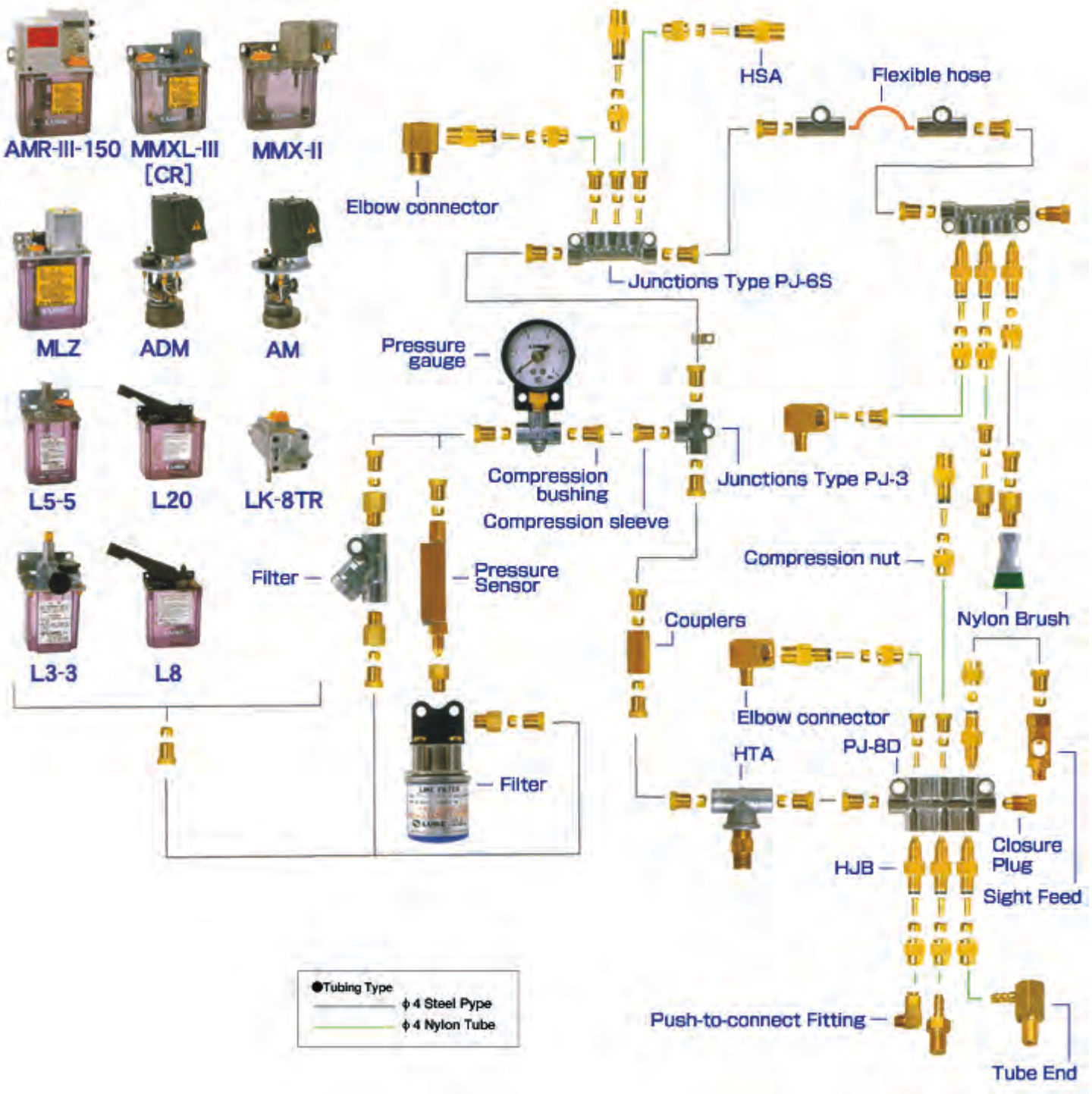
LUBE USA

Subsidiary of Lube Corporation

LUBE USA

Centralized Lubrication Systems

(SLR) Single Line Resistance Systems



Automatic intermittent piston pump MMXL-III

Incorporating an energy-saving motor, economical and realizing intermittent lubrication by simply turning the power ON.
Automatic intermittent pump incorporating a small motor,hence an economical model.
Widely used for small machines in many industries.

Standard CE

Specifications

Pump	Discharge volume	0.2~1.0ml/stroke 1.5~2.5ml/stroke 2.5~5.5ml/stroke
	Discharge pressure	0.3MPa
Mortor (Other voltages available.)	Power	AC100Vφ1/50mA, AC200Vφ1/25mA (50Hz) AC100Vφ1/42mA, AC200Vφ1/18mA(60Hz)
	Output	3W Synchronous Mortor
Emergency detection	Continuous	
	Oil level switch	Contact type A contact (NO) ON at low level Contact capacity0.5A, AC DC200V/30W smaller
Operation rating	Continuous	
Working viscosity range	30~1300mm²/S	
Reservoir capacity	0.8l,3l (plastic) 3l,4l,8l (sheet metal)	
Weight	1.8kg (With 1.8l Reservoirs)	
Protection class	IP54 (CE Approved type)	

MMXL-III pumps are also available with 110v. And 220v motors. See part numbers on the next page. CE approval to meet the European Safety Standard is also available. Please contact Lube USA for part number and ordering information.

Automatic intermittent piston pump MMXL-III

0.2~1cc discharge models

Discharge volume 1.0cc without oil level swich 1.8ℓ resin reservoir

Part Number		Interval time(in case of 50Hz)					
Motor voltage							
100V	200V	3min	6min	15min	30min	60min	120min
301051	301057	O					
301052	301058		O				
301053	301059			O			
301054	301060				O		
301055	301061					O	
301056	301062						O

Discharge volume 1.0cc with oil level swich 1.8ℓ resin reservoir

Part Number		Interval time(in case of 50Hz)					
Motor voltage							
100V	200V	3min	6min	15min	30min	60min	120min
301063	301069	O					
301064	301070		O				
301065	301071			O			
301066	301072				O		
301067	301073					O	
301068	301074						O

1.5~2.5cc discharge models

Discharge volume 2.5cc without oil level swich 1.8ℓ resin reservoir

Part Number		Interval time(in case of 50Hz)					
Motor voltage							
100V	200V	3min	6min	15min	30min	60min	120min
301013	301001	O					
301014	301002		O				
301015	301003			O			
301016	301004				O		
301017	301005					O	
301018	301006						O

Discharge volume 2.5cc with oil level swich 1.8ℓ resin reservoir

Part Number		Interval time(in case of 50Hz)					
Motor voltage							
100V	200V	3min	6min	15min	30min	60min	120min
301019	301007	O					
301020	301008		O				
301021	301009			O			
301022	301010				O		
301023	301011					O	
301024	301012						O

Discharge volume 2.5cc without oil level swich 1.8ℓ resin reservoir

Part Number		Interval time(in case of 50Hz)					
Motor voltage							
110V	220V	3min	6min	15min	30min	60min	120min
301213	301201	O					
301214	301202		O				
301215	301203			O			
301216	301204				O		
301217	301205					O	
301218	301206						O

Discharge volume 2.5cc with oil level swich 1.8ℓ resin reservoir

Part Number		Interval time(in case of 50Hz)					
Motor voltage							
110V	220V	3min	6min	15min	30min	60min	120min
301219	301207	O					
301220	301208		O				
301221	301209			O			
301222	301210				O		
301223	301211					O	
301224	301212						O

2.5~5.5cc discharge models

Discharge volume5.5cc without oil level swich 1.8ℓ resin reservoir

Part Number		Interval time(in case of 50Hz)					
Motor voltage							
100V	200V	3min	6min	15min	30min	60min	120min
301037	301025	O					
301038	301026		O				
301039	301027			O			
301040	301028				O		
301041	301029					O	
301042	301030						O

Discharge volume 5.5cc with oil level swich 1.8ℓ resin reservoir

Part Number		Interval time(in case of 50Hz)					
Motor voltage							
100V	200V	3min	6min	15min	30min	60min	120min
301043	301031	O					
301044	301032		O				
301045	301033			O			
301046	301034				O		
301047	301035					O	
301048	301036						O

Discharge volume 5.5cc without oil level swich 1.8ℓ resin reservoir

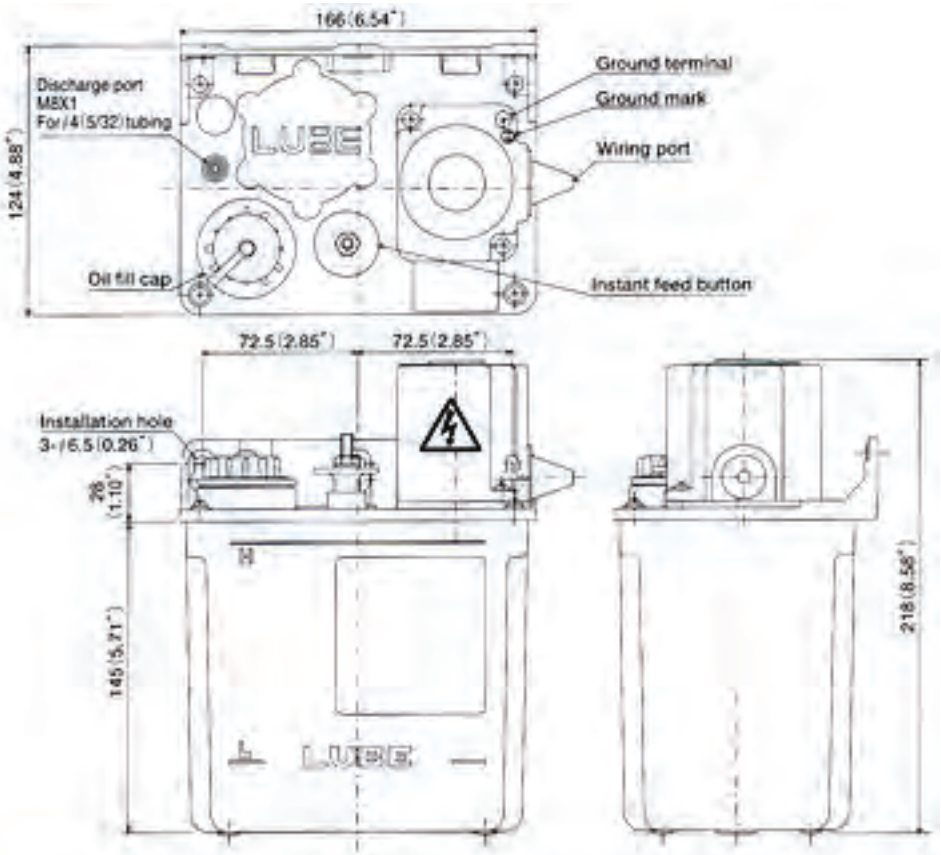
Part Number		Interval time(in case of 50Hz)					
Motor voltage							
110V	220V	3min	6min	15min	30min	60min	120min
301237	301225	O					
301238	301226		O				
301239	301227			O			
301240	301228				O		
301241	301229					O	
301242	301230						O

Discharge volume 5.5cc with oil level swich 1.8ℓ resin reservoir

Part Number		Interval time(in case of 50Hz)					
Motor voltage							
110V	220V	3min	6min	15min	30min	60min	120min
301243	301231	O					
301244	301232		O				
301245	301233			O			
301246	301234				O		
301247	301235					O	
301248	301236						O

Automatic intermittent piston pump MMXL-III

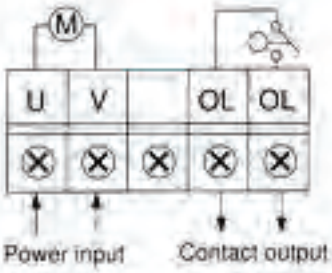
Dimensional drawing



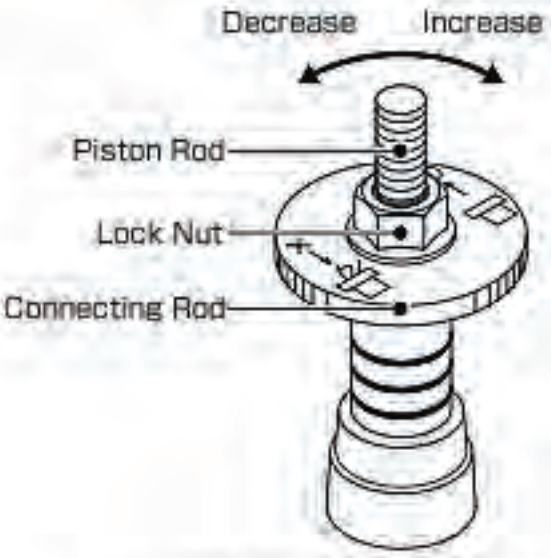
Interval time	3min	6min	15min	30min	60min	120min
Motor RPM	20	10	4	2	1	1/2

Caution

Wiring diagram



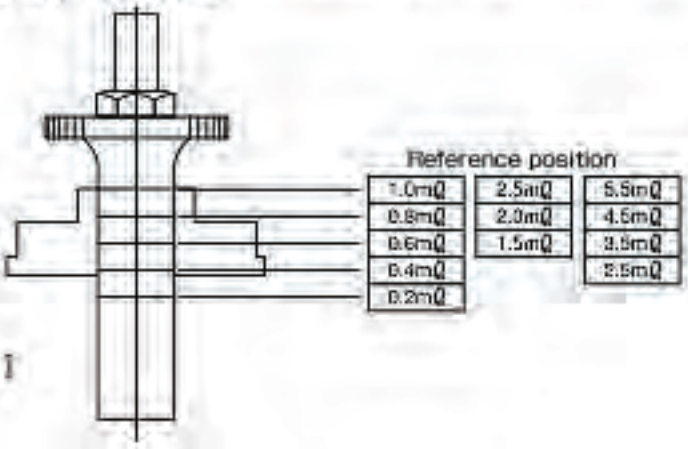
Discharge Volume Adjustment



[Discharge Volume Adjusting Knob.]

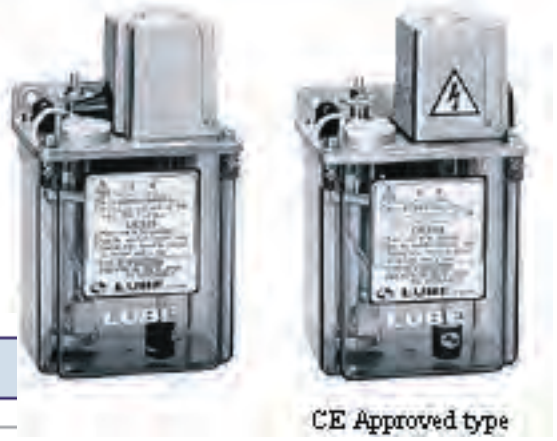
Loosen Locknut
-Turn knob countertclockwise to decrease discharge
-Turn knob clockwise to increase discharge
Tighten locknut.

ONLY ADJUST OIL DISCHARGE WHEN PISTON IS FULLY RELAXED



Automatic intermittent piston pump MLZ

Compact version of MMXL-III. Ideal for small machines with limited installation space.



CE Approved type

Specifications

Discharge volume	1.5~2.5cc/stroke
Discharge pressure	0.3MPa(3kgf/cm2)43.5psi
Power	AC100V/1φ, AC 200V/1φ AC110V/1φ AC 220V/1φ
Rated current	AC100V/50mA, 200V/25mA (50Hz) AC100V/42mA, AC200V/18mA (60Hz)
Motor	3W Synchronous motor
Operation rate	Continuous
Working viscosity range	32~1300cSt
Oil level switch	Contact type : A contact (ON at low level) Contact capacity : AC / DC200V, 30W/0.5A
Contact capacity	0.5A, AC / DC200V/30W
Reservoir capacity	0.8 ℓ (Standard)
Weight	1.2kg/2.65lbs
Others	Protection class IP54 (CE Approved type)

Part Number

Without oil level switch tank0.8ℓ resin reservoir

Part Number				Interval time(in case of 50Hz)				
Motor voltage								
100V	200V	110V	220V	6min	15min	30min	60min	120min
362801	362901	162801	162901	O				
362802	362902	162802	162902		O			
362803	362903	162803	162903			O		
362804	362904	162804	162904				O	
362805	362905	162805	162905					O

Without oil level switch tank0.8ℓ resin reservoir

Part Number				Interval time(in case of 50Hz)				
Motor voltage								
100V	200V	110V	220V	6min	15min	30min	60min	120min
362806	362906	162806	162906	O				
362807	362907	162807	162907		O			
362808	362908	162808	162908			O		
362809	362909	162809	162909				O	
362810	362910	162810	162910					O

CE Approved type

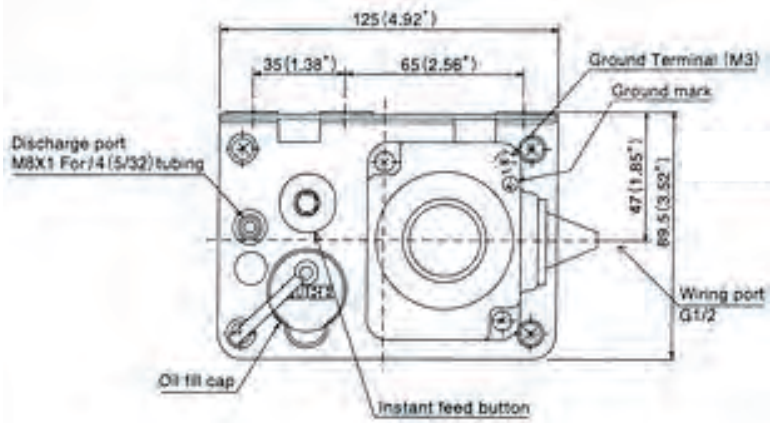
Without oil level switch tank0.8ℓ resin reservoir

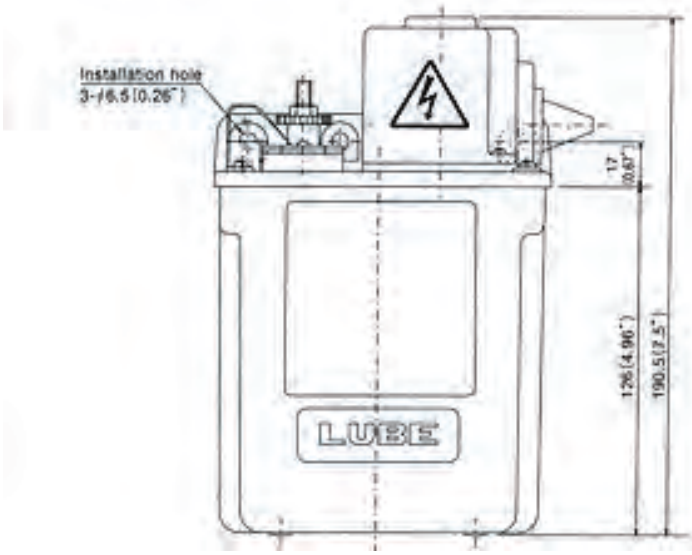
Part Number		Interval time(in case of 50Hz)				
Motor voltage						
100V	200V	6min	15min	30min	60min	120min
367201	367206	O				
367202	367207		O			
367203	367208			O		
367204	367209				O	
367205	367210					O

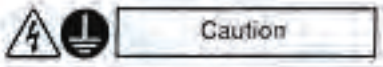
Without oil level switch tank0.8ℓ resin reservoir

Part Number		Interval time(in case of 50Hz)				
Motor voltage						
100V	200V	6min	15min	30min	60min	120min
367216	367221	O				
367217	367222		O			
367218	367223			O		
367219	367224				O	
367220	367225					O

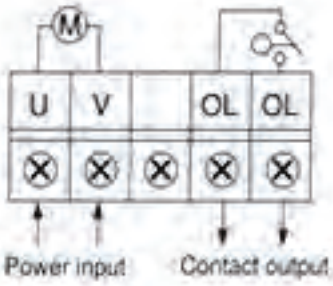
Dimensional drawing



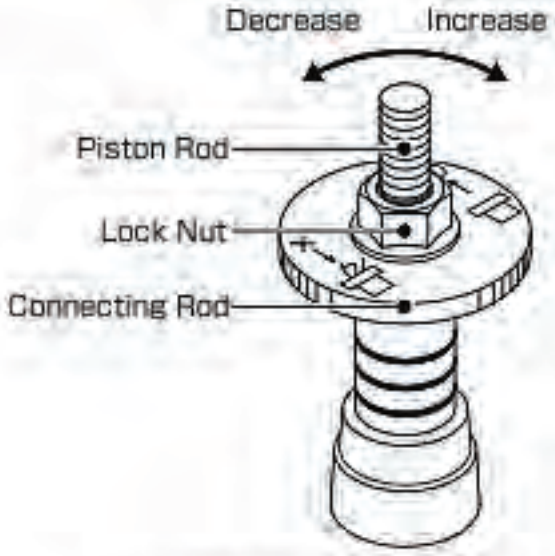




Wiring diagram



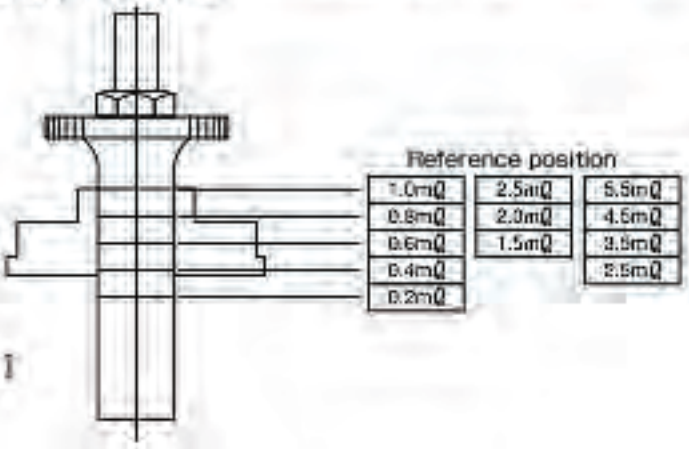
Discharge Volume Adjustment



[Discharge Volume Adjusting Knob.]

