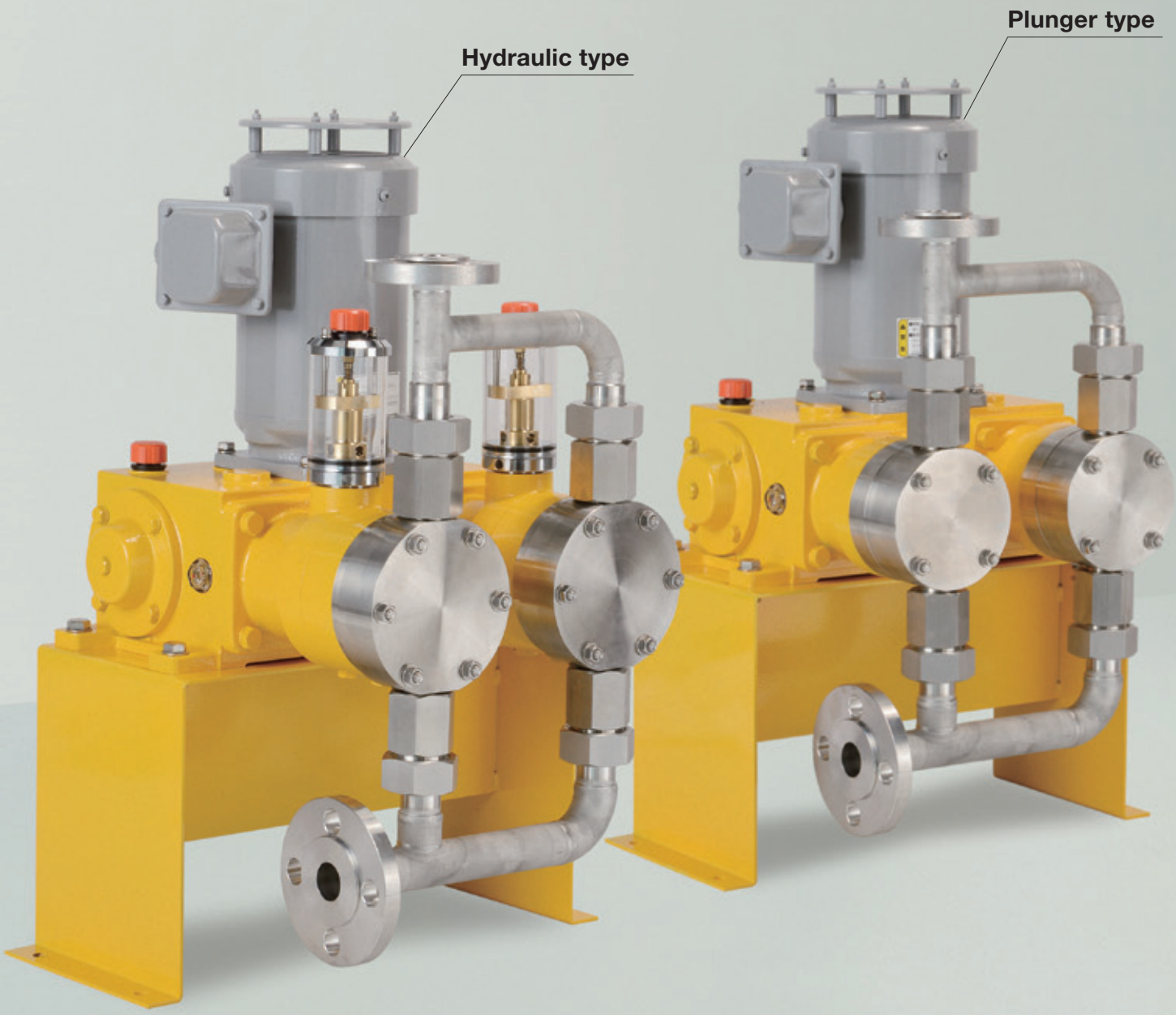
TACMINA

Smoothflow Pump

PL

- Direct-driven type
- Hydraulic type
- Plunger type
- Metered supply

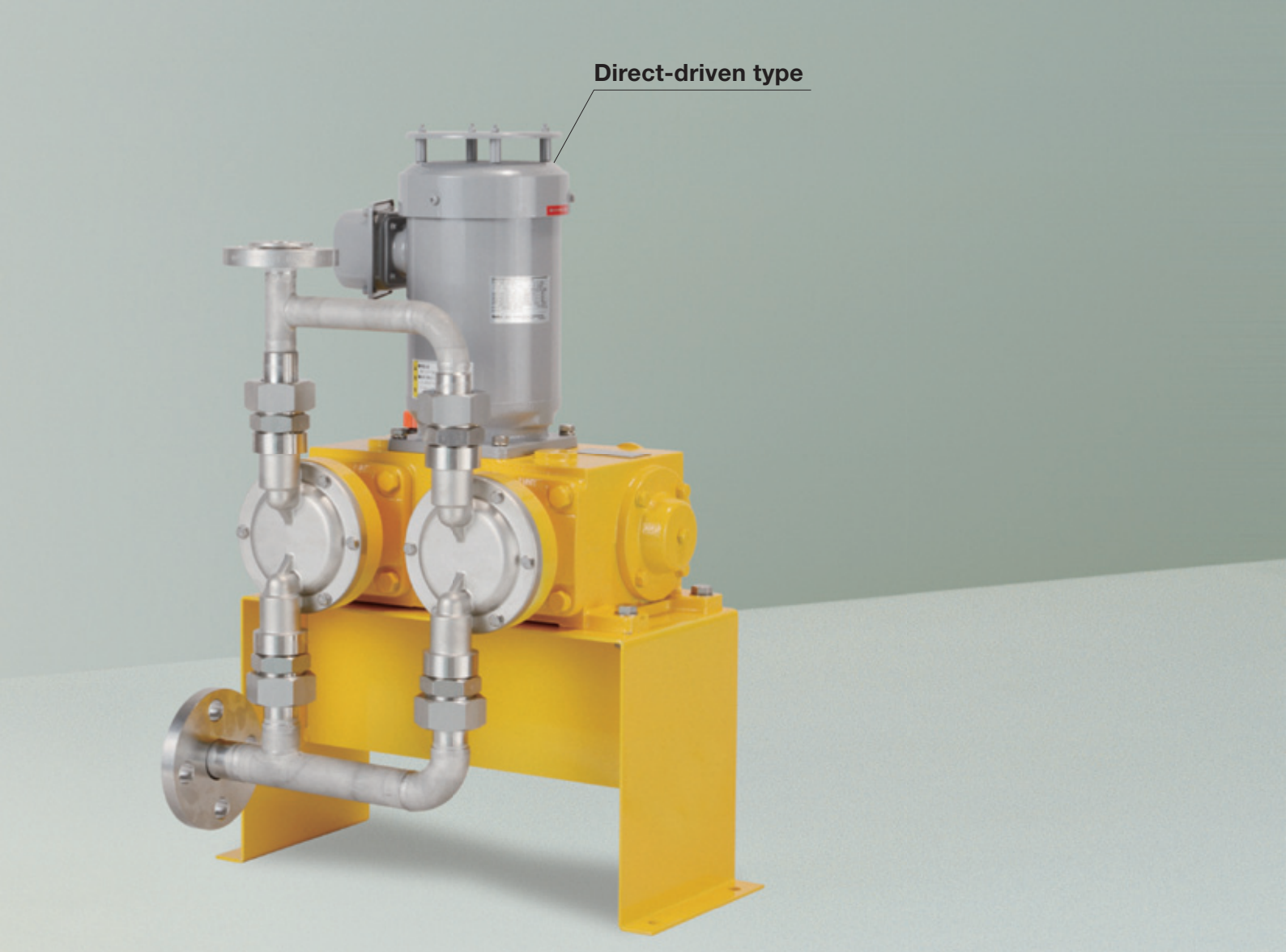


A New Paradigm to Create Safe and Reliable

Diaphragm metering pumps are known for their outstanding performances, as they precisely meter and transfer any kind of liquids without excessive pressure or shear. Yet, with this method of transfer, there is still the problem of "pulsation," and so diaphragm metering pumps have been regarded as difficult to implement in manufacturing processes that require high precision.

The TACMINA Smoothflow Series, the highly innovative pulseless diaphragm metering pump, addresses this problem without sacrificing performance.

As an ideal answer for liquid transfer, the Smoothflow Pump can be configured in-line in processes, and operated automatically and continuously. It also ensures greatly enhanced operator ease, product quality and productivity. What's more, your burden of capital investment and maintenance can now be considerably reduced, providing you with "safety" and "reliability."



Transfer of Liquids

Ideal Method of Liquid Transfer

Smoothflow

- Constant & Stable Flow
- Eco-Friendly
- Economical
- Gentle on Liquids

For Those Who Want Total Control in Liquid Flow

Smoothflow — the ideal method of liquid transfer. This innovative method not only meets your liquid transfer needs, but provides optimal solutions to Man, liquids and the environment as well.
TACMINA's Smoothflow technology, based on unique know-how cultivated over 50 years, delivers you ultimate performance and provides complete satisfaction.

