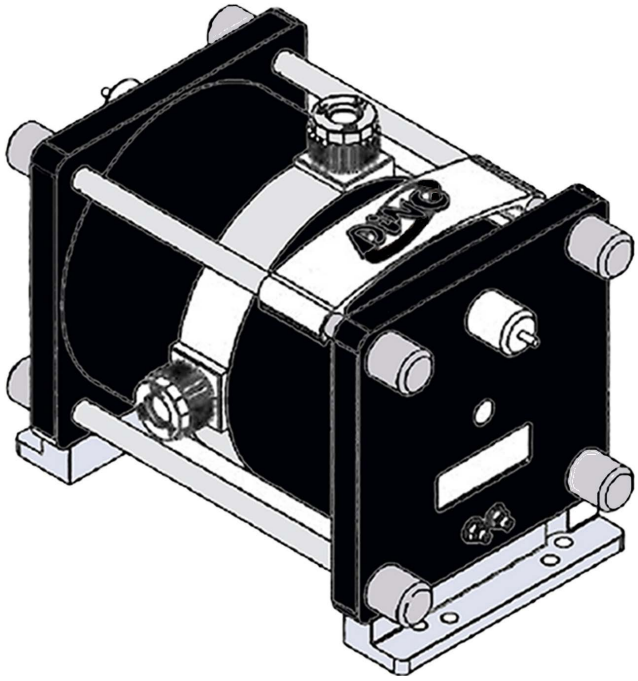


AEROTRONIC BELLOWS PUMP

DTE SERIES

OPERATION MANUAL

Thank you for choosing DINO's DTE Series Electric Bellows Pump.

This operation manual is divided into four sections: "Safety Information" "Product Introduction", "Installation Instructions" and "Operating Instructions." It provides guidance on the proper use and operation of the pump.
To maximize the performance of the pump and ensure its safe and long-term operation, please read this manual carefully before using the pump.

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This operation manual should be kept by the user for quick reference. It is recommended that every user read through the manual and store it near the pump system, ensuring that it is ea sily accessible to any user at any time.

Important Instructions

For the safe and proper operation of the pump:

•Carefully read the "Safety Instructions" section to prevent accidents involving your custo mers or other personnel, and to avoid damage or loss to other assets. Always follow the instructions and recommendations provided in these sections.

•Follow the instructions described in this manual. These instructions are essential to protect users of the pump from potentially hazardous conditions and situations associated with the pump system.

•Below are the meanings of the symbols described:

⚠ **Warning**	**Failure to follow or incorrect application of the "Warning" instructions may result in serious accidents, including death or injury.**
⚠ **Caution**	**Failure to follow or incorrect application of the "Caution" instructions may result in severe injury to the user or serious damage to the product.**

Symbol Types

⚠ **Indicates that special attention must be paid to a "Warning" or "Caution". Inside the triangle, a specific and practical image is provided as part of the warning or caution message.**

⊘ **Indicates a prohibited operation or procedure. Inside or near this circle, a specific and practical image describes the activity to be avoided.**

❗ **Indicates important operations or procedures that must be performed or completed. Failure to follow these instructions may result in pump failure or damage.**

Safety Information

⚠ Warning

Look Around Before Operation:
Ensure no one is around the pump when connecting the power cable. There is no power switch provided on the pump. Connect the power cable and air supply to the pump to begin operation.


Caution

Do Not Modify the Pump:
Never attempt to modify the pump. Modifications may result in serious accidents or damage. DINO assumes no responsibility for any accidents or damage caused by modifications made without prior consent from DINO.


No Remodeling

For Specified Use Only:
Using the pump outside its explicitly designated applications may cause injury or damage to the pump. Always operate the pump in accordance with its specificati ons and intended application.


Prohibited

Do Not Discharge Hazardous Fluids:
Never discharge hazardous fluids (including but not limited to chemical liq uids) directly onto factory floors or building surfaces.


Prohibited

Do Not Touch:
Touching the pump or piping that becomes extremely hot due to circulating hot fluids may result in severe burns. When handling fluids at temperatures above 50°C, adequate hand protection must be installed.


DO not touch

⚠ Caution

Do Not Exceed Voltage:
Never supply voltage beyond the specified level. Doing so may cause fire or electric shock.


Prohibited

Wear Protective Gear:
Always wear protective equipment (such as safety goggles, helmet, face mask, and acid-resistant gloves) when disassembling, assembling, or maintaining the pump. Additionally, take care to clean the pump with pure water before perform ing any operation.


Wear protective gear

Qualified Personnel Only:
The pump must only be operated by personnel who have received proper training in pump safety and operation.


Caution

Safety Information

⚠ Caution

Lifting the Pump:
If the lifting rope or chain breaks or is severed during the lifting process, it may result in serious injury or death.
Always use a rope or chain that can adequately support the load of the pump.
Additionally, no personnel should be allowed beneath the pump while it is being lifted.



Power Shut-off:
Ensure that no one turns off the power switch while work is being performed on the pump.
Before starting any maintenance or repair work on the pump, make sure the power switch is turned off.
If the work site is noisy or visibility is poor, place a clearly visible sign near the power switch stating "Power Off (Under Maintenance)" to inform others.
If anyone other than the designated operator or service personnel turns on the power , it may result in a serious accident.
The operator must take special precautions to prevent such incidents.



Storage Restrictions:
Do not store the pump in locations with explosive atmospheres, dust, or corrosive gases (such as chlorine gas).
Doing so may cause fire hazards or pose health risks to personnel.



Ventilated Work Area:
When handling toxic liquids or strong odors, ensure that the work area is well-ventilated.
Additionally, wear appropriate protective equipment (such as protective masks, safety goggles, gloves, etc.).



Disposal of Used Pumps:
Disposal of used or damaged pumps must comply with local laws and regulations.
(Please contact a licensed industrial waste disposal company.)



Returning to Distributor:
When returning the pump to the distributor, drain all liquid from the pump and clean it thoroughly with clean water to prevent any accidents during transportation.



Pump Stroke Speed:
Do not operate the pump beyond the maximum stroke speed specified in Section 4 : Technical Specifications (see page 8 for details).
Exceeding the maximum stroke speed will shorten the diaphragm’s service life.



Safety Information

⚠ Caution

Supply Air Pressure:
The supply air pressure must be maintained within the specified range. Otherwise, the air bellows may deform.



Model	Fluid Temperature	Supply Air Pressure Range
DTE-15·30·60	5-50 °C	**0.15-0.5** (**MPa**)
	51-100°C	**0.15-0.3** (**MPa**)
	101-180 °C	**0.15-0.2** (**MPa**)

Liquid Temperature Range:
The temperature of the liquid being pumped should be between 5°C and 180°C.



Prohibited Liquids:
Do not operate the pump with the following types of liquids:
· Liquids that crystallize easily
· Liquids containing sludge or suspended solids
· Solvents or light oil



Liquids Requiring Careful Handling:
Solvent-based liquids containing dehydrogenation bonds or nitric hydrochloric acid should be handled with caution.



Gas Exhaust Port:
Do not reduce the size of the gas exhaust port (e.g., by narrowing the pipe diameter). Otherwise, residual pressure may cause the bellows to deform.



During Pump Operation:
Ensure that the valves on both the suction and discharge sides are fully open.

Also, make sure the piping is completely filled with liquid.,



Safety Information

⚠ Caution

Stopping Pump Operation:
When stopping the pump, release the pressure on the discharge side first. Failure to do so may cause the bellows to deform due to residual pressure in the discharge line.
If there is a valve on the discharge side, do not close the valve when stopping the p ump. The resulting pressure surge may deform the bellows or the connecting plate.



Pump Stopped:
Do not supply air to both the left and right air supply ports at the same time, as this may cause the diaphragm to deform.。



Precautions Regarding Electrodes:
In some cases, the electrode may fail to detect air leakage. This can be due to operating conditions (such as supply pressure) and the size of cracks in the diaphragm. Please contact DINO for further details.