Loosen Locknut
-Turn knob countertclockwise to decrease discharge
-Turn knob clockwise to increase discharge
Tighten locknut.

ONLY ADJUST OIL DISCHARGE WHEN PISTON IS FULLY RELAXED



Automatic intermittent piston pump MMX-II

Motor driven automatic piston pump.

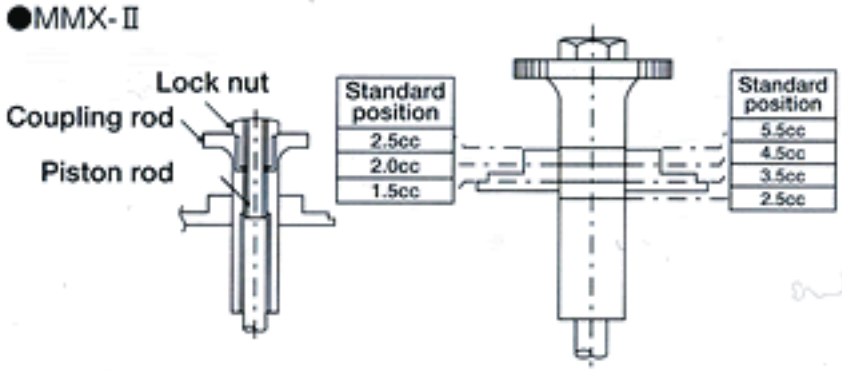
There are 7 interval time settings with 2 sets of volume discharge 2.5cc and 5.5cc/stroke

Specifications

Discharge volume	1.5~2.5cc/stroke 2.5~5.5cc/stroke
Discharge pressure	0.4MPa(4kgf/cm2)58psi
Power	AC100V/1φ AC 200V/3φ(50-60Hz) AC110V/1φAC 220V/3φ(50-60Hz)
Rated current	AC100V/0.2mA, 200V/0.11mA (50Hz)
Motor	Induction motor, E class, 4P Output 5W
Operation rate	Continuous
Working viscosity range	32~1300cSt
Oil level switch	Contact type : A contact (ON at low level) Contact capacity : 0.5A, AC / DC200V/30W
Reservoir capacity	1.8ℓ , 3ℓ : Resin 3ℓ , 4ℓ , 8ℓ : Metal
Weight	1.8 ℓ : 3kg/6.6lbs
Others	Rotary directions : Clockwise A 2μF condenser for the 100V motor is integrated into the terminal box.

Manual discharge & Adjusting knob To adjust discharge

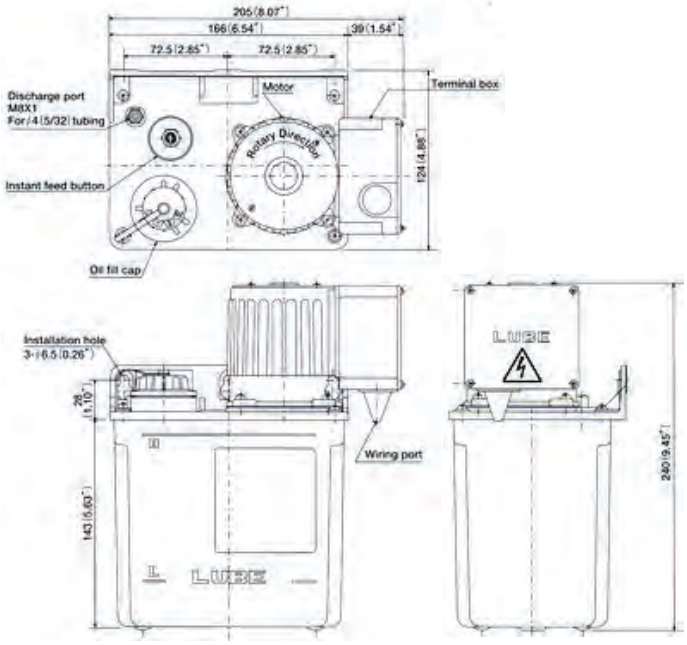
●MMX-Ⅱ



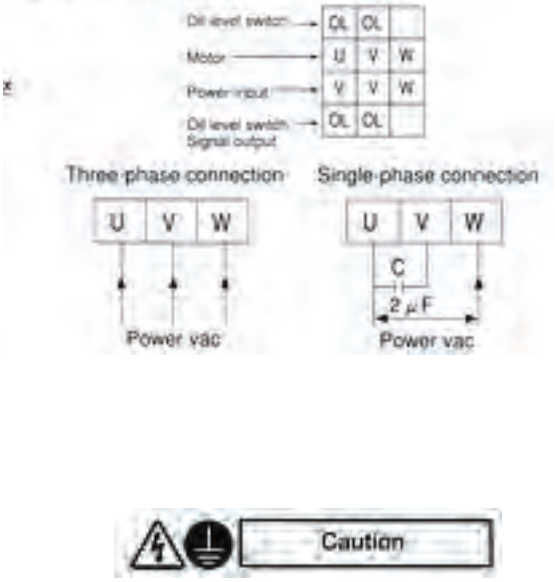
Fix tip of piston rod with screwdriver and loosen locknut.
Turn manual adjusting knob counterclockwise to decrease discharge.
Turn manual adjusting knob clockwise to increase discharge.
Turn locknut.

ONLY ADJUST LUBRICANT DISCHARGE WHEN PISTON IS FULLY RELAXED

Dimensional drawing



Wiring diagram



Part Number

Discharge oil volume2.5cc without oil level switch 1.8ℓ resin reservoir

Part Number		Interval time(in case of 50Hz)						
Motor Voltage								
100V	200V	1min25sec	3min45sec	7min30sec	15min	30min	60min	120min
312569	302569	O						
312568	302568		O					
312567	302567			O				
312566	302566				O			
312565	302565					O		
312595	302595						O	
312596	302596							O

Discharge oil volume2.5cc without oil level switch 1.8ℓ resin reservoir

Part Number		Interval time(in case of 50Hz)						
Motor Voltage								
110V	220V	1min25sec	3min45sec	7min30sec	15min	30min	60min	120min
162514	162507	O						
162513	162506		O					
162512	162505			O				
162511	162504				O			
162510	162503					O		
162509	162502						O	
162508	162501							O

Discharge oil volume2.5cc with oil level switch 1.8ℓ resin reservoir

Part Number		Interval time(in case of 50Hz)						
Motor Voltage								
100V	200V	1min25sec	3min45sec	7min30sec	15min	30min	60min	120min
342569	332569	O						
342568	332568		O					
342567	332567			O				
342566	332566				O			
342565	332565					O		
342595	332595						O	
342596	332596							O

Discharge oil volume2.5cc with oil level switch 1.8ℓ resin reservoir

Part Number		Interval time(in case of 50Hz)						
Motor Voltage								
110V	220V	1min25sec	3min45sec	7min30sec	15min	30min	60min	120min
162544	162537	O						
162543	162536		O					
162542	162535			O				
162541	162534				O			
162540	162533					O		
162539	162532						O	
162538	162531							O

Discharge oil volume5.5cc without oil level switch 1.8ℓ resin reservoir

Part Number		Interval time(in case of 50Hz)						
Motor Voltage								
100V	200V	1min25sec	3min45sec	7min30sec	15min	30min	60min	120min
312579	302579	O						
302578	302578		O					
312577	302577			O				
312576	302576				O			
312575	302575					O		
312597	302597						O	
312598	302598							O

Discharge oil volume5.5cc without oil level switch 1.8ℓ resin reservoir

Part Number		Interval time(in case of 50Hz)						
Motor Voltage								
110V	220V	1min25sec	3min45sec	7min30sec	15min	30min	60min	120min
162528	162521	O						
162527	162520		O					
162526	162519			O				
162525	162518				O			
162524	162517					O		
162523	162516						O	
162522	162515							O

Discharge oil volume5.5cc with oil level switch 1.8ℓ resin reservoir

Part Number		Interval time(in case of 50Hz)						
Motor Voltage								
100V	200V	1min25sec	3min45sec	7min30sec	15min	30min	60min	120min
342579	332579	O						
342578	332578		O					
342577	332577			O				
342576	332576				O			
342575	332575					O		
342597	332597						O	
342598	332598							O

Discharge oil volume5.5cc with oil level switch 1.8ℓ resin reservoir

Part Number		Interval time(in case of 50Hz)						
Motor Voltage								
110V	220V	1min25sec	3min45sec	7min30sec	15min	30min	60min	120min
162558	162551	O						
162557	162550		O					
162556	162549			O				
162555	162548				O			
162554	162547					O		
162553	162546						O	
162552	162545							O

Automatic intermittent gear pump AMR-III-150

Capable of operation over a wide working viscosity range.
Digital display tells how the pump is doing on sight. Control by timer and counter is selectable.

1.8l 3l

Specifications

Pump	Discharge volume	150ml/min (50Hz) 180ml/min (60Hz)	
	Discharge pressure	0.8MPa (safety valve set pressure)	
Mortor	Power	AC100Vφ1/0.83A, AC200Vφ1/0.41A (50Hz) AC100Vφ1/0.64A, AC200Vφ1/0.33A (60Hz)	
	Output	20W (50Hz/60Hz) Capacitor motor	
Oil level switch (option)	Timer	Discharge time adjustable range: 1~99 seconds (2.5~247.5ml) 50Hz, (3~297ml) 60Hz Interval time adjustable range: 1 to 9999 minutes 1 to 9999 counts	
	Abnormal output	Contact type A contact (NO)	
		Contact capacity AC250V 1.5A	
	Abnormality detection	Oil level pressure	
		Oil level switch	Contact type: A contact (NO) ON at low level
		Prerssure switch	Contact type: A contact (NO) Operating pressure: 0.14MPa ON Reset pressure : 0.07MPa OFF
Working viscosity range	68~1300mm^2/S(50Hz)		
Reservoir capacity	1.8l,3l (plastic) 3l,4l,8l (sheet metal)		
Weight	1.8l Reservoirs: 3.2kg, 3l Reservoirs: 4kg		

Part Number

Part Number	Model	Part Number	Model
112067	AMR-III-150-1		
112069	AMR-III-150-1-3		
112068	AMR-III-150-2		
112070	AMR-III-150-2-3		

Automatic intermittent gear pump AMR-III-150

Improper handling can result in a death or serious injury.

Electrical shock may be received under certain conditions

Be sure to ground.

Controller

1)When powered, the controller resumes operation from its status established when power was interrupted. Whether the pump is in the midst of interval or discharging is indicated through INTERVAL lamp (yellow) or DISCHARGE pump (green) on the front of the pump. In addition, the display shows the remaining time of interval in "minutes" or discharge in "seconds."

2)Initial timer setting is 3 minutes for interval and 20 seconds for discharge, which can be changed as service condition demands. (For details, see below.)

3)Alarm lamp is lit for low oil level and low discharge pressure (less than 1.7 MPa], when the pump is stopped. In the case of low oil level, refilling the reservoir to a proper level automatically releases the alarm status into a normal condition. As for low discharge pressure, press RESET key to clear the alarm status.

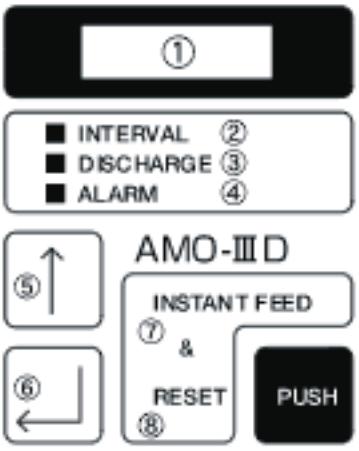
How to change timer setting

1□jWhen the pump is in the interval of operation, hold down INCREMENT key⇧and ENTER key↵at a time for about 1 second. The controller stops displaying and enters into the change mode (blinking).

2□jFirst the set value for interval time is shown on the display, flickering at the number of thousands. Pressing INCREMENT key ⇧, replace the existing number of thousands with desired number, then press ENTER key↵. This leaves the set value flickering at the number of hundreds and the places of + and -. Select desired number and place, and press ENTER key

3□jThen, the set value for discharge time flickers at the numbers of tens and units in seconds in that order. Select desired numbers and press ENTER key

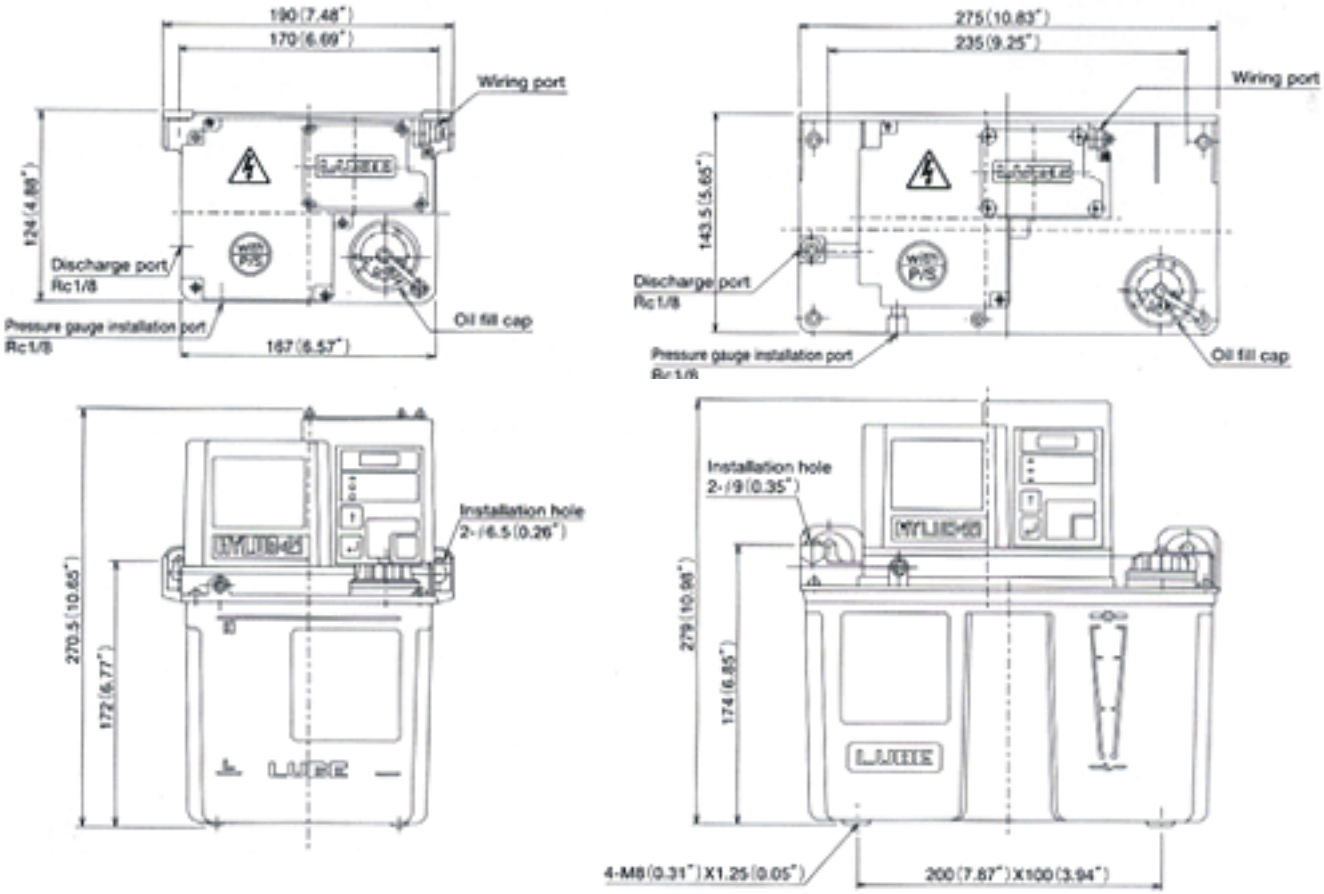
4□jIf ENTER key↵is pressed after changing the set value for discharge time at the number of units, the pump is returned to normal state, operating according to the set value previous to the change until it enters into next discharge operation. When immediate verification of the changed setting is desired, press RESET key.



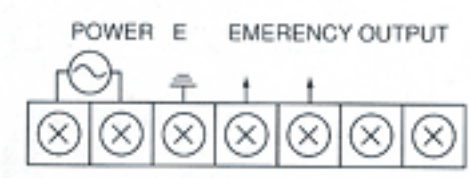
① Remaining Time Display
② Interval Lamp
③ Discharge Lamp
④ Alarm Lamp
⑤ Increment Key
⑥ Enter Key
⑦ Instant Feed Key
⑧ Reset key

Automatic intermittent gear pump AMR-III-150

Dimensional drawing



Wiring diagram



Caution

[Directions for use]

- Do not remove the oil strainer to keep the pump clear of foreign matter.
- Replace or clean the suction filter at least once a year. Click here to view the service list.
- Oil viscosity varies with oil temperature. Be sure to use oil within specified working viscosity range. Click here to viewo the viscsity list.
- Do not use any special additive-contained oil, water soluble oil and solvent.
- Periodically check the oil in the reservoir for impurities. Replace it, if necessary, with fresh oil immediately. Be sure to clean the reservoir before oil change.
- Make sure that proper voltage and pressure are proper.
- Do not overtighten the discharge joint.
  Refer to the tightening torque table.
- For system planning information, click here.