Ideal for the metered transfer of difficult-to-transfer chemical liquids and fluids, such as high-temperature, high-viscosity resins and inflammable chemicals.

Direct-driven type ····· Page 7

Ideal for the high-pressure and metered injection of highly volatile chemicals, such as emulsions, latex and slurry.

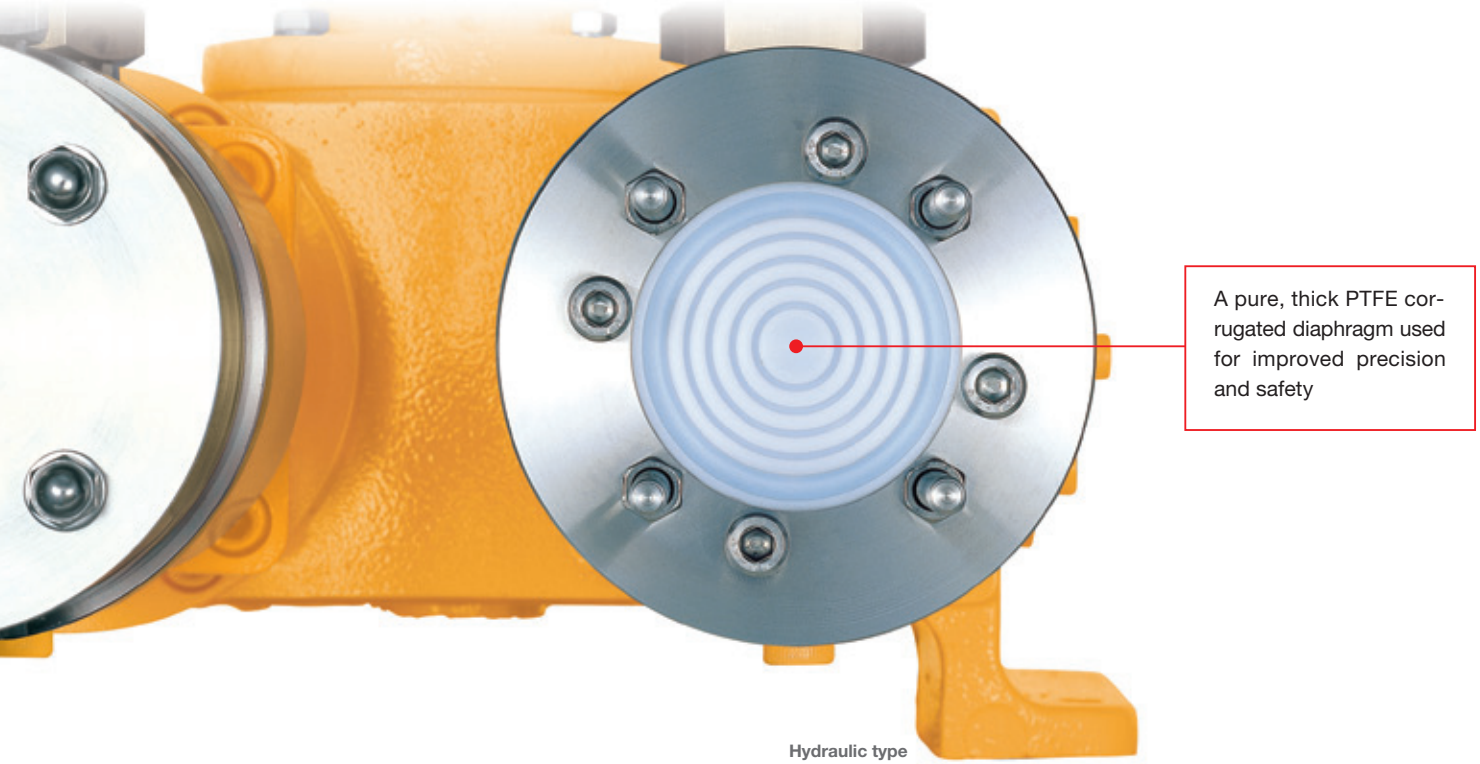
Hydraulic type ····· Page 9

Ideal for high-accuracy, high-pressure injection

Plunger type ····· Page 11

* On some products, the base is not provided in the standard specification.

An Ideal Pump Mechanism for Accurately and Gently Transferring Liquids



Hydraulic type

No Entry of Foreign Matter*

Since the pump has no rotating or sliding parts, where foreign matter is often generated, the risk of foreign matter contamination is greatly reduced. This pump can be used safely for processes that require the strict quality management, such as the food industry, pharmaceutical industry, electrical machinery industry, and so on.

Accurate Transfer of Even Small Amounts

As a backflow prevention mechanism is included in the pump body, the flow rate will not be lowered even when the pressure fluctuates. This is suitable for applications that require high-precision supply capabilities such as coating and mixing drugs. It is also suitable for applications that require accurate mixing ratio/accurate measurements.

No Leakage*

The Smoothflow pump has no seals, which frees you from the worry of leakage. This is ideal for the transfer of toxic substances that are hazardous when leaked outside or for liquids that easily vaporize.

Idling Possible*

The Smoothflow pump is designed in a seal-less structure, which does not adversely affect the drive unit even during pump idling. This frees you from the worry of possible malfunction.

No Damage to Liquid*

The Smoothflow pump does not stir or compress liquids like other pumps. This enables the transfer of food or chemicals whose propaerties are not allowed to deform due to shearing, abrasion, pressure or changes in temperature.

Fluid transfer structure that is optimal for transferring slurries*

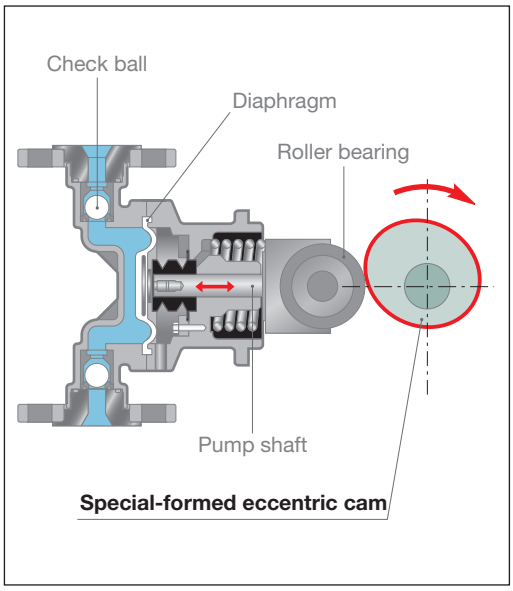
As the diaphragm pump gently pushes out the fluid, the wetted parts do not suffer from abrasion by slurries such as diatomaceous earth slurry.

* Characteristics of direct-driven and hydraulic types.

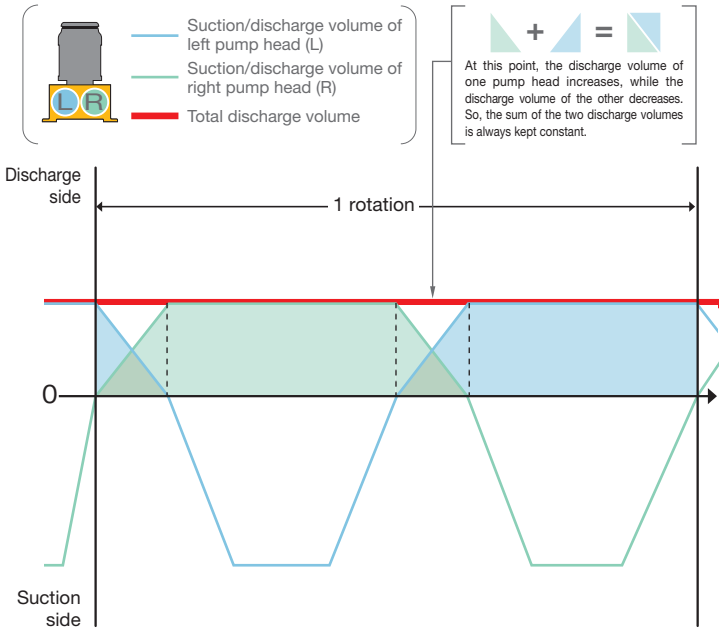
“Special-formed Eccentric Cam” Ensures Pulseless Continuous Discharge

On conventional duplex metering pumps, pulsation occurs on the discharge side as rotary motion of the circular eccentric cam is converted to reciprocating motion.
However, by applying the special-formed eccentric cam to set the sum of the discharge volumes of both the left and right pump heads to a constant value, TACMINA has achieved smooth, pulse-free continuous metered operation on a diaphragm pump.

Smoothflow pump (Example: Direct-driven type)



Discharge waveform



Enables process in-lining*

The Smoothflow Pump instantly solves pressing issues in manufacturing processes – efficiency (time), improved yield (product) and labor savings (personnel). It also eliminates liquid contact with the outside air and uneven injection, thus improving product quality.