Electrostatic Electricity:
When handling low-conductivity liquids such as ultrapure water or fluoroinert liquids (e.g., Fluorinert™), static electricity may be generated inside the pump. This can lead to electrostatic discharge and damage to the pump. Take appropriate measures to prevent and eliminate electrostatic buildup.



Product Introduction

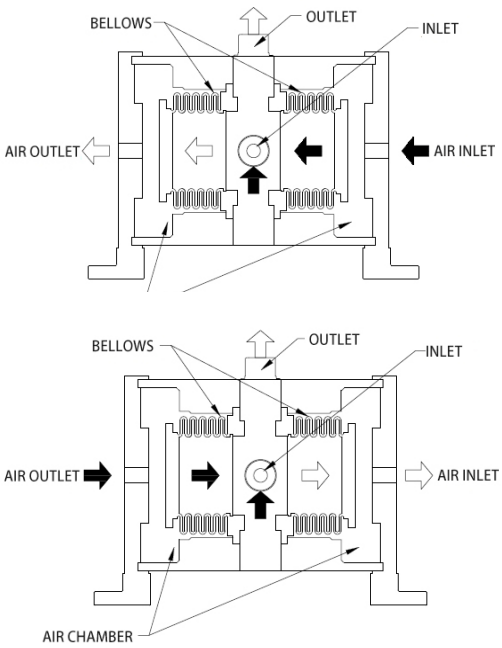
1、**Unboxing Inspection..... 7**
2、Operating Principle..... 7
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1. Unboxing Inspection

After unpacking the product, check the following points to ensure the product fully matches your order.
If you find any discrepancies, please contact your distributor.

[1] Does the model indicated on the nameplate match the product you ordered?
[2] Has the pump or any of its parts been damaged due to mishandling or improper transportation?
[3] Have all special accessories (if ordered) been delivered with the pump? For example: quick exhaust valve.

2. Operating Principle



⇨➡ : Direction of liquid flow
→ : Direction of air supply flow

Suction/Compression: Generated by the stroke of the bellows

The DINO electric-controlled bellows pump is specifically designed for semiconductor manufacturing processes.

The pump body consists of two air chambers and a pair of bellows. This pair of bellows moves back and forth inside the air chambers to perform suction and discharge, enabling continuous liquid transfer.

[1] Liquid is drawn into the pump head through the suction port by the expansion of the bellows (sucti on stroke).

[2] The liquid is then forcibly discharged from the d ischarge port of the pump head by the compressio n of the bellows (discharge stroke).

3.Model Description

DTE - 15
(1) (2)

(1) Product Series

DTE：Pump for medium to high-temperature liquids and low to high-pressure applications.

(2) Maximum Discharge Volume

DTE15：15L/min
DTE30：40L/min
DTE60：67L/min

4. Technical Specifications

Model	DTE-15			DTE-30			DTE-60		
Max. discharge capacity(LPM)	15 LPM			40 LPM			67 LPM		
Max. air supply pressure(MPa)	0.15-0.5	0.15-0.3	0.15-0.2	0.15-0.5	0.15-0.3	0.15-0.2	0.15-0.5	0.15-0.3	0.15-0.2
Liquid temperature (°C)	5-50	51-100	101-180	5-50	51-100	101-180	5-50	51-100	101-180
Max. air consumption	17.5 (Nm^3/h	10.2 (Nm^3/h	6.5 (Nm^3/h	39.5 (Nm^3/h	23.7 (Nm^3/h	15.6 (Nm^3/h	46.2 (Nm^3/h	29 (Nm^3/h	19.2 (Nm^3/h
Max. stroke speed	192 SPM			202 SPM			158 SPM		
Pump connection size	1/2”(Super 300)			3/4”(Super 300)			1”(Super 300)		
Suction lift	1 M			2 M			2 M		
Air source connection size	Rc 1/4”			Rc 3/8”			Rc 3/8”		
Ambient temperature	0–40°C (32–104°F)								
Source voltage	10-60(V)								
Drive system	By proximity switch								
Output type	NPN/DC								
Weight	8 KG			19 KG			35 KG		

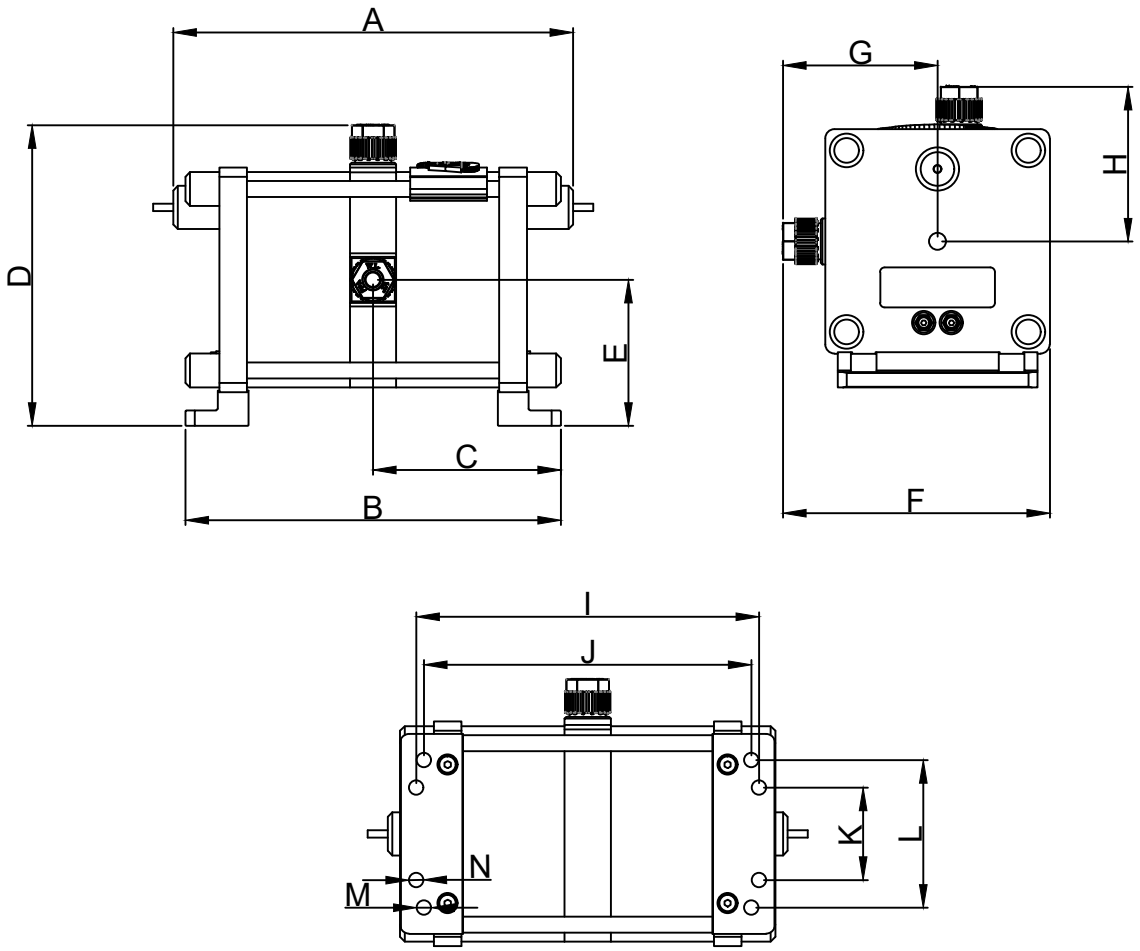
Note:

*The value of the maximum discharge volume is measured using pure water at room temperature.

*The value of the self-priming height is measured using pure water at room temperature, under the maximum stroke speed.