* Should the pump malfunction, contact us for immediate response with substitution.

Motor driven continuous gear pump AMS

Motor driven gear pump for continuous micro-volume lubrication used with a resistance type Centralized Lubrication Equipment

Specifications

Discharge volume	AMS-1.5 1.25cc/(50Hz),1.5cc/min(60Hz) AMS-3 2.5cc/min(50Hz),3cc/min(60Hz)
Discharge pressure	0.8MPa(8kgf/cm2)116psi
Power	AC100V/1φ, AC110V/1φ, AC200V/1φ
Rated current	AC100V : 50mA(50Hz),42mA(60Hz) AC200V : 25mA(50Hz),18A(60Hz)
Motor	Synchronous motor 3W Rotary direction : clockwise
Operation rate	Continuous
Oil level switch	Contact type : A contact(oN at low level) Contact capacity : 0.5A,AC~ DC200V/30W
Reservoir capacity	1.8ℓ
Weight	1.8Kg

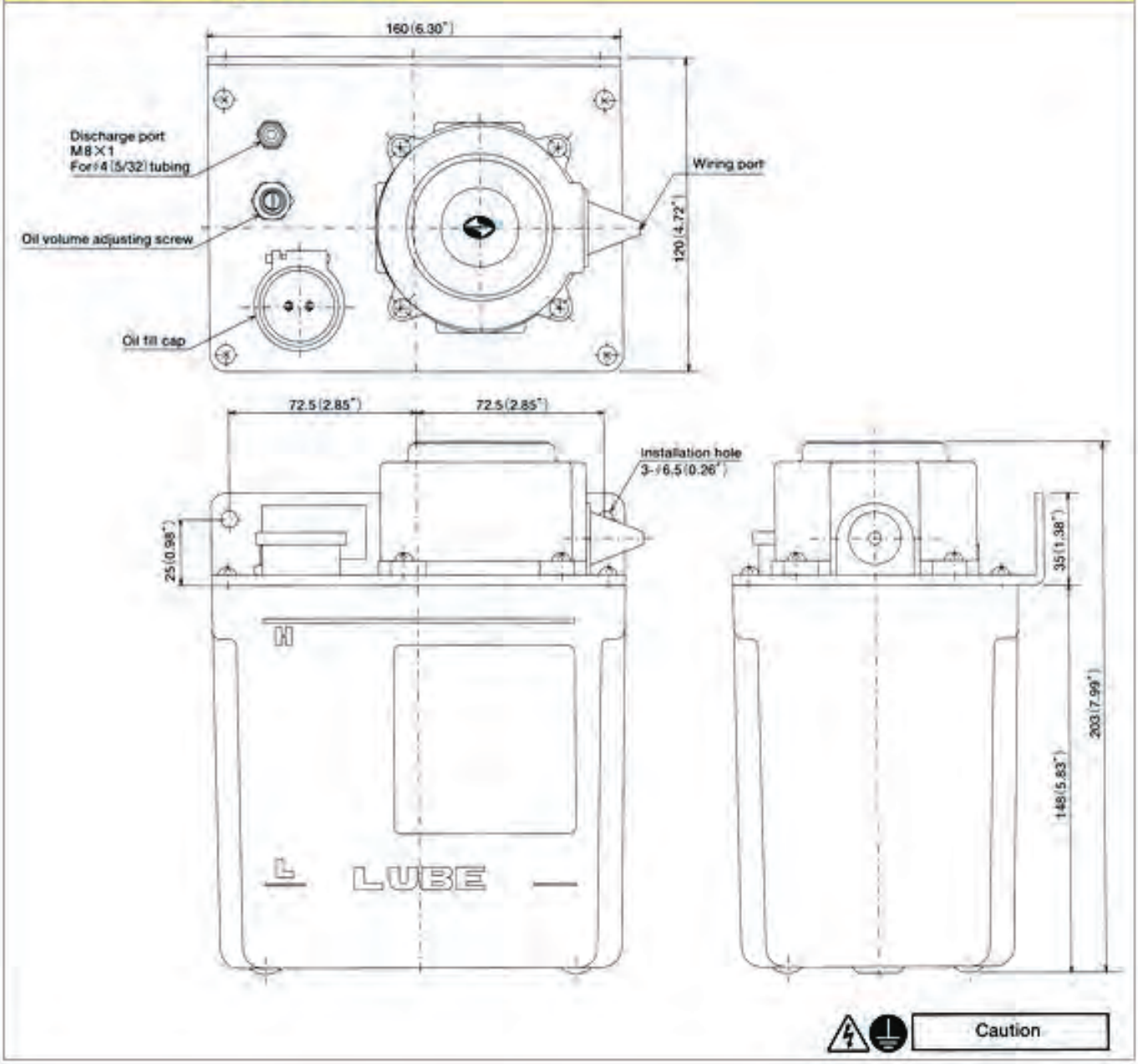
Part Number

Part Number	Pump model	Motor			Oil level switch
		100V	110V	200V	
102401	AMS-1.5	O			
102403	AMS-1.5	O			O
102402	AMS-1.5			O	
102404	AMS-1.5			O	O
102441	AMS-1.5		O		
102443	AMS-1.5		O		
102405	AMS-3	O			
102407	AMS-3	O			O
102406	AMS-3			O	
102408	AMS-3			O	O
102445	AMS-3		O		
102447	AMS-3		O		
102452	AMS-3		O		
102977	AMS-6-40L		O		O

Note:Call for other voltages.

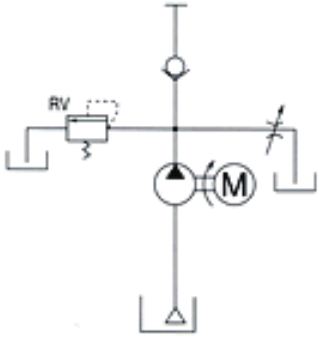
Motor driven continuous gear pump AMS

Dimensional drawing

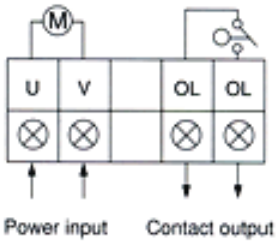


Dimensional drawing

Hydraulic circuit drawing



Wiring diagram



Motor driven continuous gear pump AMI-300

For both continuous and intermittent lubrication

Specifications

Discharge volume	300cc/min(50Hz) 330cc/min(60Hz)
Discharge pressure	0.5MPa(5kgf/cm2)72.5psi
Power	AC100V/1φ, AC200V/3φ(50/60Hz)
Rated current	AC100V/1.4A AC200V/0.35A
Motor	50W Induction motor
Operation rate	Continuous
Working viscosity range	65~1300cSt
Oil level switch	Optional with reservoir
Reservoir capacity	2ℓ, 3ℓ, 4ℓ and 8ℓ : Metal
Weight	4.4kg/9.7lbs
Others	Attached condenser 8μF for 100V(500421) Rotary direction : Clockwise

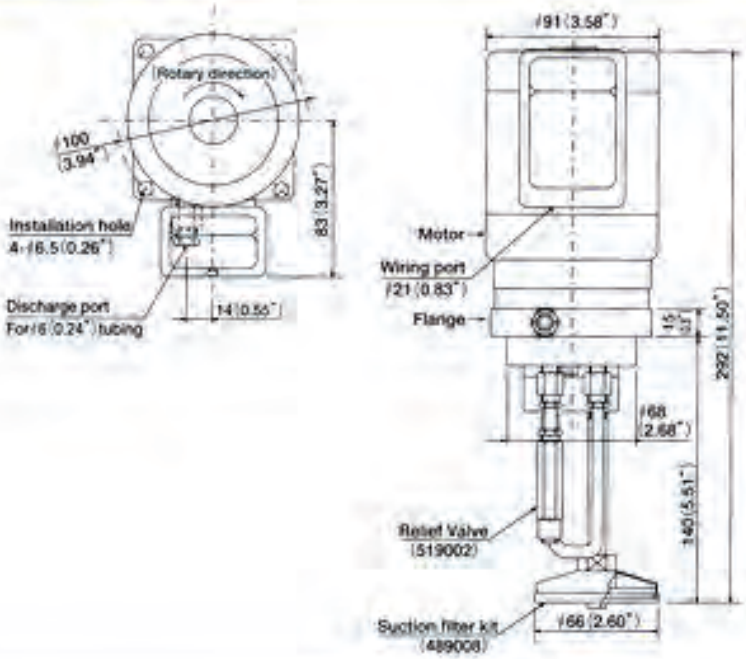
Part Number

Part Number	Model	Voltage	
		100V	200V
202035	AMI-300	O	
202036	AMI-300		O

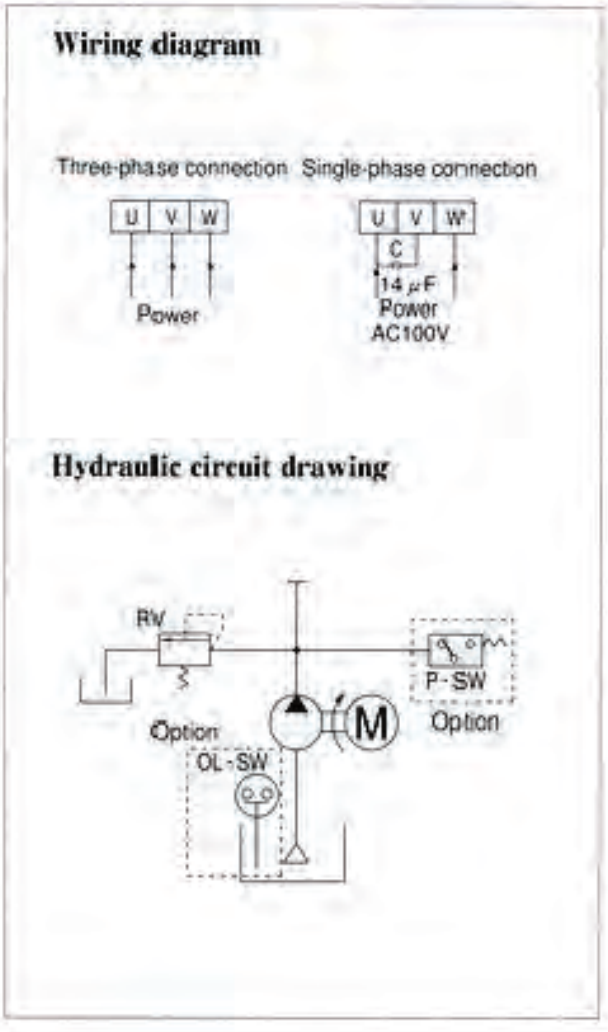
Note:Call for other voltages

Motor driven continuous gear pump AMI-300

Dimensional drawing



Wiring diagram



Caution

Motor driven continuous gear pump AMI-1000

For both continuous and intermittent lubrication

spesification

Discharge volume	1000cc/min(50Hz) 1100ccc/min(60Hz)
Discharge pressure	1.2MPa(12kgf/cm2)174psi
Power	AC100V/1φ, AC200V/3φ(50Hz/60Hz)
Rated current	AC100V/2.0A AC200V/0.8A
Motor	75W Induction motor
Operation rate	Continuous
Working viscosity range	65□1300cSt
Oil level switch	Optional with reservoir
Reservoir capacity	2ℓ, 3ℓ, 4ℓ and 8ℓ : Metal
Weight	7.14kg/15.7lbs
Others	Attached condenser 12μF for 100V(500421) Rotary direction : Counter-clockwise

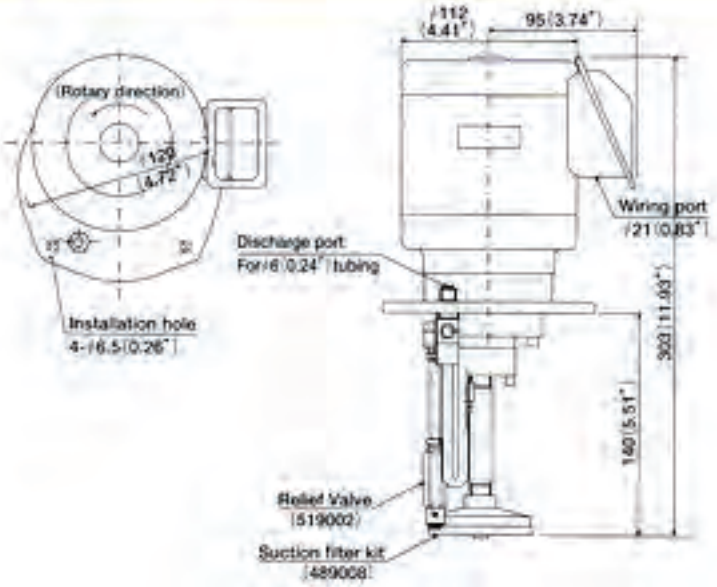
Part Number

Part Number	Pump model	Voltage		
		100V	200V	200V(With needle)
202132	AMI-1000	O		
202131	AMI-1000		O	
202275	AMI-1000			O

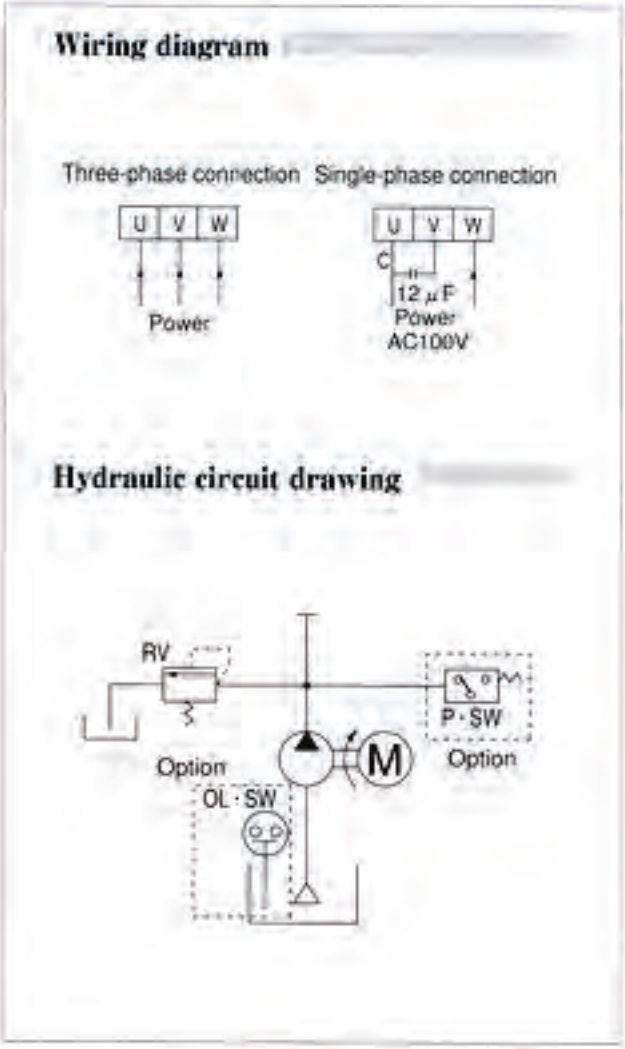
Note:Call for other voltages.

Motor driven continuous gear pump AMI-1000

Dimensional drawing



Wiring diagram



Caution

Electric continuous gear pump AM

Low-speed gear pump,Highly durable pump

Speciifications

Discharge volume	60cc/min,10~300cc/h Changeable with cam setting
Discharge pressure	0.8MPa(8kgf/cm2)116psi
Power	AC100V/1φ, AC200V/3φ(50/60Hz)
Rated current	100V : 30W/0.6A, 50W/0.75A 200V : 30W/0.30A, 50W/0.33A
Motor	Induction motor, E class, 4P, 30W, 50W
Operation rate	Continuous
Working viscosity range	32~1300cSt
Oil level switch	Optional with reservoir
Reservoir capacity	2ℓ, 3ℓ, 4ℓ and 8ℓ : Metal
Weight	5.4kg/11.9lbs
Others	Rotary direction : Couter-clockwise 100V/30W pump has 5μF condenser 50W pump has 8μF condenser

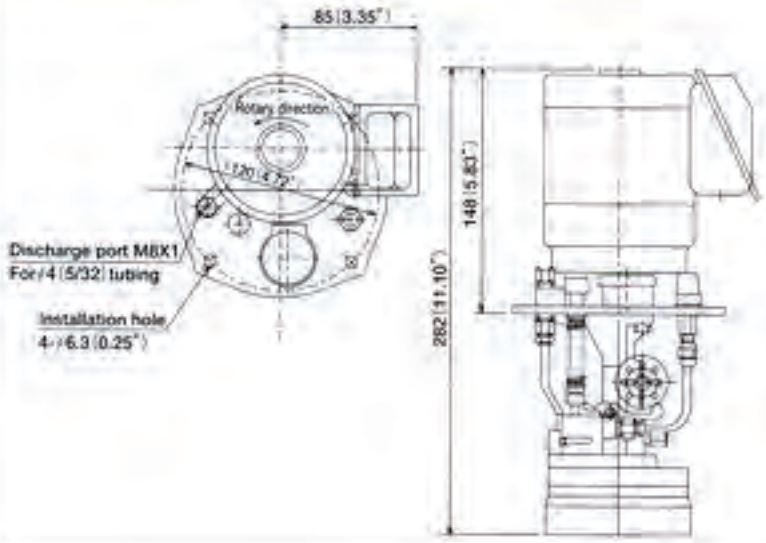
Part Number

Part Number	Pump model	Motor			
		30W		50W	
		200V	100V	200V	100V
102050	AM	O			
102054	AM		O		
102051	AM			O	
102055	AM				O

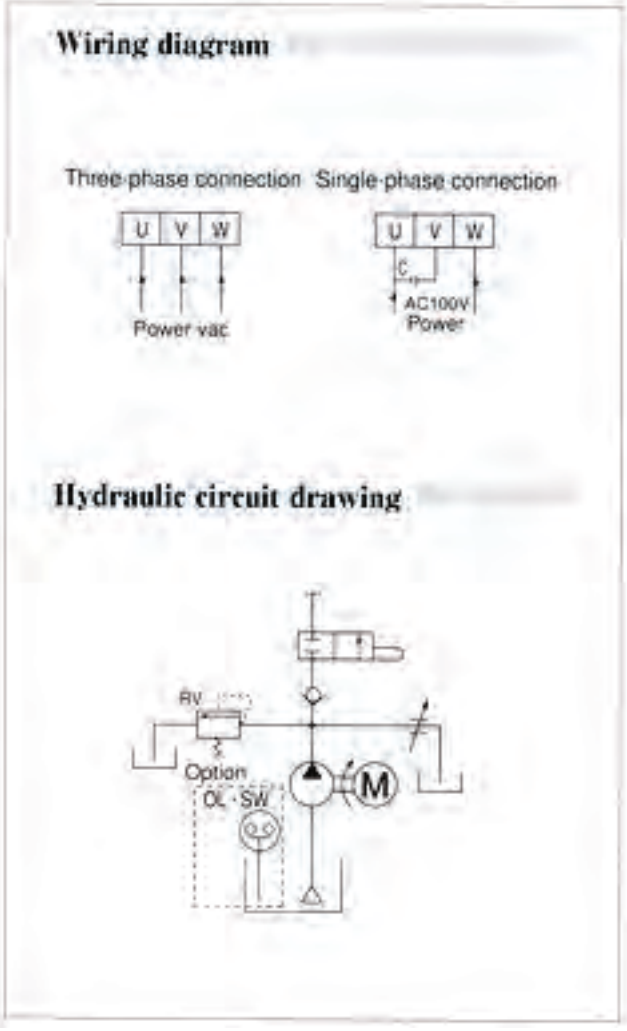
Note:Call for other voltages.