Easy Maintenance

Accumulators or cushion tanks for even injection are no longer required. The Smoothflow Pump has few liquid end materials, which overall simplifies disassembly, cleaning and maintenance.

No Need for Dampers or Accumulators

Generally used accumulators are slow to react and must be monitored and serviced at all times. TACMINA Smoothflow pumps offer quick reaction, and free you from the need for unnecessary maintenance and troublesome pressure adjustments.

Eliminating the Major Cause of Pump Trouble

The Smoothflow Pump has done away with the in-tank agitation mixing process, the major cause of various pump trouble. This minimizes the incidence of accidents and malfunction.

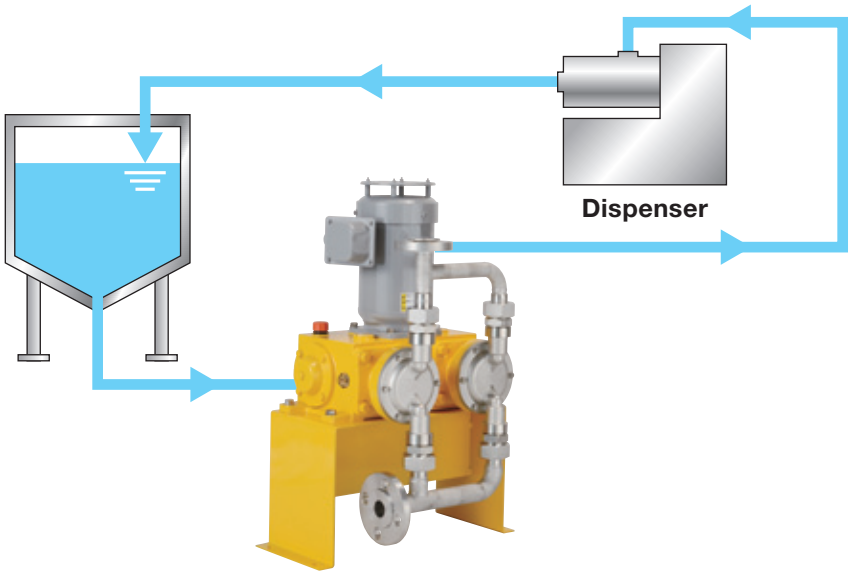
Easy Piping, and Enhanced Cost and Space Savings

Extremely economical because of little transferring liquid loss as piping on the discharge side can be made thinner than piping on pumps that generate pulsation

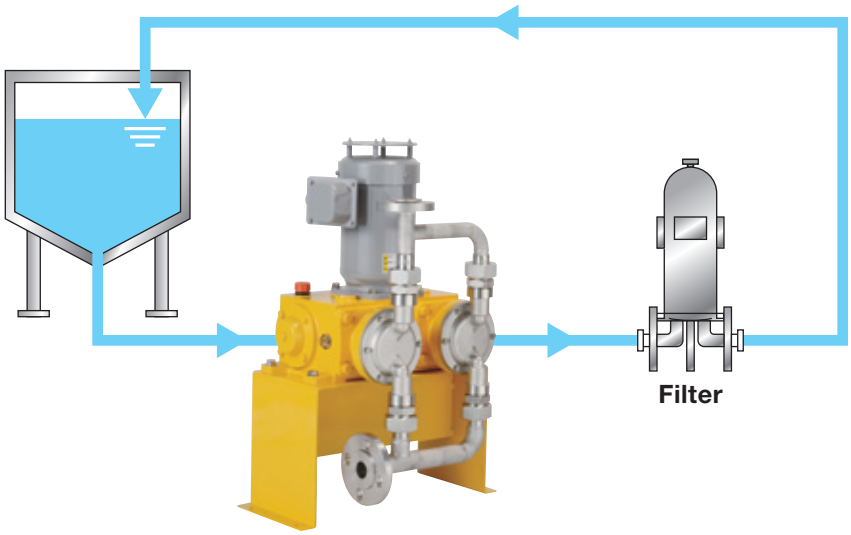
Excellent responsiveness

In addition to the non-pulsation property, Smoothflow pumps offer instant response to flow rate change.
Unlike the non-pulsation achieved by a conventional air chamber, a Smoothflow pump discharges immediately after starting the operation and no liquid drips when the operation is stopped, allowing for precise adjustment of supply amount and mixing ration.

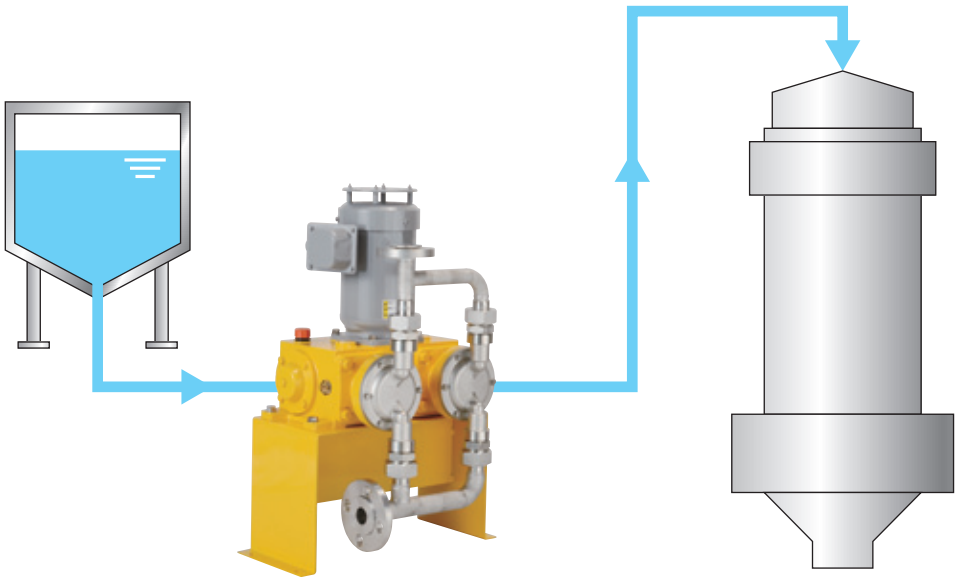
Dispersion process : Contributes to stable quality without the pump being worn by slurry liquids.



Filtration process : Prevents flow rate decreases due to filter clogging.

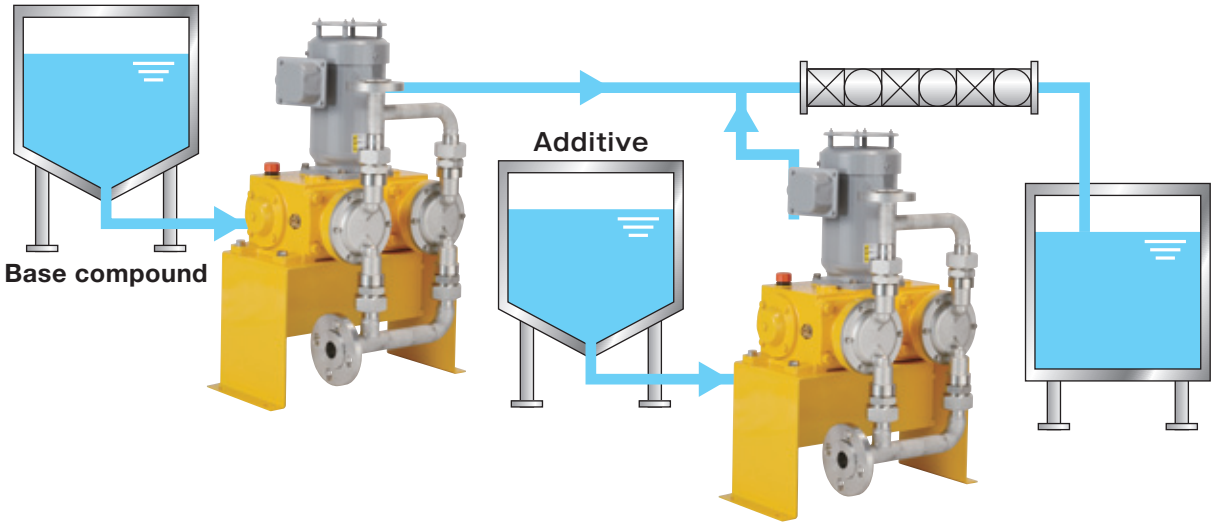


Spray-drying process : Contributes to homogenizing particle size by a constant flow with no pulsations.



