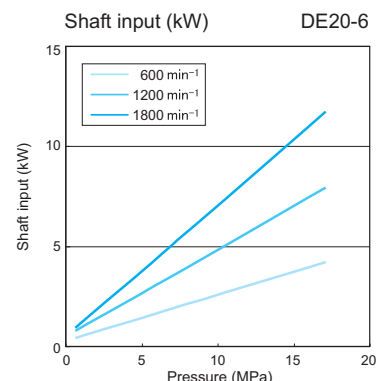
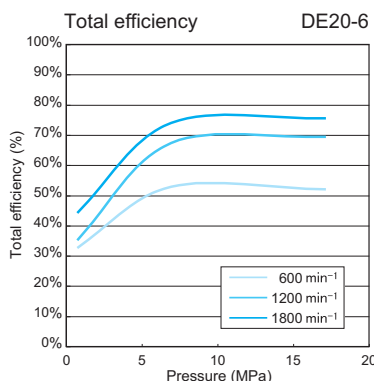
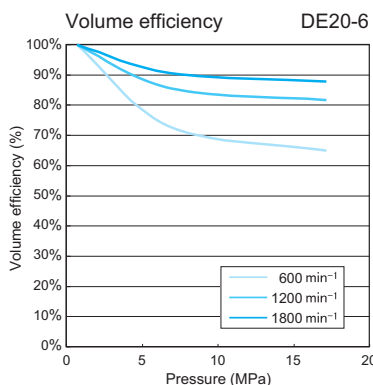
VANE PUMPS

D

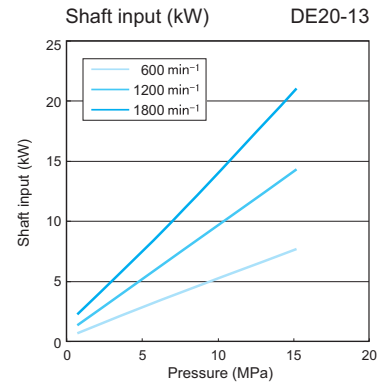
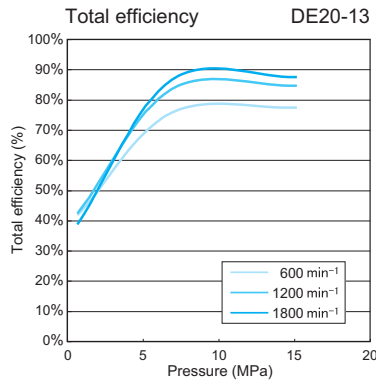
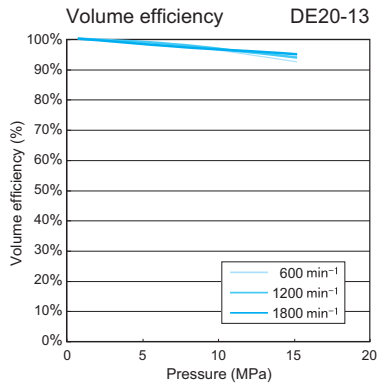
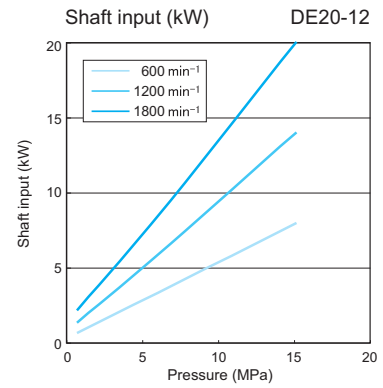
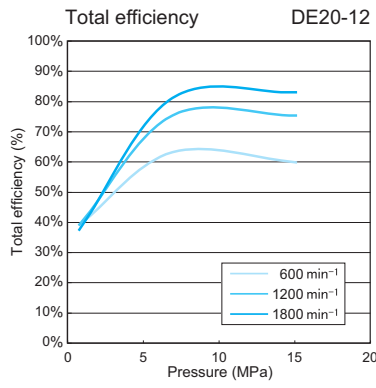
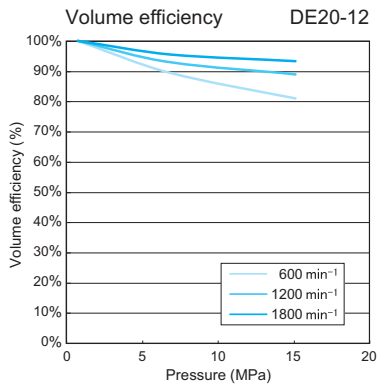
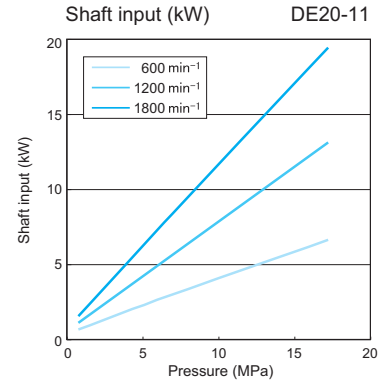
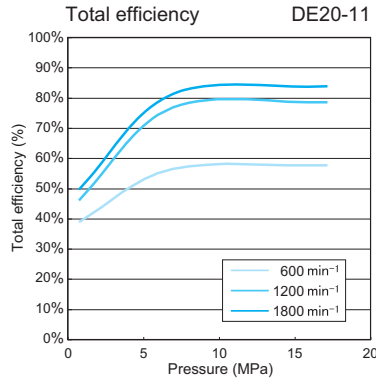
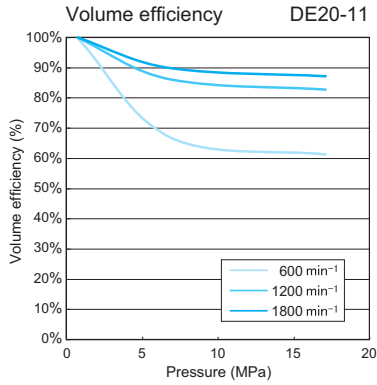
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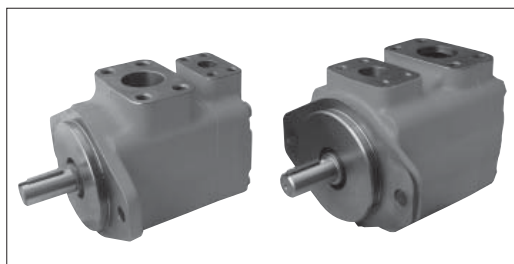
General performance Fluid used: viscosity of 32 mm²/s, Fluid temperature: 49°C



General performance Fluid used: viscosity of 32 mm²/s, Fluid temperature: 49°C



Medium-pressure Cartridge Type Vane Pump



Features

- The intra-vane type structure realizes a low noise level at high pressure. The cartridge type design offers reliable operation over a prolonged period. These vane pumps with a maximum pressure of 20.6 MPa are suited to various applications in industrial machinery.