5. Dimensions

DTE-15

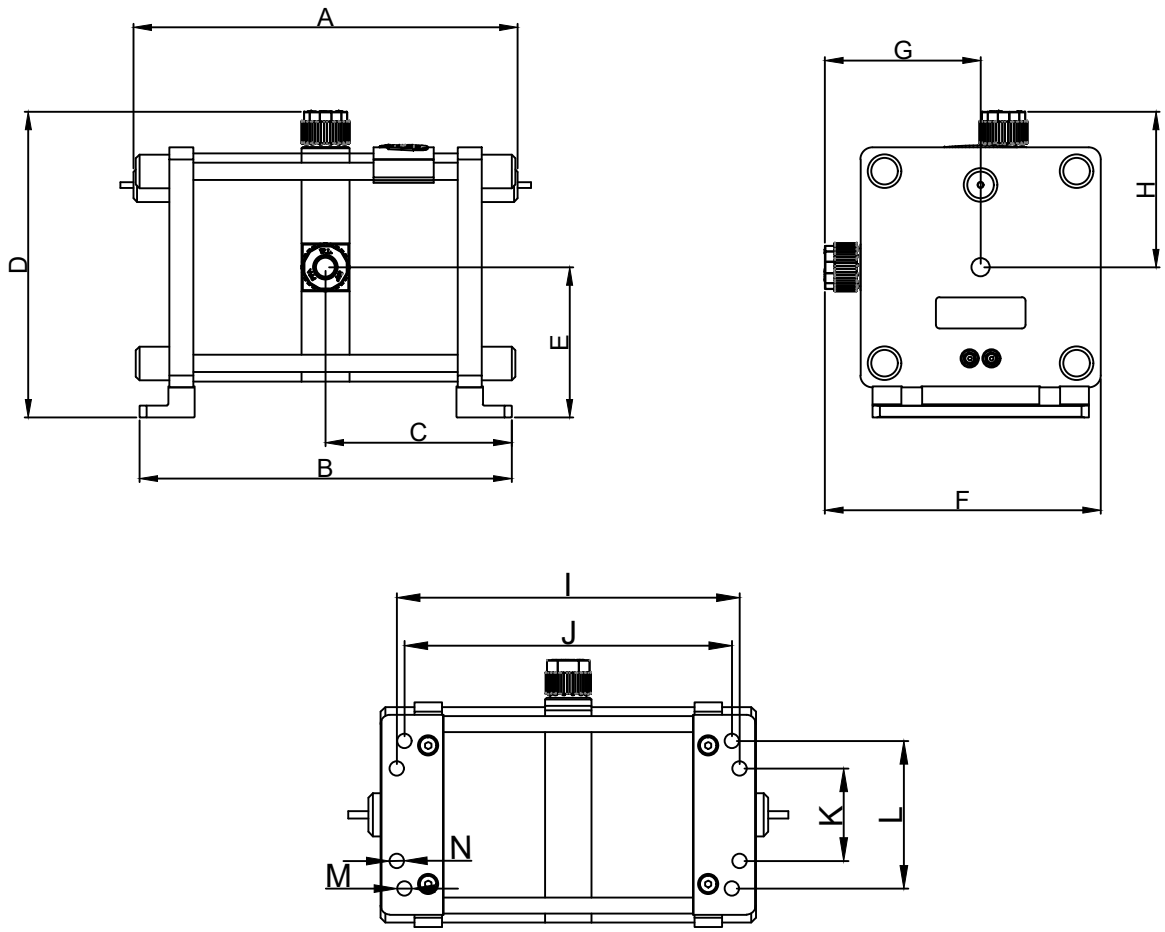


DTE-15					
A	260	E	95	I	223
B	244	F	173.5	J	213
C	122	G	100.5	K	60
D	195.5	H	100.5	L	96

Unit：mm

5. Dimensions

DTE-30

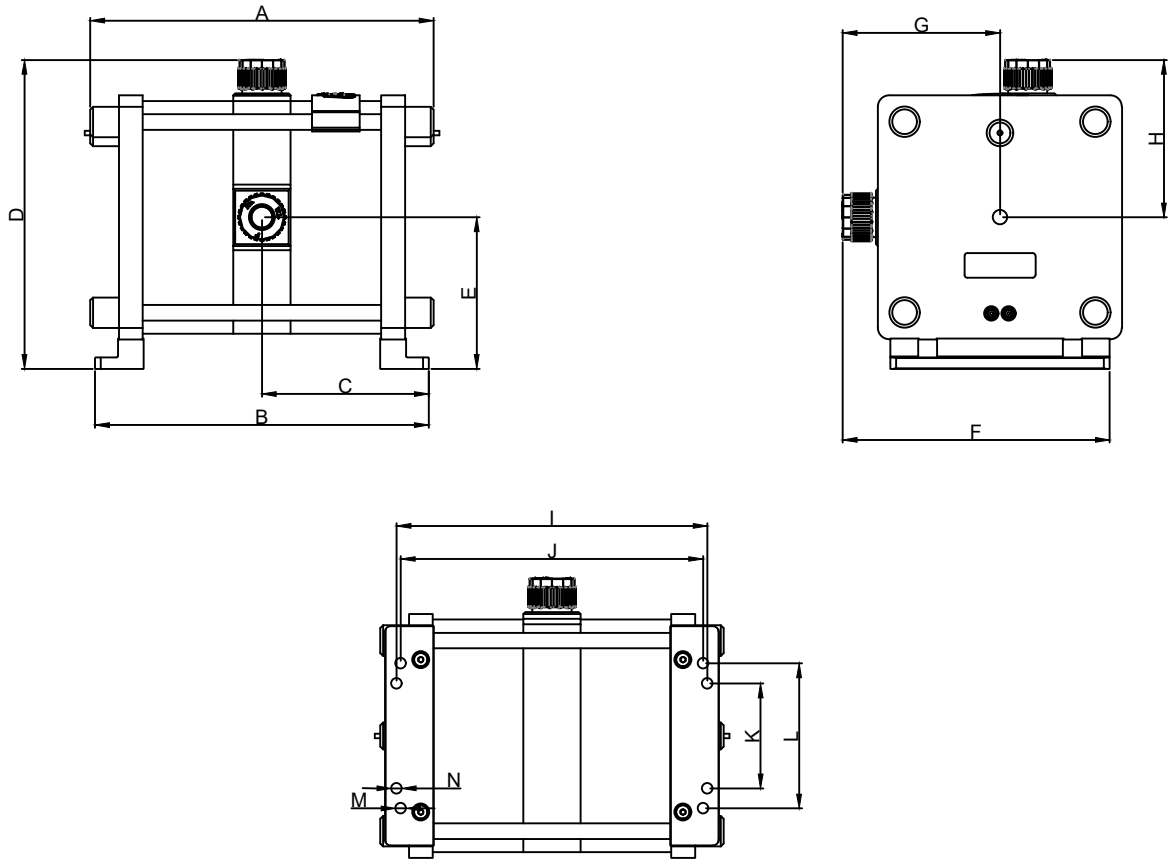


DTE-30					
A	320	E	125	I	286
B	310	F	229.7	J	272
C	155	G	129.7	K	80
D	254.7	H	129.7	L	115

Unit：mm

5. Dimensions

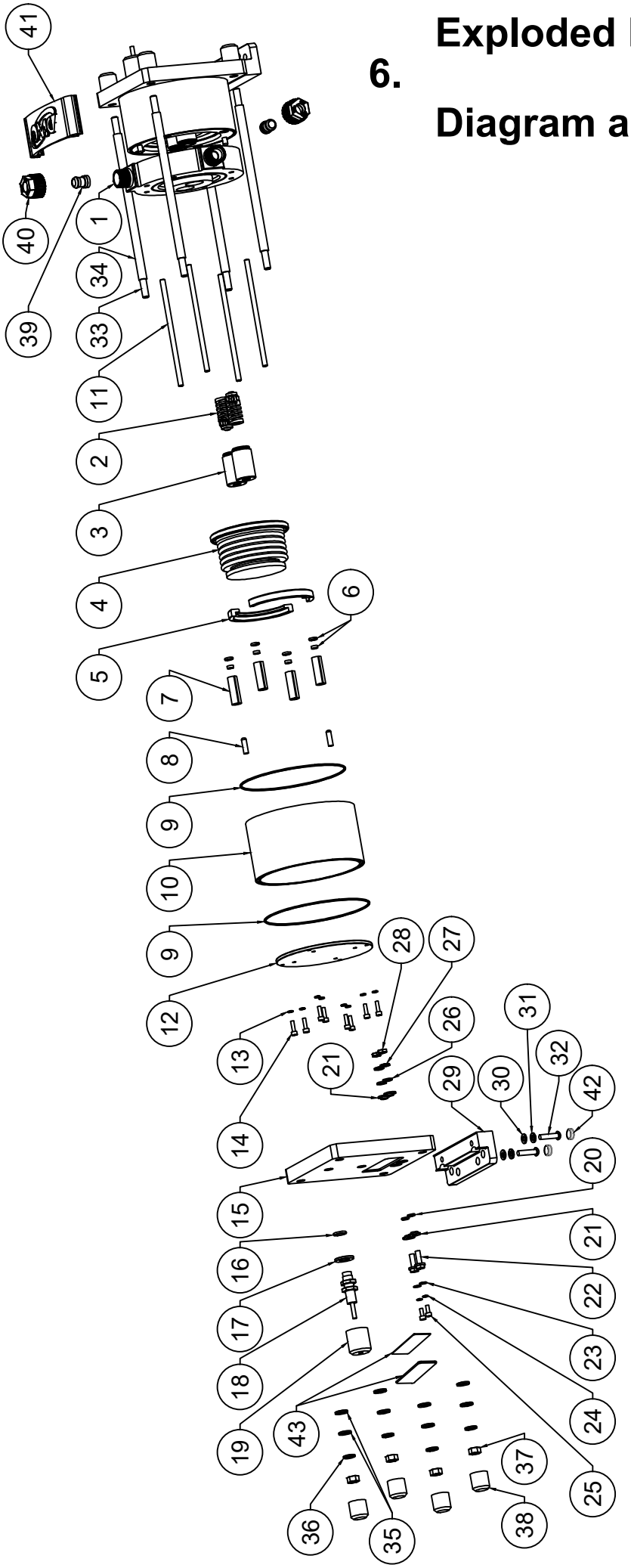
DTE-60



DTE-60					
A	360	E	159	I	326
B	350	F	280	J	317
C	175	G	165	K	110
D	324	H	165	L	152

Unit：mm

6. Exploded Parts Diagram and Parts List.



Parts List

DINO				DTE-15	DTE-30	DTE-60
No.	Description	Qty.	Material	Part No.	Part No.	Part No.
01	Center Body	1	TFM	P1-15-15001	P1-30-30001	P1-60-60001
02	Spring Valve	4	TFM	P1-15-15002	P1-30-30002	P1-60-60002
03	Spring Valve Cylinder	4	TFM	P1-15-15003	P1-30-30003	P1-60-60003
04	Bellow	2	TFM	P1-15-15004	P1-30-30004	P1-60-60004
05	Bellows Half Ring	2	SUS304	P1-15-15005	P1-30-30005	P1-60-60005
06	Bellows Rod Washer,O-ring	8	RYT AR	P1-15-15006	P1-30-30006	P1-60-60006
07	Bellows Rod Sleeve	8	RYT AR	P1-15-15007	P1-30-30007	P1-60-60007
08	Cylinder Positioning Pin	4	SUS304	P1-58-60001	P1-58-60001	P1-58-60001
09	Cylinder O-ring	4	VT	P1-15-15008	P1-30-30008	P1-60-60008
10	Cylinder	2	AL (PTFE Coated)	P1-15-15009	P1-30-30009	P1-60-60009
11	Bellows Rod	4	SUS304(Chrome Plating)	P1-15-15010	P1-30-30010	P1-60-60010
12	Bellows Disc	2	SUS304	P1-15-15011	P1-30-30011	P1-60-60011
13	Disc Spring Washer	16	SUS304	P1-58-M4002	P1-58-M5002	P1-58-M8002
14	Disc Screw	16	SUS304	P1-58-M4004	P1-58-M5001	P1-58-M8001
15	Side Cover	2	AL(PTFE Coated)	P1-15-15012	P1-30-30012	P1-60-60012
16	Proximity Switch O-ring	2	VT	P1-58-60002	P1-58-60002	P1-58-60002
17	Proximity Switch Washer	2	SUS304	P1-58-M1203	P1-58-M1203	P1-58-M1203
18	Proximity Switch	2	Stainless Steel	P1-58-60003	P1-58-60003	P1-58-60003
19	Proximity Switch Cap	2	PP	P1-58-60004	P1-58-60004	P1-58-60004
20	Leak Sensor O-ring	4	VT	P1-58-60005	P1-58-60005	P1-58-60005
21	Leak Sensor Gasket	8	PTFE	P1-58-60006	P1-58-60006	P1-58-60006
22	Leak Sensor Main Screw	4	SUS304	P1-58-M6001	P1-58-M6001	P1-58-M6001