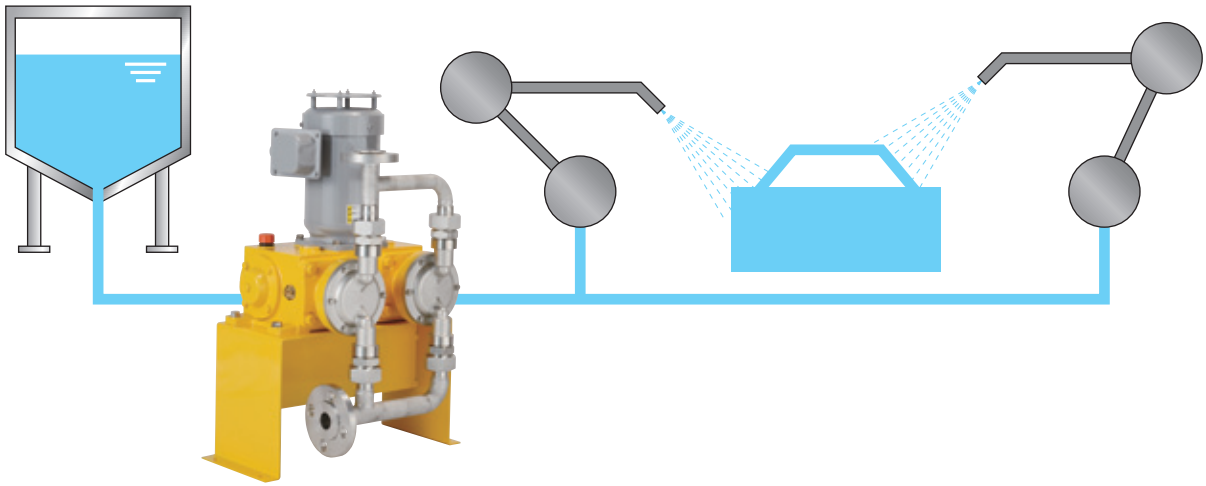
In-line continuous preparation process :

Creating an in-line process realizes uniform preparation with high accuracy without foreign particle contamination.



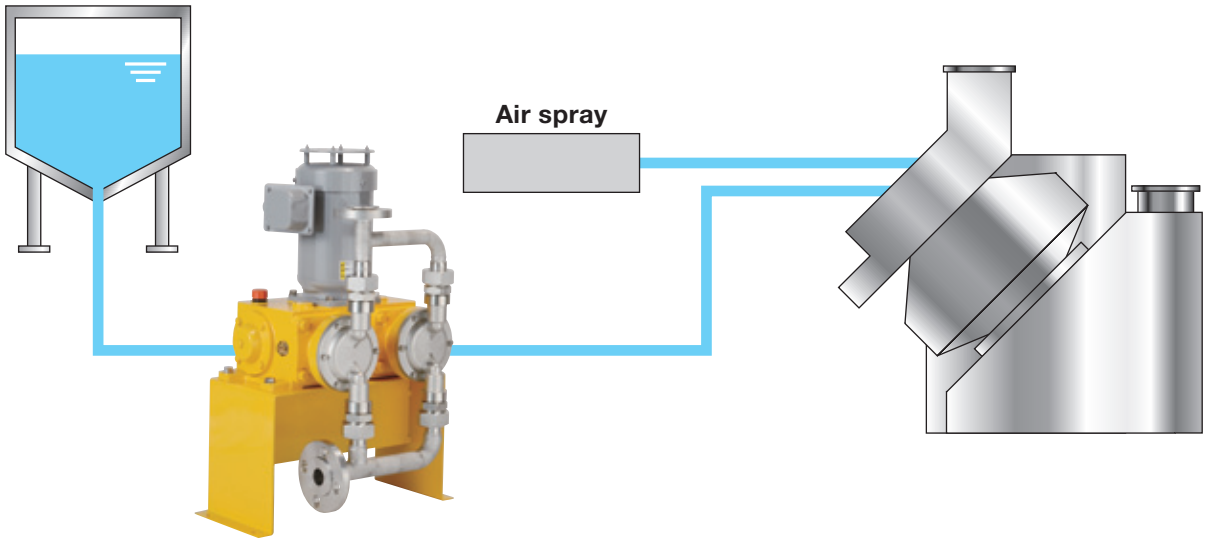
Paint spraying process :

Realizes increased quality of the painted surface without being affected by pressure fluctuations.



Coating process :

Contributes to increased quality of the coated surface with a constantly stable continuous flow.



PL Direct-driven Type

PLFXD2

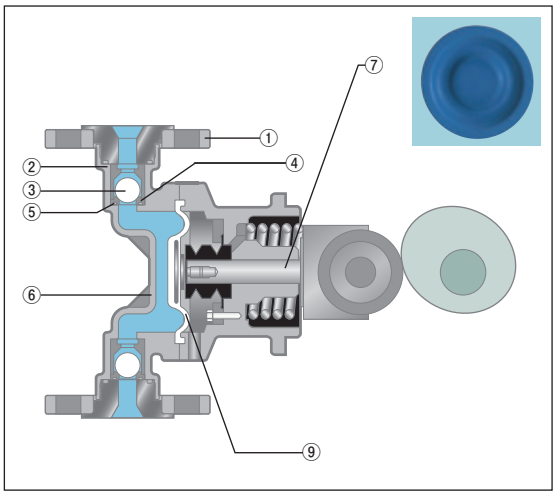
D (Direct-driven diaphragm) type

Features

- Low-cost but capable of high-precision injection
- Excellent durability. Ideal for exacting applications in processes
- Simple mechanism facilitates parts replacement and maintenance.

Application examples

- Dilution of sulfuric acid and caustic soda
- Circulation of paint in dip tanks
- Injection of curing agents for molding sand
- Glaze spraying process ... etc.



∗ The picture shows the PTFE type.

Performance Specifications

Specification \ Model			PLFXD2 PLFYD2	PLFXD2·PLFXW2 PLFYD2·PLFYW2					PLFXD2·PLFXW2		
			01	03	06	08*5	1	2	3P	6	14
Max. discharge volume*1		L/min	0.24	0.72	1.44	2	2.4	3.6[3.4]	6	13.2	28
		L/h	14.4	43.2	86.4	120	144	216[204]	360	792	1680
		US G/h	3.8	11.4	22.8	31.7	38	57[53.9]	95	209.1	443.5
Max. discharge pressure		MPa	1*6	1*7			0.5		0.7	0.5	
		bar	10				5		7	5	
		psi	145				72.5		101.5	72.5	
Stroke length		mm	4	6		8	6	8	10		15
Strokes per minute*1		strokes/min	13~126						10~97		12~117
Set frequency range		Hz	6~60								
Transferrable viscosity	Standard type	mPa·s	50 or less						100 or less		50 or less
	High-viscosity type		2000 or less				1000 or less		3000 or less		–
Transferrable temperature		℃	PVC:0~40℃/SUS·PVDF:0~60℃*8(no freezing allowed)								
Connection type	Hose	PVC	ϕ9×ϕ15		ϕ12×ϕ18				–		
		PVDF	–	ϕ10×ϕ12	ϕ12×ϕ15				–		
		SUS	ϕ10×ϕ12		ϕ12×ϕ15				–		
	Flange	Discharge side	JIS10K15A						JIS10K20A		JIS10K40A
		Suction side	JIS10K15A						JIS10K25A		JIS10K50A
	Union*2		Rc 3/8						–		–
Motor	Type		Totally enclosed fan-cooled outdoor type								
	Power supply	V/Hz	3-phase 200V(50Hz/60Hz)/220V(60Hz)								
	Power/Number of poles	kW/P	0.2/4						0.75/2		1.5/4
	IE code		IE1						IE3		
	Insulation class/Conduit pipe size		E / G 3/4						F / G 3/4		
	Specified current/ Locked rotor current*3	200V/50Hz	1.1/5.6[1.3/5.52]						3.6/28		6.9/56
		200V/60Hz	1/5.4[1.2/5.38]						3/25		6.1/44
		220V/60Hz	1/5.94[1.2/5.92]						3.1/27		5.9/51
Weight*3*4	D type	kg	21[25]		27[31]				75	77	166
	W type		24[28]		30[34]				79	81	171

*1 Values in [ ] are for the direct-driven type PTFE diaphragm. *2 SUS type only. *3 Values in [ ] are for the horizontal drive box type. *4 For STST or 6T6T flange types.
*5 Direct-driven type is PVC type only. *6 SUS hose connection: 0.5 MPa. *7 SUS/PVDF hose connection: 0.5 MPa. *8 W type PVDF/SUS is 0 to 80.