Electric continuous gear pump AM

Dimensional drawing



Wiring diagram



Caution

Electric continuous gear pump ACM-II

Continuous pump with small discharge volume

Specifications

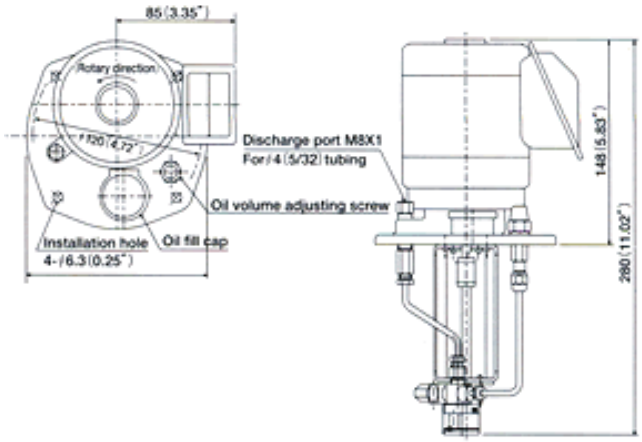
Discharge volume	60cc/min(50Hz), 70cc/min(60Hz)
Discharge pressure	0.8MPa(8kgf/cm2)116psi
Power	AC100V/1φ, AC200V/3φ(50/60Hz)
Rated current	100V/0.6A 200V/0.3A
Motor	Induction motor, E class, 4P, 30W
Operation rate	Continuous
Working viscosity range	32~1300cSt
Oil level switch	Optional with reservoir
Pressure switch	External with reservoir
Reservoir capacity	2ℓ, 3ℓ, 4ℓ and 8ℓ
Weight	54kg/11.9lbs
Others	Rootary diirection : Counter- clockwise Condenser : 5μF for 100V

Part Number

Part Number	Model	Motor	
		30W	
		200V	100V
102486	ACM-II	O	
102484	ACM-II		O

Note:Call for other voltages.

Dimensional drawing



Electric continuous and intermittent gear pump ADM

The pump with tiwn discharge ports which can do continuous and cyclic lubrication

Specifications

Discharge volume	60cc/min, 10~300cc/h Adjustable with cam setting
Discharge pressure	0.8MPa(8kgf/cm2)116psi
Power	AC100V/1φ, AC200V/3φ(50/60Hz)
Rated current	100V : 30W/0.6A, 50W/0.75A 200V : 30W/0.3A, 50W/0.33A
Motor	Induction motor, E class, 4P 30W, 50W
Operation rate	Continuous
Working viscosity range	32~1300cSt
Oil level switch	Optional with reservoir
Weight	5.4kg/11.9lbs
Others	MOtor rotary dirction : Counter-clockwise 2 discharge ports : continuous/cyclic Condenser 100V/30W/ 5μF 100V/50W 8μF

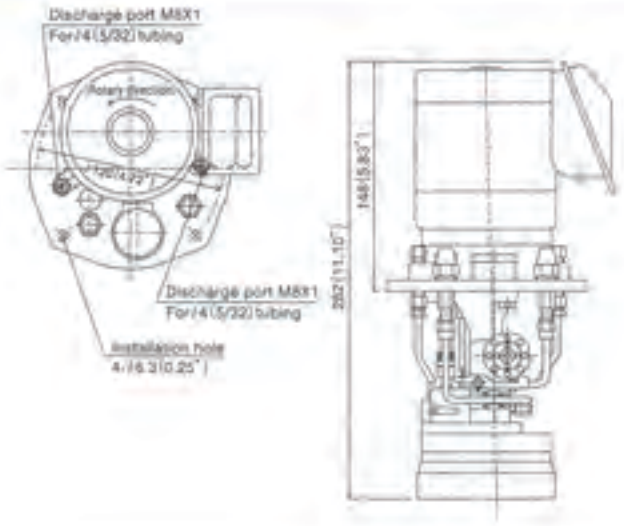
Part Number

Part Number	Motor			
	30W		50W	
	200V	100V	200V	100V
102250	O			
102254		O		
102251			O	
102255				O

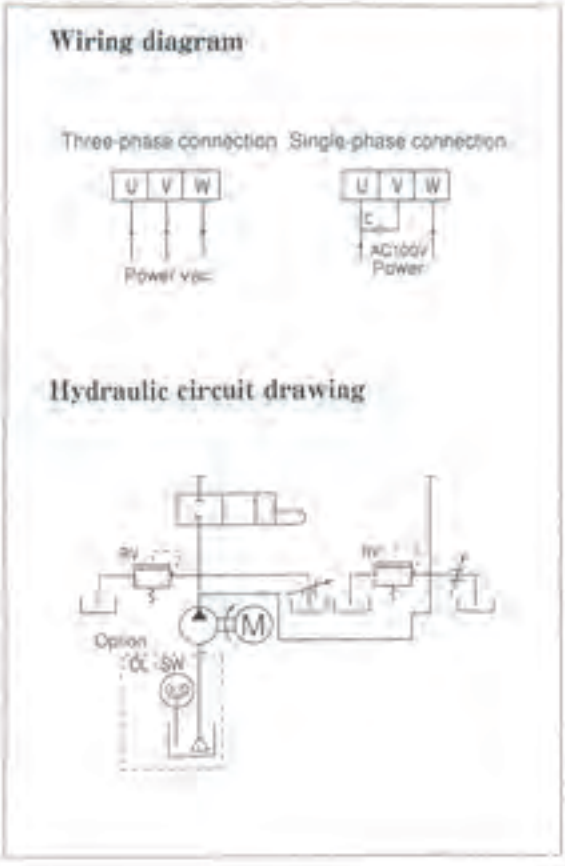
Note:Call for other voltages.

Electric continuous and intermittent gear pump ADM

Dimensional drawing



Wiring dingram



Solenoid operated piston pump EX

Solenoid operated piston pump

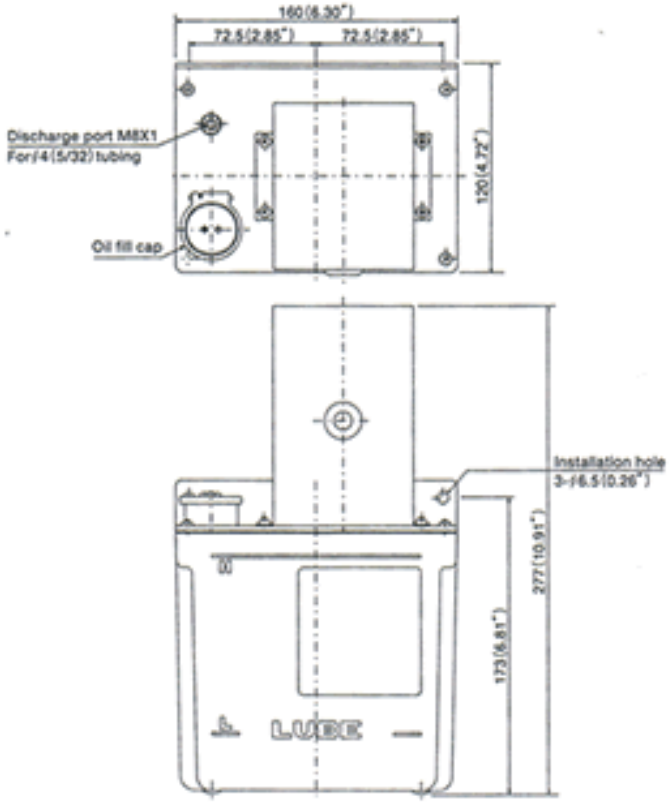
Specifications

Discharge volume	0.4~0.9cc/Stroke(Adjustable)
Discharge pressure	0.4MPa(4kgf/cm2)58psi Max.
Power	AC100V/1φ, AC200V/1φ (50/60Hz)
Working viscosity range	32~1300cSt
Reservoir capacity	1.8ℓ(Standard)
Weight	1.85kg/4.1lbs

Part Number

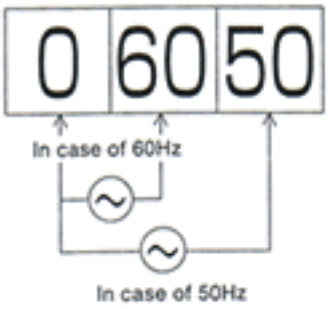
Part Number	Solenoid				Hold	Start	Solenoid cover
	AC100V		AC200V				
	50Hz	60Hz	50Hz	60Hz			
102701	O				0.5A	1.8A	O
102703		O			0.52A	6.0A	
102700			O		0.25A	2.9A	O
102702				O	0.26A	3.0A	

Dimensional drawing



Wiring dingram

Wiring diagram



Manual lubricating pump L-8/L-20

Manually actuated piston pump

L-8L

L-20R

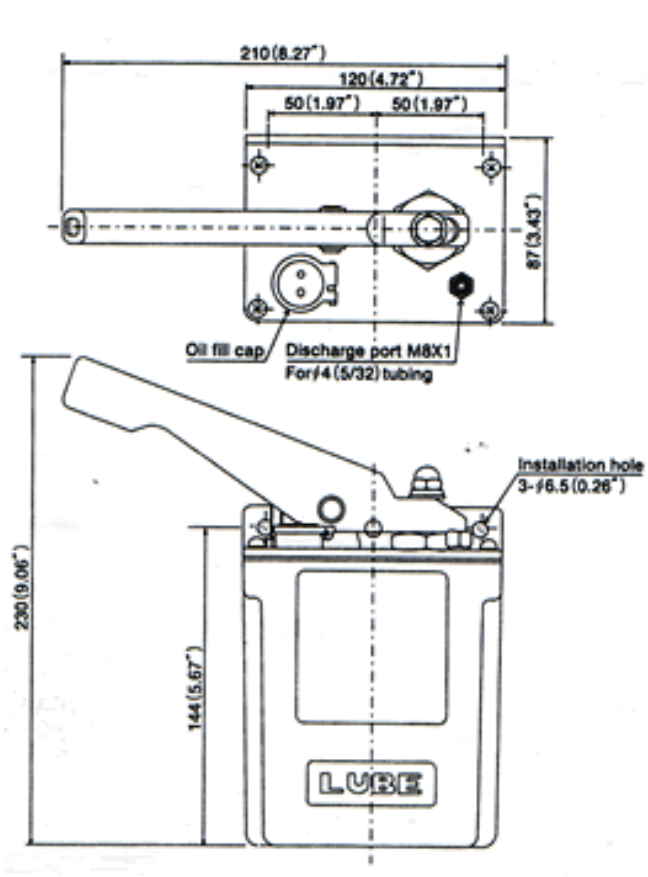
Specifications

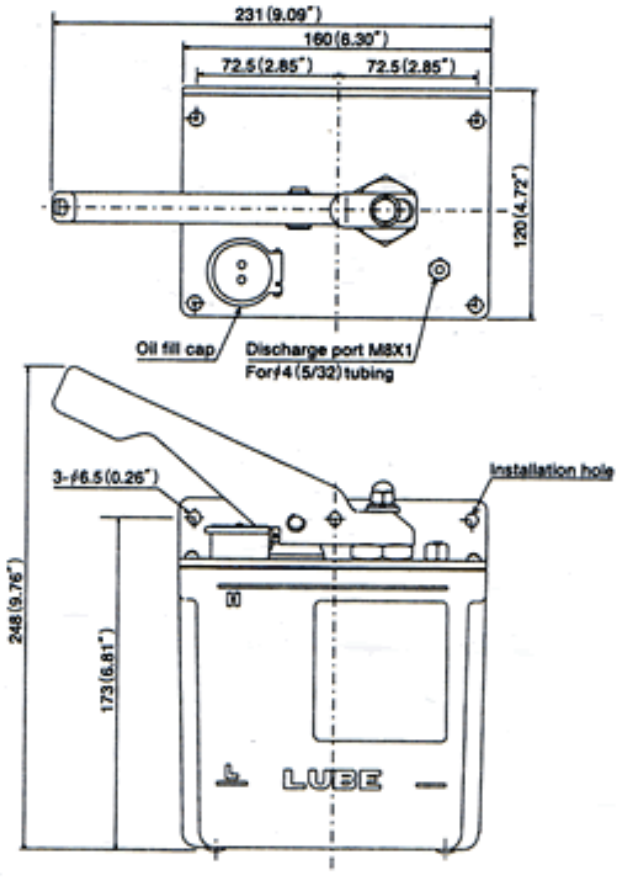
Discharge volume	2~7cc/stroke(Adjustable)
Discharge pressure	0.5MPa(5kgf/cm2)72.5psi
Working viscosity range	32~1300cSt
Reservoir capacity	0.8ℓ(L8),1.8ℓ(20L)
Weight	0.8ℓ : 1.2kg/2.6lbs, 1.8ℓ : 1.8kg/4lbs

Part Number

Part Number	Model	Lever	
		Left	Right
103111	L-8L	O	
103112	L-8R		O
103211	L-20L	O	
103212	L-20R		O

Dimensional drawing





Manual lubricating pump LPM L-3/L-5

LPM

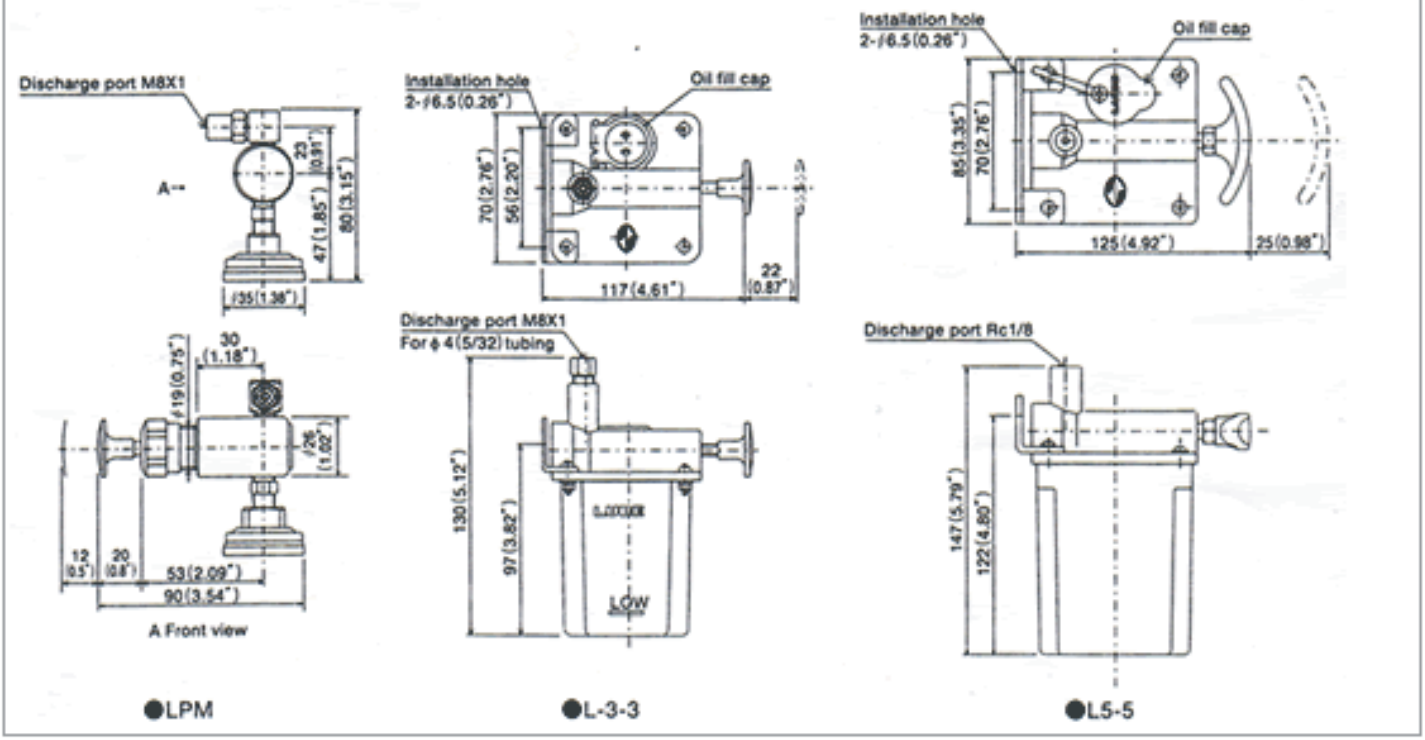
L-3-3

L5-5

Part Number

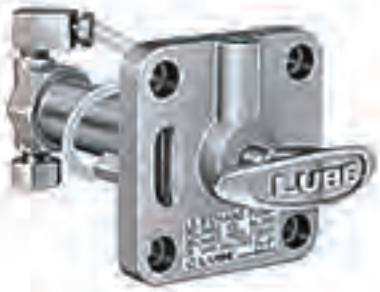
Part Number	Model	Discharge oil Volume	Discahrge pressure		Reservoir (resin)		Weight
		cc/Stroke	0.2Mpa 2kg/cm2	0.3Mpa 3kg/cm2	220cc	400cc	
103021	LPM	1.5~2.5cc	O				0.15kg
103031	L-3-2	2cc		O	O		0.34kg
103030	L-3-3	3cc		O	O		0.34kg
103051	L-5-3	3cc		O		O	0.4kg
103052	L-5-4	4cc		O		O	0.4kg
103053	L-5-5	5cc		O		O	0.4kg

