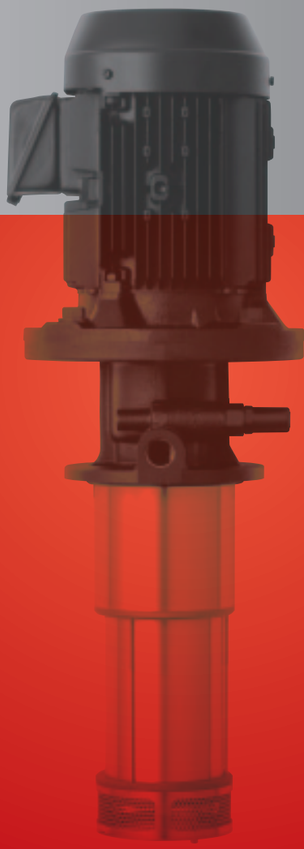
Create the New Stream!

NOP™

VORTEX™

VORTEX Products Guide



NOP™

Nippon Oil Pump Co., Ltd.

VORTEX™

Customer Service: [Tel] 03-5294-5807 [E-mail] vortex@nop-group.jp

VORTEX direct website: Search NOP VORTEX www.nop-vortex.jp

Notice related to safety:
For safe operation of our products, please peruse through the User's Guide included with the product without fail.

NOP™ **Nippon Oil Pump Co., Ltd.**

This catalog is valid through November, 2014.

For further information:

検索 NOP PUMP

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2-15-9 Uchi-Kanda, Chiyoda-ku, Tokyo 7101-0047
Japan

Your dealer:

20131118-V

Patent pending

VORTEX™

All-in-one Coolant Pump

EP Series

Pump: Plunger
Motor: 2200W/AC
Flowrate 15ℓ/min
Pressure: 7.0MPa

ET Series

Pump: Trochoid™
Motor: 1500W/AC
Flowrate 24ℓ/min
Pressure: 2.0MPa

CT Series

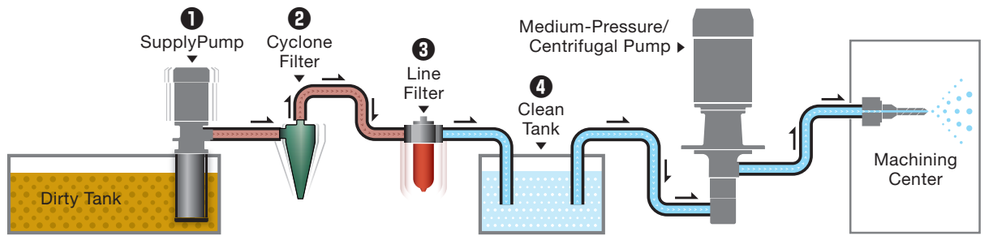
Pump: Trochoid™
Motor: 1500W/AC
Flowrate 24ℓ/min
Pressure: 2.0MPa

RoHS REACH

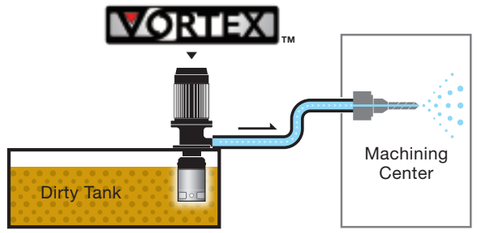
Vortex products are compliant with the RoHS Directive and Reach Regulation.

The All-in-One Coolant Pump —
Saves the cost of various components,
Requires no maintenance, and
Performs well in tough conditions.

Existing Flow (Conventional coolant unit)

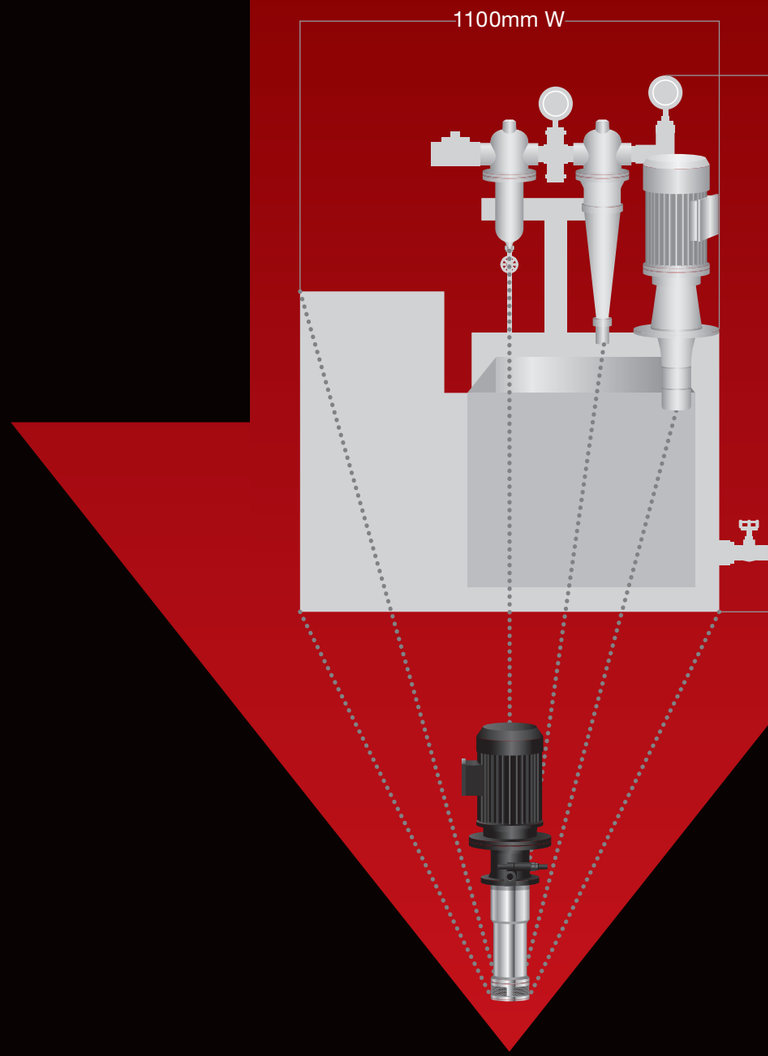


Proposal by VORTEX



- ❶ NO supply pump
- ❷ NO cyclone filter
- ❸ NO line filter
- ❹ NO clean tank

Conventional coolant size



VORTEX™

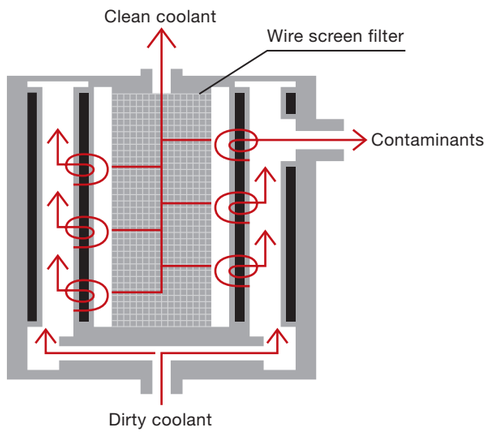
VORTEX E Series: 268mm W x783mm H x 268mm D

The ratio of space by volume is approximately 1/50.
Vortex greatly expands the working space and reduces hassle,
offering an easy-to-work and efficient environment.

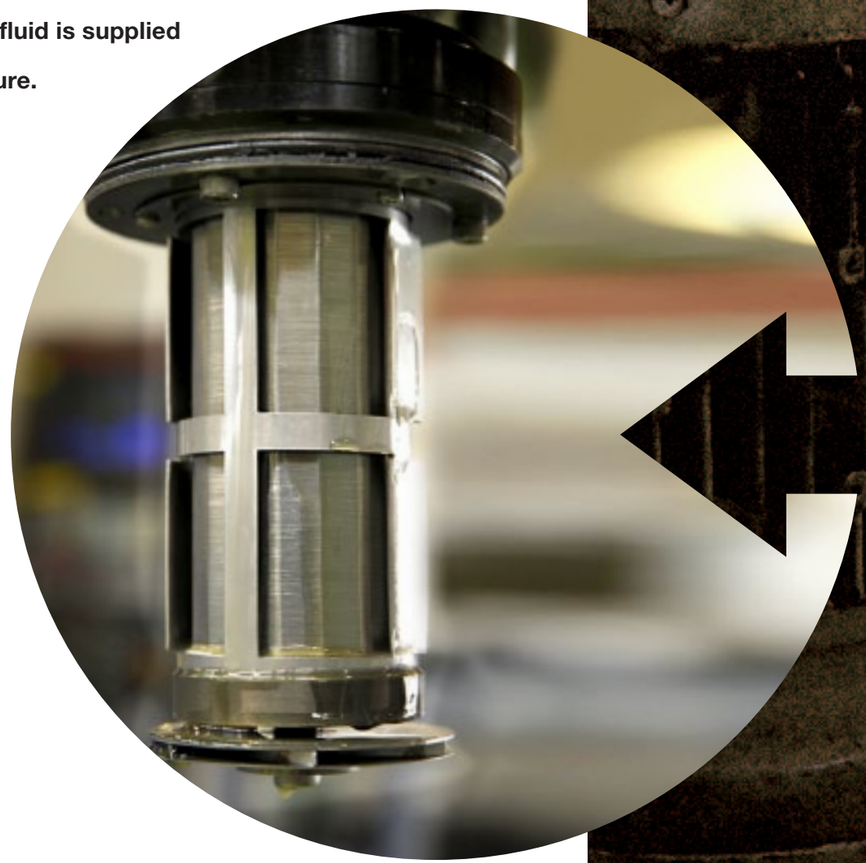
The Vortex will never be clogged, and require no maintenance — even in a dirty tank like this.