23	Leak Sensor Washer	4	SUS304	P1-58-M4003	P1-58-M4003	P1-58-M4003
24	Leak Sensor Spring Washer	4	SUS304	P1-58-M4002	P1-58-M4002	P1-58-M4002
25	Leak Sensor Sub Screw	4	SUS304	P1-58-M4001	P1-58-M4001	P1-58-M4001
26	Leak Sensor Washer	4	SUS304	P1-58-M6003	P1-58-M6003	P1-58-M6003
27	Leak Sensor Spring Washer	4	SUS304	P1-58-M6002	P1-58-M6002	P1-58-M6002
28	Leak Sensor Thin Nut	4	SUS304	P1-58-M6004	P1-58-M6004	P1-58-M6004
29	Base Foot	2	UPE	P1-15-15013	P1-30-30013	P1-60-60013
30	Base Foot Washer	4	SUS304	P1-58-M6003	P1-58-M6003	P1-58-M8003
31	Base Spring Washer	4	SUS304	P1-58-M6002	P1-58-M6002	P1-58-M8002
32	Base Round Head Screw	4	SUS304	P1-58-M6005	P1-58-M6006	P1-58-M8005
33	Side Cover Connecting Rod	4	SUS304	P1-15-15014	P1-30-30014	P1-60-60014
34	Side Cover Connecting Rod Cover	4	PTFE	P1-15-15015	P1-30-30015	P1-60-60015
35	Side Cover Rod Washer	16	SUS304	P1-58-M8003	P1-58-M1203	P1-58-M1403
36	Side Cover Rod Spring Washer	8	SUS304	P1-58-M8002	P1-58-M1202	P1-58-M1402
37	Side Cover Rod Nut	8	SUS304	P1-58-M8004	P1-58-M1204	P1-58-M1404
38	Side Cover Rod Screw Cap	8	PP	P1-15-15016	P1-30-30016	P1-60-60016
39	SUPER300 15A Ball	2	PTFE	P1-15-15017	P1-30-30017	P1-60-60017
40	SUPER300 15A Cap	2	PTFE	P1-15-15018	P1-30-30018	P1-60-60018
41	Snap-on Logo Plate	1	PP	P1-15-15019	P1-30-30019	P1-60-60019
42	Base Screw Plug	4	EPDM	P1-58-60009	P1-58-60009	P1-58-60010
43	Nameplate Frame Set	1	PP	D1-58-90012	D1-58-90012	D1-58-90012
	Dampener Base	1	PTFE	P1-15-15020	P1-30-30020	P1-60-60020
	Dampener Mount	1	UPE	P1-15-15021	P1-30-30021	P1-60-60021
	Dampener Base Screw	4	UPE	D1-58-60008	D1-58-60008	D1-58-60008
	Pump Carton Box	1		P1-15-40001	P1-30-40001	P1-60-40001
	Shock-Absorbing Foam	1		P1-15-40002	P1-30-40002	P1-60-40002
	Quick Exhaust Filter Element	1		P1-58-60008	P1-58-60007	P1-58-60007

Installation Instructions

The "Installation Section" must be thoroughly understood by the user.
Do not begin installation work unless you are certain that you fully understa
nd all the descriptions provided in this section.