VANE PUMPS

Nomenclature

※ - **DEV** ※ ※ - ※ - ※ - ※ - **10**
1 2 3 4 5 6 7

1 Applicable fluid code

No designation: Wear-resistant hydraulic fluid
 Water-glycol hydraulic fluid
 F: Phosphate ester hydraulic fluid

2 Model No.

DEV: Medium-pressure cartridge type vane pump

3 Pump capacity code

20: DEV20 (7 to 45 cm³/rev)
 25: DEV25 (33 to 67 cm³/rev)
 35: DEV35 (81 to 121 cm³/rev)
 45: DEV45 (138 to 193 cm³/rev)

4 Pump capacity (cm³/rev)

	DEV20	DEV25	DEV35	DEV45			
2:	7	10:	33	25:	81	42:	138
5:	18	12:	40	30:	97	45:	147
8:	27	14:	45	35:	112	50:	162
9:	30	17:	55	38:	121	60:	193
11:	36	21:	67				
12:	39						
14:	45						

6 Installation types

No designation: Without foot support
 B: Foot support mount

7 Design No.

(The design No. is subject to change)

5 Direction of rotation, when viewed from the shaft end

R: Clockwise (rightward)
 L: Counterclockwise (leftward)

Specifications and masses

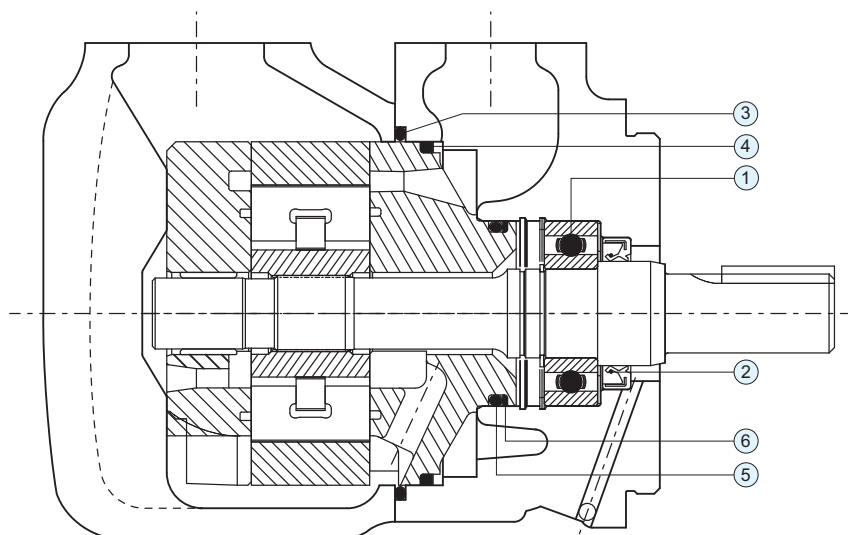
Model No.	Displacement volume cm ³ /rev	Maximum pressure* MPa	Minimum pressure MPa	Minimum rotational speed min ⁻¹	Maximum rotational speed* min ⁻¹	Mass kg				
						Without foot support	With foot support			
DEV20-2	7	13.8	0.7	600	1800	12.0	14.7			
DEV20-5	18									
DEV20-8	27									
DEV20-9	30									
DEV20-11	36									
DEV20-12	39									
DEV20-14	45	13.8				17.2			14.8	17.5
DEV25-10	33									
DEV25-12	40									
DEV25-14	45									
DEV25-17	55									
DEV25-21	67									
DEV35-25	81	17.2							22.7	28.6
DEV35-30	97									
DEV35-35	112									
DEV35-38	121									
DEV45-42	138									
DEV45-45	147	17.2				34.0	39.9			
DEV45-50	162									
DEV45-60	193									

* Values with wear-resistant hydraulic fluid

- Foot supports are not provided with the pump. Order them separately as required by referring to Page S-2.
- Refer to Pages D-31 and 32 for the conditions of use for models compatible with flame-resistant hydraulic oil and for other notes on handling.
- Refer to Page S-3 for the machining dimensions of coupling holes.

Sectional structural diagram

DEV20, 25, 35, 45



D
VANE PUMPS

DEV20 Seal/bearing table

Part No.	Name	Specifications	Material	Quantity
1	Bearing	6204	—	1
2	Oil seal	Special part	NBR	1
3	O-ring	AS568-236 (HS70°)	—	1
4	Sealing ring	Special part	—	1
5	O-ring	AS568-222 (HS70°)	NBR	1
6	Backup ring	MS28774-222	PTFE	1

DEV35 Seal/bearing table

Part No.	Name	Specifications	Material	Quantity
1	Bearing	6306	—	1
2	Oil seal	Special part	NBR	1
3	O-ring	AS568-247 (HS70°)	NBR	1
4	Sealing ring	Special part	—	1
5	O-ring	AS568-230 (HS70°)	NBR	1
6	Backup ring	MS28744-146	PTFE	1

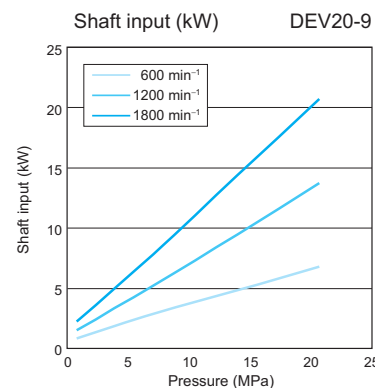
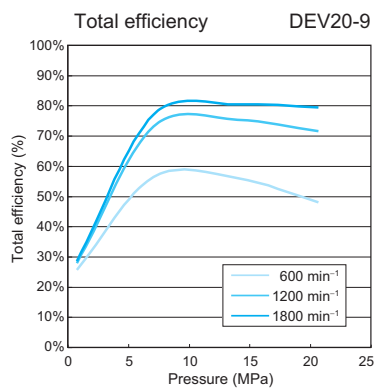
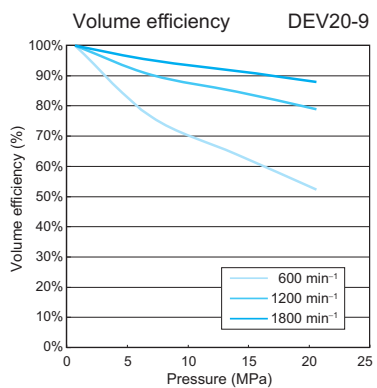
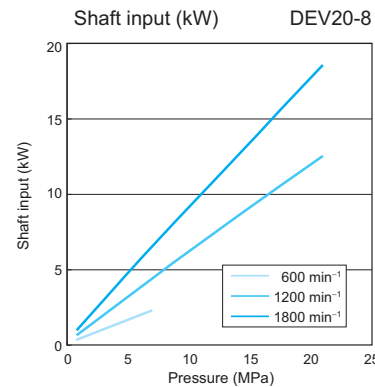
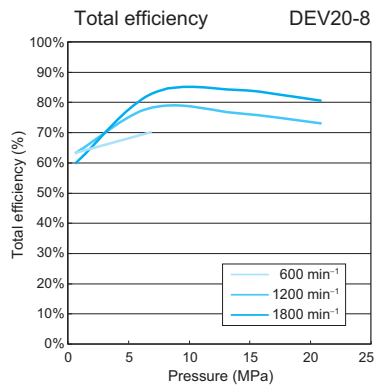
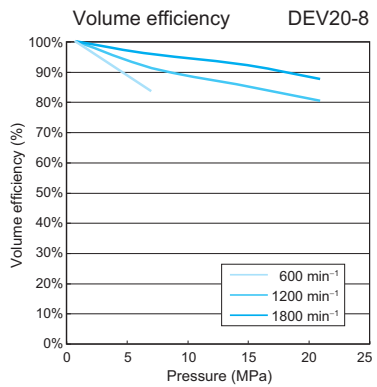
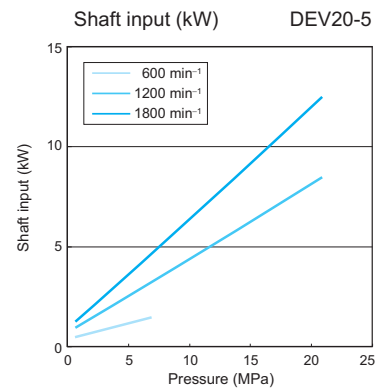
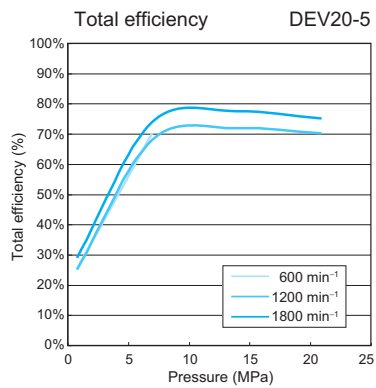
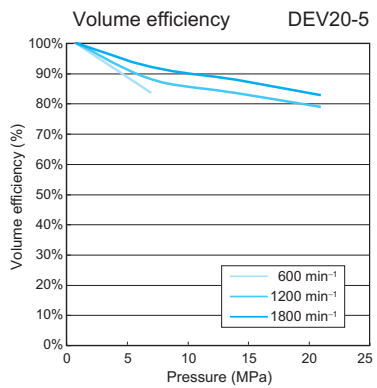
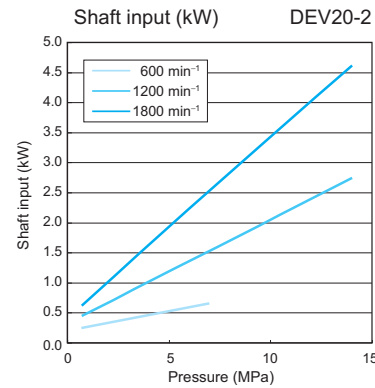
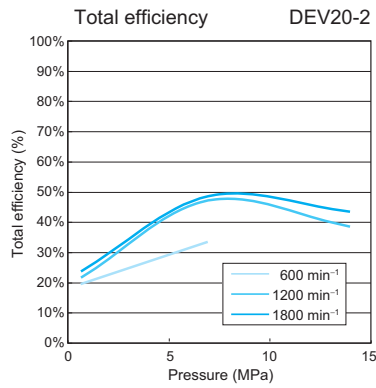
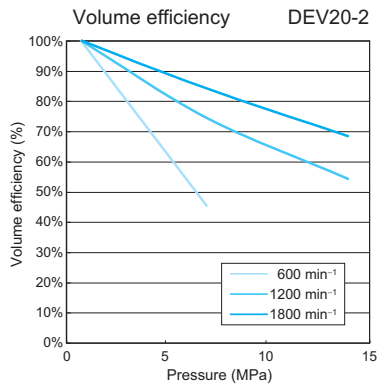
DEV25 Seal/bearing table