Our special Turbulence™ design generates turbulence. The combined action of the turbulence and centrifugal force washes away chips from the filter automatically. Filter maintenance is no longer required — no more cumbersome cleaning work. Of course, a clog-free filter ensures a constant flow rate. The coolant fluid is supplied to the machining center at a stable pressure.

[Turbulence™ Filter]



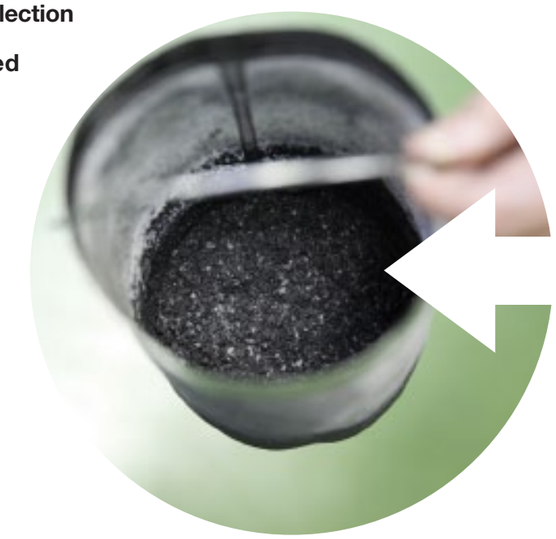
The centrifugal force and turbulence release and separate the contaminants from the mesh filter.



On the left is a photograph of an actual Vortex (after 7,000 hours of operation) installed in this tank. The filter obviously remains clean.

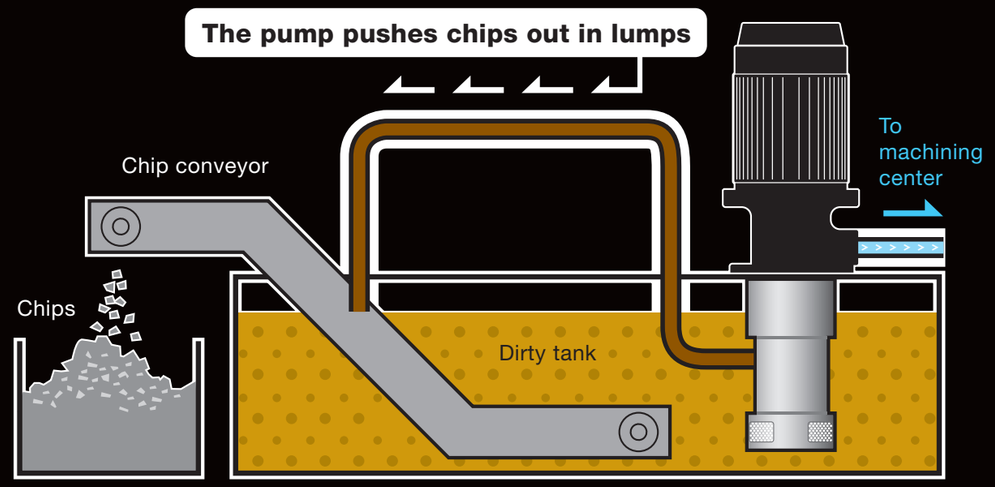
Chip recovery is simple! — the Vortex separates and ejects chips in lumps.

The Vortex cleans the coolant, but that is not all. It also performs cumbersome chip collection well. The separated chips are pushed out of the drain port and dumped into a bucket in lumps. Chip recovery is incomparably simpler than the conventional system. The Vortex can be used in combination with your existing chip conveyor system to collect and recycle chips.



The adoption of a Vortex simplifies chip recovery. The Vortex separates and ejects chips in lumps automatically.

A Vortex may be combined with your existing chip conveyors and other accessory equipments.



Chip conveyor type (allows for easiest installation)

• Chip recovery method:	A chip conveyor collects chips for recycling.
• Compatible machine tools:	Machining centers, NC lathes
• Typical applications:	For iron or other applications where large-size chips are produced in a good amount

“Let’s cut out waste of time, extra labor, and hassle!” That’s what I’ve been saying all along as a member of a manufacturing team.

I have always felt as I worked around the coolant system every day there is so much waste of time, extra labor, and hassle. It is a very dirty area and not exactly the kind of area I would love to step into. Yet, I must get in there to care for the system before the pressure drops and causes the machining center to stop.

It is extremely difficult to service a large coolant unit that is located, for example, in the back of a machine where the space is small and limited. The line must be stopped during maintenance work, and reduces our production efficiency.

Another thing that is often overlooked is the fact that the pump is constantly running at the full speed, wasting power. We would never achieve savings in power consumption, let alone our mission of preventing global warming by cutting down on CO_2 emission.

Yuji Kawano

Yuji Kawano

Fellow, VORTEX Business Dept.

VORTEX™

E SERIES

The Turbulence™ filter is built in.

This is the High-Spec Series that washes chips away automatically.

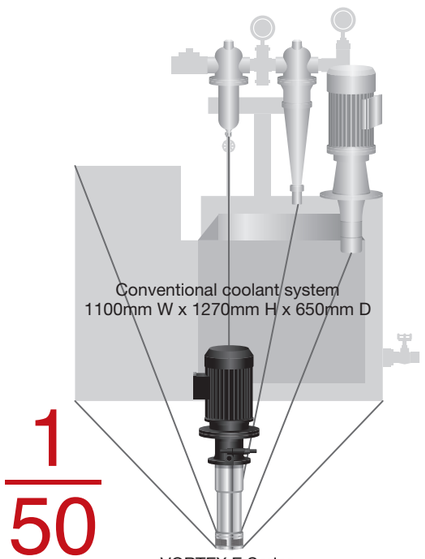
VORTEX™ Features of the E series

An All-in-one, High-to-medium Pressure Coolant Pump

All components of a coolant system are consolidated into a single Vortex unit. No line and suction filters are required. The use of a Vortex unit reduces the required space to about 1/50th by volume of that occupied by a conventional coolant system. The saved space expands the available plant space, resulting in a higher production efficiency.

- Maximum operating pressure: 7.0MPa
- Maximum discharge: 18 liters/min.
- No suction filter is required.
- No line filter is required.
- No clean tank is required.
- No transfer pump is required on the dirty-tank end.
- No plumbing is required to interconnect various components.

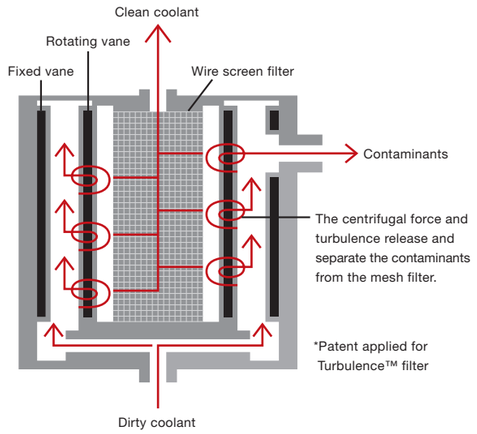
*Aqueous solution with 2% or more water-soluble coolant fluid. The water-insoluble coolant fluid of less than 15mm²/s viscosity



Automatic Self-cleaning Turbulence™ Filter

Our special Turbulence™ design generates turbulence. The combined action of the turbulence and centrifugal force washes away chips from the filter automatically. The result is a maintenance-free unit with a stable high pressure and large flow rate.

*Chips larger than 20μm in size removed (when using aqueous solution containing 2% or more water-soluble coolant fluid).



Compatible types of chips

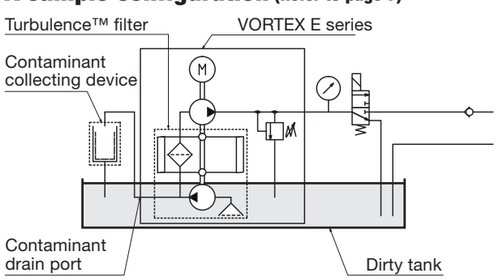
Material	Iron	Casting	Aluminum
Compatibility	Excellent	Excellent	Excellent

Filtering performance

Suction strainer	2mm (Solids larger than this must be removed in the tank.)
Filter	20μm 50μm*, 100μm* (Must be specified at the time of purchase.)

*Applicable only to Model ET.

A sample configuration (Refer to page 7)



Two Types of Pump to Choose

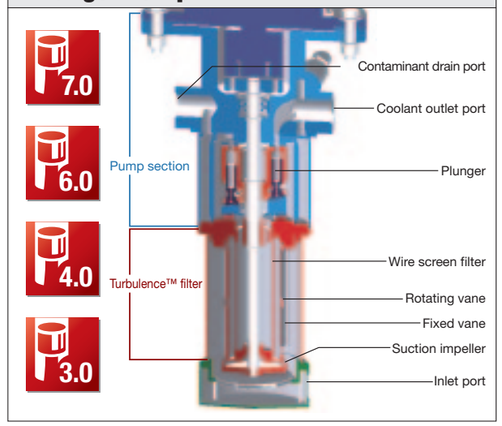
You have two options — the powerful plunger pump and the high-efficiency Trochoid™ pump — depending on your application.

- Compatible types of fluid
  - Aqueous solution containing 2% or more water-soluble coolant fluid
    Water-insoluble coolant fluid of 15mm²/s or less viscosity*
  - Not for lubricant oil or fuel oil
  - Not for clear water, purified water, water solutions without rust-preventive property, viscous fluids, corrosive liquid, solvents, and oils

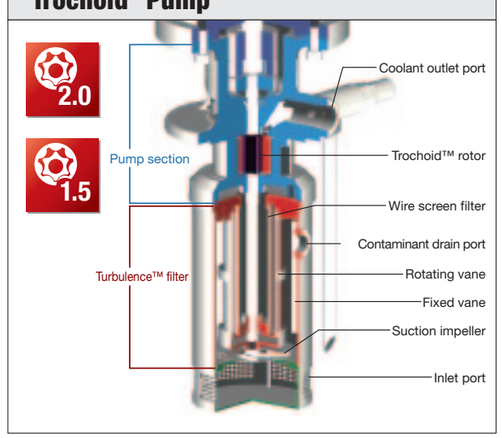
*EP is limited to use with water-soluble coolants.