Dimensional drawing



●LPM ●L-3-3 ●L5-5

Manual lubricating pump LK



LK-8

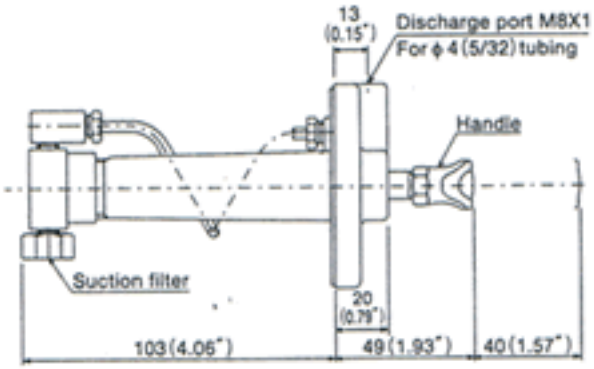
LK-8TR

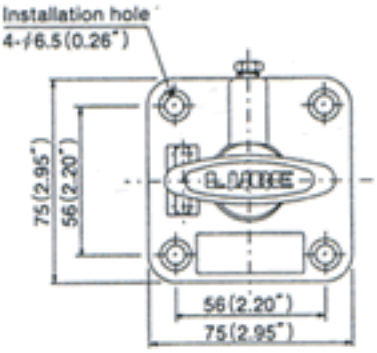
Part Number

Part Number	Model	Reservoir(500cc)
103401	LK-8	-
103402	LK-8TL	O
103403	LK-8TR	O

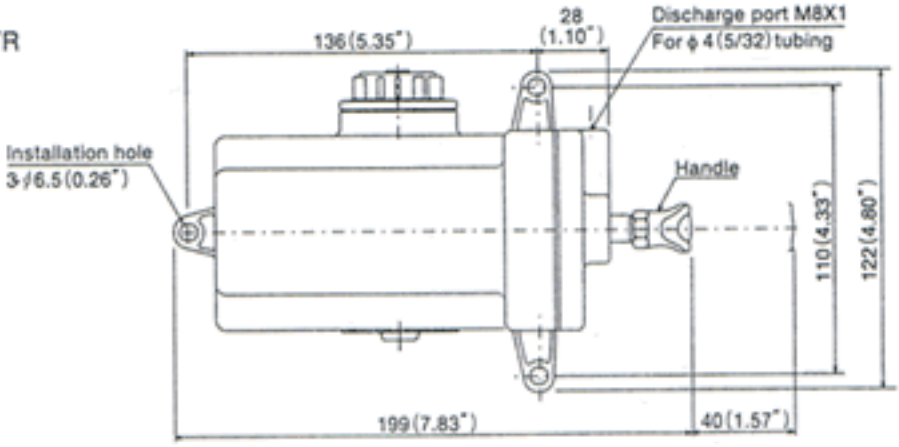
Dimensional drawing

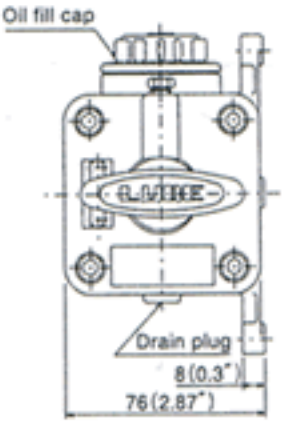
●LK-8





●LK-8TR





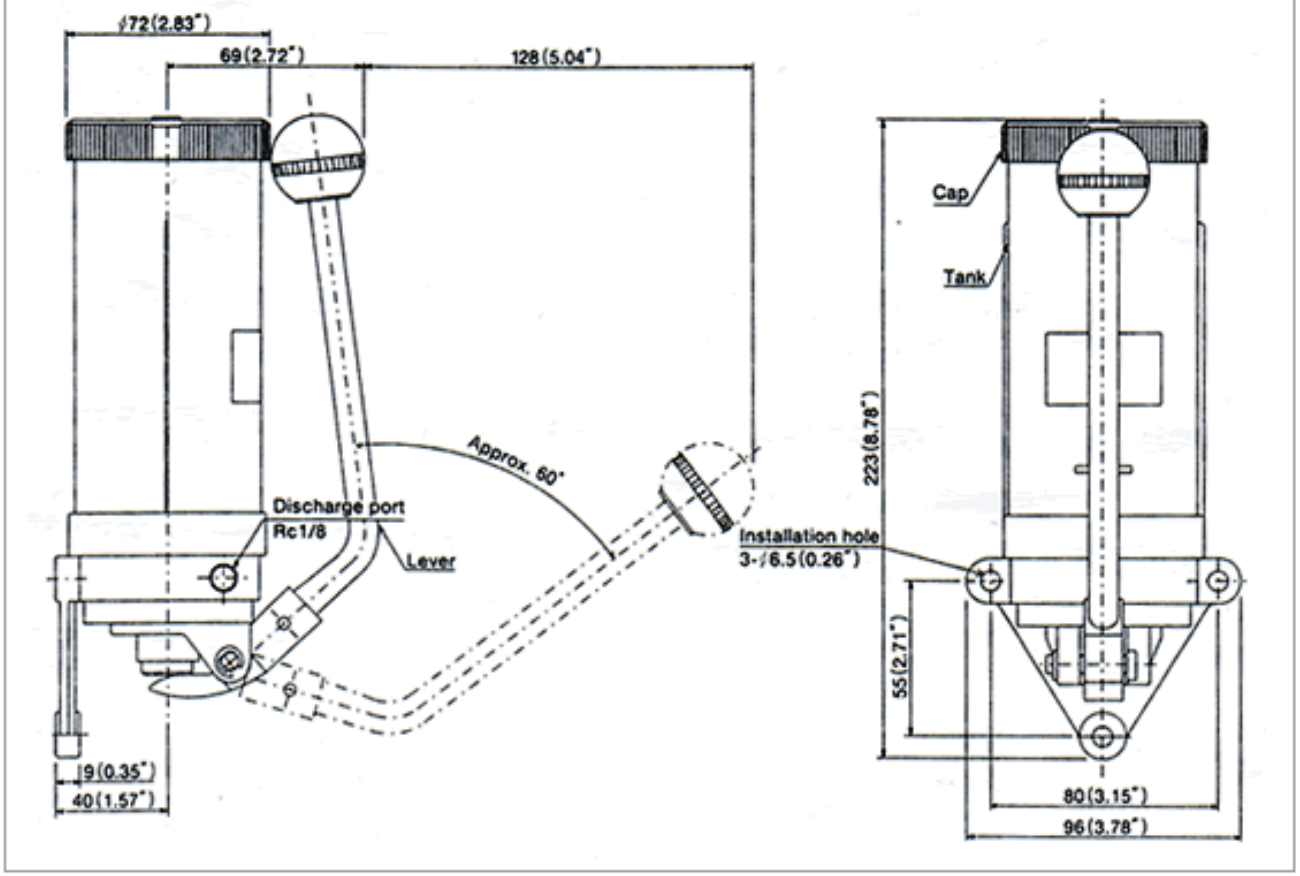
Manual lubricating pump LT

Specifications

Discharge volume	cc/stroke
Discharge presure	3.4MPa(35kgf/cm2)507psi
Working viscosity range	65~1300cSt
Reservoir capacity	260cc : Resin
weight	1.2kg/2.6lbs

Part Number
103420

Dimensional drawing



Flow unit

Resistance type valve for cyclic lubrication

Choose flow units shen using an intermittent lubrication pump and system.Intermittent pumps are typically piston style pumps or low pressure gear pumpswith timed intervals.

Flow units have a check valve to hold residual pressure during interval.a filter to prevent contaminants at the vearing,and a restrictor pin(rod).

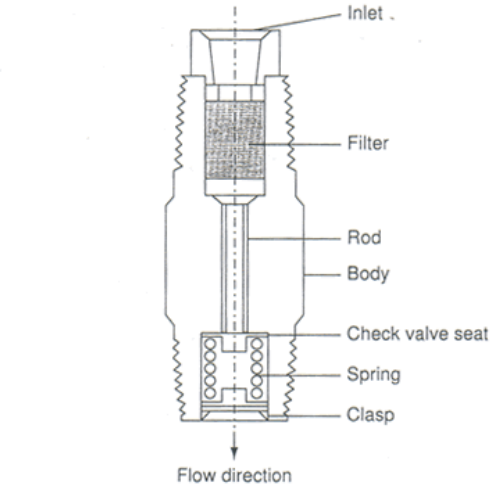
The flow of each unit is determined by the restrictor pin(rod);oil is forced around the rod when the system is pressurized,the amount of flow is determined by the size of the restrictor pin,the amount of avaikable oil and the number of flow units in the system.The flow rate and direction of flow units in the system.The flow rate and direction of flow of the unit id stamped on the body.

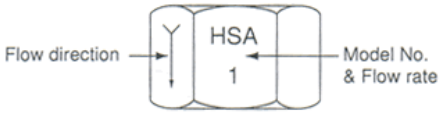
Flow units can be mouted either at the bearing or in a manifold.Use one flow unit for eace defferent point of lubrication in any variety on one machine as required.

Specifications

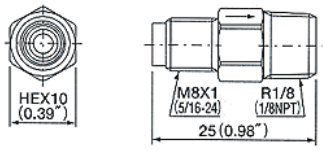
Normal working pressure	Pressure under 0.8MPa(8kgf/cm2)116psi

Internal construction





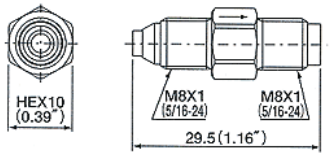
Dimensional drawing



Part Number

Part Number		Model	
Metric	Inch		
105501	185501	HSA	03
105001	185001		02
105002	185002		0
105003	185003		1
105004	185004		2
105005	185005		3
105006	185006		4
105007	185007		5

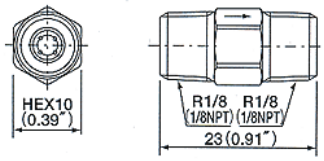
Dimensional drawing



Part Number

Part Number		Model	
Metric	Inch		
105502	185502	HJB	03
105008	185508		02
105009	185009		0
105010	185010		1
105011	185011		2
105012	185012		3
105013	185013		4
105014	185014		5

Dimensional drawing

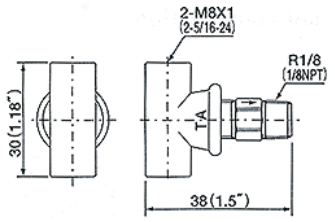


Part Number

Part Number		Model	
Metric	Inch		
105513	185513	HTU	03
105072	185072		02
105073	185073		0
105074	185074		1
105075	185075		2
105076	185076		3
105077	185077		4
105078	185078		5

Flow unit

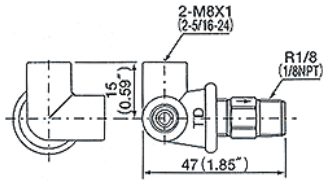
Dimensional drawing



Part Number

Part Number		Model	
Metric	Inch		
105503	185503	HTA	03
105015	185015		02
105016	185016		0
105017	185017		1
105018	185018		2
105019	185019		3
105020	185020		4
105021	185021		5

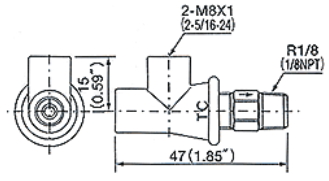
Dimensional drawing



Part Number

Part Number		Model	
Metric	Inch		
105504	185504	HTD	03
105022	185022		02
105023	185023		0
105024	185024		1
105025	185025		2
105026	185026		3
105027	185027		4
105028	185028		5

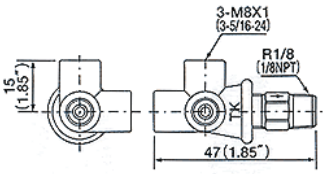
Dimensional drawing



Part Number

Part Number		Model	
Metric	Inch		
105505	185505	HTC	03
105029	185029		02
105030	185030		0
105031	185031		1
105032	185032		2
105033	185033		3
105034	185034		4
105035	185035		5

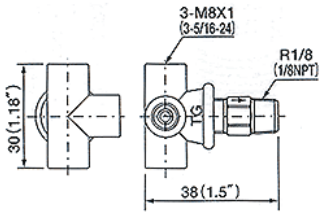
Dimensional drawing



Part Number

Part Number		Model	
Metric	Inch		
105507	185507	HTU	03
105043	185043		02
105044	185044		0
105045	185045		1
105046	185046		2
105047	185047		3
105048	185048		4
105049	185049		5

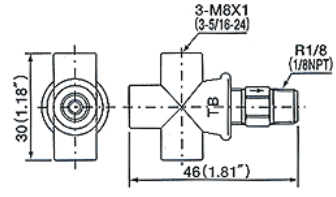
Dimensional drawing



Part Number

Part Number		Model	
Metric	Inch		
105508	185508	HTG	03
105051	185051		02
105052	185052		0
105053	185053		1
105054	185054		2
105055	185055		3
105056	185056		4
105057	185057		5

Dimensional drawing

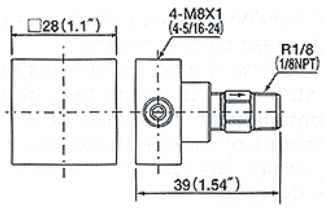


Part Number

Part Number		Model	
Metric	Inch		
105506	185506	HTB	03
105036	185036		02
105037	185037		0
105038	185038		1
105039	185039		2
105040	185040		3
105041	185041		4
105042	185042		5

Flow unit

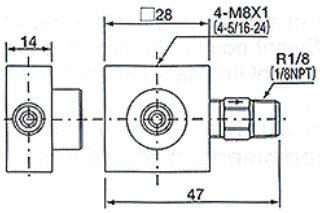
Dimensional drawing



Part Number

Part Number		Model	
Metric	Inch		
105509	185509	HTH	03
105058	185058		02
105059	185059		0
105060	185060		1
105061	185061		2
105062	185062		3
105063	185063		4
105064	185064		5

Dimensional drawing



Part Number

Part Number		Model	
Metric	Inch		
105510	185510	HTL	03
105065	185065		02
105066	185066		0
105067	185067		1
105068	185068		2
105069	185069		3
105070	185070		4
105071	185071		5

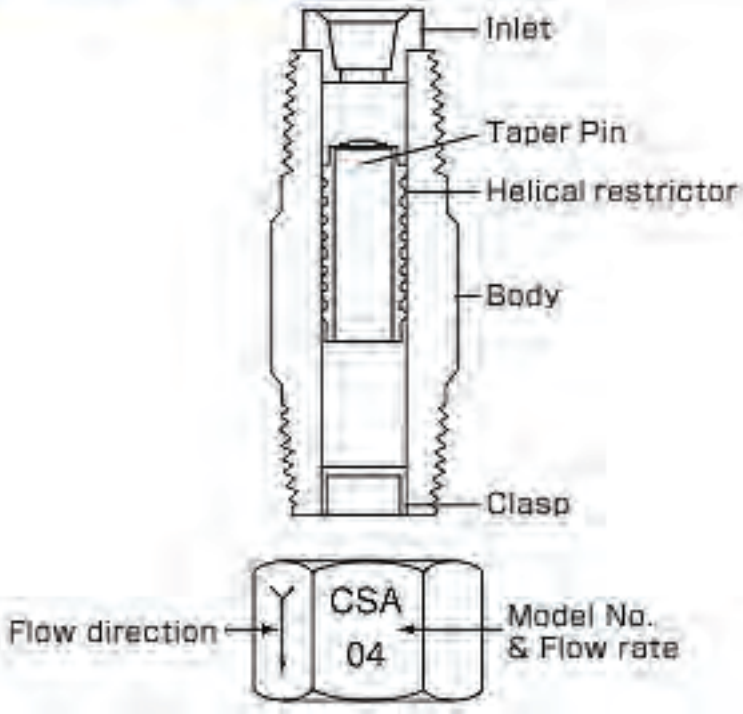
Control unit

Resistance type valve for continuous lubrication

Specifications

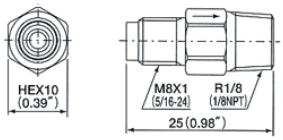
Normal working pressure	Pressure under 0.8MPa(8kgf/cm2)116psi

Internal construction



Control unit

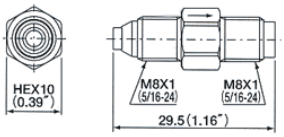
Dimensional drawing



Part Number

Part Number		Model	
Metric	Inch		
105201	185201	CSA	05
105202	185202		04
105203	185203		03
105204	185204		02
105205	185205		0
105206	185206		1
105207	185208		2
105208	185208		3
105209	185209		4
105210	185210		5

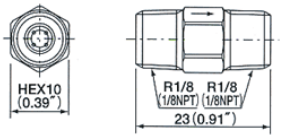
Dimensional drawing



Part Number

Part Number		Model	
Metric	Inch		
105211	185211	CJB	05
105212	185212		04
105213	185213		03
105214	185214		02
105215	185215		0
105216	185216		1
105217	185217		2
105218	185218		3
105219	185219		4
105220	185220		5

Dimensional drawing

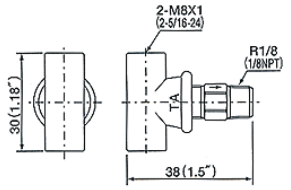


Part Number

Part Number		Model	
Metric	Inch		
105321	185321	CTU	05
105322	185322		04
105323	185323		03
105324	185324		02
105325	185325		0
105326	185326		1
105327	185327		2
105328	185328		3
105329	185329		4
105330	185330		5

Control unit

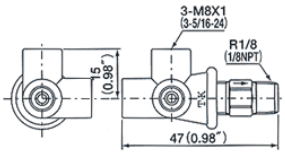
Dimensional drawing



Part Number

Part Number		Model	
Metric	Inch		
105221	185221	CTA	05
105222	185222		04
105223	185223		03
105224	185224		02
105225	185225		0
105226	185226		1
105227	185227		2
105228	185228		3
105229	185229		4
105230	185230		5

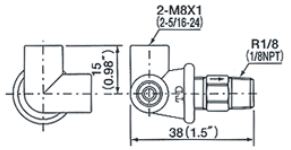
Dimensional drawing



Part Number

Part Number		Model	
Metric	Inch		
105261	185261	CTK	05
105262	185262		04
105263	185263		03
105264	185264		02
105265	185265		0
105266	185266		1
105267	185267		2
105268	185268		3
105269	185269		4
105270	185270		5

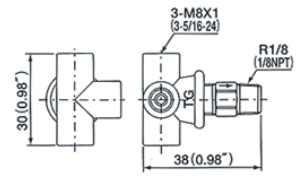
Dimensional drawing



Part Number

Part Number		Model	
Metric	Inch		
105231	185231	CTD	05
105232	185231		04
105233	185233		03
105234	185234		02
105235	185235		0
105236	185236		1
105237	185237		2
105238	185238		3
105239	185239		4
105240	185240		5

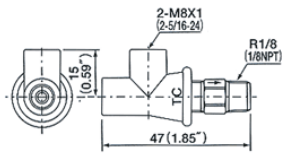
Dimensional drawing



Part Number

Part Number		Model	
Metric	Inch		
105271	185271	CTG	05
105272	185272		04
105273	185273		03
105274	185274		02
105275	185275		0
105276	185276		1
105277	185277		2
105278	185278		3
105279	185279		4
105280	185280		5

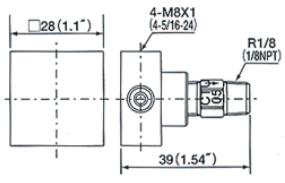
Dimensional drawing



Part Number

Part Number		Model	
Metric	Inch		
105241	185241	CTC	05
105242	185242		04
105243	185243		03
105244	185244		02
105245	185245		0
105246	185246		1
105247	185247		2
105248	185248		3
105249	185249		4
105250	185250		5

Dimensional drawing

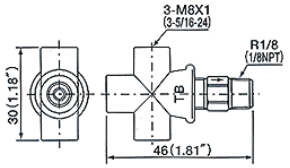


Part Number

Part Number		Model	
Metric	Inch		
105281	185281	CTH	05
105282	185282		04
105283	185283		03
105284	185284		02
105285	185285		0
105286	185286		1
105287	185287		2
105288	185288		3
105289	185289		4
105290	185290		5

Control unit

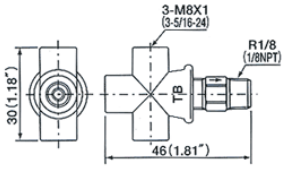
Dimensional drawing



Part Number

Part Number		Model	
Metric	Inch		
105251	185251	CTB	05
105252	185252		04
105253	185253		03
105254	185254		02
105255	185255		0
105256	185256		1
105257	185257		2
105258	185257		3
105259	185259		4
105260	185260		5

Dimensional drawing



Part Number

Part Number		Model	
Metric	Inch		
105291	185291	CTL	05
105292	185292		04
105293	185293		03
105294	185294		02
105295	185295		0
105296	185296		1
105297	185297		2
105298	185298		3
105299	185299		4
105300	185300		5

Junctions [For 4mm(5/32) O.D. tubing]