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2、Installation, Piping and Wiring..... 17
2.1 Installation..... 17
2.2 Fluid Piping..... 18
2.3 Air Piping..... 20
2.4 Wiring..... 25

1、Before Installation

To ensure that the pump's performance meets your application requirements, comprehensive safety measures must be taken for both the pump body and the entire system.
The following information, including key points to follow when handling the pump, outlines measures that ensure safe system operation. Please read the descriptions carefully.

To operate this pump, a 5-port solenoid valve is required.
In addition, to enhance system safety, a quick exhaust valve must be installed.

<table>
<tr><th>NO.</th><th>Notes</th><th>Descriptions</th></tr>
<tr><td>1</td><td>Pump Stroke Speed:
Do not operate the pump beyo nd the maximum stroke speed specified in Item 4 of the specifi cations table on page 8.</td><td>If any air bubbles are drawn in through the pump's inlet, th e pump may enter an air-lock state and the stroke speed m ay rise to an abnormal level. Safety measures must be tak en to prevent the pump from operating beyond the maximu m stroke speed.</td></tr>
<tr><td>2</td><td>Supply Air Pressure:</td><td>The supply air pressure must be maintained within the specif ied range. Considering the pressure resistance of the filter a t room temperature, the supply air pressure should be kept a s low as possible to protect the bellows and ensure safe ope ration. Any fluctuation in the supply air pressure will affect th e discharge volume. A regulator should be installed to stabili ze the pressure.
<table>
<tr><th>Model</th><th>Fluid Temperature</th><th>Supply Air Pressure</th></tr>
<tr><td rowspan="3">DTE-15·30·60</td><td>5-50 °C</td><td>0.15~0.5 (MPa)</td></tr>
<tr><td>51-100°C</td><td>0.15~0.3 (MPa)</td></tr>
<tr><td>101-180 °C</td><td>0.15~0.2 (MPa)</td></tr>
</table>
</td></tr>
<tr><td>3</td><td>Liquid Temperature Range</td><td>The liquid temperature must be maintained within the range of 5–180°C.</td></tr>
<tr><td>4</td><td>Prohibited Liquids:
⚠ Caution
1. Liquids that crystallize easily
2. Liquids containing slurry
3. Low-dielectric hydrocarbon liquids</td><td>Transporting crystallizable or slurry-containing liquids will shorten the lifespan of the valves and bellows, and therefore is not recommended.
When transporting solvents, static electricity may be generated between the fluoropolymer and the liquid, eventually causing pinhole damage.</td></tr>
</table>

NO.	Notes	Descriptions
5	Liquids Requiring Careful Handling · Strippers · Hydrazine · Fuming sulfuric acid · Solvents	Some strippers may cause premature rupture of the bellows or tubing (PFA). (For warranty periods applicable to such liquids, please contact DINO.) Explosion-proof specifications are required when handling solvents. (For more details, please consult DINO.)
6	Do not close the exhaust valve while the pump is stopped until all pressure in the bellows has been released.	⚠ **Caution** If the pump is stopped without releasing the discharge-side pressure, the residual pressure may deform the bellows.
7	Do not leave the pump unused for extended periods without first draining the liquid inside.	⚠ **Caution** If the pump is stopped without draining the liquid, gas components in the liquid may permeate and cause corrosion of electrodes or other parts.
8	Do not reduce the exhaust port diameter (do not use piping with a diameter smaller than specified).	⚠ **Caution** If the exhaust port of the 5-port solenoid valve is extended to a non-designated location and the exhaust port is narrowed, an imbalance between supply pressure and discharge-side pressure may occur, potentially causing deformation of the bellows.
9	Do not supply air to both the left and right air inlets simultaneously when the pump is stopped.	⚠ **Caution** If air is supplied to both air chambers on the left and right sides while the pump is stopped, the bellows will become pressurized and may deform. Special attention is required when using double solenoid valves, as some valve types may cause both air chambers to be pressurized simultaneously when the valve is in the stop position.
10	Do not close the secondary air valve when the pump is stopped.	⚠ **Caution** If the secondary air valve on the liquid piping is closed while the pump is stopped, the residual pressure inside the bellows may deform the bellows or connecting plates. Please note that the secondary air valve should remain open at all times, except when draining the liquid.

2、Installation, Piping and Wiring.

If you sense or notice any danger or abnormal conditions during installation or other setup work, stop the work immediately and return to the first step.

⚠ Warning

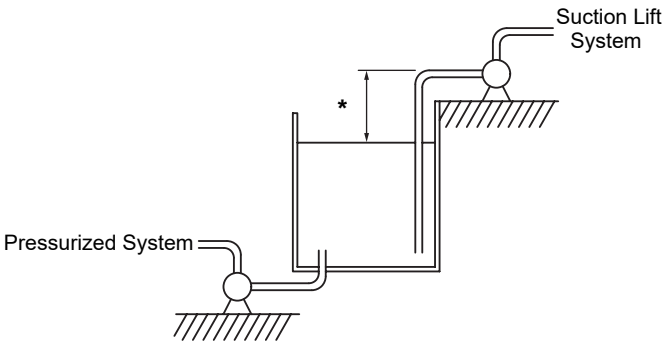
Make sure that no one turns on the power switch while work is being performed on the pump. Always turn off the power switch before starting any maintenance or repair work on the pump. If the work site is noisy or has poor visibility, a clearly visible sign stating “Power Off (Under Maintenance)” should be placed near the power switch to inform others of the ongoing situation.

Activation of the power switch by anyone other than the operator/maintenance personnel may lead to serious accidents. The operator must take special precautions to prevent such incidents.

Only operators or maintenance personnel who have received thorough training in safe operating procedures are allowed to handle electrical wiring and power control.
DINO shall not be held responsible for any personal injury or property damage caused by failure to follow these instructions.
If necessary, please contact DINO or your authorized DINO distributor.

2.1 Installation

[1] Pump Installation



¡ Overflow Suction System:

Install the pump as close as possible to the chemical supply tank.

⚠ Caution:

Use a flooded suction system when supplying liquid above room temperature or from a liquid circulation system.

Suction Lift System:

Based on the self-priming capability, install the suction piping as close as possible to the chemical supply tank.

***Self-Priming Capability：**

DTE-15：1M
DTE-30：2M
DTE-60：2M

⚠ Caution:

The stated self-priming capability is based on using pure water at room temperature and operating the pump at its maximum stroke speed.
The actual suction lift height may vary depending on the characteristics and temperature of the liquid, as well as the length of the suction piping.

[2]Installation Base:

Select a flat and solid base (such as a mounting chassis) for installation to avoid vibration

[3]Pump Direction:

Position the discharge port facing upward and the suction port facing horizontally.
Secure the pump in place using bolts.

2.2 Liquid Piping

The outlet and inlet connections are compatible with the Super 300 standard.。

[1] The pump’s inlet and outlet fittings conform to the Super 300 standard and are made of PFA.
The applicable tubing sizes are as follows:

*DTE-15 (1/2": Outer diameter 12.7 mm × Inner diameter 9.52 mm)
*DTE-30 (3/4": Outer diameter 19 mm × Inner diameter 16 mm)
*DTE-60 (1": Outer diameter 25 mm × Inner diameter 22 mm)

[2]Before connecting the piping to the pump, remove any foreign substances.
[3]Avoid applying excessive load to the pump during piping connection. If necessary, use pipe holders to prevent vibration from being transferred to the pump.
[4] Carefully assemble pipe joints to prevent liquid leakage, air leakage, and air suction.
[5]Use standard fittings for piping, but ensure the fittings are designed to operate leak-free under high-temperature conditions.

2.2.1 Precautions for Suction Line Configuration

[1] Under pressurized conditions, the inlet piping should be as wide in diameter and as short in length as possible.
For suction lift systems, set the height according to the pump’s self-priming capability.