- Relief valve is built into the unit

Plunger Pump



Trochoid™ Pump



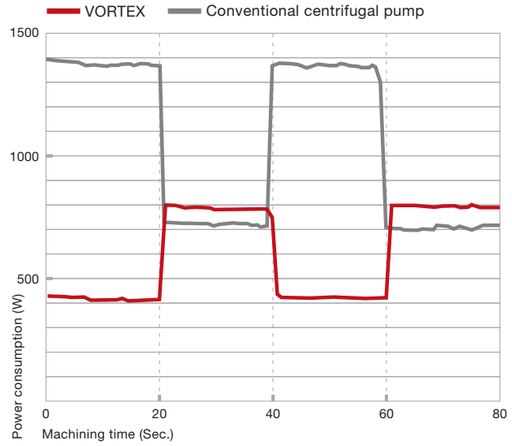
Huge Energy Saving Effect Reduces Utility Costs*

*Trial calculations based on use of ET

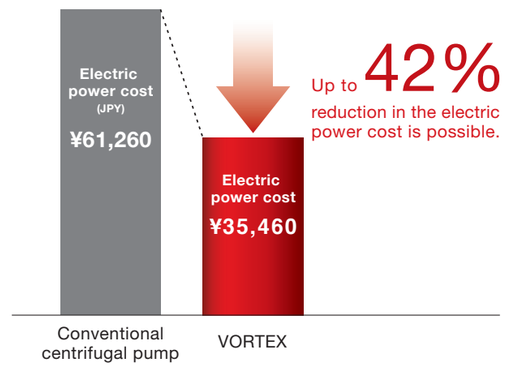
The use of a Vortex results in huge energy savings over the conventional centrifugal pumps. The electric power cost is greatly reduced.

- Operating cycle: Unload: 20 sec. →Drill 1 Center Through: 20 sec. → Unload: 20 sec. → Drill 2 Center Through: 20 sec.
- Center Through pressure: 1.1MPa
  *Calculated on the basis of operating time 8h/day, operating days 365/year, and the electric power cost ¥20/kWh.

Comparison of power consumption during machining operation

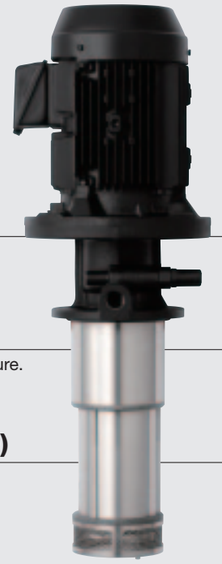


Comparison of annual electric power costs



EP

Plunger-type, All-in-one High-pressure Pump



Turbulence™ filter

Special turbulence cleans the filter automatically, rendering the filter clog free.

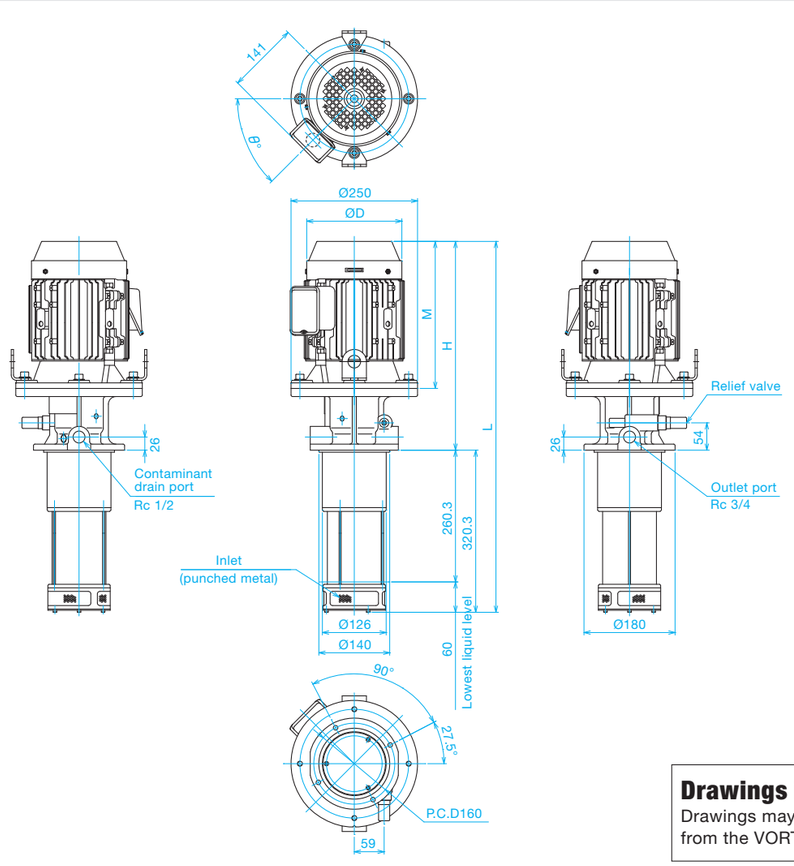
Plunger pump / 7.0MPa~3.0MPa*

Piston action pushes fluid at high to medium pressure.
*3.0MPa model is scheduled for future release.

Compatible with the TAZUNA™ fluid control system (software)

TAZUNA™ reduces the electric power cost further by approximately 20%.
The pressure and flow rate are automatically adjusted.

■ Dimensional Drawing (typical)



Drawings in PDF
Drawings may be downloaded from the VORTEX website.

■ Model Numbering System

TOP—YTH ① ② - ③ E VD ④ ⑤

① **Motor capacity**	2200: 2.2kW
② **Motor type**	A1: AC 200V, 3 phase electric induction motor
	A6: AC 200/220V 50/60Hz 3 phase electric induction motor with CE marking
	A7: AC 200V 60Hz 3 phase electric induction motor with CE marking
③ **Pump capacity**	P008: Plunger pump, 8cc/rev.
	P010: Plunger pump, 10cc/rev.
	P016: Plunger pump, 16cc/rev. (For future release)

E: Filtering method	E: Turbulence™ filter type
VD: Relief valve	External return type
④ **Relief pressure setting (MPa)**	70: 7.0MPa
	60: 6.0MPa
	40: 4.0MPa
	30: 3.0MPa
⑤ **Filtering performance**	C: 20μm

■ Specifications

Model \ Item	Motor capacity	Type	Pump capacity (ℓ/min)	Maximum pressure (MPa)	L	H	M	ϕD	θ°	TB	Approx. weight (kg)
YTH2200A1-P008EVD70C	2.2kW	AC standard	12.0/14.4	7.0	732.8	412.5	290.5	198	45	141	43
YTH2200A1-P010EVD70C			15.0/18.0								
YTH2200A1-P016EVD30C			24.0/28.8	3.0							
YTH2200A✱-P008EVD70C		AC with CE marking	12.0/14.4	7.0	783.3	463	341	202	45	172	56
YTH2200A✱-P010EVD70C			15.0/18.0								
YTH2200A✱-P016EVD30C			24.0/28.8	3.0							

✱② Motor type

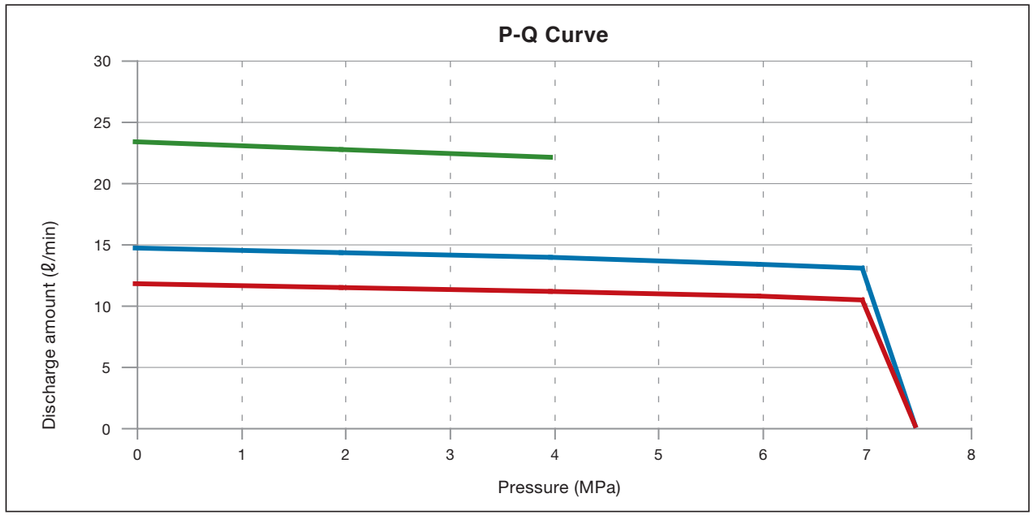
■ Performance Curves

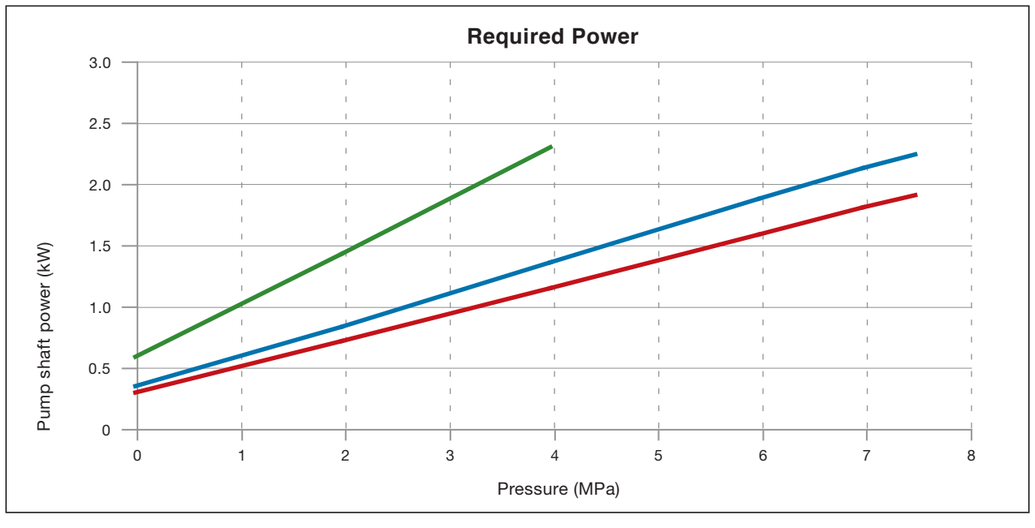
Water-soluble coolant (general performance)