Part No.	Name	Specifications	Material	Quantity
1	Bearing	6205	—	1
2	Oil seal	Special part	NBR	1
3	O-ring	AS568-241 (HS70°)	NBR	1
4	Sealing ring	Special part	—	1
5	O-ring	AS568-224 (HS70°)	NBR	1
6	Backup ring	MS28774-224	PTFE	1

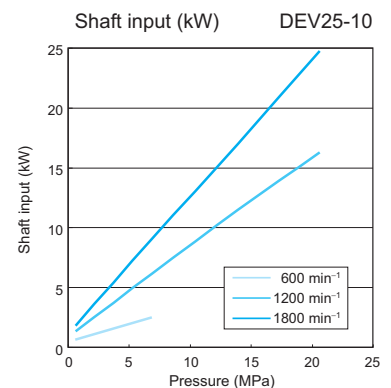
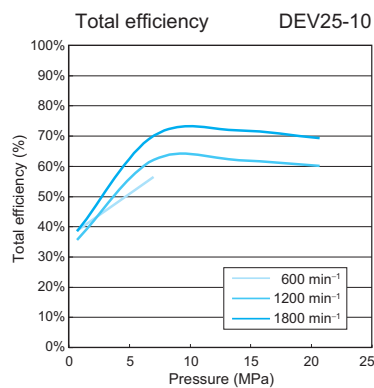
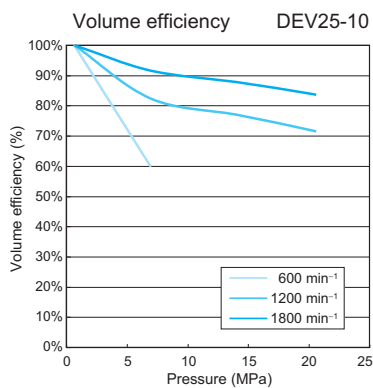
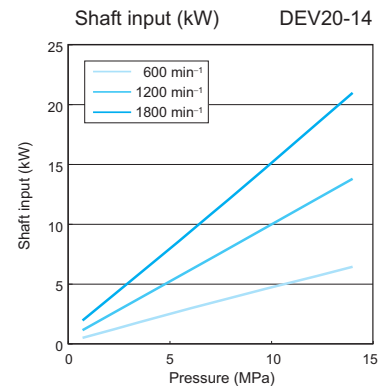
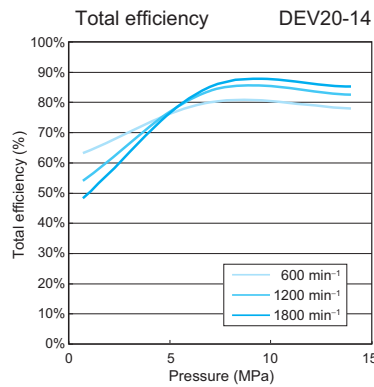
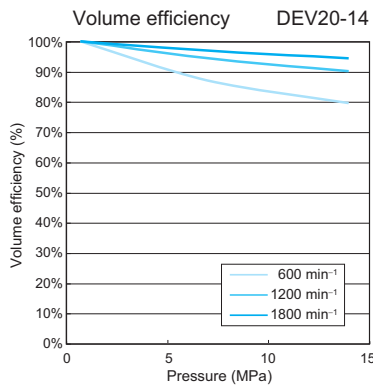
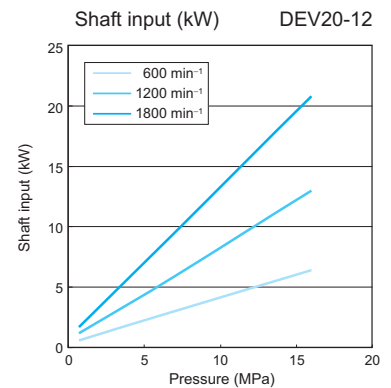
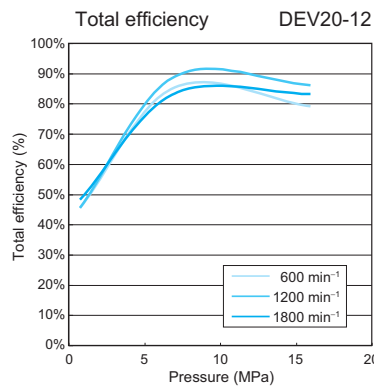
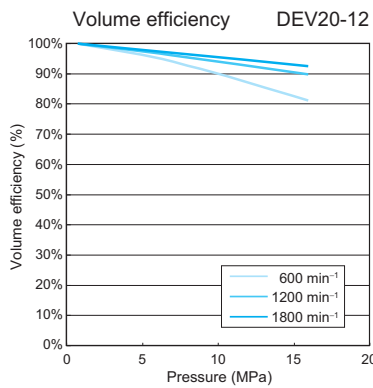
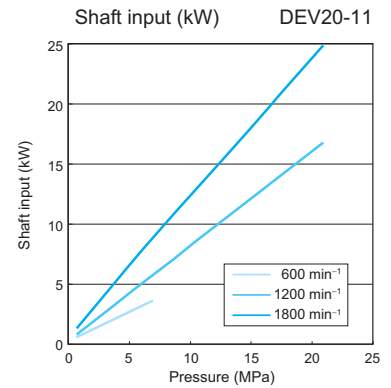
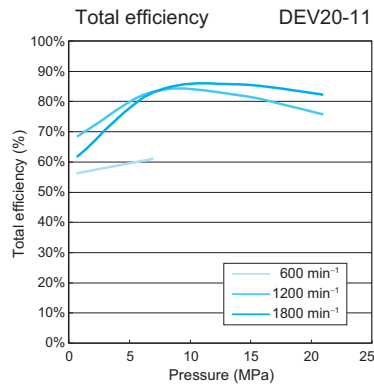
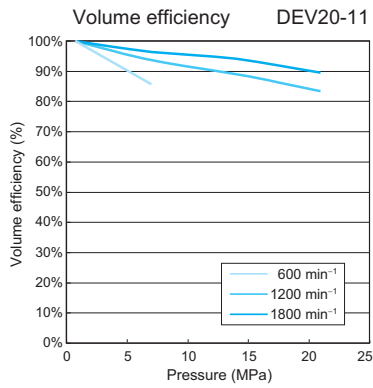
DEV45 Seal/bearing table