[2] To prevent solid contaminants such as wafer debris from entering the bellows, install a filter or mesh screen at the pump inlet. Select a filter or screen with low flow resistance.

⚠ **Caution:**
Wafer fragments may become lodged inside the bellows, leading to damage.
If solid particles clog the pump valve, it may disable the check valve function and affect flow rate.

[3] When installing a valve on the suction line, use a valve with an orifice larger than the inner diameter of the piping.
A smaller orifice may increase flow resistance or raise the risk of blockage by crystallized material.
Ensure the valve remains fully open during pump operation.

⚠ **Caution:**
Operating the pump with a valve installed on the suction line increases internal pres
sure in the bellows, which may cause the bellows to deform inward.

2.2.2 Precautions When Installing Discharge Piping

[1] The length and number of bends in the pump's discharge piping will increase the discharge load.
To reduce the load, install a pulsation damper to minimize pulsation.

[2] When installing a valve in the discharge line, use a valve with an orifice larger than the pipe's inner diameter.
Smaller orifices may increase discharge line resistance and are more prone to blockage by crystallized material.
Keep the valve open during pump operation. After the pump stops, wait until the discharge pressure reaches "0" before closing the valve.

⚠ **Caution:**
Do not close the valve before the pump stops. The resulting pressure surge may deform the bellows.

[3]A filter that matches the pump model must be selected.
When choosing a filter, consider the filtration area, particle removal efficiency, and flow characteristics.
Using an incorrect filter may result in failing to achieve the desired flow rate.

⚠ **Caution:**
The filter must be properly wetted before operating the pump.
If no liquid is supplied for a long time, the filter may dry out and affect performance.

[4] The piping design should ensure that no residual pressure remains on the discharge side when the pump is stopped.

⚠ **Caution:**
Residual pressure on the discharge side when the pump is stopped may cause the bellows to deform.

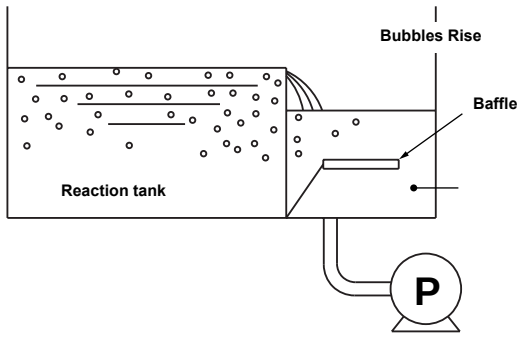
2.2.3 Defoaming Methods

When strong acid liquids are delivered into a reaction tank or circulated through narrow piping, bubbles may form.
If these bubbles mix with the liquid and enter the bellows, the system may enter an air-lock condition. This leads to an increase in stroke speed and disrupts the smooth delivery of liquid.

To ensure safe and efficient circulation and chemical supply, degassing must be performed and appropriate safety measures must be taken.

When air enters the bellows and pump, causing an air seal (air-lock), the pump stroke speed increases.
If the increase is excessive and exceeds the specified stroke speed, stop the pump or perform degassing immediately.

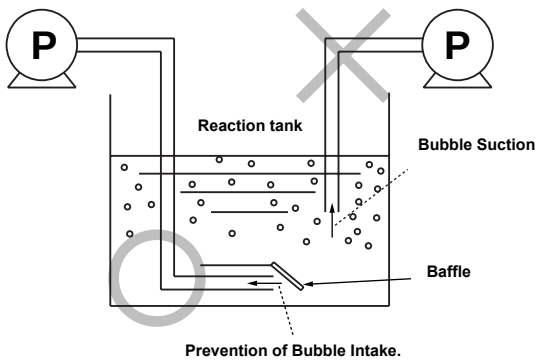
CASE 1 (Pressurized System):



1、Pressurized System：

Install a baffle in the overflow tank to separate bubbles from the liquid, thereby removing bubbles from the system.

CASE 2 (Suction System):



2、Suction System:

In suction lift systems, place the baffle at the low liquid level point in the reaction tank.

This setup prevents bubbles from being drawn in together with the liquid, as the suction pipe inlet remains below the baffle and avoids the surface where bubbles are concentrated.

2.3Air Piping

⚠ CAUTIONS

Any supplied air must be clean and free of dust. If the supply air contains moisture, oil, or dust, the pump's performance will be reduced.

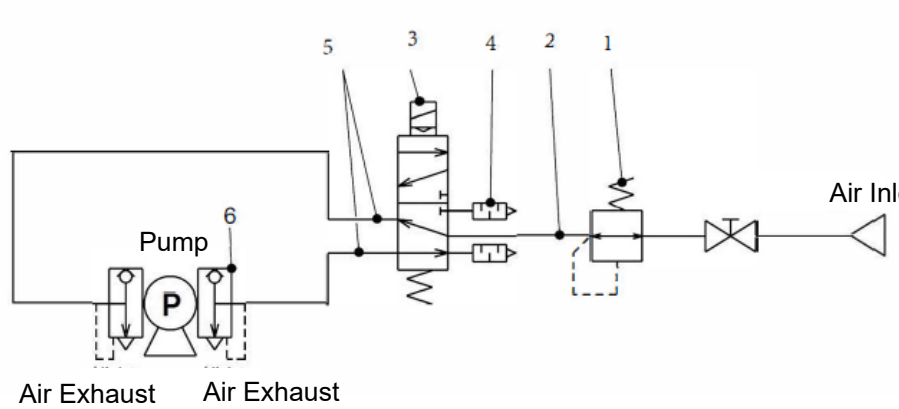
If the air supply line to the pump is too long and narrow, the following issues may occur:

Residual pressure is not effectively released from the pump's air chamber, causing the bellows to deform from the inside.

The pump's stroke speed decreases, resulting in reduced discharge volume.

Set up the air piping according to the sample layout shown on the next page.

2.3.1 Example of Air Piping Setup



1.Regulator
2.Air Piping
3.Solenoid Valve
4.Silencer
5.Air Piping
6.Quick Exhaust Valve

Note:
Air supply port to pump:
*DTE-15: Rc1/4
*DTE-30, DTE-60: Rc3/8

[1]Regulator:

Select a regulator based on the pump's air consumption.
(The pressure drop should be less than 20 kPa.)

⚠ **Caution:**
Set the air supply pressure within the specified range.
Each pump should be equipped with an individual regulator.

Model	Fluid Temperature	Supply Air Pressure Range
DTE-15·30·60	5-50 °C	0.15-0.5 (MPa)
	51-100°C	0.15-0.3 (MPa)
	101-180 °C	0.15-0.2 (MPa)

⚠ **Caution:**
If one regulator is used for two or more solenoid valves, the valve farthest from the regulator may not operate properly due to insufficient pressure transmission.

[2]Air Piping:

1) When air supply pressure is below 0.5 MPa:

*DTE-15: air pipe inner diameter between the regulator and solenoid valve should be 6.5 mm or more
*DTE-30: 9 mm or more
*DTE-60: 12 mm or more

2)When air supply pressure is below 0.3 MPa:
*DTE-15: 6.5 mm or more
*DTE-30: 8 mm or more
*DTE-60: 10 mm or more

[3] Air Supply Piping

Select the air tubing between the solenoid valve and the pump or quick exhaust valve according to the table below.

Pump air pressure: 0.5 MPa or lower

Pipe Length	DTE-15	DTE-30	DTE-60
Less than 1 meter	Inner diameter ≥ 6.5 mm	Inner diameter ≥ 8 mm	Inner diameter ≥ 10 mm
1 to 3 meters	Inner diameter ≥ 7.5 mm or Use a quick exhaust valve	Inner diameter ≥ 9 mm or Use a quick exhaust valve	Inner diameter ≥ 12 mm or Use a quick exhaust valve
More than 3 meters	Use a quick exhaust valve		

Pump air pressure: 0.3 MPa or lower

Pipe Length	DTE-15	DTE-30	DTE-60
Less than 1 meter	Inner diameter ≥ 6.5 mm	Inner diameter ≥ 8 mm	Inner diameter ≥ 10 mm
1 to 3 meters	Inner diameter ≥ 7.5 mm or Use a quick exhaust valve	Inner diameter ≥ 9 mm or Use a quick exhaust valve	Inner diameter ≥ 12 mm or Use a quick exhaust valve
More than 3 meters	Use a quick exhaust valve		

Note:
The air pipe lengths on both the left and right sides must be equal.
Unequal lengths can cause increased liquid pulsation.