Oil used: JIS K2241, Type A3 solution containing 2% water-soluble cutting fluid

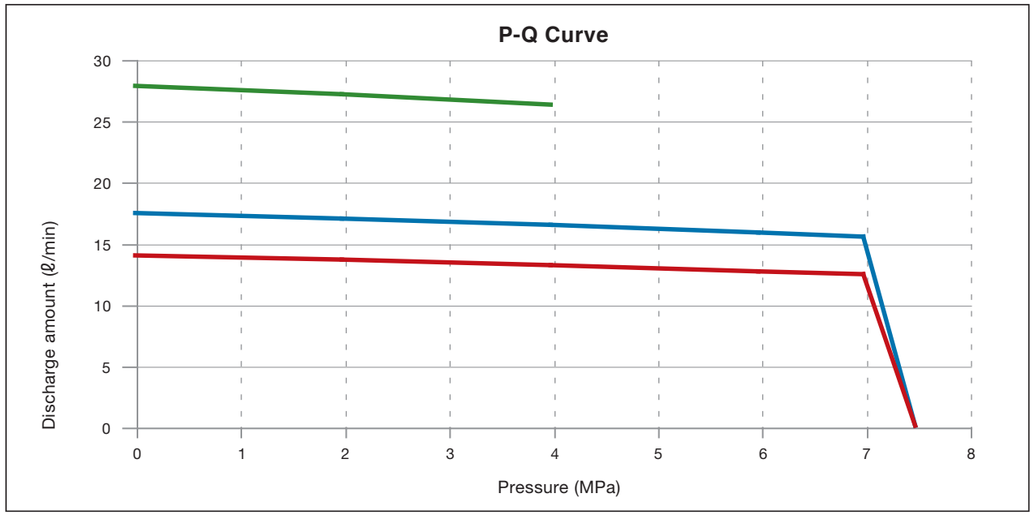
P008
P010
P016

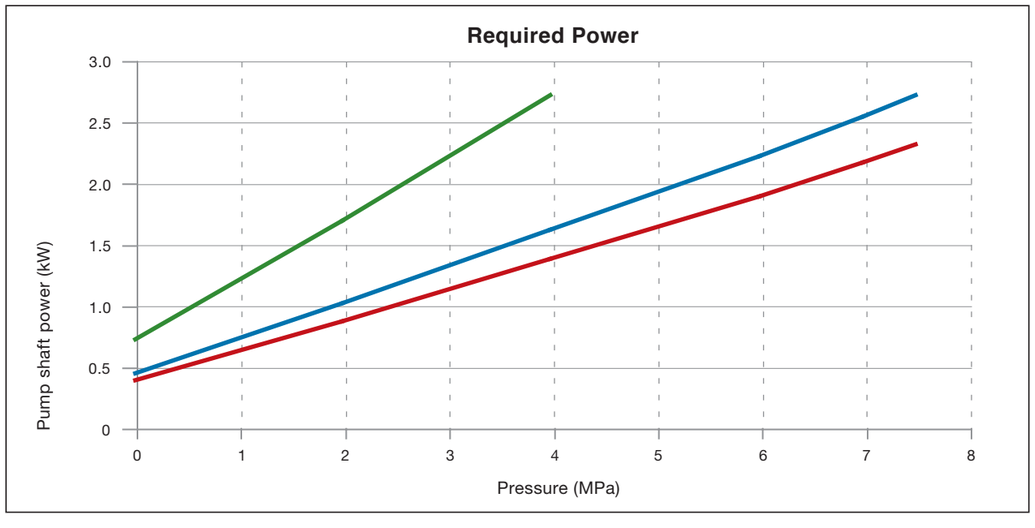
50Hz





60Hz





ET

Trochoid™-type, All-in-one Medium-pressure Pump

Turbulence™ filter

Special turbulence cleans the filter automatically, rendering the filter clog free.

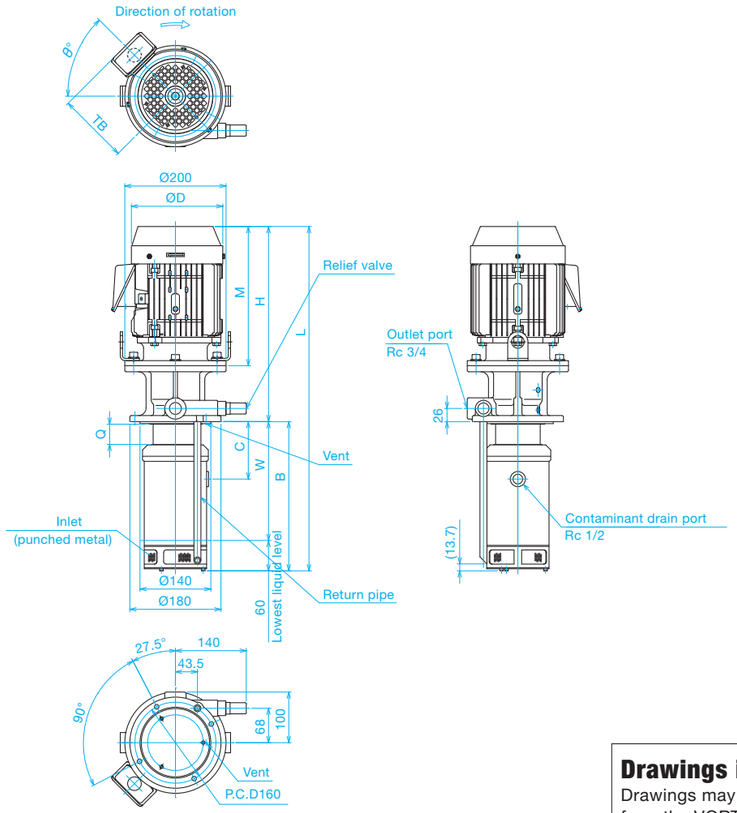
Trochoid™ pump / 2.0 MPa, 1.5 MPa

A rotor turning in a trochoidal curve generates pressure to suck and discharge fluid. This is an extremely efficient self-priming pump.

Compatible with the TAZUNA™ fluid control system (software)

TAZUNA™ reduces the electric power cost further by approximately 20%.
The pressure and flow rate are automatically adjusted.

■ Dimensional Drawing (typical)



Drawings in PDF
Drawings may be downloaded from the VORTEX website.

■ Model Numbering System

TOP—YTH ① ② - ③ E VD ④ ⑤

① **Motor capacity**	750: 0.75kW
	1500: 1.5kW
② **Motor type***	D1: DC brushless motor
	A1: AC 200V, 3 phase electric induction motor
	A6: AC 200V 3 phase electric induction motor with CE marking
③ **Rotor capacity**	T208: Trochoid™ pump, 8cc/rev.
	T216: Trochoid™ pump, 16cc/rev.

E: Filtering method	E: Turbulence™ filter type
VD: Relief valve	External return type
④ **Relief pressure setting (MPa)**	20: 2.0MPa
	15: 1.5MPa
⑤ **Filtering performance**	A: 100μm
	B: 50μm
	C: 20μm

*Different voltages are available.

■ Specifications

Model \ Item	Motor capacity	Type	Pump capacity (ℓ/min)	Maximum pressure (MPa)	L	B	C	W	Q	H	M	ϕD	θ°	TB	Approx. weight (kg)
YTH750A1-T208EVD✱	0.75kW	AC standard	12.0/14.4	2.0	618.3	274.8	93.5	214.8	20	343.5	233	170	30	140	30
YTH750A2-T208EVD✱		AC with CE marking			668.3					393.5	283	170	15	134	35
YTH750D1-T208EVD✱		Brushless DC			630.3					335.5	225	172	0	143.5	25
YTH1500A1-T216EVD✱	1.5kW	AC standard	24.0/28.8	2.0	680.3	294.8	113.5	234.8	40	385.5	275	198	45	140	34
YTH1500A2-T216EVD✱		AC with CE marking			717.3					422.5	312	202	0	166	42
YTH1500D1-T216EVD✱		Brushless DC			665.3					370.5	260	172	0	143.5	28

✱④ Relief pressure setting, ⑤ Filtering performance

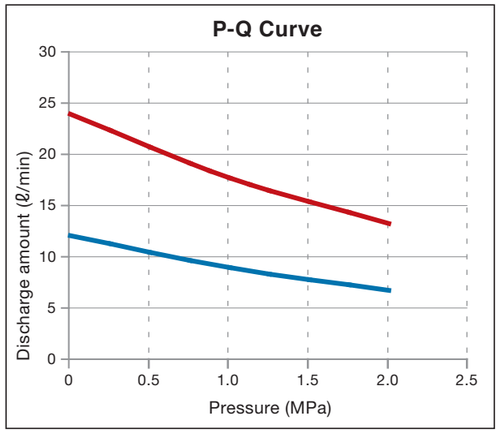
■ Performance Curves

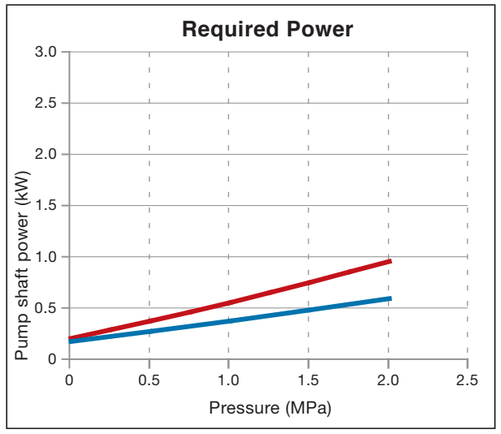
Water-soluble coolant (general performance)