Part No.	Name	Specifications	Material	Quantity
1	Bearing	6307	—	1
2	Oil seal	Special part	NBR	1
3	O-ring	AS568-253 (HS70°)	NBR	1
4	Sealing ring	Special part	—	1
5	O-ring	AS568-233 (HS70°)	NBR	1
6	Backup ring	MS28744-233	PTFE	1

General performance Fluid used: viscosity of 26 mm²/s, Fluid temperature: 50°C

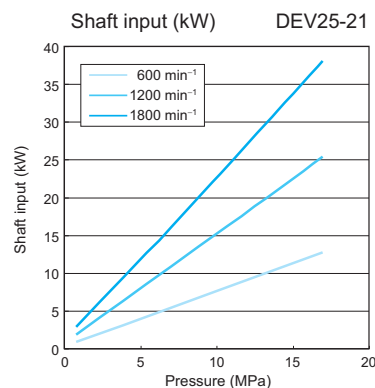
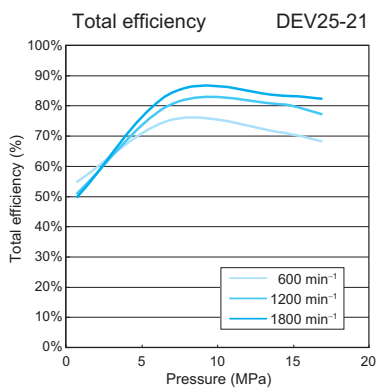
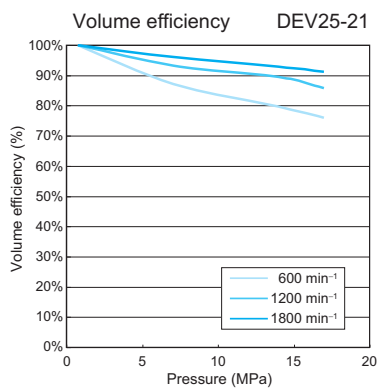
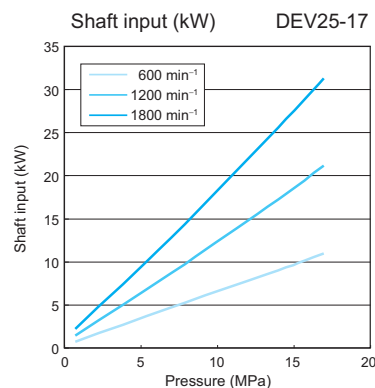
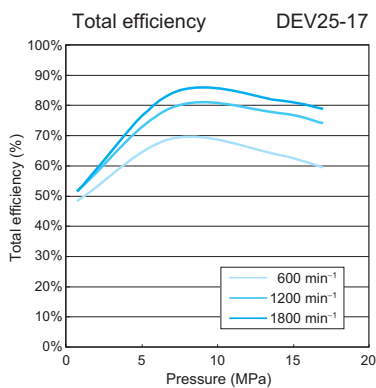
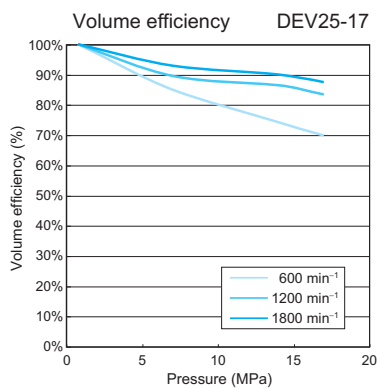
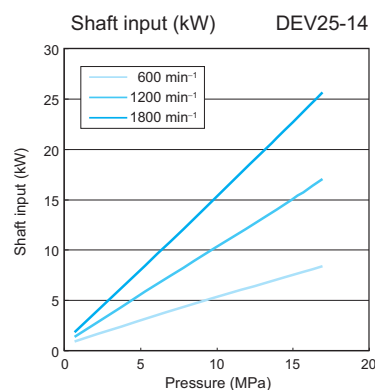
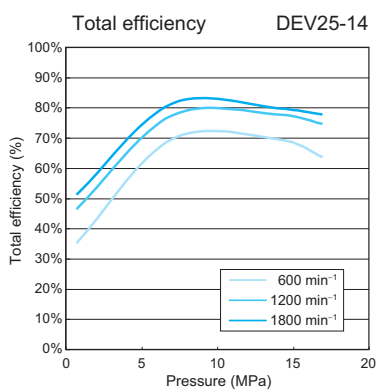
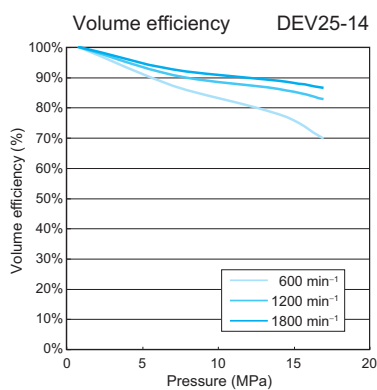
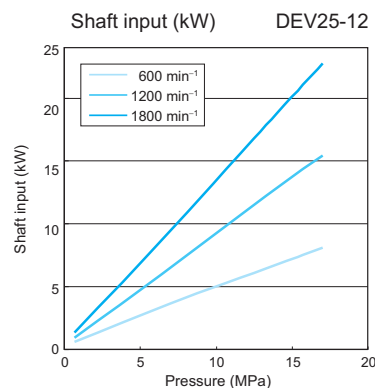
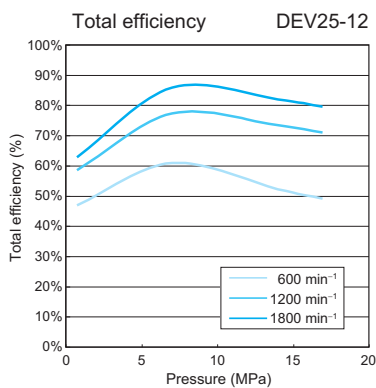
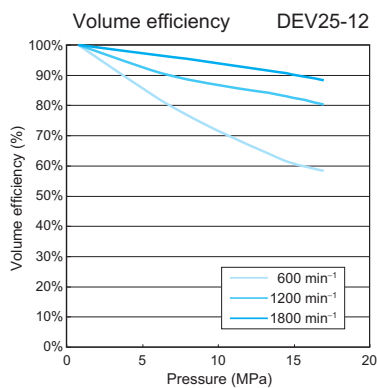