[4] Quick Exhaust Valve:

As shown in Figure 1, the air discharged from the pump exits the system through the exhaust port of the solenoid valve (see Figure 1 on the next page).

Depending on the type of liquid used, some permeable gases may mix with the exhaust air.
(The solenoid valve may become corroded by such permeable gases and eventually become unusable.)

In such cases, install a quick exhaust valve between the pump and the solenoid valve.
The air will be discharged through the exhaust port of the quick exhaust valve, as shown in Figure 2. (O nly a limited amount of air will pass through the solenoid valve.)

• Air Exhaust Direction:

Figure 1: Air exhaust without quick exhaust valve

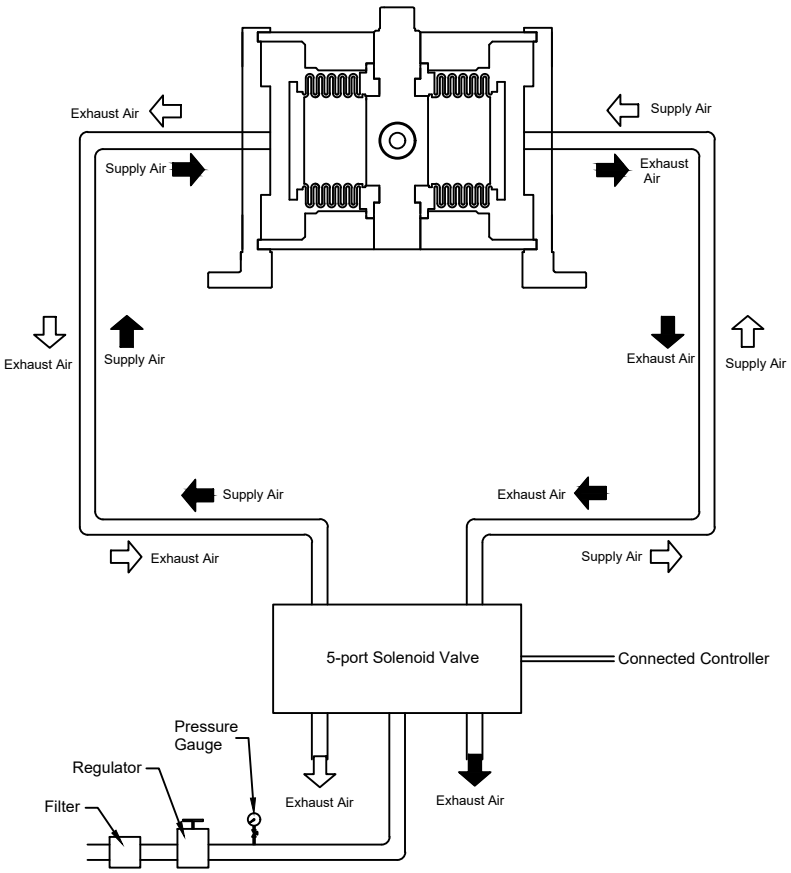
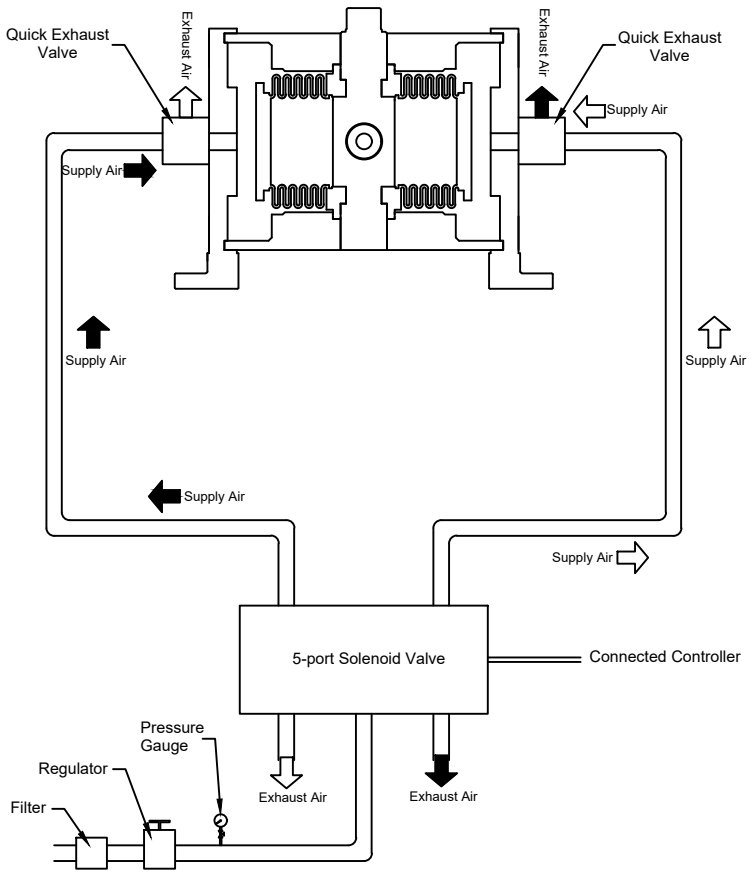
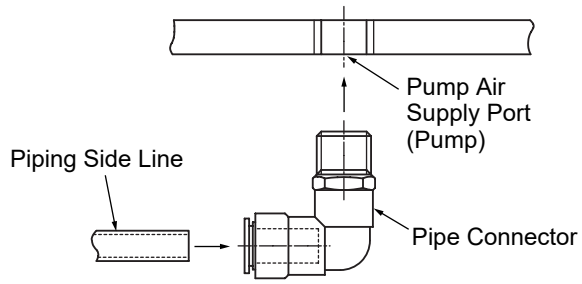


Figure 2: Air exhaust with quick exhaust valve



2.3.2 Key Points to Observe in the Air Piping System



[1] Pump Connection Port Size:
The connection port size on the air supply side is as follows:
*DTE-15: Rc 1/4"
*DTE-30, DTE-60: Rc 3/8"

[2] Install a Pressure-Regulating Valve with Pressure Relief:
Fluctuations in air supply pressure can cause changes in the pump's stroke rate and discharge volume. Install a regulator to maintain stable air pressure.

[3] Install a Safety Valve:
Install a safety valve to prevent air supply pressure from exceeding the specified pressure range.

Model	Fluid Temperature	Supply Air Pressure Range
DTE-15·30·60	5-50 °C	0.15~0.5 (MPa)
	51-100°C	0.15~0.3 (MPa)
	101-180 °C	0.15~0.2 (MPa)

[4] Exhaust Port Installation:
The exhaust ports of the air circulation system and solenoid valve must be installed in the correct positions to release the discharged air into the open atmosphere.

⚠ **Caution:**
Narrowing the air exhaust outlet may block the pump's exhaust.
This may cause the bellows to deform from the inside.
Follow the setup example described in Section 2.3.1 to determine the correct configuration.

[5] Noise Reduction Measures at the Exhaust Outlet:
To minimize exhaust noise, connect an exhaust pipe to the exhaust port or install a silencer.

[6] Installation of Multiple Pumps:
The total air consumption of multiple pumps increases with the capacity of the compressor.
The pipe diameter must be selected based on the total number of pumps being installed.

2.4 Wiring

This pump requires a 5-port solenoid valve and connection to various controllers for operation.
Please refer to the respective controller's instruction manual for detailed wiring guidance.