Oil used: JIS K2241, Type A3 solution containing 2% water-soluble cutting fluid

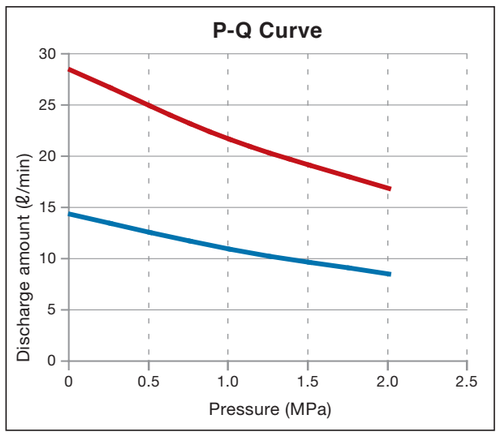
T208
T216

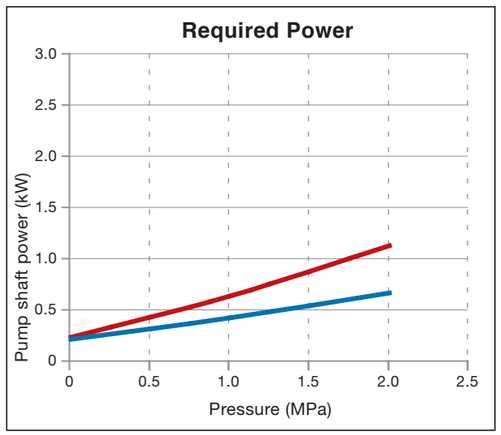
50Hz





60Hz



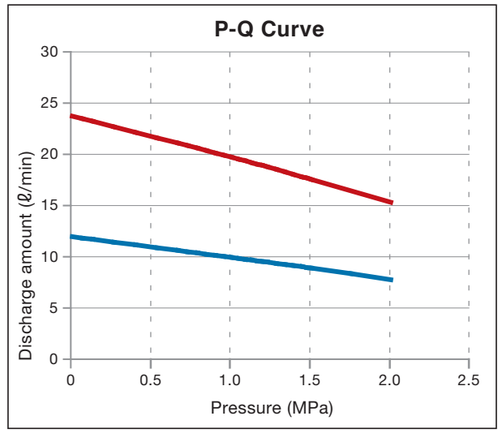


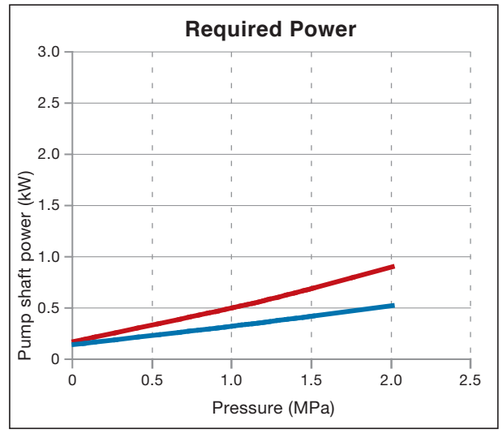
Spindle Oil (general performance)

Oil used: ISO VG2 equivalent

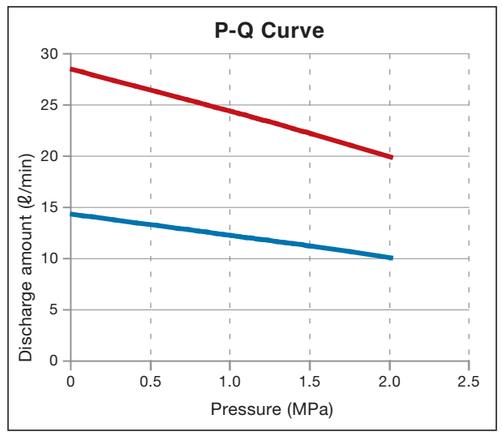
T208
T216

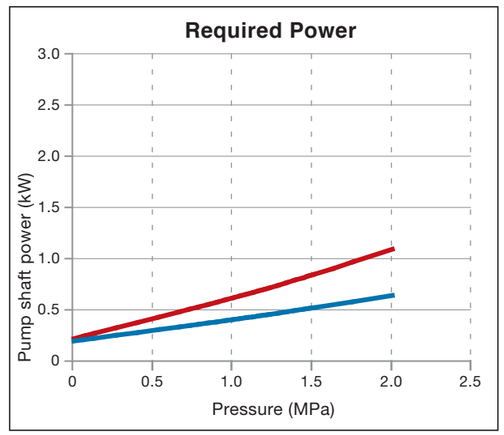
50Hz





60Hz





VORTEX™

C SERIES

The Double-cyclone Filter is Built In.

This is a VORTEX Basic Series.

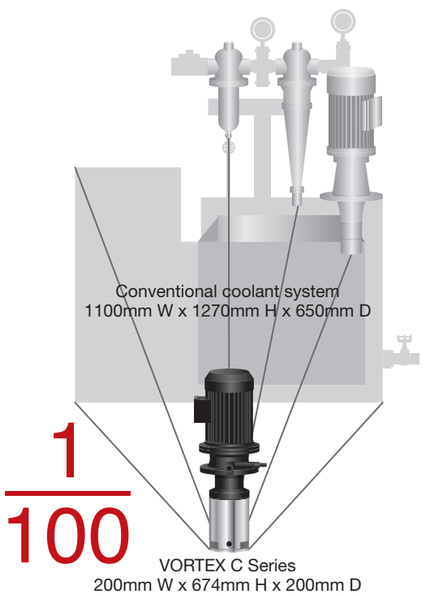
VORTEX™ Features of the C series

World's First — All-in-one, Medium-pressure Coolant Pump

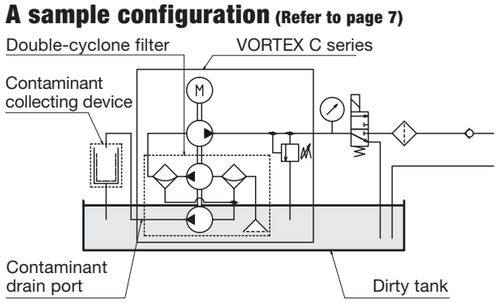
This is a basic Vortex model consolidating a large coolant system into one unit. Simply replace a conventional medium-pressure pump with a C series pump to reduce the occupied space to 1/100th by volume. The plant space is in effect greatly expanded and production efficiency improves.

- Maximum operating pressure: 2.0MPa
- Maximum discharge: 28.8 liters/min.
- No suction filter is required.
- No clean tank is required.
- No transfer pump is required on the dirty-tank end.
- No plumbing is required to interconnect various components.

*Aqueous solution with 2% or more water-soluble coolant fluid.



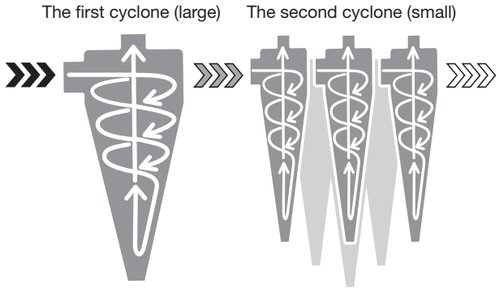
A sample configuration (Refer to page 7)



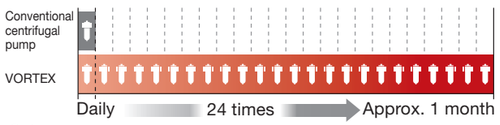
1+6 Double-cyclone Filter

A proprietary double-cyclone filtering system removes chips*. The first and second cyclones remove relatively large and fine chips, respectively. The line-filter cleaning cycle is extended by 24 times.

*Chips larger than 20μm in size removed (when using aqueous solution containing 2% or more water-soluble coolant fluid).



Line-filter cleaning become once a month*



*On the average

Compatible types of chips

Material	Iron	Casting	Aluminum	Copper
Compatibility	Excellent	Excellent	Good	Excellent

Filtering performance

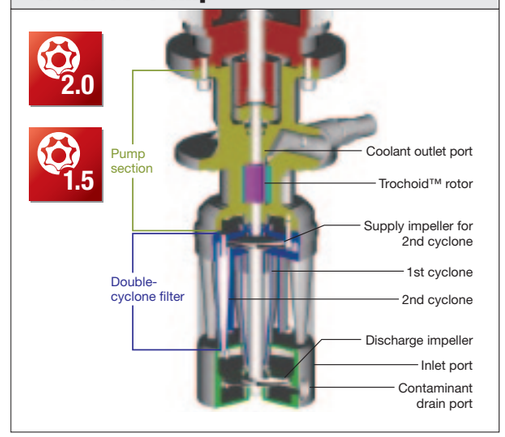
Suction strainer	2mm (Solids larger than this must be removed in the tank.)
Filter	50μm: 95% (specific gravity 2.7) 100μm: 99% (specific gravity 2.7) Note: No problems in using a Trochoid™ pump

High-efficiency Trochoid™ Pump

The C Series uses a Trochoid™ pump which excels in fluid control efficiency. The double-cyclone system sorts out chips and enables direct connection to the dirty tank.