General performance Fluid used: viscosity of 26 mm²/s, Fluid temperature: 50°C

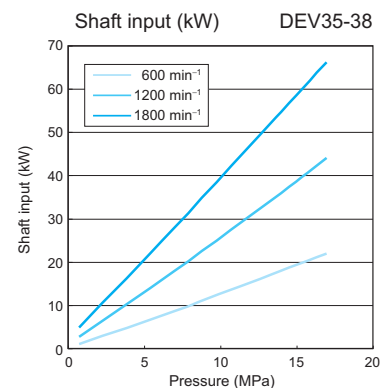
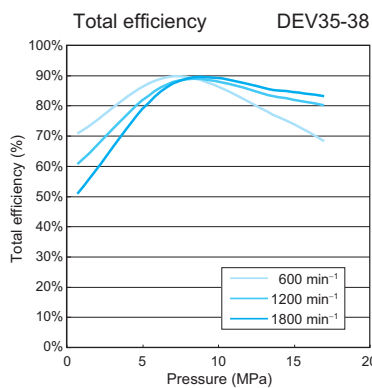
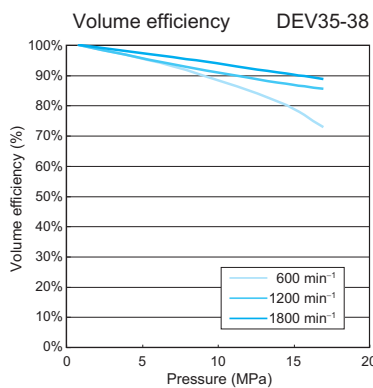
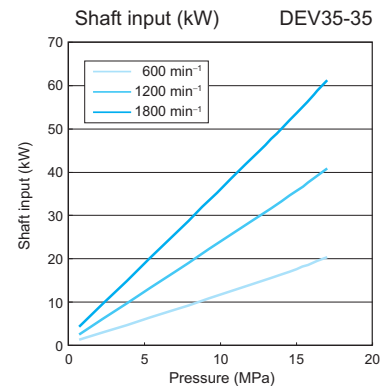
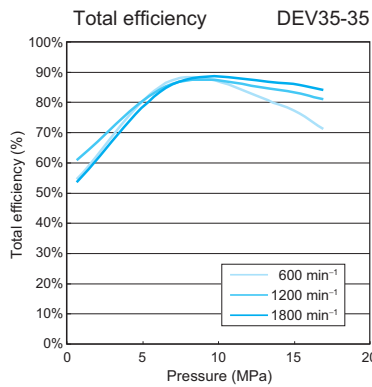
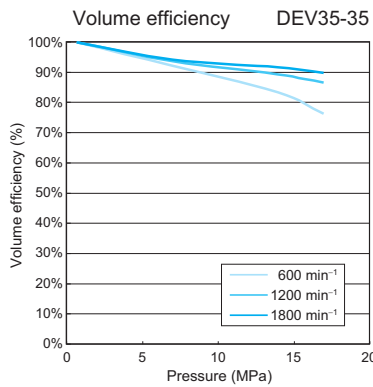
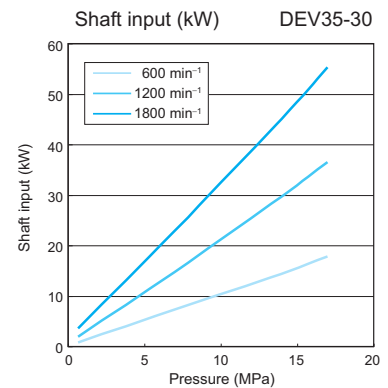
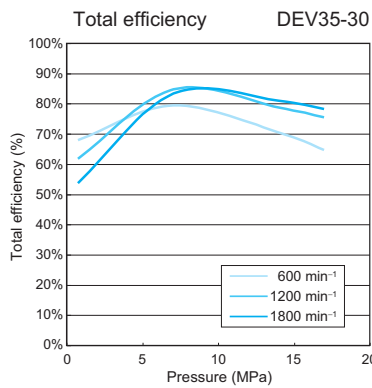
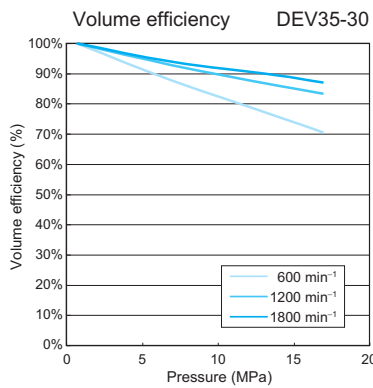
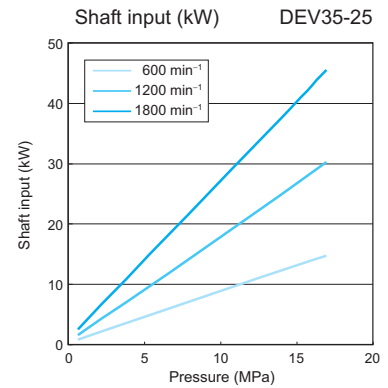
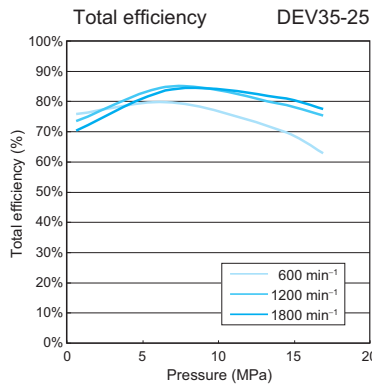
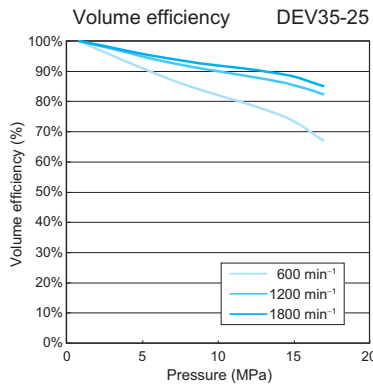