Liquid End Materials

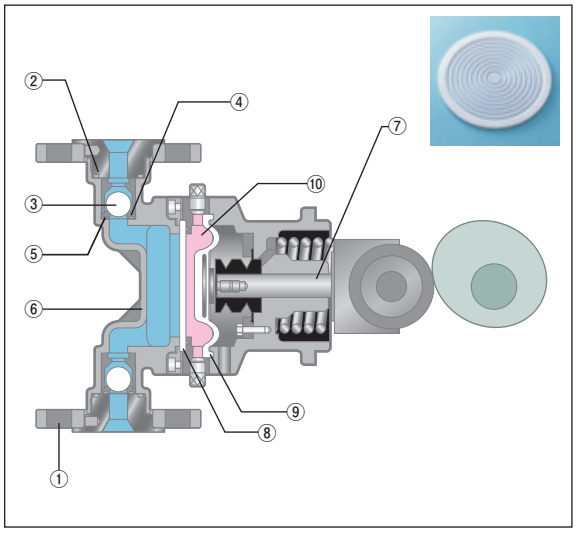
	VECE	VTCE	VTCF	VT6E	VT6F	STSE	STSF	STST	6T6T	FTCT
Pump head	PVC	PVC	PVC	PVC	PVC	SCS14*1	SCS14*1	SUS304*2	SCS14	PVDF
Diaphragm	EPDM	PTFE	PTFE	PTFE	PTFE	PTFE	PTFE	PTFE	PTFE	PTFE
Check ball	Ceramic	Ceramic	Ceramic	SUS316	SUS316	SUS304	SUS304	SUS304	SUS316	Ceramic
Joint	PVC	PVC	PVC	PVC	PVC	SUS304	SUS304	SUS304	SUS316	PVDF
O-ring for joint	EPDM	EPDM	Fluoro-rubber	EPDM	Fluoro-rubber	EPDM	Fluoro-rubber	PTFE*3	PFA/Sillicon rubber	PTFE*4

*1 SCS14 casting has the same composition as SUS316. *2 Model 3P uses SCS14. *3 Models 3P and 6 use PFA/silicon rubber.
*4 Model 03 uses special fluororubber (perfluororuber). Models 3P and 6 use a combination of PTFE/FEP and silicon rubber.

W (Direct-driven double diaphragm) type

Features

- Highly corrosion-resistant pure, thick PTFE is used for the front diaphragm.
- The buffer solution filled between the two diaphragms alleviates diaphragms' fatigue.
- A leak monitor or remote head can be mounted for safer transfer of liquids.



① Loose flange
② Joint
③ Check ball
④ Valve seat
⑤ O-ring
⑥ Pump head
⑦ Pump shaft
⑧ Front diaphragm
Pure, thick PTFE corrugated diaphragm used
⑨ Drive diaphragm
Highly durable, corrosion-resistant molded diaphragm used
⑩ Buffer solution

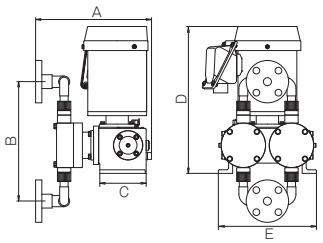
Application examples

- Injection of filter media in beer filtration processes
- Transfer/injection of organic solvents
- Transfer of highly corrosive solvents
- Injection of chemicals in leather production

... etc.

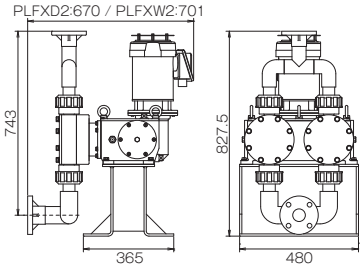
External Dimensions

Drive box type : X (vertical) type
Model:01、03、06、08、1、2、3P、6

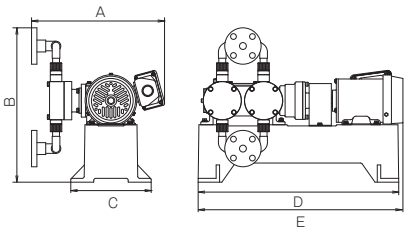


Model		A	B	C	D	E
PLFXD2	01	245.5	225	104	329.5	220
	03	247	225	104	329.5	220
	06・08	248	252.5	104	329.5	220
	1・2	260	268	104	329.5	220
	3P	346	486	200	684	470
	6	353	516	200	684	470
PLFXW2	03	277	226	104	329.5	220
	06・08	280	260	104	329.5	220
	1・2	287	272.5	104	329.5	220
	3P	378	486	200	684	470
	6	385	526	200	684	470

Model:14



Drive box type : Y (horizontal) type
Model:01、03、06、08、1、2



Model		A	B	C	D	E
PLFYD2	01	333	373	210	524	535
	03	334.5	373	210	524	535
	06・08	335.5	395.5	210	524	535
	1・2	347.5	403	210	524	535
PLFYW2	03	364.5	373.5	210	524	535
	06・08	367.5	399	210	524	535
	1・2	374.5	405.5	210	524	535

∗ Shape differs by model. Please contact us for details.

Model Code

PL [1] **F** [2] **X** [3] **D** [4] **2** [5] **–** **01** [6] [7] **–** **STST** [8] **–** **F** [9] **W** [10] **S** [11]

1
Blank : Standard
S : Sanitary

2 Series name
F Series

3 Drive box type
X : Vertical type
Y : Horizontal type

X : Vertical type

4 Type
D : Direct-drive diaphragm
W : Direct-drive double diaphragm

5 Number of pump heads*1
2 : Duplex

6 Model*2 / **7** Pressure specification / **8** Liquid end Materials

6 Model	7 Pressure specification	8 Liquid end Materials
01 03 06 08 1 2	Blank : Standard	VECE*3 VTCF STST FTCT
3	P : High-pressure type	VTCE VTCF VT6E VT6F STSE STSF STST FTCT
6	Blank : Standard	
14	Blank : Standard	VTCF 6T6T

9 Connection type
H : Hose
F : Flange
U : Union*4

F : Flange

10 Valve structure
W : Standard
V : High-viscosity type*5

11 General
S : Standard
X : Special

*1 Pumps with 3 or more heads can also be manufactured. Contact TACMINA for details. *2 For Model 01, 4 Type is D and 8 Liquid end material is VECE, VTCF, or STST. For Model 08, 4 Type is D and 8 Liquid end material is VECE. *3 If the model uses VECE, then 4 Type is D. *4 If the connection type is Union, 8 Liquid end material is STST. *5 For further information contact TACMINA.

PL Hydraulic Type

M (Hydraulic diaphragm) type

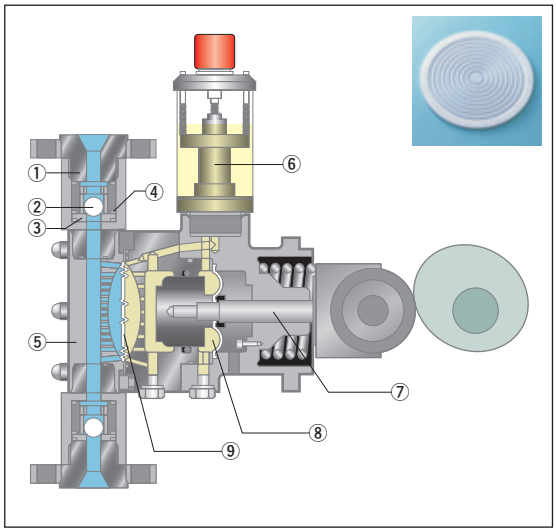
PLFXM2

Features

- Hydraulic mechanism enables high-pressure, high-precision discharge.
- The built-in relief mechanism prevents pump malfunction and accidents caused by excessive pressure. This eliminates the need for relief piping, and frees you from the worry of transferred liquid leakage.
- Pure, thick and extremely highly corrosion-resistant PTFE used for the front diaphragm.

Application examples

- Transfer of adhesives for sticky sheets
- Precipitation process for organic metal powders
- Injection of urea solution for denitration and desulfurization
- Injection of catalysts for the production of plastics ... etc.



Performance Specifications

Specification \ Model				PLFXM2・PLFXMW2 PLFYM2・PLFYMW2			PLFXM2・PLFXMW2									
				01	02	06	08	08P	1	1P	3	4P	8	8P	15	15P
Max. discharge volume			L/min	0.23	0.47	1.2	1.6		3.3		6.4	7.8	15.8		31	
			L/h	13.8	28.2	72	96		198		384	468	948		1860	
			US G/h	3.6	7.4	19	25.3		52.3		101.4	123.6	250.3		491	
Max. discharge pressure*1			MPa	1[2.5]		1[1.5]	1[1.6]	[2.5]	1[1.6]	[2.5]	1[1.2]	[2.5]	0.7[1]	[2]	0.6[0.8]	[1.5]
			bar	25		15	16	25	16	25	12	25	10	20	8	15
			psi	362.6		217.6	232.1	362.6	232.1	362.6	174	362.6	145	290.1	116	217.6
Stroke length			mm	8			15								19	
Strokes per minute			strokes/min	13～126			10～97					12～117				
Set frequency range			Hz	6～60												
Transferrable viscosity			mPa・s	50 or less												
Transferrable temperature			℃	PVC：0～40/PVDF・SUS：0～80 (no freezing allowed)												
Connection type	Flange	PVC PVDF	Discharge side	JIS10K15A			JIS10K15A	—	JIS10K15A	—	JIS10K20A	—	JIS10K40A	—	JIS10K40A	—
			Suction side	JIS10K15A			JIS10K15A	—	JIS10K20A	—	JIS10K25A	—	JIS10K50A	—	JIS10K50A	—
		SUS	Discharge side	JIS30K15A			JIS16K15A	JIS30K15A	JIS16K15A	JIS30K15A	JIS16K20A	JIS30K25A	JIS10K40A	JIS20K40A	JIS10K40A	JIS16K40A
			Suction side	JIS10K15A			JIS10K15A	JIS10K15A	JIS10K20A	JIS10K20A	JIS10K25A	JIS10K25A	JIS10K50A	JIS10K50A	JIS10K50A	JIS10K50A
	Union	PVC		Rp 1/2			—									
		PVDF/SUS		Rc 3/8			—									
Motor	Type			Totally enclosed fan-cooled outdoor type												
	Power supply *2		V/Hz	3-phase 200V (50Hz/60Hz)/220V (60Hz)												
	Power/Number of poles		kW/P	0.2/4			0.75/2					1.5/4				2.2/4
	IE code			IE1			IE3									
	Insulation class/Conduit pipe size			E / G 3/4			F / G 3/4									
	Specified current/ Locked rotor current *3		200V/50Hz	1.1/5.6[1.3/5.52]			3.6/28					6.9/56				10.6/96
			200V/60Hz	1/5.4[1.2/5.38]			3/25					6.1/44				9.4/81
			220V/60Hz	1/5.94[1.2/5.92]			3.1/27					5.9/51				9.2/89.1
Weight *3*4	M type		kg	28[32]			77		81			201			226	241
	MW type			29[33]			81	83	85			206			231	246