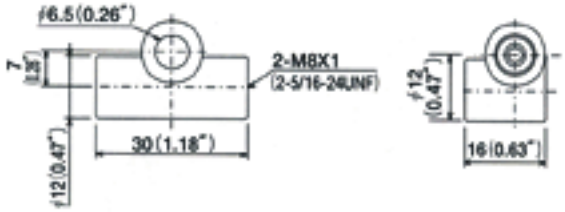



Part Number

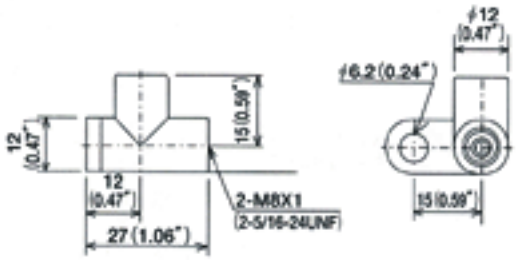
Part Nunber		Model	Specifilcation
M8×1	5/16-24 UNF		
106421	186421	PJ-2	Tow -way
106424	186424	PJ-2F	
106420	186420	PJ-3	Three-way
106425	186425	PJ-3F	
106423	186423	PJ-4	Four-way

Dimensional drawing

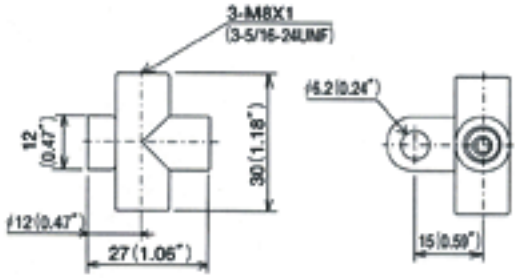
106421



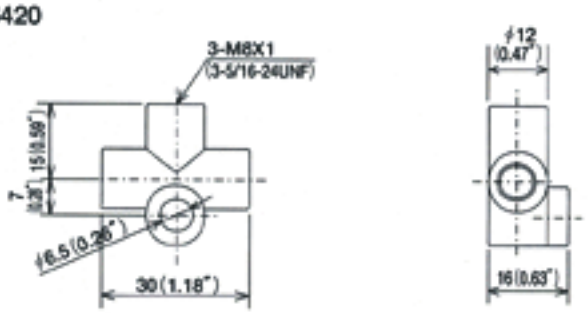
106424



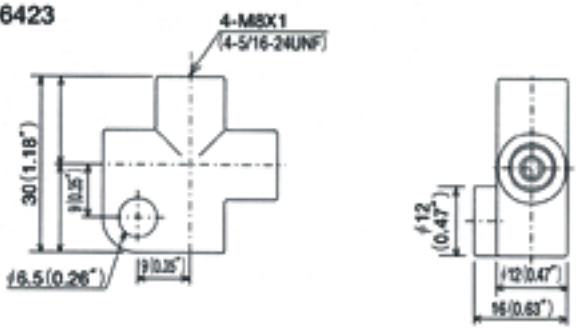
106425



106420



106423

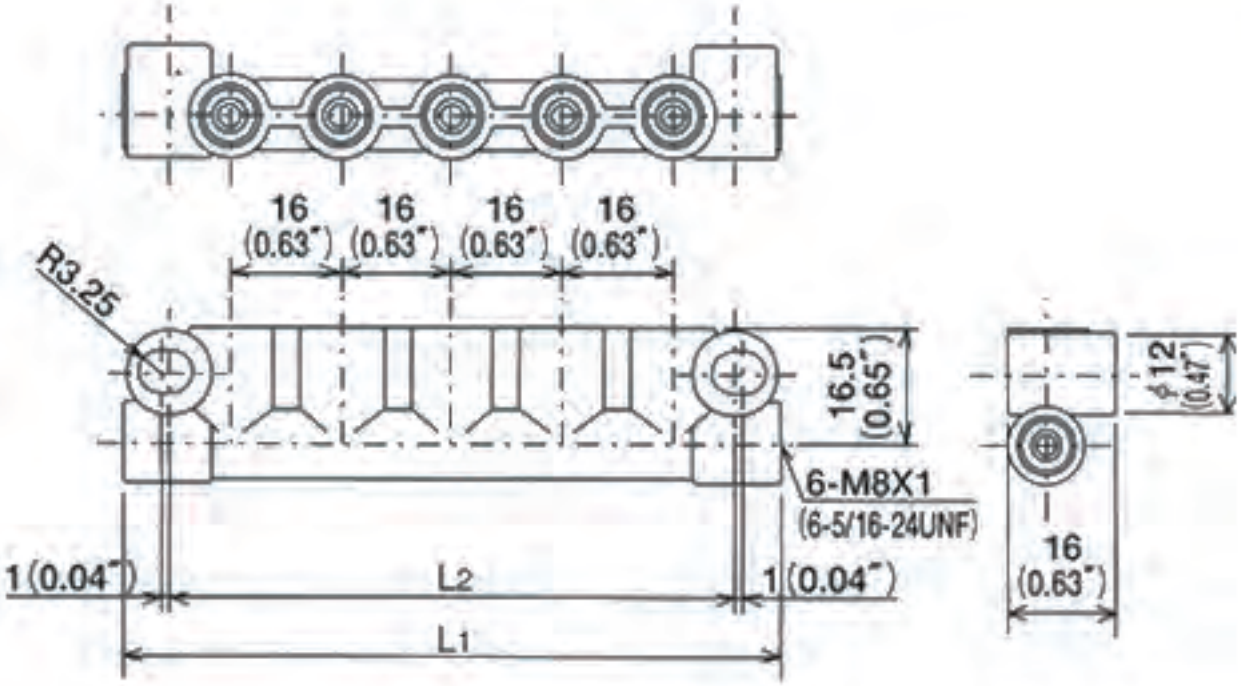


Junctions [For Flow unit/Control unit installation]

Part Number

Part Number		Model	Specifilcation	Size	
M8×1	5/16-24 UNF			L1	L2
106401	186401	PJ-4S	single type for 2ports	47(1.85")	34(1.34")
106402	186402	PJ-5S	single type for 3ports	63(2.48")	50(1.97")
106403	186403	PJ-6S	single type for 4ports	79(3.11")	66(2.60")
106404	186404	PJ-7S	single type for 5ports	95(1.85")	82(3.23")
106405	186405	PJ-8S	single type for 6ports	111(4.37")	98(3.86")
106406	186406	PJ-9S	single type for 7ports	127(5.00")	114(4.49")
106407	186407	PJ-10S	single type for 8ports	143(5.63")	130(5.12")
106408	186408	PJ-12S	single type for 10ports	175(6.89")	162(6.38")

Dimensional drawing



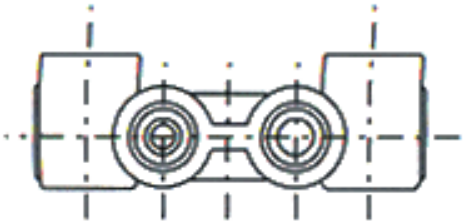
Junctions [For Flow unit/Control unit installation]

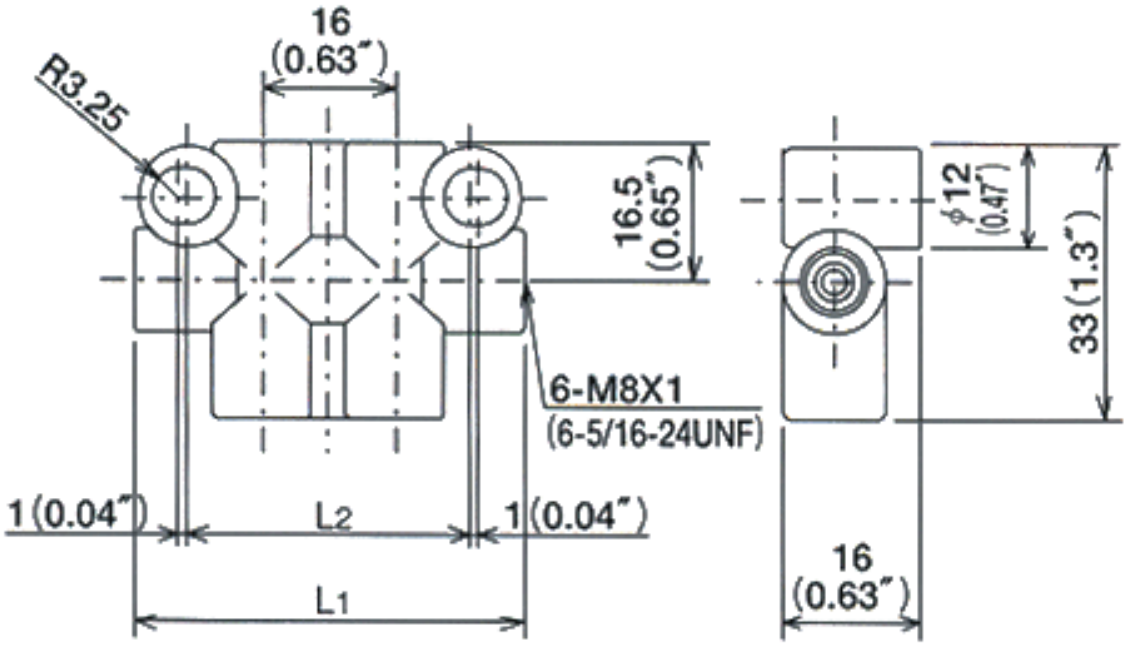
Part Number

Part Nunber		Model	Specifilcation	Size	
M8×1	5/16-24 UNF			L1	L2
106411	186411	PJ-6D	Double type for 4ports	47(1.85")	34(1.34")
106412	186412	PJ-8D	Double type for 6ports	63(2.48")	50(1.97")
106413	186413	PJ-10D	Double type for 8ports	79(3.11")	66(2.60")

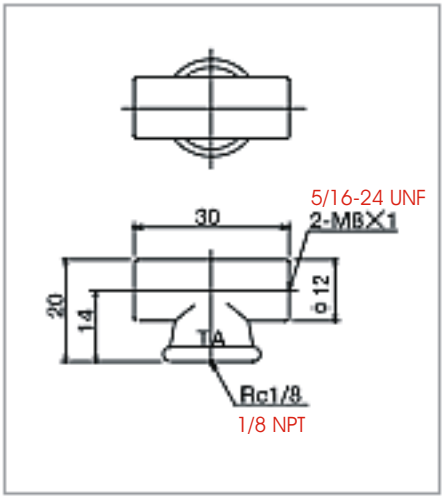
Part Nunber	Model	Specifilcation	Size	
			L1	L2
106414	PJ-12D	Double type for 10ports	82(3.23")	94(3.70")
106415	PJ-14D	Double type for 12ports	98(3.86")	110(4.33")
106416	PJ-16D	Double type for 14ports	114(4.49")	126(4.96")

Dimensional drawing





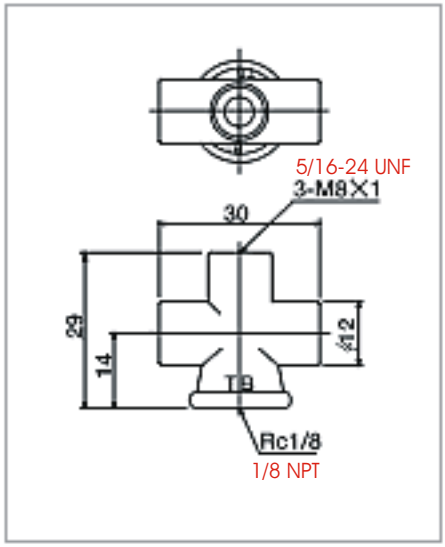
Junctions header



Model	Part Number
TA	106431

Material:Zinc Die Casting (ZDC)

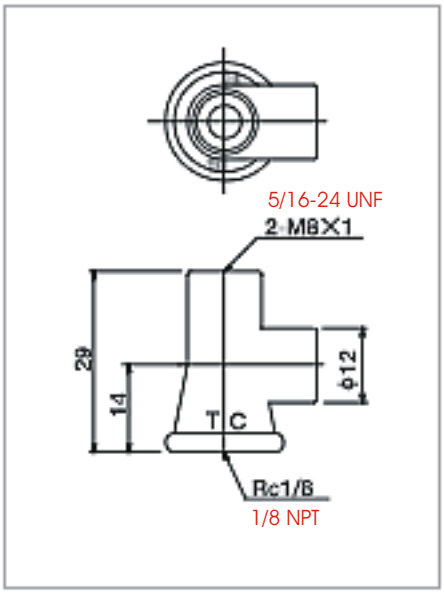
Model	Part Number
TA	186431



Model	Part Number
TB	106432

Material:Zinc Die Casting (ZDC)

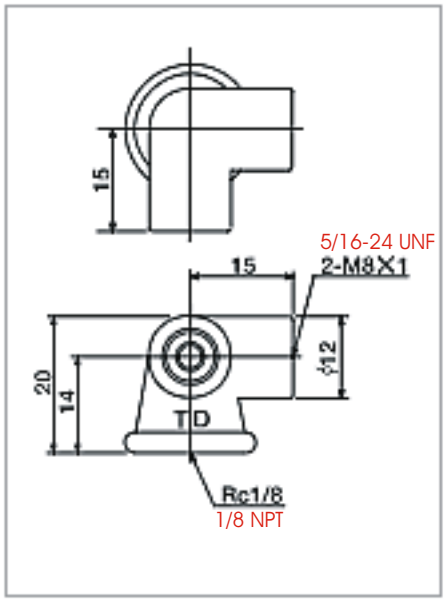
Model	Part Number
TB	186432



Model	Part Number
TC	106433

Material:Zinc Die Casting (ZDC)

Model	Part Number
TC	186433

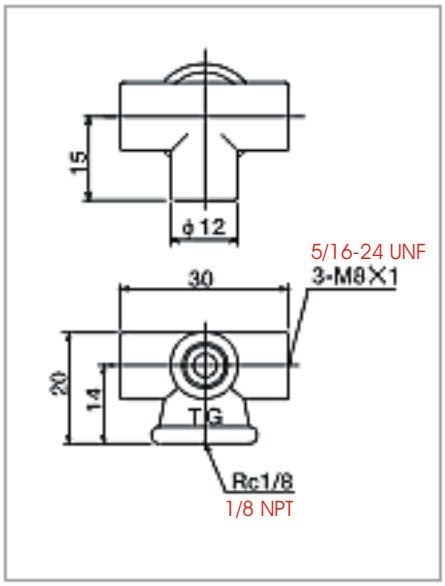


Model	Part Number
TD	106434

Material:Zinc Die Casting (ZDC)

Model	Part Number
TD	186434

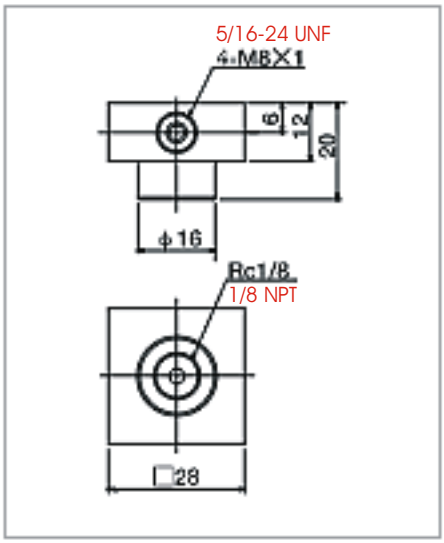
Junctions header



Model	Part Number
TG	106435

Material:Zinc Die Casting (ZDC)

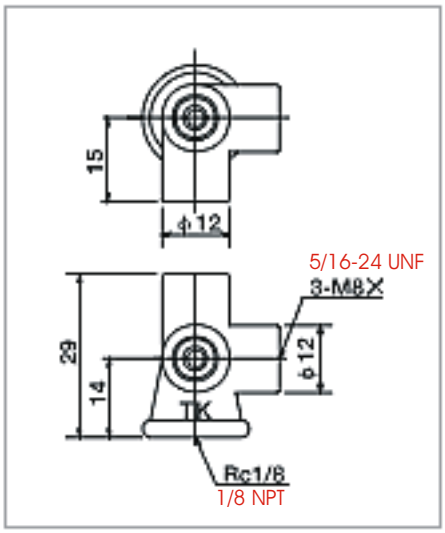
Model	Part Number
TG	186435



Model	Part Number
TH	106436

Material: Brass(C3604)

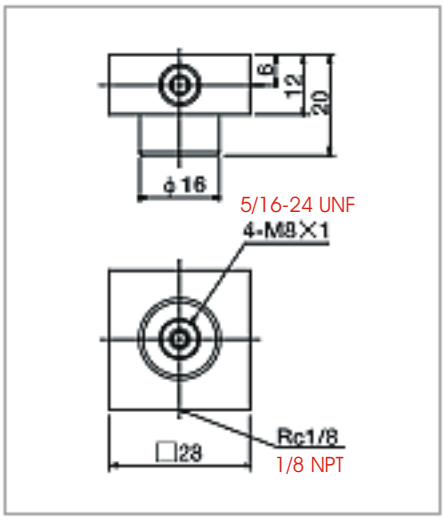
Model	Part Number
TH	186436



Model	Part Number
TK	106437

Material:Zinc Die Casting (ZDC)

Model	Part Number
TK	186437



Model	Part Number
TL	106438

Material:Brass(C3604)

Model	Part Number
TL	186438

Filter

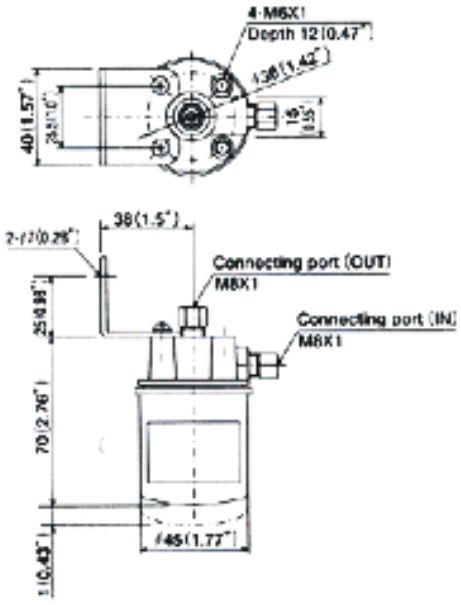
In-Line oil filters help eliminate clogged flow units and MO-valves

Part Number

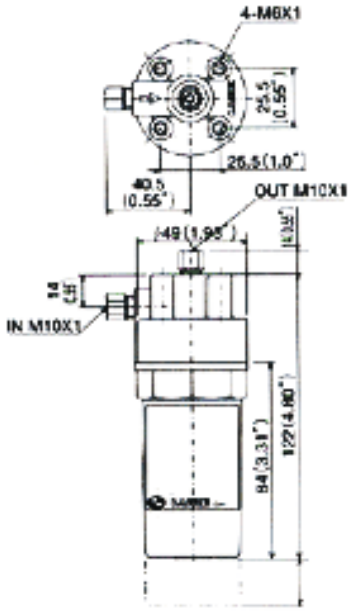
Part Number	Model	Connecting port		Normal working pressure	Pressure loss		Filtration rating
		M8	M10				
189311	FX-1	O		1.0 MPa (10kgf/cm^2)	O		40u
189314			O		O		25u
209343	F-3D		O	Under2.9 MPa (30kgf/cm^2)	O		125u
209344			O		O		40u
209346			O			O	5u

Part Number	Model	Filtration rating
259304	For FX-1	40u
259308		25u
259311	For F-3D	125u
259312		40u
259313		10u
259314		5u

Dimensional drawing



●FX-1(109311)



●F-3D(206308)