[1] Wiring of Proximity Switch:
DTE series pumps come with a proximity switch that has three wires: brown, blue, and black.
Incorrect wiring may burn out the proximity switch, so please wire correctly.

[2] When pumping flammable liquids such as solvents, an explosion-proof proximity switch must be used.
Do not use electrodes, as the spark from the electrode could cause a fire.

[3] The air lines of the 5-port solenoid valve are divided into "normally open" and "normally closed" sides.
The "normally open" side should be connected to Proximity Switch A.The "normally closed" side should be connected to Proximity Switch B. If this connection is incorrect, the pump will not operate.
To ensure proper pump operation, either swap the air lines of the solenoid valve or swap the wiring of Proximity Switch A and B.

[4] For alarm output status, please refer to each brand's operation manual.

2.4.1 Wiring Guidelines

[1] Wiring: The pump is supplied with: A proximity switch cable (approx. 1 meter) and an electrode lead wires (approx. 1.8 meters)
Other necessary connection wires are not included.
Please refer to the table below to select the proper wires for connecting the controller and 5-port solenoid valv e.

Wire Application	Power Specifications
For power supply to the controller	115V, 0.24A or higher
For connecting the 5-port solenoid valve and controller	24V, 0.24A or higher

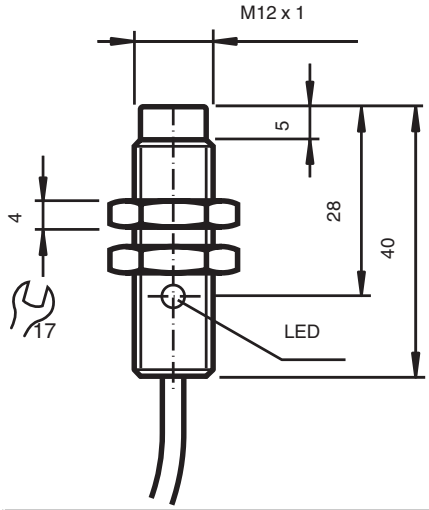
[2] Extension of Electrode Wires:
The total resistance, including connecting wires (approx. 1.8 meters), must be controlled under 5 kΩ.
If resistance exceeds 5 kΩ, the pump may not stop.
(This is because the controller may not detect damage to the bellows, and thus fail to trigger an automatic stop alarm.)

[3] Wiring of Proximity Switch:
The proximity switch wires must be kept separate from power cables or any high-voltage wiring.
They must not be installed in the same conduit or cable pipe. Otherwise, the switch may malfunction.

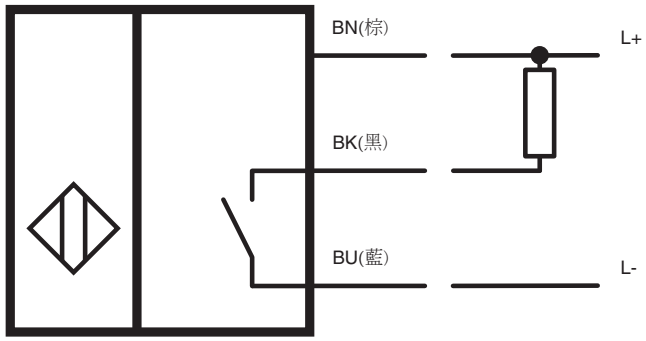
When extending the wire:
For lengths under 30 meters, use wire of 0.3 mm^2 or more.
For lengths over 30 meters, use wire with resistance of 100 Ω/km or less.

2.4.2 Proximity Switch Technical Specifications

Dimensions



Wiring Method



General Description		
Switching Function		NPN Normally Open
Rated Operating Distance	Sn	4mm
Mounting Type		Non-flush Mount
Output Type		DC
Adjustable Sensing Range	Sa	0~3.24mm
Reduction Factor Al		0.37
Reduction Factor Cu		0.36
Reduction Factor V2a		0.74
Rated Values		
Operating Voltage	UB	10~60V
Switching Frequency	f	0~2000Hz
Hysteresis	H	1－10% of Sn, typical 3%
Polarity Protection		Yes
Short Circuit Protection		Pulse
Voltage Drop	Ud	≤ 3V
Operating Current	IL	0~200mA
No-load Current	Io	≤ 15mA
Switching State Indicator		Yellow LED Indicator
Compliance Standards		
EMC		IEC/EN 60947-5-2:20004
Standard		IEC/EN 60947-5-2:20004
Environmental Conditions		
Operating Temp.		-25~70°C
Storage Temp.		-40~85°C
Mechanical Characteristics		
Connection Type		2m,PUR Cab;e
Conductor Cross-section		0.34mm2
Housing Material		Stainless Steel
Sensing Surface		PBT
Protection Rating		IP67

Operating Instructions

The operation of the pump must be limited to the scope and procedures described in this manual.
It is strictly prohibited to operate the pump using methods or procedures not covered in this manual.

DINO assumes no responsibility for any personal injury or property damage resulting from failure to comply with this instruction.
If necessary, please contact DINO or your authorized DINO distributor.

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1. **Maintenance**

Before starting the pump for the first time or after a long period of inactivity, the following preparation steps must be carried out:

[1] Confirm that all wiring has been correctly connected. (Wiring of proximity switches and solenoid valves.)

⚠ **Caution:**
Incorrect wiring may cause the proximity switch to burn out.

[2] Confirm that the air piping is properly connected. Check for any loose fittings.

[3] Ensure that the pump is securely fixed in the correct position.

[4] Confirm that there are no loose connectors on the liquid piping.

[5] Confirm that the valves on both the suction and discharge lines are fully open.

[6] Confirm that the tank or reservoir is filled with liquid.

⚠ **Caution:**
Use purified water for test operation. Before actual operation, verify that the test run shows no abnormal conditions.

[7] Confirm that the filter is fully wetted.

⚠ **Caution:**
Follow the instructions provided in the filter's operation manual.

2. Pump Operation

During the pump's trial run, clean the unit and piping simultaneously.

2.1 Starting the Pump

[1] Supply air to the pump:
• Set the regulator to the specified air pressure.

⚠ **Caution:**
Set the supply pressure within the allowable range.

Model	Fluid Temperature	Supply Air Pressure Range
DTE-15·30·60	5-50 °C	**0.15-0.5 (MPa)**
	51-100°C	**0.15-0.3 (MPa)**
	101-180 °C	**0.15-0.2 (MPa)**

• Open the air valve.

⚠ **Caution:**
Adjust the air valve to ensure the pump does not exceed the maximum stroke speed.

[2] Turn on the power switch on the controller
The pump will begin operation, and the "Operation Indicator" LED (blue) on the controller will start flashing.

2.2 Stopping the Pump

[1] Turn off the power switch on the controller.
The pump will stop operating, and the “Operation Indicator” LED will turn off.

[2] After stopping the pump, ensure the discharge-side valve remains open.

⚠ **Caution:**
Do not close the discharge-side valve after stopping the pump.

[3] Make sure no residual pressure remains on the discharge side of the system when the pump is stopped.

2.3 Adjusting the Discharge Volume (Output)

[1] The pump’s discharge volume can be adjusted by changing the degree of opening of the air supply valve and adjusting the airflow rate.

3. Precautions During Operation

Please observe the following points during operation:
If any abnormal condition is observed, immediately stop the pump and refer to the section “Causes of Malfunctions and Troubleshooting.”

No.	Checkpoints	Note
1	Is the pump’s stroke speed within the specified range?	The stroke speed must be within the specified range. (Note 1))
2	Is the air pressure maintained at the proper level?	The air supply must be maintained within the specified range. (Note 2)
3	Is the air volume sufficient?	
4	Are there any leaks in the seals of the air or liquid piping?	
5	Is the supplied air clean?	

Note 1: The allowable maximum stroke speed depends on the pump model.
(Refer to Product Description 4, Specifications on Page 8.)

Note 2: The allowable air supply pressure range varies depending on the liquid temperature.
(Refer to Product Description 4, Specifications on Page 8.)