- Compatible types of fluid
  - Aqueous solution containing 2% or more water-soluble coolant fluid
  - Not for water-insoluble coolant fluid, lubricant oil or fuel oil
  - Not for clear water, purified water, aqueous solutions without rust-preventive property, viscous fluids, corrosive liquid, solvents, and oils
- Relief valve is built into the unit.

Trochoid™ Pump



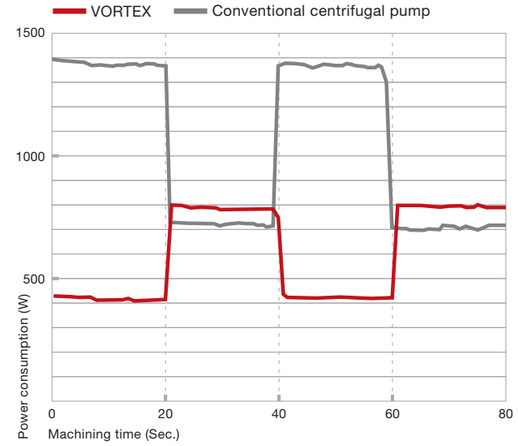
Huge Energy Saving Effect Reduces Utility Costs*

The use of a Vortex results in huge energy savings over the conventional centrifugal pumps. The electric power cost is greatly reduced.

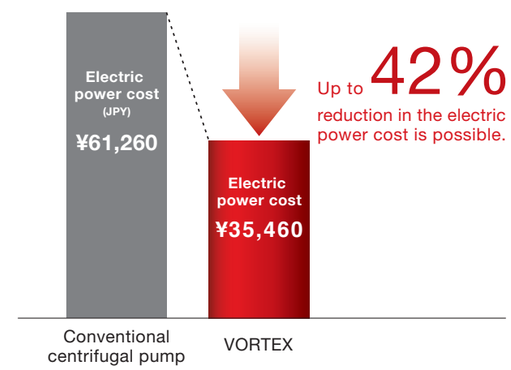
- Operating cycle: Unload: 20 sec. →Drill 1 Center Through: 20 sec. → Unload: 20 sec. → Drill 2 Center Through: 20 sec.
- Center Through pressure: 1.1MPa

*Calculated on the basis of operating time 8h/day, operating days 365/year, and the electric power cost ¥20/kWh.

Comparison of power consumption during machining operation



Comparison of annual electric power costs



CT

Cyclone-type, All-in-one Medium-pressure Pump

GOOD DESIGN AWARD 2011

Double-cyclone filter

Two layers of double cyclones (one large cyclone and six small cyclones) remove chips from the coolant fluid.

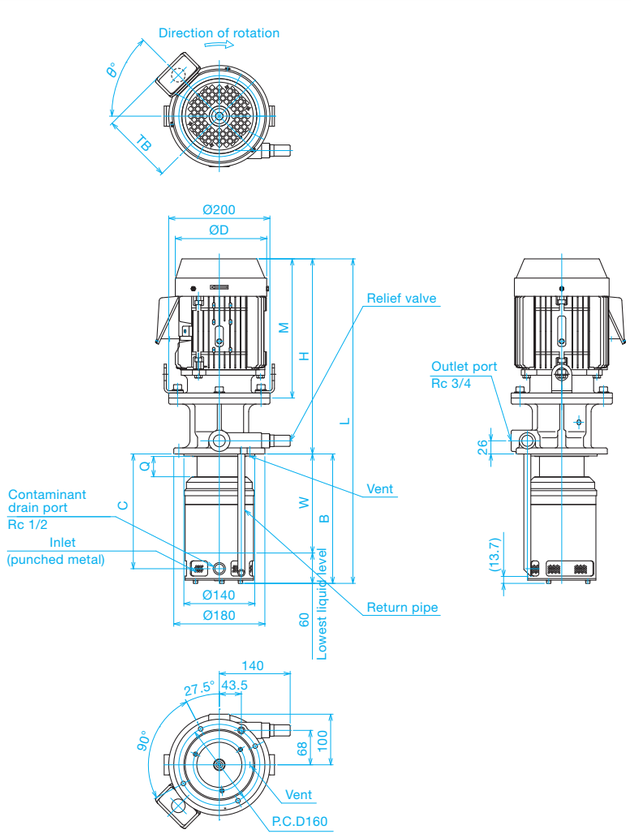
Trochoid™ pump / 2.0MPa, 1.5MPa

A rotor turning in a trochoidal curve generates pressure to suck and discharge fluid. This is an extremely efficient self-priming pump.

Compatible with the TAZUNA™ fluid control system (software)

TAZUNA™ reduces the electric power cost further by approximately 20%.
The pressure and flow rate are automatically adjusted.

■ 寸法図（代表図）



Drawings in PDF
Drawings may be downloaded from the VORTEX website.

■ Model Numbering System

TOP—YTH ① ② - ③ C VD ④

① **Motor capacity**	750: 0.75kW
	1500: 1.5kW
② **Motor type***	A1: AC 200V, 3 phase electric induction motor
	A2: AC 200/220V 50/60Hz 3 phase electric induction motor with CE marking
③ **Rotor capacity**	T208: Trochoid™ pump, 8cc/rev.
	T216: Trochoid™ pump, 16cc/rev.

C: Filtering method	C: Double-cyclone type
VD: Relief valve	External return type
④ **Relief pressure setting (MPa)**	20: 2.0MPa
	15: 1.5MPa

*Different voltages are available.

■ Specifications

Model \ Item	Motor capacity	Type	Pump capacity (ℓ/min)	Maximum pressure (MPa)	L	B	C	W	Q	H	M	φD	θ°	TB	Approx. weight (kg)
YTH750A1-T208CVD✱	0.75kW	AC standard	12.0/14.4	2.0	579.2	235.7	206.7	175.7	20	343.5	233	170	30	140	30
YTH750A2-T208CVD✱		AC with CE marking			629.2					393.5	283	170	15	134	35
YTH1500A1-T216CVD✱	1.5kW	AC standard	24.0/28.8	2.0	641.2	255.7	226.7	195.7	40	385.5	275	198	45	140	34
YTH1500A2-T216CVD✱		AC with CE marking			678.2					422.5	312	202	0	166	42

✱④ Relief pressure setting, ⑤ Filtering performance

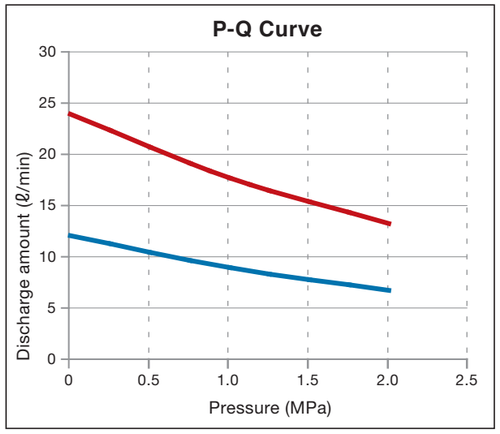
■ Performance Curves

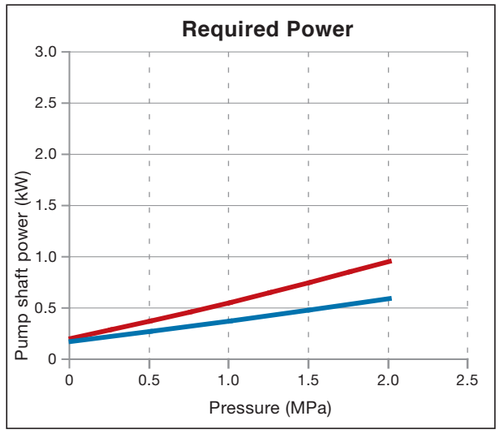
Water-soluble coolant (general performance)

Oil used: JIS K2241, Type A3 solution containing 2% water-soluble cutting fluid

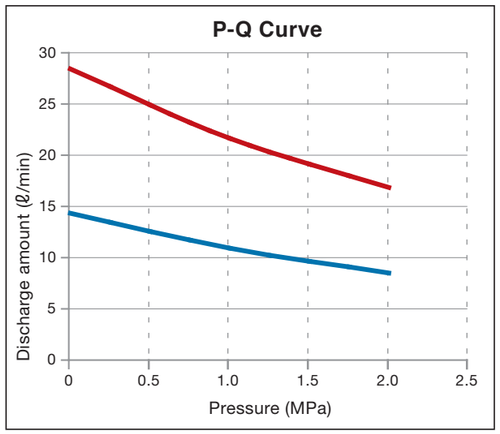
T208
T216

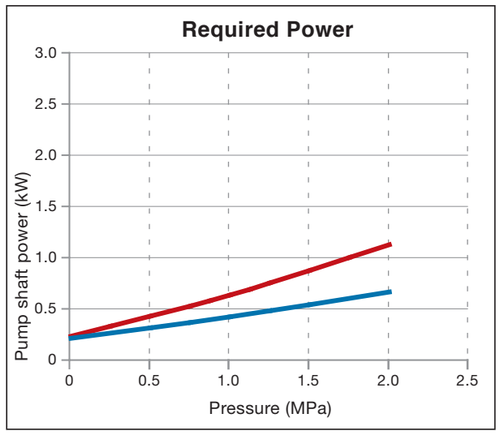
50Hz





60Hz



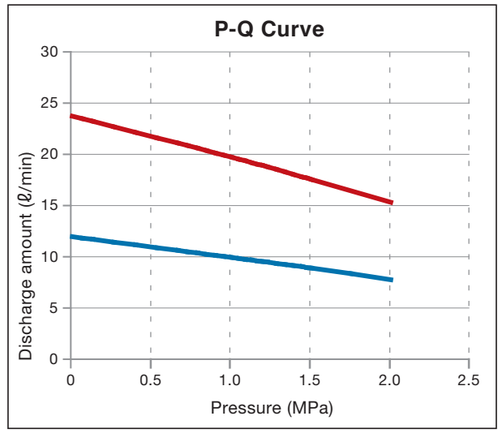


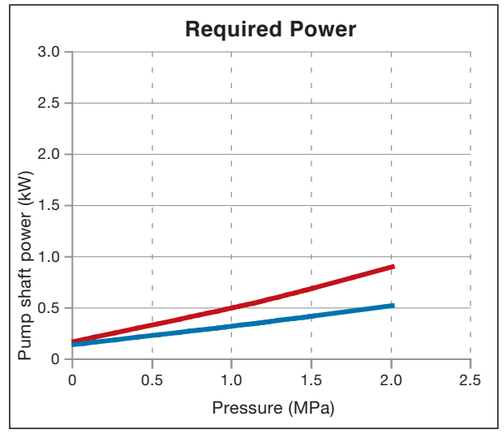
Spindle Oil (general performance)