VANE PUMPS

General performance Fluid used: viscosity of 26 mm²/s, Fluid temperature: 50°C

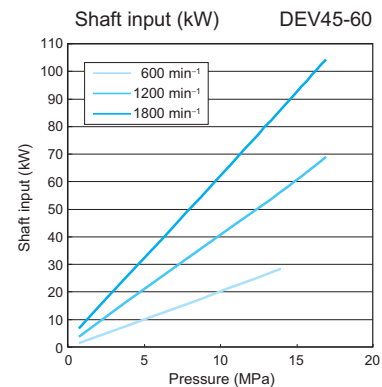
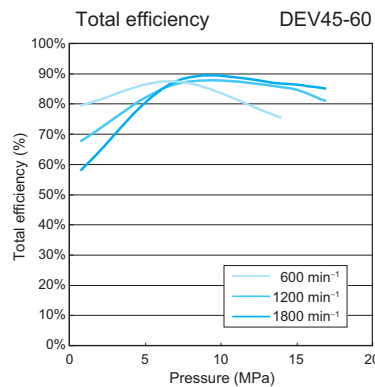
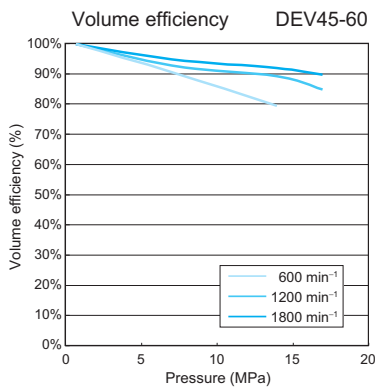
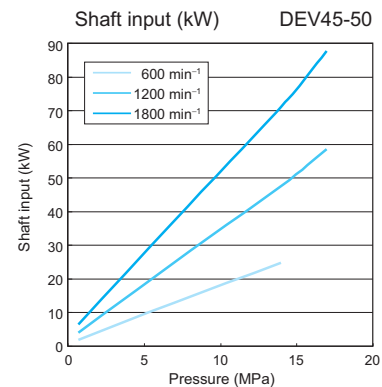
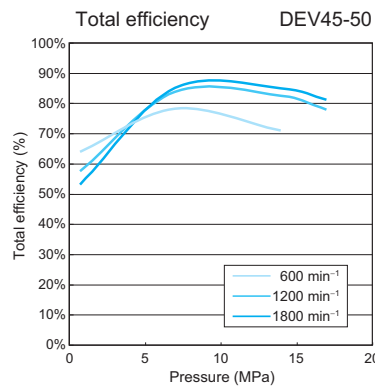
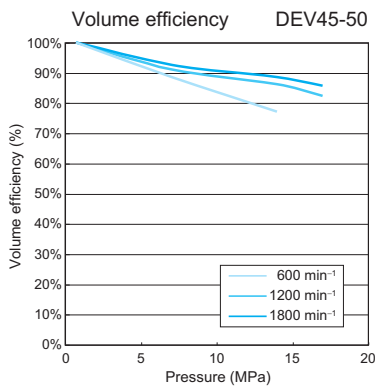
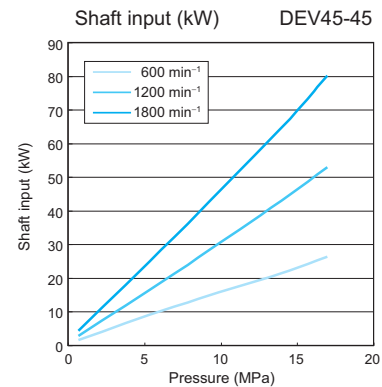
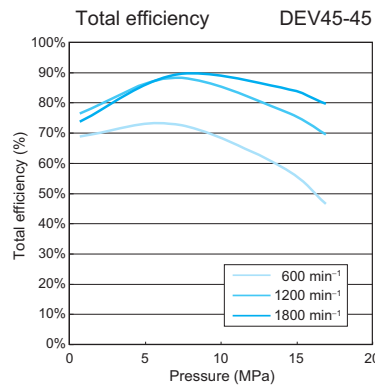
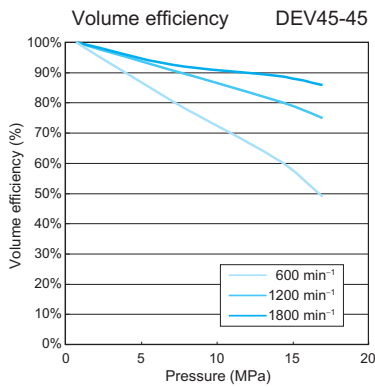
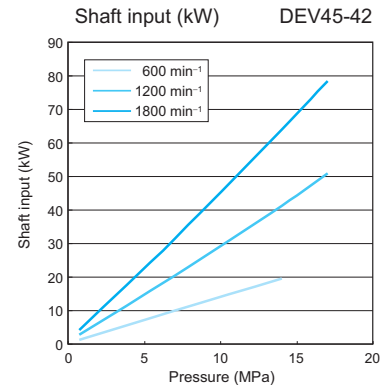
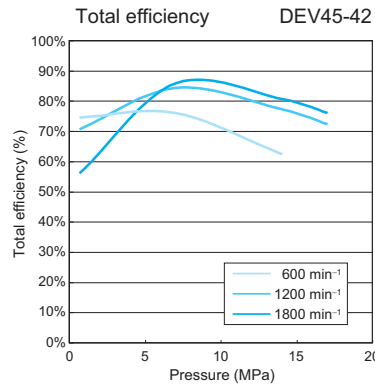
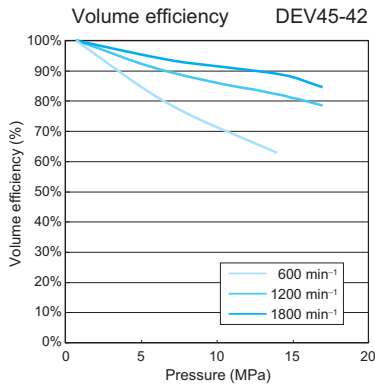


General performance Fluid used: viscosity of 26 mm²/s, Fluid temperature: 50°C



D
VANE PUMPS

General performance Fluid used: viscosity of 26 mm²/s, Fluid temperature: 50°C



Conditions of use for models compatible with flame-resistant hydraulic oil (DE, DEV)

Hydraulic oil	Model No.	DE10-1 to 5			DE10-6, 7			DE20-6 to 9			DE20-11 to 13		
		Operating pressure MPa		Permissible rotational speed min ⁻¹	Operating pressure MPa		Permissible rotational speed min ⁻¹	Operating pressure MPa		Permissible rotational speed min ⁻¹	Operating pressure MPa		Permissible rotational speed min ⁻¹
		Maximum	Minimum		Maximum	Minimum		Maximum	Minimum		Maximum	Minimum	
Wear-resistant hydraulic fluid		17.2	0.7	600 to 1800	13.8 to 15.2	0.7	600 to 1800	17.2	0.7	600 to 1800	15.2 to 17.2	0.7	600 to 1800
Water-glycol hydraulic fluid		12.2	0.7		12.2	0.7		12.2	0.7		10.7	0.7	
Water/oil emulsion type hydraulic fluid		10.1	0.7		10.7	0.7		10.7	0.7		9.1	0.7	
Phosphate ester hydraulic fluid		13.5	0.7		13.5	0.7		13.5	0.7		12.2 to 13.5	0.7	

Hydraulic oil	Model No.	DEV20			DEV25			DEV35			DEV45		
		Operating pressure MPa		Permissible rotational speed min ⁻¹	Operating pressure MPa		Permissible rotational speed min ⁻¹	Operating pressure MPa		Permissible rotational speed min ⁻¹	Operating pressure MPa		Permissible rotational speed min ⁻¹
		Maximum	Minimum		Maximum	Minimum		Maximum	Minimum		Maximum	Minimum	
Wear-resistant hydraulic fluid		13.7 to 20.6	0.7	600 to 1800	17.2	0.7	600 to 1800	17.2	0.7	600 to 1800	17.2	0.7	600 to 1800
Water-glycol hydraulic fluid		13.7 to 15.9	0.7	600 to 1500	15.7	0.7	600 to 1500	15.7	0.7	600 to 1500	15.7	0.7	600 to 1500
Water/oil emulsion type hydraulic fluid		6.9	0.7	600 to 1200	6.9	0.7	600 to 1200	6.9	0.7	600 to 1200	6.9	0.7	600 to 1200
Phosphate ester hydraulic fluid		13.7 to 20.6	0.7	600 to 1800	17.2	0.7	600 to 1800	17.2	0.7	600 to 1800	17.2	0.7	600 to 1800