*1 Values in [ ] are for the SUS type. *2 Model 15P also supports 230V (60 Hz). Rated current and maximum starting current are 9.2 A and 93.2 A, respectively.
*3 Values in [ ] are for the horizontal drive box type. *4 For STST or 6T6T flange types.

Liquid End Materials

Name of part \ Type	VTCF	STSE	STSF	STST	6T6T	FTCT
Pump head	PVC	SUS304	SUS304	SUS304	SCS14*2	PVDF
Diaphragm	PTFE	PTFE	PTFE	PTFE	PTFE	PTFE
Check ball	Ceramic	SUS304	SUS304	SUS304	SUS316	Ceramic
Joint	PVC	SUS304	SUS304	SUS304	SUS316	PVDF
O-ring for joint	Fluoro-rubber	EPDM	Fluoro-rubber	PTFE*1	PFA/Sillicon rubber	PTFE

*1 Models 08, 08P, 1, 1P, and 3 use PFA/silicon rubber. *2 SCS14 casting has the same composition as SUS316.

MW (Hydraulic double-diaphragm) type

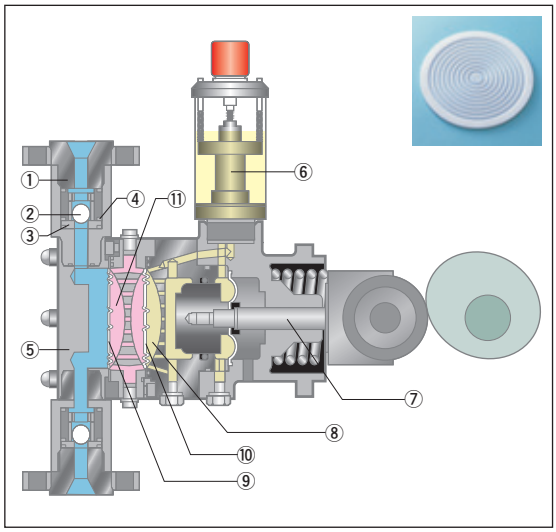
Features

- Slurry and high-viscosity liquids can be discharged and transferred at high pressure.
- The buffer solution unifies the pressure generated in the drive unit and transfers the pressure to the diaphragm without damaging it.
- Use of two diaphragms frees you from the worry of entry by hydraulic operating oil.
- A leak monitor or remote head can be mounted for safer transfer of liquids.

Application examples

- Mixing of plastics having dual liquid properties
- Drink preparation process
- Metered transfer of high-concentration zirconia (slurry)
- Metered injection of flavorings, colorings, aromatizing liquids

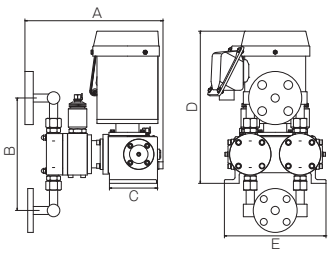
... etc.



① Joint
② Check ball
③ Valve seat
④ O-ring
⑤ Pump head
⑥ Hydraulic pressure regulator
In the case of a piping blockage, the built-in relief mechanism releases the excessive pressure to improve safety and durability.
⑦ Pump shaft
⑧ Operating oil
For sustained performance and safety, low-toxic, stable silicon-based oil is used in addition to the gear oil for the drive unit.
⑨ Front diaphragm
Pure, thick PTFE corrugated diaphragm used
⑩ Rear diaphragm
Pure, thick PTFE corrugated diaphragm used
⑪ Buffer solution

External Dimensions

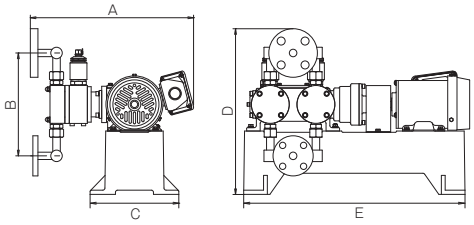
Drive box type : X (vertical) type



Model		A	B	C	D	E
PLFXM2	01・02	312.5	228	104	329.5	220
	06	299	244	104	329.5	220
	08	406	399	200	684	470
	08P	416	419	200	684	470
	1	408	457	200	684	470
	1P	416	477	200	684	470
	3	421	461	200	684	470
PLFXMW2	01・02	335	228	104	329.5	220
	06	324	244	104	329.5	220
	08	437	399	200	684	470
	08P	447	419	200	684	470
	1	440	457	200	684	470
	1P	447	477	200	684	470
	3	452	461	200	684	470

Model		A	B	C	D	E
PLFXM2	4P	657	514	365	816	480
	8・8P	663	588	365	816	480
	15	683	614	365	816	480
	15P	644	614	365	880	480
PLFXMW2	4P	683	514	365	816	480
	8・8P	691	588	365	816	480
	15	717	614	365	816	480
	15P	678	614	365	880	480

Drive box type : Y (horizontal) type



Model		A	B	C	D	E
PLFYM2	01・02	400	228	210	384.5	535
	06	386.5	244	210	392	535
PLFYMW2	01・02	422.5	228	210	384.5	535
	06	411.5	244	210	392	535

∗ Shape differs by model. Please contact us for details.

Model Code

PL [1] **F** [2] **X** [3] **M** [4] **2** [5] – **01** [6] [7] – **STST** [8] – **F** [9] **W** [10] **S** [11]

1	2 Series name	3 Drive box type	4 Type	5 Number of *1 pump heads	6 Model	7 Pressure *2 specification	8 Liquid end Materials	9 Connection type	10 Valve structure	11 General specifications
Blank : Standard S : Sanitary	F Series	X : Vertical type Y : Horizontal type	M : Hydraulic diaphragm MW : Hydraulic double diaphragm	2 : Duplex	01 02 06	Blank : Standard	VTCF STST FTCT	F : Flange U : Union	W : Standard V : High-viscosity type *3	S : Standard X : Special
		X : Vertical type			08 1	Blank : Standard P : High-pressure type	VTCF STSE STSF STST	F : Flange		
					3	Blank : Standard				
					4	P : High-pressure type	6T6T			
					8 15	Blank : Standard P : High-pressure type	VTCF 6T6T			

*1 Pumps with 3 or more heads can also be manufactured. Contact TACMINA for details. *2 For high-pressure models, STSE, STSF, STST, and 6T6T types are the possible options for 8 Liquid end materials. *3 For further information contact TACMINA.

PL Plunger Type

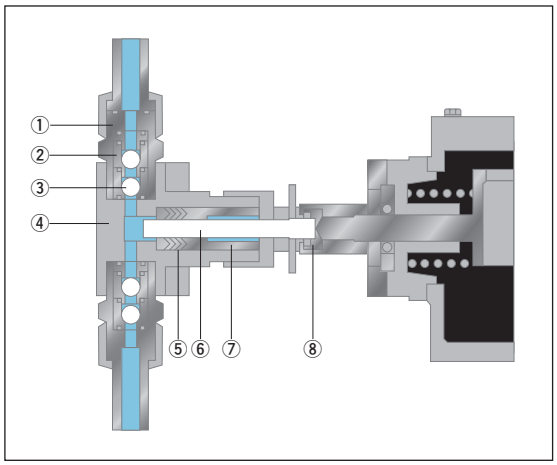
PLFXP2

Features

- Capable of injecting small amounts of liquids at high pressure and at high precision without being affected by pressure fluctuations
- Rigiducture for excellent durability

Application examples

- Injection of additives into resin-molding lines
- High-pressure injection of boiler chemicals
- Injection of other chemicals into high-pressure lines ... etc.