●F-3D/filter element

®Pressure gauge

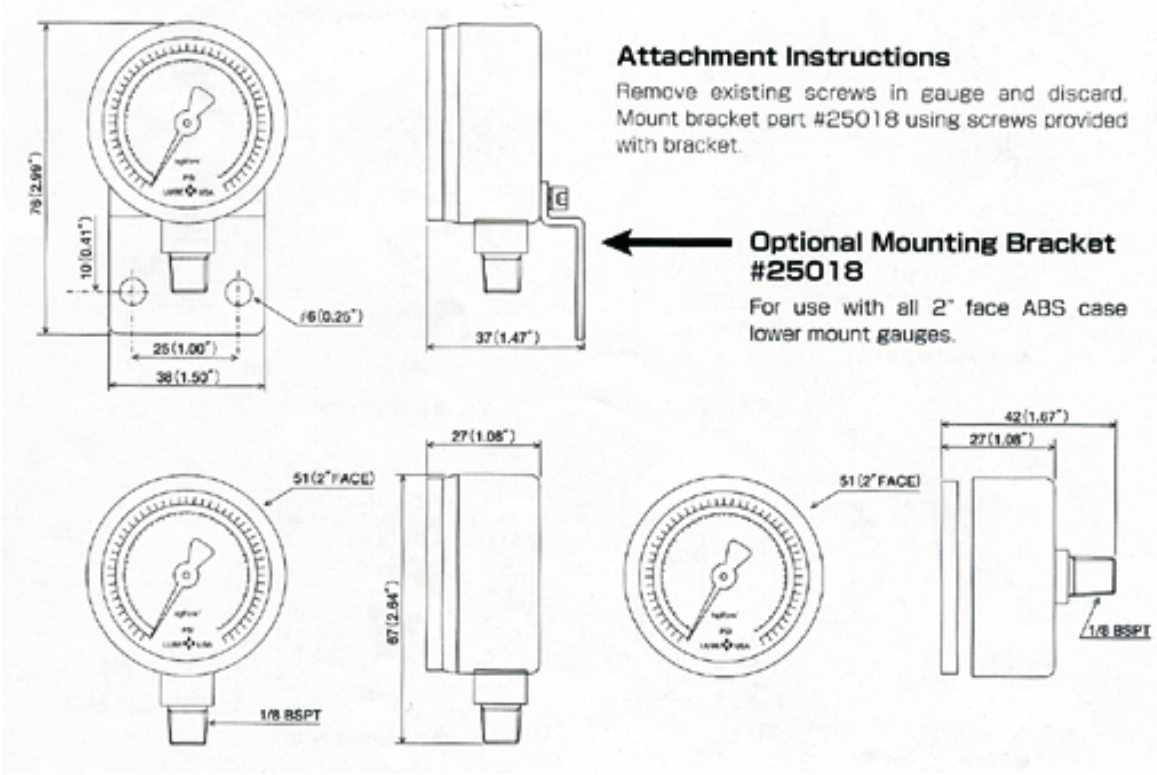
Part Number

Part Number	Pressure range		Thread
25012	0-100 PSI	0-7kgf/cm^2	1/8 BSPT L.M. R1/8
25013	0-200 PSI	0-14kgf/cm^2	1/8 BSPT L.M. R1/8
25014	0-600 PSI	0-43kgf/cm^2	1/8 BSPT L.M. R1/8
25015	0-600 PSI	0-43kgf/cm^2	1/8 BSPT C.B.M.. R1/8
35011	0-100 PSI	0-7kgf/cm^2	C.B.M. 1/8 NTP
35012	0-100 PSI	0-7kgf/cm^2	L.M. 1/8 NTP
35010	0-60 PSI	0-7kgf/cm^2	L.M. 1/8 NTP

L.M.:Lower mount connection

C.B.M:Center back mount connection

Dimensional drawing



Oil level switch

Used for oil level detection

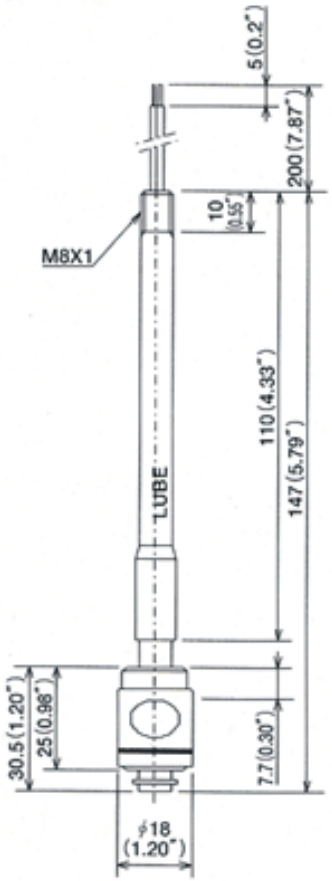
Specification

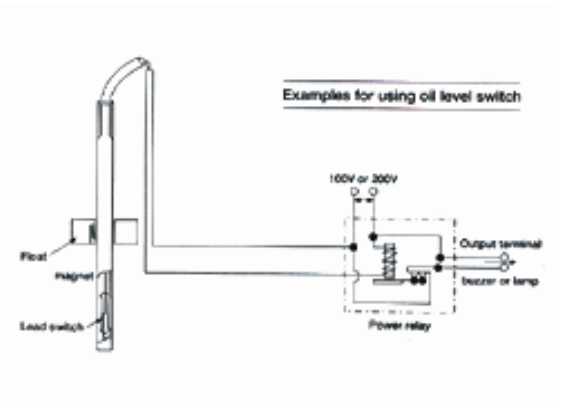
Contact specification	Maximum working voltage AC200V, DC200V Contact capacity 30W or 0.5A(resistance load)
Working condition	Contact type : N.O. (Normally open) Working temperature range -10℃~+80℃ / +14℉+176℉ (limited to liquid nonfreezing condition) Working liquid specific gravity : over 0.7 Max. pressure : 0.1MPa(10kgf/cm^2)145psi Object liquid : general industrial lubricant (oil)

Part Number

Part Number	Model	Contact type		Specification
		N.O.	N.C.	
109704	W-105	O		Without terminal box Cord length 20cm
109705			O	
109706	W-105-B	O		With terminal box
109707			O	

Dimensional drawing





Compression parts

Used for connecting tubing to junctions,adapters and metering valves

Dimensional drawing

Part Number

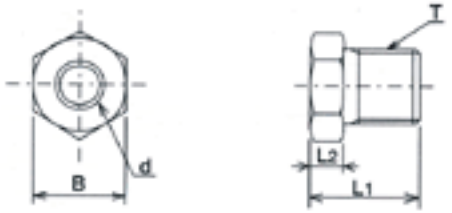
Compression nut

Part Number	Model	Tubing O.D.		T	d1	d2	B
		φ4	φ6				
106251	CN-4	O		M8×1	φ4.2	φ10	HEX10
186251	CN-4	O		5/16-24	φ5/32	φ10	HEX10
206251	CN-6	-	O	M10×1	φ6.2	φ12	HEX12

Material : C3604

Compression parts

Dimensional drawing



Part Number

Compression bushing

Part Number	Model	Tubing O.D			T	d	L1	L2	B
		φ4	φ6	φ8					
106252	CB-4(10)	O			M8×1	φ4.2	11.6 (0.46")	4 (0.16")	HEX10
186252	CB-4	O			5/16-24	φ5/32	11.6 (0.46")	4 (0.16")	HEX10
106253	CB-4(8)	O			M8×1	φ4.2	11.6 (0.46")	4 (0.16")	HEX8
186253	CB-4	O			5/1 6-24	φ5/32	11.6 (0.46")	4 (0.16")	HEX8
206252	CB-6		O		M10×1	φ6.2	12.5 (0.49")	4 (0.16")	HEX10
207252	CB-8			O	M14×1.5	φ8.2	16 (0.63")	4.5 (0.18")	HEX14
166253	CB-4	O			M8×1	φ4.2	20 (0.79")	12 (0.47")	HEX8
166255	CB-6		O		M10×1	φ6.2	20 (0.79")	12 (0.47")	HEX10

Note : 166253 and 166255 are for braided tubing.

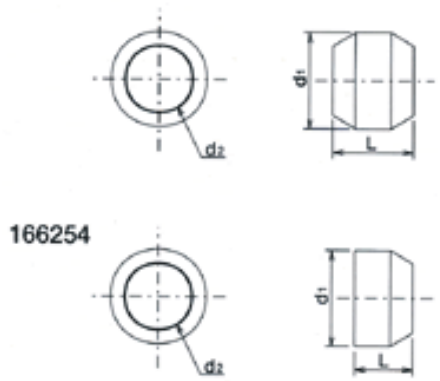
Material : C3604

Part Number	Model	Tubing O.D			T	d	L1	L2	B
		φ4	φ6	φ8					
106279	CB-4(8)	O			M8×1	φ4.2	11.6 (0.46")	4 (0.16")	HEX8
186268	CB-4(8)	O			5/16-24	φ4.2	11.6 (0.46")	4 (0.16")	HEX8

Material : SUS

Compression parts

Dimensional drawing



Part Number

Compression sleeve

Part Number	Model	Tubing O.D			d1	d2	L1
		φ4	φ6	φ8			
106254	CS-4	O			φ6	φ4.1	5(0.20")
206254	CS-6		O		φ8	φ6.1	6(0.24")
207254	CS-8			O	φ10	φ8.1	6.5(0.26")

Material : C3604

Part Number	Model	Tubing O.D			d1	d2	L1
		φ4	φ6	φ8			
106280	CS-4	O			φ6	φ4.1	5(0.20")

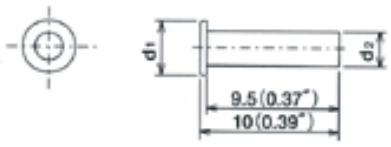
Material : SUS

Half sleeve

Part Number	Model	Tubing O.D			d1	d2	L1
		φ4	φ6	φ8			
166254	CS-4	O			φ4	φ4.1	4.5(0.18")

Material : C3604

Dimensional drawing



Tube insert

Part Number	Model	Tubing O.D			d1	d2
		φ4	φ6	φ8		
106271	TI-4	O			φ3.8	φ2.5
206271	TI-6		O		φ5.8	φ4
207271	TI-8			O	φ7.8	φ6

Material : C2680

Closure plugs/Sealing washers

Dimensional drawing

Part Number

Closure plug

Part Number	Model	L1	L2	T	B
106255	CP-4	16(0.63")	12(0.47")	M8×1	HEX8
186255	CP-4	16(0.63")	12(0.47")	5/16-24	HEX8
206255	CP-6	20(0.79")	15(0.59")	M10×1	HEX10
207255	CP-8	25(0.98")	17(0.67")	M14×1.5	HEX17

Material : C3604

Dimensional drawing

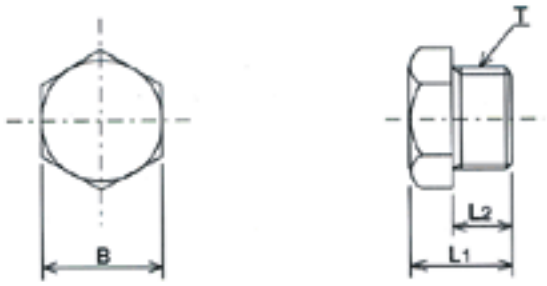
Part Number

Blanking plug

Part Number
540170

Closure plugs/Sealing washers

Dimensional drawing



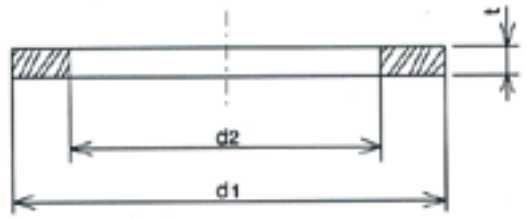
Part Number

Blanking plug

Part Number	Model	T	L1	L2	B
206275	BP-10	M10×1	10(0.39")	6(0.24")	12
206276	BP-12	M12×1	10(0.39")	6(0.24")	14
207276	BP-14	M14×1.5	13(0.51")	8(0.31")	17

Material : C3604

Dimensional drawing



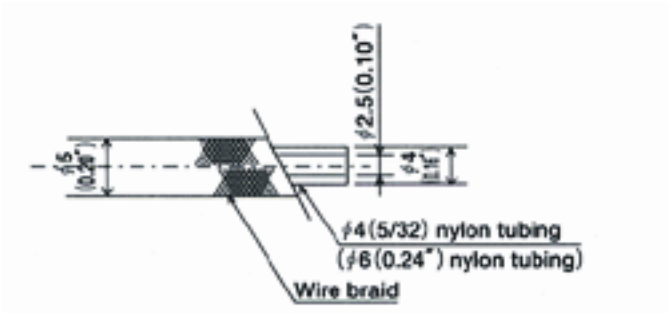
Part Number

Sealing washer

Part Number	Model	D1	D2	t	Thread size
207611	SW-10	φ14	φ10.1	1	M10×1
207612	SW-12	φ16	φ2.1	1.5	M12×1
207613	SW-14	φ18	φ14.1	1.5	M14×1.5

Material : C2600

Tubing



Part Number

Nylon tubing

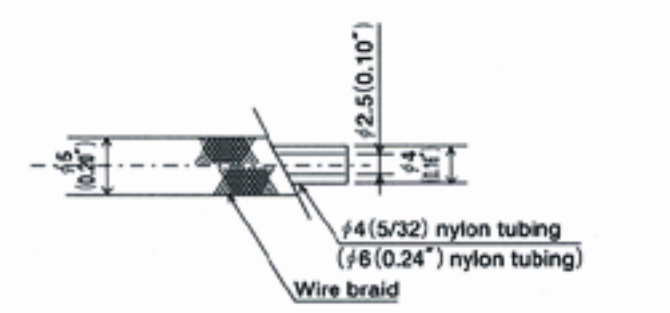
Part Number	Outer dia-meter	Inner dia-meter	Standard length	Working pressure	Burst Pressure	Working tempeature range	Minimum bending radius	Color
106801	φ4	φ2.5	100M (330F)	2.5MPa (25kgf/cm^2) 362psi	9.8MPa (100kgf/cm^2) 1,450psi	-20°C/-40°F ~+70°C/158°F	R12	Opaque white
106806	φ4	φ2.5		4.4MPa (45kgf/cm^2) 652psi	17.6MPa (180kgf/cm^2) 2,610psi		R16	
218005	φ6	φ4		2.2MPa (22kgf/cm^2) 319psi	8.6MPa (88kgf/cm^2) 1,276psi		R24	Opaque white
208006	φ6	φ4		3.7MPa (38kgf/cm^2) 551psi	15.2MPa (155kgf/cm^2) 2,247psi		R27	
218003	φ8	φ6		1.5MPa (15kgf/cm^2) 217psi	6.2MPa (63kgf/cm^2) 913psi		R48	

Material:nylon

Braided tubing

Part Number	Outer diameter	Standard length	Working pressure	Burst Pressure	Working tempeature range	Minumum bending radius	Surface treatment
106803	φ4	100M (330F)	2.5MPa (25kgf/cm^2) 362psi	9.8MPa (100kgf/cm^2) 1,450psi	-20°C/-40°F ~+70°C/158°	R16	EP-Fe/Zn
218007	φ6	100M (330F)	2.2MPa (22kgf/cm^2)319psi	8.6MPa (88kgf/cm^2) 1,276psi	-20°C/-40°F ~+70°C/158°	R27	EP-Fe/Zn

Tubing



Aluminium tubing

Part Number	Outer diameter	Inner diameter	Standard length	Tensile strength	Extension
106811	φ4	φ3	2M (65F)	6~10kgf/mm	41%
206811	φ6	φ4.4			

Material:JIS H4080A1050TD-0 (alminium drawn tube)

Copper Tubing

Part Number	Outer diameter	Inner diameter	Standard length	Working pressure	Tensile strength	Inner diameter
106821	φ4	φ3	5M (16F)	6.9MPa (70kgf/cm^2) 1,015psi	20kgf/mm	40%
218015	φ6	φ4.4		7.9MPa (80kgf/cm^2) 1,160psi	21kgf/mm	
206823	φ8	φ6		5.9MPa (60kgf/cm^2) 870psi	23kgf/mm	

Material:JIS H3300C1220T-0L (phosphor deoxydized copper)

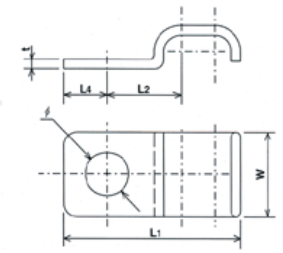
Steel tubing

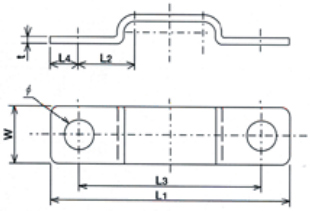
Part Number	Outer dia-meter	Inner dia-meter	Standard length	Standard length	Tensile strength	Extension	Surface treatment
218011	φ4	φ2.6	2M (6.5F)	24.5MPa (250kgf/cm^2) 3,625psi	Over 30kgf /mm	25%	Ep-Fe/Zn 8/CM
218012	φ6	φ4.6					
206836	φ8	φ6.6		19.6MPa (200kgf/cm^2) 2,900psi			
206837	φ10	φ8.6					

Material:JIS G3141 (Equvalent to SPCC)

Tube clips

Dimensional drawing





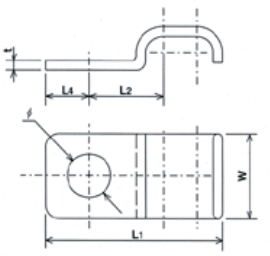
Part Number

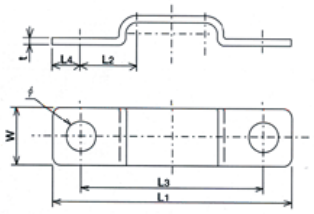
Straight tube end

Part Number	Model	Number and O.D. of tubing		L1	L2	L3	L4	t	W	φ
106301	PC-4-1	φ4×1	One side fixed	17 (0.67")	9 (0.35")	-	5 (0.20")	1.2	10	5.2
106302	PC-4-2	φ4×2		21 (0.87")	9 (0.35")	-				
106303	PC-4-3	φ4×3		25 (0.98")	9 (0.35")	-				
106304	PC-4-4	φ4×4	Two side fixed	42 (1.65")	10 (0.39")	32 (1.26")				
106305	PC-4-5	φ4×5		46 (1.81")	10 (0.39")	36 (1.42")				
106306	PC-4-6	φ4×6		50 (1.97")	10 (0.39")	40 (1.57")				
106311	PC-4-1L	φ4×1	One side fixed	16 (0.63")	9 (0.35")	-				6.2
106312	PC-4-2L	φ4×2		20 (0.79")	9 (0.35")	-				
106314	PC-4-4L	φ4×4	Two side fixed	42 (1.65")	10 (0.39")	32 (1.26")				
106315	PC-4-5L	φ4×5		46 (1.81")	10 (0.39")	36 (1.42")				
106316	PC-4-6L	φ4×6		50 (1.97")	10 (0.39")	40 (1.57")				
106321	PC-4-4-8.5	φ4×1	One side fixed	22 (0.87")	11 (0.43")	-	8 (0.31")		15	8.5
106322	PC-4-2-8.5	φ4×2		26.2 (1.03")	11 (0.43")	-				
106323	PC-4-3-8.5	φ4×3		30.4 (1.20")	11.2 (0.44")	-				
106324	PC-4-4-8.5	φ4×4	Two side fixed	50 (1.97")		34 (1.34")				
106325	PC-4-5-8.5	φ4×5	One side fixed	38.4 (1.51")	11.2 (0.44")	-				