Handling (DE, DEV)

● Hydraulic oil

- A viscosity grade of ISO VG32 or ISO VG46 is recommended.
- Avoid using MIL-spec. hydraulic fluid, high water base hydraulic fluid (HFA), or spindle oil.
- Maintain the fluid temperature inside the tank in the range 10 to 45°C when using a water-glycol hydraulic fluid or water/oil emulsion type hydraulic fluid.
- Recommended contamination level of hydraulic fluid

Operating pressure MPa		Up to 13.7	13.7 to 20.6	Over 20.6
Recommended contamination level	ISO class	20/18/15	19/17/14	18/16/13
	NAS class	10	9	8

Use clean hydraulic fluid that satisfies the recommended contamination level for the operating pressure.

● Installation and alignment

- Ensure that the eccentricity of the drive shaft and pump shaft is no greater than 0.05 mm (TIR), and run the pump with no force acting perpendicularly on the pump shaft. Misalignment between the shaft centers will cause damage to bearings and oil seals, generate noise and vibration, and lead to pump accidents.
- Avoid crosswise drive using a belt, chain or gears (it will cause noise generation or damage to the bearings).
- The pump shaft can be installed vertically.
- Restrict the clearance between the spigot joint of the flange and the hole to +0.01 to +0.05 mm in diameter.
- Restrict the clearance between the key shaft and the coupling hole to +0.003 to +0.025 mm in diameter.

● Filters

- Use a suction filter with 150 meshes per inch at the inlet side.
- In the return line to the tank at the discharge side, use a line filter with a filtration accuracy of 25 μm or better.
- For delivery pressures of 14 MPa {140 kgf/cm²} or greater, use a line filter with a filtration accuracy of 10 μm or better.

● Piping

- Ensure the suction port is airtight. Aeration will cause abnormal noise.

- When using steel pipes for piping, take care not to force the pump off center. Forcing the pump off center with pipes may cause abnormal noise.

● At start

- Fill inside the pump and the hydraulic system with the hydraulic fluid before starting operation.
- After checking that all hydraulic circuits and electrical circuits are ready for operation, set the hydraulic circuit at the load side in the no-load status before starting the pump.
- When the pump is driven for the first time, turn the power switch to the motor on and off a few times to let the air out of the piping and then run it continuously at full speed.
- At a fluid temperature of 7°C or lower, warm up the pump by running it at a pressure of 2 MPa maximum and increase the pressure when the fluid temperature has risen. (Note that the pressure must be 0.7 MPa minimum.)
- If there is a temperature difference of 20°C or greater between the pump and fluid, warm up the pump to reduce the temperature difference to within 20°C before running it.

● Suction pressure

- Keep the suction pressure within the permissible suction pressure of the pump.
- High suction pressures will generate cavitation and cause damage to the parts, noise, and vibration, resulting in a shorter pump service life.
- The discharge pressure must always be larger than the suction pressure.

	Permissible suction pressure MPa	
	Hydraulic fluid (1)	Hydraulic fluid (2)
DE series	-0.017 to 0.068	-0.01 to 0.068
DEV series	-0.017 to 0.14	-0.01 to 0.14

(1) Wear-resistant hydraulic fluid (2) Water-glycol hydraulic fluid, water/oil emulsion type hydraulic fluid, phosphate ester hydraulic fluid

● Maximum pressure

- The rated pressure refers to the maximum pressure at which the product can be operated continuously.

Starting up procedure and points to note (DE, DEV)

- Supply fluid from either the pump's discharge port or suction port before starting the pump. Avoid piping where both of the ports are installed downward. As far as possible, try to arrange the oil tank and the pump such that the oil level in the tank is higher than the pump position. If the oil tank needs to be arranged such that the pump position is lower than the oil level, keep the piping length as short as possible and be sure to supply fluid into the pump casing from either the discharge port or suction port before starting the pump.
- The pump usually starts suctioning and discharging the fluid within two to three seconds after it is started. If no fluid is discharged, check for resistance at the suction side of the pump, aeration, and removal of air at the discharge side.
- Air has to be removed from the hydraulic system to enable suctioning by the pump when starting it for the first time. If it cannot be removed, implement the necessary measures, such as loosening the pipe joint at the discharge side or providing an air bleeding valve to enable removal of air. If the pump does not suction or discharge even after such measures, increasing the rotational speed of the pump may help. Follow the guideline below for the rotational speed of the pump when starting it for the first time.

Guideline for rotational speed of the pump when starting it for the first time

DE series	DEV series
1000 min ⁻¹ minimum	800 min ⁻¹ minimum
If the oil level is lower than the pump position and insufficient priming fluid is supplied at the start, it may be necessary to run the pump at 1500 min ⁻¹ or higher.	If the oil level is lower than the pump position and insufficient priming fluid is supplied at the start, it may be necessary to run the pump at 1000 min ⁻¹ or higher.

When starting the pump at a rotational speed lower than the guideline above, it is advisable to have the oil level in the oil tank higher than the pump position.

- Once the pump has started suctioning and discharging, securely fasten the connections at the discharge side that were loosened earlier. At the initial operation of the pump, run it for 5 to 10 minutes with no load to remove air in the hydraulic system. When the entire system has filled with fluid with the air fully removed, the pump can run under the regular operation conditions.

The operating conditions while the pump is running are as follows.

	DE series	DEV series
Minimum rotational speed	600 min ⁻¹	600 min ⁻¹
Recommended suction pressure	0 to 0.034 MPa	0 to 0.034 MPa
Permissible suction pressure	-0.017 to 0.068 MPa	-0.017 to 0.14 MPa
Recommended hydraulic fluid viscosity	13 to 54 cSt	13 to 54 cSt
Maximum viscosity at start	220 cSt	860 cSt

- When the pump is stopped for a long time, or when building a system where fluid inside the discharge/suction piping of the pump is drained when the pump is stopped, arrange the suction piping of the pump in the direction that prevents the fluid inside the pump casing draining out. By orienting the suction/discharge port upward or sideways, fluid is retained inside the pump on starting it after it has been stopped for a long time, and dry running of the pump can be avoided. When starting the pump after it has been stopped for a long time, follow the procedure and pay due attention to the points to note given above again.
- The condition of fluid inside piping in relation to the time that the pump has been stopped varies depending on the system configuration and conditions of use. However, it is necessary to check that the pump suction fluid and the pressure rises properly after the pump has been stopped for around a week to 10 days. If suctioning at the pump cannot be confirmed, stop the pump and restart it by following the procedure above.

D

GEAR PUMPS

Handling

● Hydraulic oil

- Use a general-purpose hydraulic oil (R&O) equivalent to ISO VG32 to 68, or wear-resistant hydraulic oil.
- Operate the unit in an environment where both the following conditions are satisfied: viscosity range from 15 to 400 mm²/s {cSt} and oil temperature from 0 to 60°C.
- Contamination of the hydraulic fluid causes pump trouble and reduces the service life, so pay due attention to controlling contamination and ensure that it goes no higher than NAS contamination class 9.