① Joint ② Valve seat ③ Check ball ④ Pump head
⑤ V-packing ⑥ Plunger ⑦ Packing refaiher ⑧ Universal Joint

Performance Specifications

Specification \ Model			PLFXP2 PLFYP2						PLFXP2						
			0005	001	002	006	01	02	04	08	1	3	4P	8P	15P
Max. discharge volume*1		L/min	0.011 [0.01]	0.024 [0.022]	0.056 [0.054]	0.14 [0.13]	0.28 [0.26]	0.56 [0.52]	0.84	1.64	3.4	6.6	7.8	15.8	31
		L/h	0.66 [0.6]	1.44 [1.32]	3.36 [3.24]	8.4 [7.8]	16.8 [15.6]	33.6 [31.2]	50.4	98.4	204	396	468	948	1860
		US G/h	0.17	0.38	0.89	2.22	4.44	8.87	13.3	26	53.9	104.5	123.6	250.3	491
Max. discharge pressure		MPa	3					2	10	5	2.5	1.2	4	2	1.5
		bar	30					20	100	50	25	12	40	20	15
		psi	435.1					290.1	1450.4	725.2	362.6	174	580.2	290.1	217.6
Stroke length		mm	8						15						19
Strokes per minute *1		strokes/min	6～63 [6～59]						10～97				12～117		
Set frequency range		Hz	6～60												
Transferrable viscosity		mPa･s	50 or less												
Transferrable temperature		℃	0～80 (no freezing allowed)												
Connection type	Flange	Discharge side	JIS30K15A						—		JIS30K15A	JIS16K20A	—	JIS20K40A	JIS16K40A
		Suction side	JIS10K15A						—		JIS10K20A	JIS10K25A	—	JIS10K50A	
	Union	Discharge side	Rc 3/8						Rc 3/8		—		Rc1	—	
		Suction side	Rc 3/8						Rc 1/2		—		Rc1	—	
Motor	Type		Totally enclosed fan-cooled outdoor type												
	Power supply *2	V/Hz	3-phase 200V (50Hz/60Hz) /220V (60Hz)												
	Power/Number of poles	kW/P	0.2/4						0.75/2				1.5/4		2.2/4
	IE code		IE1						IE3						
	Insulation class/Conduit pipe size		E / G 3/4						F / G 3/4						
	Specified current/ Locked rotor current *1	200V/50Hz	1.1/5.6 [1.3/5.52]						3.6/28				6.9/56		10.6/96
		200V/60Hz	1/5.4 [1.2/5.38]						3/25				6.1/44		9.4/81
		220V/60Hz	1/5.94 [1.2/5.92]						3.1/27				5.9/51		9.2/89.1
Weight *1	Flange	kg	20 [24]				22 [26]		—		71		—	191	246
	Union		19 [23]				21 [25]		63		—		186	—	—

*1 Values in [ ] are for the horizontal drive box type. *2 Model 15P also supports 230V (60 Hz). Rated current and maximum starting current are 9.2 A and 93.2 A, respectively.

Liquid End Materials

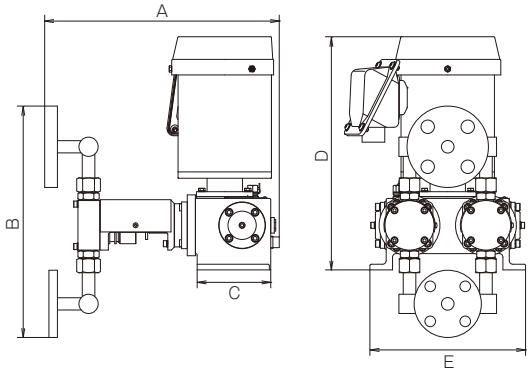
Name of part \ type	SNSN	STSE	STSF	STST	6T6T
Pump head	SUS304	SUS304	SUS304	SUS304	SUS316
Diaphragm	SUS304	SUS304	SUS304	SUS304	SUS316
Check ball	SUS304	SUS304	SUS304	SUS304	SUS316
Joint	SUS304	SUS304	SUS304	SUS304	SUS316
O-ring for joint	NBR	EPDM	Fluoro-rubber	PTFE *2	PFA/Sillicon rubber
Plunger seal *1	NBR	PTFE/SUS301	PTFE/SUS301	PTFE *3	PTFE/Hastelloy-C

*1 For Models 0005 through 02, V-packing is used as plunger seal. *2 Models 04, 08, 1, and 3 use PFA/silicon rubber. *3 Models 04, 08, 1, and 3 use PTFE/SUS301.

External Dimensions

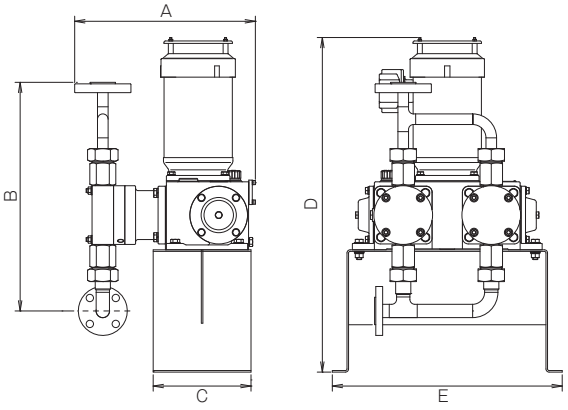
Drive box type : X (vertical) type

Model:0005、001、002、006、01、02



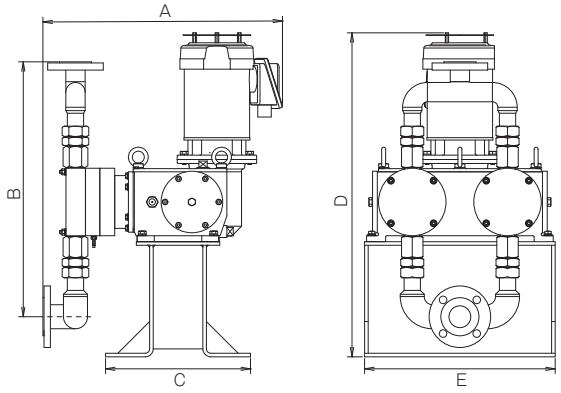
	A	B	C	D	E
0005	327.5	317	104	329.5	220
001	327.5	319	104	329.5	220
002・006	327.5	317	104	329.5	220
01・02	331.5	327	104	329.5	220

Model:04、08、1、3



	A	B	C	D	E
04・08	342	359	200	684	470
1	369	467	200	684	470
3	374	451	200	684	470

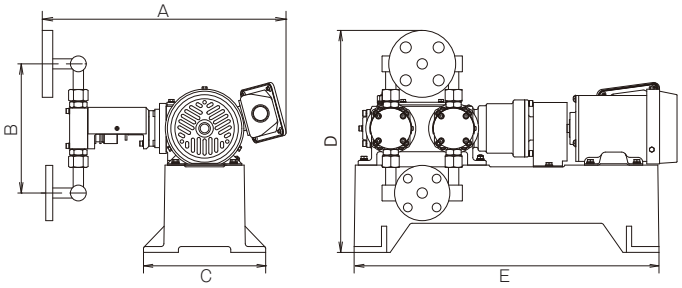
Model:4P、8P、15P



	A	B	C	D	E
4P	594	538	365	816	480
8P	602	642	365	816	480
15P	571	648	365	880	480

Drive box type : Y (horizontal) type

Model:0005、001、002、006、01、02



	A	B	C	D	E
0005	415	212	210	376.5	524
001	415	214	210	377.5	524
002・006	415	212	210	376.5	524
01・02	419	222	210	381.5	524

Model Code

PL F X P 2 – 01 [ ] – STST – F W S

1 **2** **3** **4** **5** **6** **7** **8** **9** **10**

1 Series name	**2** Drive box type	**3** Type	**4** Number of pump heads*1	**5** Model	**6** Pressure specification	**7** Liquid end Materials	**8** Connection type	**9** Valve structure	**10** General specifications
F Series	X : Vertical model Y : Horizontal mode	P : Plunger	2 : Duplex	0005 001 002 006 01 02	Blank : Standard	SNSN STST	F : Flange U : Union	W : Standard	S : Standard X : Special
	X : Vertical model			04 08		STSE STSF STST	U : Union		
				1 3			F : Flange		
				4	P : High-pressure type	6T6T	U : Union		
				8 15			F : Flange		

*1 Pumps with 3 or more heads can also be manufactured. Contact TACMINA for details.

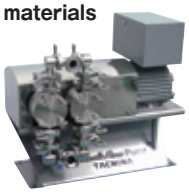
An Extensive Line-up of Pulseless Pumps to Suit Operating Conditions and Applications

TACMINA presents you with a wide line-up of products to match your particular requirements for different liquid types such as high-viscosity, liquids containing slurry or high-temperature liquids, or for improved precision injection or higher safety applications.

For supplying coating liquid

- Maximum discharge volume ranging from 0.1 to 10.5 L/min Maximum discharge pressure of 0.5 MPa.
- Ideal for applications requiring high levels of precision such as precision thin-film coating using die coaters.