Oil used: ISO VG2 equivalent

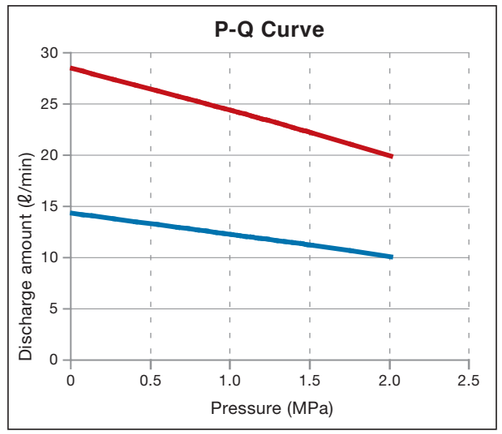
T208
T216

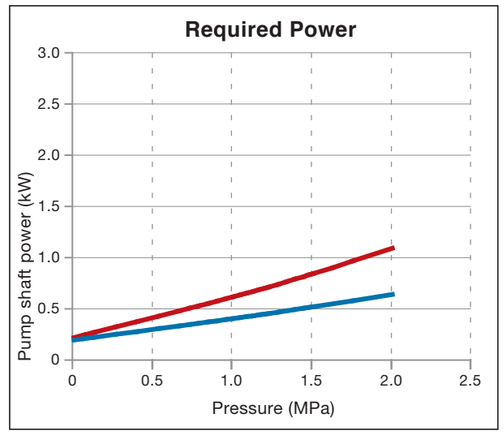
50Hz





60Hz





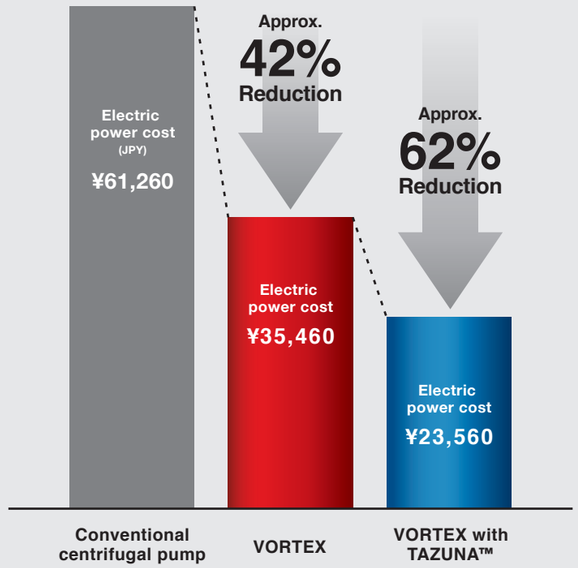
62%

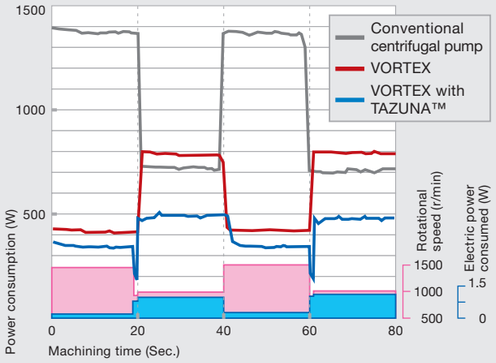

Tazuna™
A Fluid Control System
It Reduces Annual Electric Power Cost by Up to 62%.
DOWN

A Fluid Control System That Reduces Annual Electric Power Cost by Up to 62%

The use of Vortex pumps cuts the annual electric power cost by about 42%. Additional savings of about 20% would be achieved, or a total of 62%, through the use of the TAZUNA™ fluid control system. Trimming the production costs is a way to improve your competitiveness. The saving impact will be greater in a plant with a multiple of machining center operating. Reduction in power consumption enables trimming of CO^2 and is an effective measure against global warming.

Comparison of Annual Electric Power Bills





Power Consumption Graph on a Test Operation

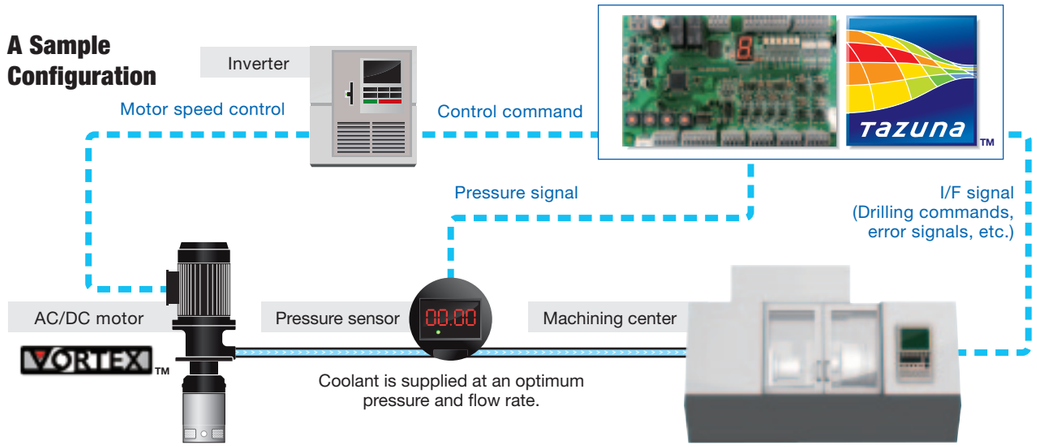
- Operating cycle: Unload: 20 sec. →Drill 1 Center Through: 20 sec. → Unload: 20 sec. → Drill 2 Center Through: 20 sec.; Center Through pressure: 1.1MPa
- The energy-saving effect will vary due to the difference in machining pressures and drill diameters.
- The calculation is based on operation 8 hours/day, 365 days/year, and the electric power billed at ¥20/kWh.

TAZUNA™ Fluid control System (Software)*

*Patent pending

TAZUNA™ is an automatic fluid control system (software) developed by NOP. The system uses a pressure sensor to identify the drill diameter being used by the machining center. It continuously controls the Vortex, adjusting the pressure and flow rate instantaneously according to the drill movement. The absence of unneeded pressure means no extra pressure is wasted through the relief valve. The power consumption is greatly reduced while maintaining machining accuracy.

A Sample Configuration



Features of TAZUNA™

■ Additional savings in energy

TAZUNA™ adjusts the motor within the Vortex pump to an optimum speed for the drill diameter in use to achieve significant energy savings and CO^2 reduction.

■ Improving machining accuracy

The system is compatible with any drill diameter. Automatic control of the pressure to an optimum value stabilizes the machining accuracy.

■ No initial settings required

An automatic drill identification system is pre-installed. The system is ready for use. No initial setting and other cumbersome programming are required (for different drills) on the machining end.

■ A variety of interface

Various input and output ports are standard features: digital I/O (8/8), analog I/O (4/4), high-speed input ports (3P), RS485 communication ports (2), selector SW (8), 16P rotary SW (4).

■ Flexibly programmable

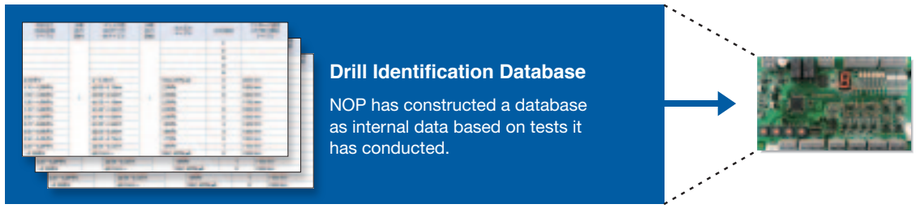
The system may be programmed to suit given specifications, allowing the user to customize the system to accomplish a variety of energy-saving control.

■ Compact and low cost

The circuit board is a compact and low-cost single card, complete with required interface.

Automatic Drill Identification System

The system senses the pressure to identify the drill hole diameter. It then selects an optimum machining pressure for the hole diameter by reference to its database. The machining pressure may be fine adjusted to suit different work and cutting fluids. The user's own database may also be stored independently.



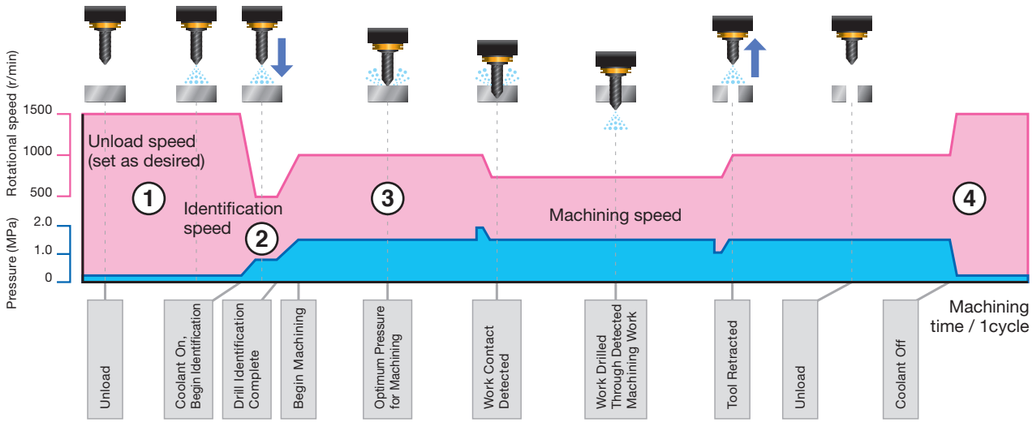
■ A Flowchart for the Automatic Drill Identification System

① In the unload status (the status other than machining in action), the system runs at the designated speed in the chip removal mode.