● Filters

- Use a suction filter with 150 meshes per inch at the inlet side.
- In the return line to the tank at the discharge side, use a line filter with a filtration accuracy of 25 μm or better.

● Piping

- Ensure the suction port is airtight. Aeration will cause abnormal noise.
- When using steel pipes for piping, take care not to force the pump off center. Forcing the pump off center with pipes may cause abnormal noise.

● At start

- Supply fluid inside the pump before starting operation for better lubrication of sliding surfaces.
- After checking that all hydraulic circuits and electrical circuits are ready for operation, set the hydraulic circuit at the load side in the no-load status or connect an unloading circuit before starting the pump.
- Check that the pump rotates in the direction of the arrow showing the direction of rotation.
- When the pump is driven for the first time, turn the power switch to the motor on and off a few times to let the air out of the piping and then run it continuously at full speed. Noise may be observed until the air has been completely removed but this is not abnormal.
- At a fluid temperature of 7°C or lower, warm up the pump by running it at a pressure of 2 MPa {20 kgf/cm²} maximum and increase the pressure when the fluid temperature has risen.
- If there is a temperature difference of 20°C or greater between the pump and fluid, warm up the pump to reduce the temperature difference to within 20°C before running it.

● Suction pressure

- Maintain the suction pressure -13.3 kPa to 15 kPa {-100 mmHg to 0.5 kgf/cm²}.
- The unit can permit a pressure up to -40.0 kPa {-300 mmHg} for short time at the start but do not increase the pressure during this time.
- High suction pressures will generate cavitation and cause damage to the parts, noise, and vibration, resulting in a shorter pump service life.

● Rated pressure

- The rated pressure refers to the maximum pressure at which the product can be operated continuously.

● Maximum operating pressure

- The maximum operating pressure refers to the maximum pressure at which the product can be operated.

MFP100 Series Motor Pumps



- These are motor pumps that integrate a TFP type gear pump and an electric motor in one body.

Nomenclature

MFP100/ ※ ※ - 2 - ※ - 20

1

2

3

4

5

1 Model No.

MFP100: MFP100 series motor pump

2 Pump capacity

1.2: 1.2 cm³/rev
 1.7: 1.7 cm³/rev
 2.2: 2.2 cm³/rev
 2.6: 2.6 cm³/rev
 3.2: 3.2 cm³/rev
 3.8: 3.8 cm³/rev
 4.3: 4.3 cm³/rev
 7.8: 7.8 cm³/rev

3 Voltage specifications

2: AC 200 V (50/60 Hz), AC 220 V (60 Hz)

4 Motor output

0.4: 0.4 kW-4P
 0.75: 0.75kW-4P
 1.5: 1.5 kW-4P
 2.2: 2.2 kW-4P

5 Design No. (The design No. is subject to change)

Specifications

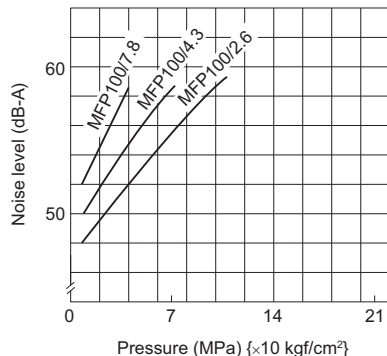
Model code	Gear pump type	Motor kW (4P)				Operating pressure MPa {kgf/cm ² }		Theoretical discharge rate cm ³ /rev
		0.4	0.75	1.5	2.2	Maximum	Rated	
MFP100/1.2-2-※-20	TFP100/1.2DCI06-20	✓	✓	✓	-	21 {210}	14 {140}	1.2
MFP100/1.7-2-※-20	TFP100/1.7DCI06-20	✓	✓	✓	-			1.7
MFP100/2.2-2-※-20	TFP100/2.2DCI06-20	✓	✓	✓	✓			2.2
MFP100/2.6-2-※-20	TFP100/2.6DCI06-20	✓	✓	✓	✓			2.6
MFP100/3.2-2-※-20	TFP100/3.2DCI06-20	✓	✓	✓	✓			3.2
MFP100/3.8-2-※-20	TFP100/3.8DCI06-20	✓	✓	✓	✓			3.8
MFP100/4.3-2-※-20	TFP100/4.3DCI06-20	✓	✓	✓	✓			4.3
MFP100/7.8-2-※-20	TFP100/7.8DCI06-20	-	✓	✓	✓	18 {180}	10.5 {105}	7.8

4: Motor output and specifications

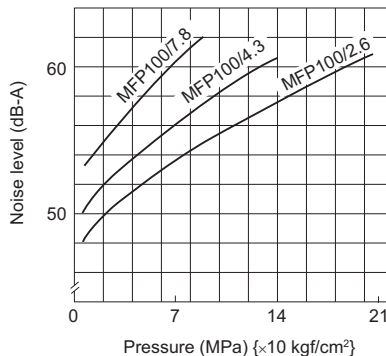
Code	Output kW (Number of poles: 4P)	Motor rated current A		
		200 V (50 Hz)	200 V (60 Hz)	220 V (60 Hz)
0.4	0.4	2.4	2.1	2.1
0.75	0.75	3.7	3.4	3.3
1.5	1.5	6.8	6.2	6.3
2.2	2.2	9.6	9.0	8.4

Noise characteristics (measuring position: 1 m from pump front)

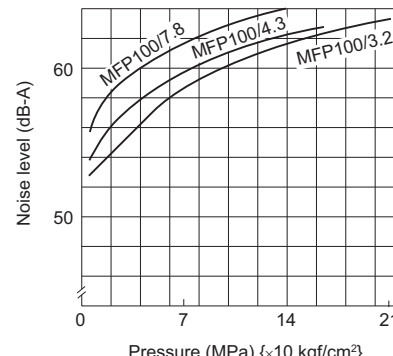
Motor 0.75 kW



Motor 1.5 kW



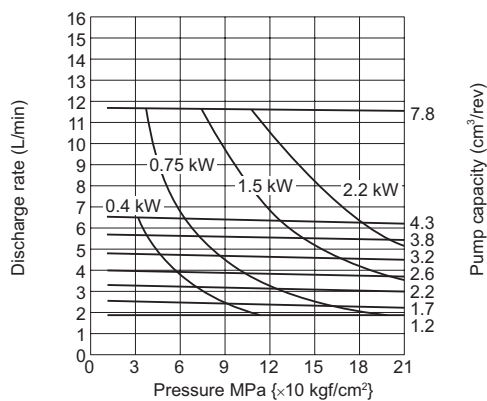
Motor 2.2 kW



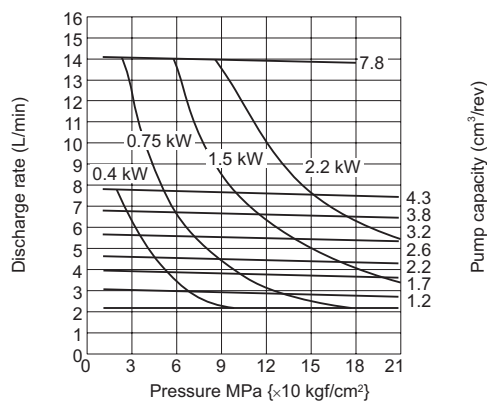
GEAR PUMPS

Shaft input characteristics

Input rotational speed: 1500 min⁻¹



Input rotational speed: 1800 min⁻¹



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