For supplying electrode materials



- Maximum discharge volume ranging from 0.14 to 2.5 L/min Maximum discharge pressure of 0.5 MPa.
- Ideal for the precise supply of coating liquids and electrode materials.

High-viscosity Specification

- Capable of transfer up to a maximum viscosity of 10000 mPa·s
- An ideal design with minimal dead space improves the transfer efficiency of high-viscosity liquids.

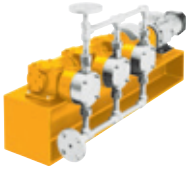
Sanitary Type

- Seal-less, sanitary liquid-end structure.
- Capable of gentle, metered transfer of liquids without any change to liquid properties.

Standard type

- Simple constructure to assure reliable cost effectiveness.
- Injection and transfer of chemical liquids at flow rates of 0.05 L/min to 80 L/min.

Triplex Type



- Capable of transferring liquids in a pulseless state on not only the discharge side but also the suction side.
- Capable of large-volume discharge.

Slurry Liquid Specification (T-branch remote head)

- A T-branch system prevents direct contact between the diaphragm and settling slurry.
- Simultaneously solves the problems of diaphragm service life and slurry blockage.

※ Pulseless type becomes duplex specification.

High-temperature Liquid Specification (Remote head)

- Heat is not transmitted to the pump itself, which allows the transfer of high-temperature liquids exceeding 100℃.
- Heat-radiation fin or heat-insulating jacket can be installed.

※ Pulseless type becomes duplex specification.

▶ For details of application products, refer to the respective catalogs.

More Safely, More Accurately and More Simply. Highly Functional Optional and Related Products

We have more optional products available to match specific site requirements and answer your diverse needs.

【Valve】

Relief Valve

Automatically releases the excessive pressure when foreign matter blocks the discharge side piping of the pump or the valve is closed at the discharge side.

Back Pressure Valve

Prevents overfeeding (exceeding the preset discharge volume) that is caused on bad piping conditions.

【Sensor】

Pulse Sensor

Uses a reed switch to detect the pump's operating speed as a pulse signal.
Interlocking with a pulse counter enables the configuration of an automatic metering feed injection system.

Leak Monitor

The electrode installed in the buffer solution immediately detects diaphragm breakage, and notifies the operator.

【Motor】

AC Servo Motor

This motor can be controlled in small increments over a wide operating range extending from the low- through high-speed areas. Brushes are not used, which eliminates the need for maintenance.

Exclusive controller

【Controller】

Inverter(Frequency control method)

This controller can control the speed of all models of motors at low cost. Also, a wide control range of 10:1 is possible without any influence from the power supply used.

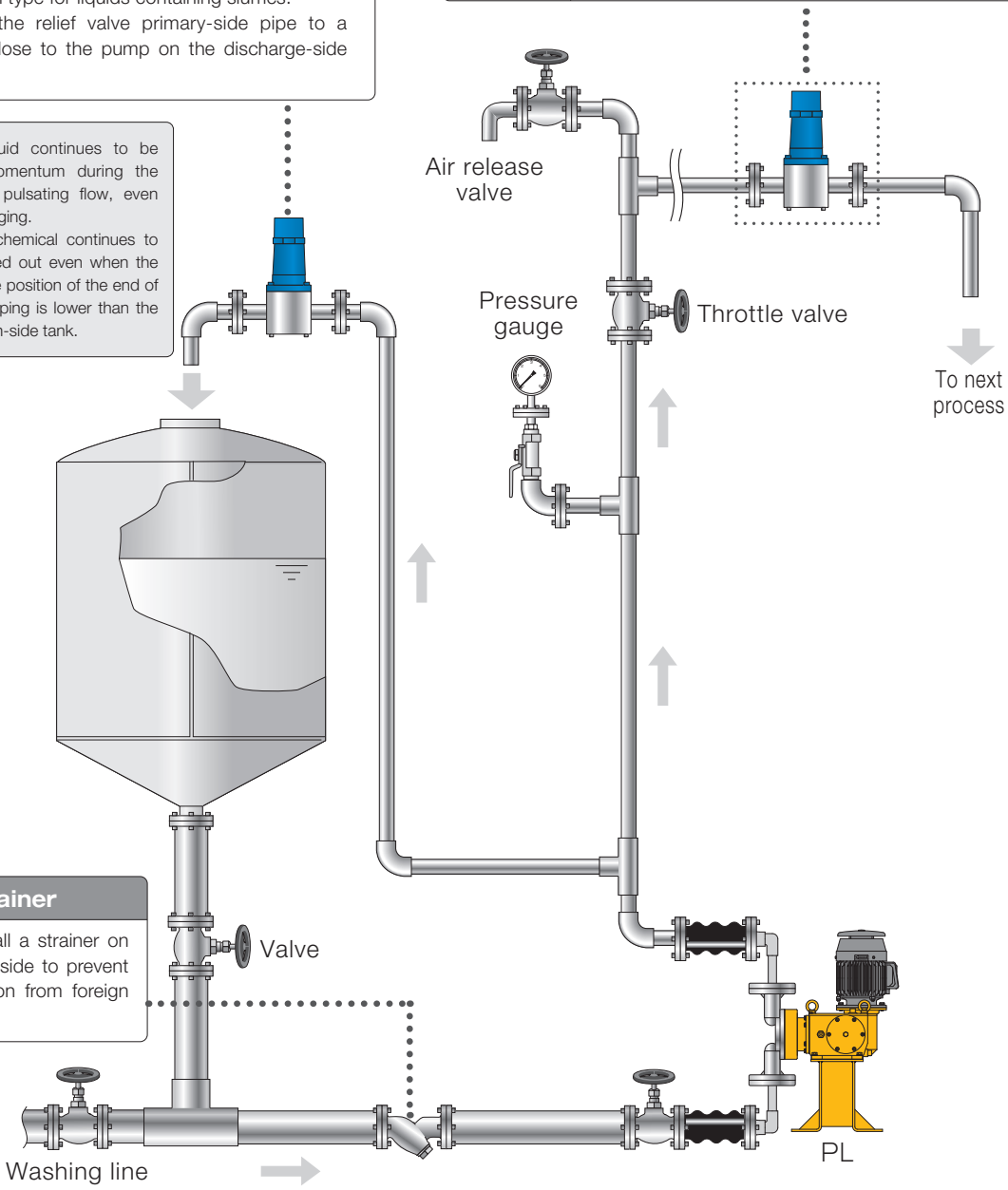
▶ For more details on our products, please visit TACMINA's home page.

In order to fully demonstrate the capabilities of metering pumps (metering performance, discharge accuracy), the correct piping design and auxiliary equipment must be installed. Appropriate piping design also helps to prevent piping and pump accidents and problems, and promises safety and peace of mind for production lines. The recommended piping for each pump mechanism will fully draw out the capabilities of the metering pump.

Relief valve	
Application	Automatically releases excessive pressure produced in the pump's discharge-side piping.
Notes	* Cannot be used when transferring liquids containing slurries. We recommend the hydraulic double diaphragm type for liquids containing slurries. * Connect the relief valve primary-side pipe to a position close to the pump on the discharge-side piping.

Back pressure valve	
Application	Installing a back pressure valve is effective if overfeeding and dripping are occurring due to the piping conditions.
Notes	* Mount the back pressure valve near the discharge-side piping injection point.

*1 A phenomenon where liquid continues to be discharged due to the momentum during the pushing process (inertia) in pulsating flow, even when the pump is not discharging.
*2 A phenomenon where the chemical continues to flow by being naturally sucked out even when the pump is stopped because the position of the end of the pump's discharge-side piping is lower than the level of the liquid in the suction-side tank.



Y-shaped strainer	
Application	Always install a strainer on the suction side to prevent contamination from foreign materials.

Introducing Smoothflow diaphragm pumps with no pulsation.

Point 1
Install an air release pipe on the suction side if necessary. (Example:Liquids that easily vaporize or that produce gas such as sodium hypochlorite).

Point 2
If the length of the piping becomes long, the pipe resistance will increase and abnormal pressure will be generated, which may damage the diaphragm or eccentric shaft.

Point 3
Always install a relief valve on the discharge-side piping. This prevents abnormal pressure from damaging the pump.

Point 4
In order to prevent piping accidents, select a pipe size for the piping in the discharge and suction areas, as well as the relief valve and back pressure valve, that is equal to or larger than the pump diameter.

Point 5
Design the process so that the pump suction-side piping is short and simple.

* The above diagram is one example of piping. For more details, contact your sales representative.
* The hydraulic double diaphragm type is suited to high-accuracy transfer and injection of liquids containing slurries and highly viscous fluids. For detailed piping designs, please contact us.
* Install valves before and after each device for maintenance and inspection purposes.

Product designs and specifications are subject to change without notice for product improvement.

TACMINA CORPORATION

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VEGETABLE OIL INK

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ISO 14001
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JQA-EM0637 Production Department