② Following a coolant on input, the speed changes to the drill-identification speed, and identifies the drill hole diameter.

③ The system controls the rotational speed so as to give an optimum machining pressure and flow rate for the drill-hole diameter as identified. (The system continuously controls the rotational speed to give an optimum machining pressure and flow rate during the machining of work.)

④ On completion of the drilling, the system returns to the unload status.



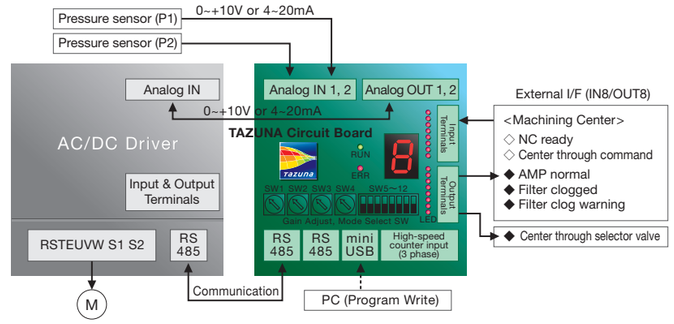
■ A Sample Installation

The system may be customized to suite the user.

Control for a constant pressure and flow rate	The pressure and flow rate are controlled at a constant value regardless of the fluid temperature and deterioration by feeding back the pressure and flow rate signals.
Servo quantitative control	The rotational angle and displacement are sensed for quantitative position control by feeding back the potentiometer signals.
Electro-magnetic proportional control valve	An analog output is linked to an electro-magnetic proportional valve for control of the pressure at an optimum value.

■ Specifications for the Control Circuit Board

The board is equipped with assorted I/F, enabling control other than the automatic drill identification system.



			TAZ-101 (Full I/F)	TAZ-102 (Half I/F)
General specifications		Ambient temperature	-10~40°C (when operating), -20~60°C (in storage)	
		Ambient humidity	10~85% (when operating), 10~90% (in storage) no condensation	
		Installed location	Indoors (free of corrosive gas or dust)	
		Input power	DC 24V±10%	
		Power consumption	10W	
		External dimensions	160mm (6.3") W x 95mm (3.8") D x 20mm (0.8") H	
Input specifications	**Digital**	Number of input ports	8 ports	4 ports
		Input signal type	DC voltage-free contact input On sync input: NPN open-collector transistor On source input: PNP open-collector transistor (Sync input/Source input are selectable at a jumper pin.)	
		Input operation indicator	An LED (red) is lit when input is on.	
	Analog	Number of input ports	4 ports	2 ports
		Input range	DC 0~10V, DC 4~20mA	
		Resolution	On DC 0-10V: Approx. 10mV (in 1024 steps) On DC 4-20mA: Approx. 16μA (in 1024 steps)	
	High-speed counter	Number of input ports	3 ports (A-phase input, B-phase input, Z-phase input) Compatible with open-collector output encoder Compatible with differential-line driver output encoder	—
		Highest response frequency	5MHz	
	SW	Number of input ports	2-position switching: 8 ports (Rotary DIP switch, 8-poles, on-off)	
			16-position switching: 4 ports (DIP switch, 16-position)	
Output specifications	**Digital**	Number of transistor output ports	6 ports (with independent common)	4 ports (with independent common)
		Maximum load	Maximum load voltage DC 300V, resistive load, maximum 0.15A (per output port)	
		Output operation indicator	An LED (red) is lit when output is on.	
		Maximum response time	85μs	
		Number of relay output ports	2 ports (with independent common)	1 ports (with independent common)
		Maximum load	Load voltage AC 125V, DC 125V, resistive load, 2A (per output port)	
		Output operation indicator	An LED (red) is lit when output is on.	
		Maximum response time	10ms	
	Analog	Number of output ports	4 ports	2 ports
		Output range	DC 0~10V, DC 4~20mA	
		Resolution	On DC 0-10V: Approx. 10mV (in 1024 steps) On DC 4-20mA: Approx. 16μA (in 1024 steps)	
CPU specifications		Processor	DSPIC33FJ128MC710A (Single-chip microcontroller by Microchip Technology Inc.)	
		Number of bits	16Bit	
		Memory	RAM: 16KB ROM: 128KB	
		Speed	40MIPS	
		Cache	2kB DMA memory	
Operation indicator specifications			On normal operation: RUN LED (green) is lit. On error: FAIL LED (red) is lit. Error No. is displayed (on 7-segment LED)	

EP

Turbulence™ filter
Special turbulence cleans the filter automatically, rendering the filter clog free.

Plunger pump / 7.0MPa~3.0MPa*
Piston action pushes fluid at high to medium pressure.
*3.0MPa model is scheduled for future release.

Compatible with the TAZUNA™ fluid control system (software)
TAZUNA™ reduces the electric power cost further by approximately 20%.
The pressure and flow rate are automatically adjusted.

ET

- **Turbulence™ filter**
- **Trochoid™ pump / 2.0MPa, 1.5MPa**
- **Compatible with the TAZUNA™**

CT

- **Double-cyclone filter**
- **Trochoid™ pump / 2.0MPa, 1.5MPa**
- **Compatible with the TAZUNA™**

Series name	**E** Series **EP** (Specification: Turbulence™ filter + plunger pump)	Series name	**E** Series **ET** (Specification: Turbulence™ filter + Trochoid™ pump)	**C** Series **CT** (Specification: Double cyclone filter + Trochoid™ pump)

Specifications for pump proper				Specifications for pump proper				
Pump model	P008	P010	P016	**Pump model**	T208	T216	T208	T216
Discharge capacity (ℓ/min)	12.0/14.4	15.0/18.0	24.0/28.8	**Discharge capacity (ℓ/min)**	12.0/14.4	24.0/28.8	12.0/14.4	24.0/28.8
Compatible fluid	Water-soluble coolant fluid			**Compatible fluid**	Water-soluble coolant fluid / Water-insoluble coolant fluid		Water-soluble coolant fluid	
Maximum allowable viscosity (mm^2/s) (Filtration rating)	15 (20μm)			**Maximum allowable viscosity (mm^2/s) (Filtration rating**	15 (20μm)、55 (50μm)、100 (100μm)		22	
Liquid temperature range (°C)	-5~60			**Liquid temperature range (°C)**	-5~60		-5~60	
Rotational speed (r/min)	1500/1800			**Rotational speed (r/min)**	1500/1800		1500/1800	
Maximum pressure (MPa)	7.0		3.0	**Maximum pressure (MPa)**	2.0		2.0	
Filter type	Wire screen filter			**Filter type**	Wire screen filter		Cyclone x 2 stages	
Filtration rating	20μm			**Filtration rating**	20μm, 50μm, 100μm		100μm: 99.9%, 50μm: 95% (Silica sand: specific gravity 2.7)	
Remarks	Install a plate filter of #60 or finer mesh on the suction end of the tank.			**Remarks**	Install a plate filter of #60 or finer mesh on the suction end of the tank.			
Painted color of the pump section	Flat black (Approximately Munsell N1.0)			**Painted color of the pump section**	Flat black (Approximately Munsell N1.0)			
Approximate weight (kg)	20			**Approximate weight (kg)**	16	16	16	16
Relief valve specifications				**Relief valve specifications**				
Type	External return type			**Type**	External return type			
Relief pressure setting (MPa)	7.0	7.0、6.0	4.0、3.0	**Relief pressure setting (MPa)**	2.0、1.5			

Motor specifications			Motor specifications						
Model No.	2200A1	2200A6 / 2200A7	**Model No.**	750A1	1500A1	750A2	1500A2	750D1*	1500D1*
Specifications	3-phase, squirrel-cage induction motor, totally enclosed, external fan, flange-mounting configuration		**Specifications**	3-phase, squirrel-cage induction motor, totally enclosed, external fan, flange-mounting configuration				DC brushless motor, totally enclosed, external fan, flange-mounting configuration	
Output (kW)	2.2		**Output (kW)**	0.75	1.5	0.75	1.5	0.75	1.5
Voltage (V)	200/200/220		**Voltage (V)**	200/200/220		200/200/220		200	
Frequency (Hz)	50/60/60		**Frequency (Hz)**	50/60/60		50/60/60		—	
Rotational speed (r/min)	1400/1680/1710	1440/1740/1740	**Rotational speed (r/min)**	1410/1690/1720	1410/1690/1710	1440/1730/1730	1440/1730/1730	1000～2500	
Rating	Continuous		**Rating**	Continuous				Continuous	
Current (A)	9.8/8.9/8.5	10.4/10.2/9.2	**Current (A)**	3.8/3.4/3.4	7.0/6.2/6.0	4.1/3.7/3.4	7.3/6.7/6.1	5.0	8.4
Number of phases	3		**Number of phases**	3				3	
Number of poles	4P		**Number of poles**	4P				10P	
Insulation class	E	B	**Insulation class**	E		F		E	
Approximate weight (kg)	23	36	**Approximate weight (kg)**	14	18	19	26	10	13
Protection rating	IP44	IP54	**Protection rating**	IP44		IP54		IP44	
Efficiency class	IE1	IE2	**Efficiency class**	IE1		IE2		Equivalent to IE3	
Compliance CE	—	Yes	**Compliance CE**	—		Yes		Scheduled for compliance	

*Applicable only to Model ET.