Tube clips

Dimensional drawing





Part Number	Model	Number and O.D. of tubing		L1	L2	L3	L4	t	W	φ
206301	PC-6-1	φ6×1	One side fixed	20 (0.79")	10 (0.39")	-	5 (0.20")	1.2	10	5.2
206302	PC-6-2	φ6×2		25 (0.98")	10 (0.39")	-				
206303	PC-6-3	φ6×3		31 (1.22")	10 (0.39")	-				
206311	PC-6-1L	φ6×1		19 (0.75")	10 (0.39")	-				6.2
2063012	PC-6-2L	φ6×2		24 (0.94")	10 (0.39")	-				
206313	PC-6-3L	φ6×3		30 (1.18")	10 (0.39")	-				
206321	PC-6-1-8.5	φ6×1		24.2 (0.95")	12 (0.47")	-	8 (0.31")		15	8.5
206322	PC-6-2-8.5	φ6×2		30.4 (1.20")	12 (0.47")	-				

Part Number	301Model	Number and O.D. of tubing		L1	L2	L3	L4	t	W	φ
207301	PC-8-1	φ8×1	One side fixed	23.7 (0.93")	12 (0.47")	-	5 (0.20")	1.6	11.5	6.4
207302	PC-8-2	φ8×2		31.8 (1.25")	12 (0.47")	-				
208301	PC-10-3	φ10×3		29.2 (1.15")	14 (0.57")	-	8 (0.31")	1.2	15.4	6.2

Flexible hose

For low pressure

Dimensional drawing

Part Number		L(mm)
φ4	φ6	
106701	206701	125
106702	206702	150
106731	206703	175
106704	206704	200
106705	206705	225
106706	206706	250
106707	206707	300
106708	206708	350
106709	206709	400
106710	206710	450
106711	206711	500
106712	206712	6550
106713	206712	600
106770	206736	625
106771	206735	650
106714	206714	675
106772	206717	700
106715	206715	750
106773	206718	800
106716	206716	825

Flexible hose

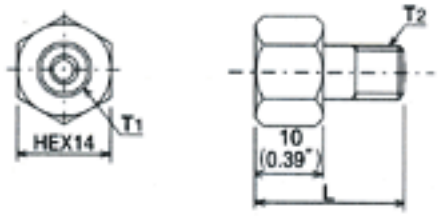
For low pressure

106717	206719	850
106718	206720	900
106764	206721	950
106719	206722	1000
106774	206723	1100
106775	206724	1200
106776	206725	1300
106765	206726	1400
106766	206727	1500
106767	206728	1600
106768	206729	1700
106777	206730	1800
106769	206731	1900
106778	206732	2000
166783	206737	2500
166794	206734	3000
166795	203738	4000
166796	203739	5000

Tubing O.D.	φ4	φ6
Working pressure	2.9MPa(30kgf/cm2)435psi	3.9MPa(40kgf/cm2)580psi
Working temperature range	-20□°C+90～°C(-4°F+194°F)	
Minimum bending radius	R40	R120
d1	φ4	φ6
d2	φ8	φ10
d3	φ10	φ13.5

Connectors

Dimensional drawing



Part Number

Straight connector

Part Number	L	T1	T2
106141	20(0.79")	Rc 1/8	R 1/8
186141	20(0.79")	1/8 NPT	1/8 NPT
106142	25(0.98")	Rc 1/8	R 1/8
186142	25(0.98")	1/8 NPT	1/8 NPT
©106143	30(1.18")	Rc 1/8	R 1/8
186143	30(1.18")	1/8 NPT	1/8 NPT
©106144	40(1.57")	Rc 1/8	R 1/8
©106145	50(1.97")	Rc 1/8	R 1/8
©106146	60(2.36")	Rc 1/8	R 1/8
©206141	20(0.79")	Rc 1/8	R 1/4

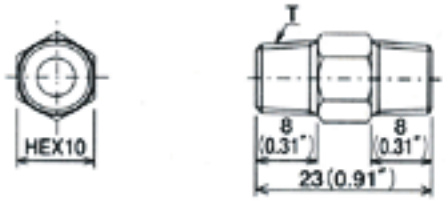
Dimensional drawing

Part Number

Part Number
106147

Connectors

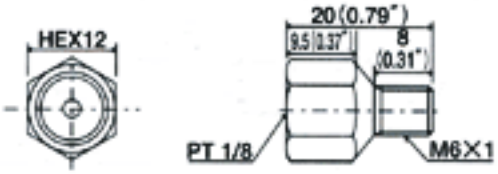
Dimensional drawing



Part Number

Part Number	T
106151	2-R1/8
186151	2-1/8NPT

Dimensional drawing



PAGE TOP

Part Number

Part Number
106154

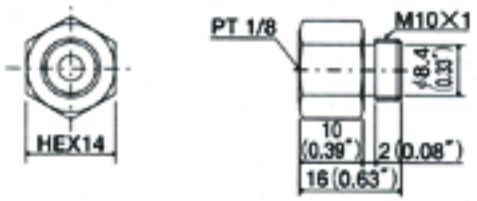
Dimensional drawing

Part Number

Part Number	T1	T2
106174	Rc1/8	M8×1
106231	M8×1	M8×1
186231	5/16-24	5/16-24

Connectors

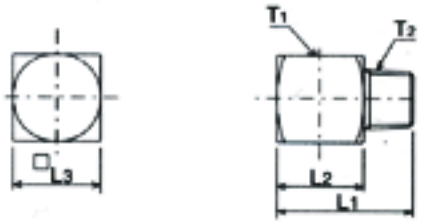
Dimensional drawing



Part Number

Part Number
106177

Dimensional drawing



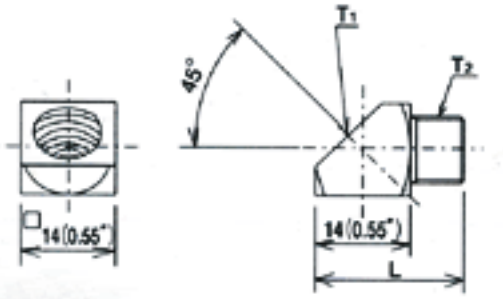
Part Number

Elbow connector

Part Number	L1	L2	L3	T1	T2
106101	22(0.87")	14(0.55")	14(0.55")	Rc 1/8	R 1/8
186101	22(0.87")	14(0.55")	14(0.55")	1/8 NPT	1/8 NPT
106102	25(0.98")	14(0.55")	14(0.55")	Rc 1/8	R 1/8
186102	25(0.98")	14(0.55")	14(0.55")	1/8 NPT	1/8 NPT
106103	30(1.18")	14(0.55")	14(0.55")	Rc 1/8	R 1/8
106104	40(1.57")	14(0.55")	14(0.55")	Rc 1/8	R 1/8
106105	50(1.97")	14(0.55")	14(0.55")	Rc 1/8	R 1/8
106106	60(2.36")	14(0.55")	14(0.55")	Rc 1/8	R 1/8
106107	20(0.79")	12(0.47")	12(0.47")	Rc 1/8	R 1/8

Connectors

Dimensional drawing

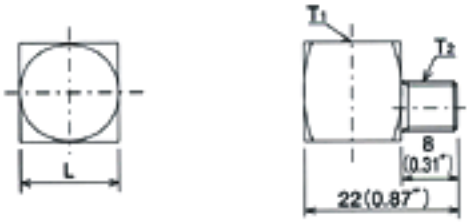


Part Number

Part number	L	T1	T2
106121	22(0.87")	Rc 1/8	R 1/8
186121	22(0.87")	1/8 NPT	1/8 NPT
106122	25(0.98")	Rc 1/8	R 1/8
186122	25(0.98")	1/8 NPT	1/8 NPT
106123	30(1.18")	Rc 1/8	R 1/8
106124	40(1.57")	Rc 1/8	R 1/8
106125	50(1.97")	Rc 1/8	R 1/8
106126	60(2.36")	Rc 1/8	R 1/8

PAGE TOP

Dimensional drawing

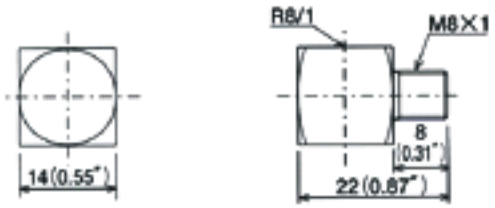


Part Number

Part Number	L	T1	T2
106181	14(0.55")	R1/8	M6×1
920730	12(0.47")	1/2-28	1/2-28

Connectors

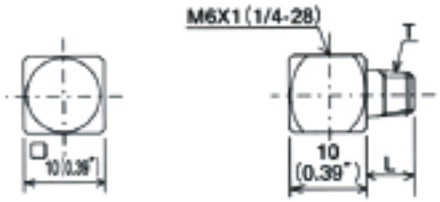
Dimensional drawing



Part Number

Part Number
106182

Dimensional drawing

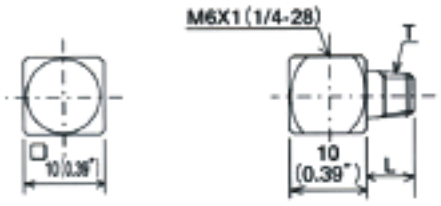


Part Number

Part Number	L	T
106183	6(0.24")	M5×0.8
106184	6(0.24")	M6×0.75
106185	6(0.24")	M6×1
106189	6(0.24")	M7×1
106192	8(0.31")	M6×0.75
166039	14(0.55")	M6×0.75
186032	8.6(0.34")	1/4-28

Connectors

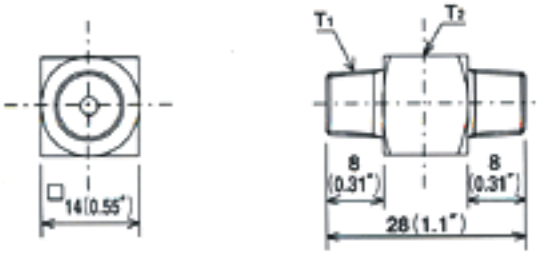
Dimensional drawing



Part Number

Part Number	T	d
106186	M6×1	5
106187	M6×1	6
106188	M6×1	7

Dimensional drawing

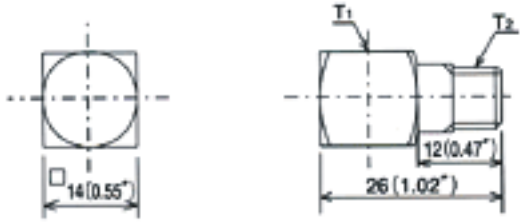


Part Number

Part Number	T1	T2
106161	2-R1/8	Rc1/8
186161	2-11/8 NPT	1/8 NPT

Connectors

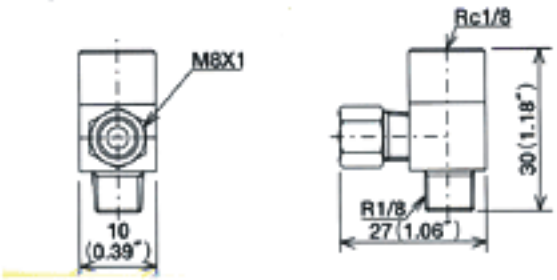
Dimensional drawing



Part Number

Part Number	T1	T2
106171	2-Rc 1/8	R 1/8
186171	2-1/8 NPT	1/8 NPT

Dimensional drawing



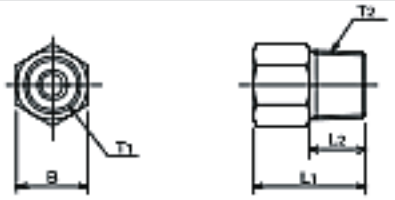
Part Number

Part Number
W619322

Adapters

Straight adapter

Dimensional drawing

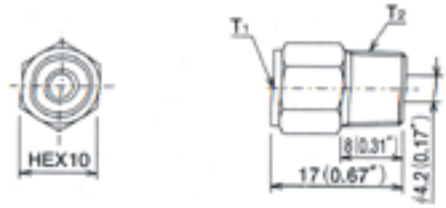


Part Number

Part Number	Tubing O.D			L1	L1	T1	T2	B
	φ4	φ6	φ8					
106001	O			16(0.63")	8(0.31")	M8×1	R1/8	HEX10
186001	O			16(0.63")	8(0.31")	5/16-24	1/8NPT	HEX10
106002	O			20(0.79")	12(0.47")	M8×1	R1/8	HEX10
186002	O			20(0.79")	8(0.31")	5/16-24	1/8NPT	HEX10
106003	O			25(0.98")	17(0.67")	M8×1	R1/8	HEX10
106004	O			30(1.18")	22(0.87")	M8×1	R1/8	HEX10
106005	O			35(1.38")	27(1.06")	M8×1	R1/8	HEX10
166004	O			22(0.87")	10(0.40")	M8×1	I/4-28UNF	HEX10
166142				20(0.79")	10(0.40")	1/8NPT	R1/8	HEX14
206001		O		20(0.79")	8(0.31")	M10×1	R1/8	HEX12
207001			O	25(0.98")	10(0.40")	M14×1.5	R1/4	HEX17

Adapters

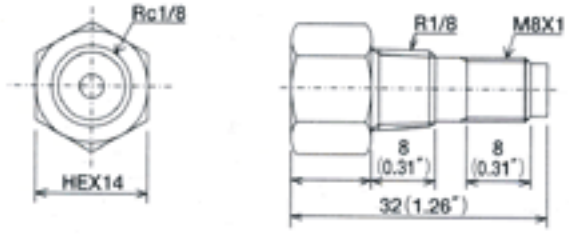
Dimensional drawing



Part Number

PartNumber	Tubing O.D	T1	T2
106011	φ4	M8×1	R1/8
186011	φ4	5/16-24	1/8NPT

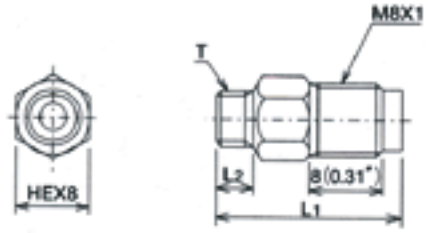
Dimensional drawing



Part Number

PartNumber	Tubing O.D
106061	φ4

Dimensional drawing

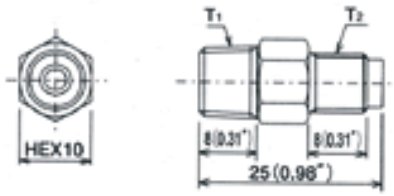


Part Number

PartNumber	Tubing O.D&φ4	L1	L2	T
106062	O	20(0.79")	4(0.16")	M6□×1
106064	O	30(1.18")	14(0.55")	M6×0.75
106065	O	23(0.91")	7(0.28")	M6×0.75

Adapters

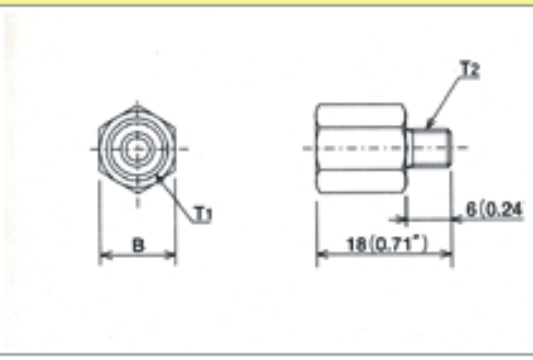
Dimensional drawing



Part Number

PartNumber	Tubing O.DΦ	T1	T2
106081	φ4	R1/8	M8□×1
186081	φ4	1/8NPT	5/16-24

Dimensional drawing

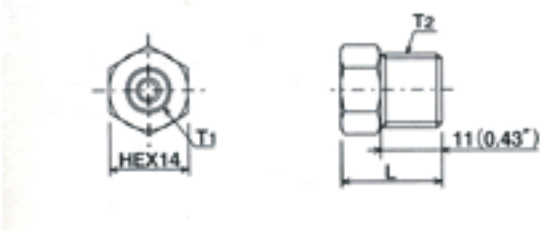


Part Number

Part Number	Tubing O.D.		T1	T2	B
	φ4	φ6			
106082	O		M8×1	M5□×0.8	HEX10
106083	O		M8×1	M5□×0.9	HEX10
106084	O		M8×1	M6×1	HEX10
106085	O		M8×1	M6×0.75	HEX10
106087	O		M8×1	M7×1	HEX10
106088	O		M8×1	M8×1	HEX10
106089	O		M8×1	M10×1	HEX12
106094		O	M10×1	M6×1	HEX12
106099	O		M8×1	1/4-28UNF	HEX10
106353		O	M10×1	1/4-28UNF	HEX12
166144	O		R1/8	M6×1	HEX12
010014	O		5/16-24	1/4-28	HEX3/8
920749	O		R1/8	1/4-28	HEX12

Adapters

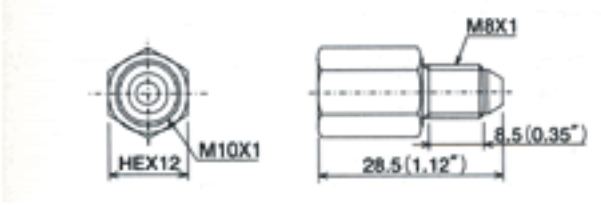
Dimensional drawing



Part Number

Part Number	Tubing O.D.		T1	T2	L
	φ4	φ6			
106091	O		M8×1	R1/4	18(0.71")
206081		O	M10×1	R1/4	20(0.79")

Dimensional drawing



Part Number

Part Number	Tubing O.D.
106095	φ6

Dimensional drawing

Part Number

Part Number	Tubing O.D.	T	D
	φ6		
106096	O	M8×1	φ5
106097	O	M8×1	φ6.2
106098	O	M8×1	φ6.85

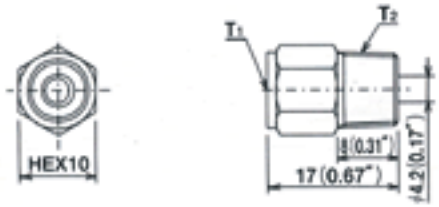
Adapters

Dimensional drawing

Part Number

Part Number	Tubing O.D.	T	D
	φ6		
106096	O	M8×1	φ5
106097	O	M8×1	φ6.2
106098	O	M8×1	φ6.85

Dimensional drawing



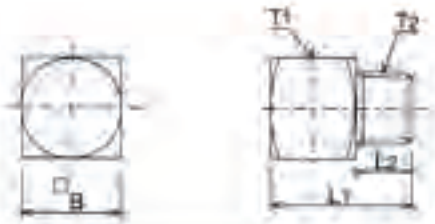
Part Number

Part Number	Tubing O.D.		T	D	L
	φ4	φ6			
206012	O		M8×1	φ3	14 (0.55")
206011		O	M10×1	φ4	16 (0.63")

Adapters

Elbow adaptert-adapter

Dimensional drawing

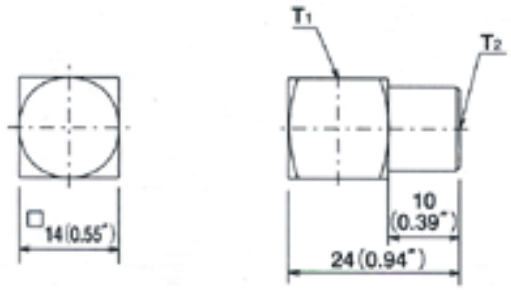


Part Number

Part Number	Tubing O.D.		L1	L2	T1	T2	B
	φ4	φ6					
106021	O		20(0.79")	8(0.31")	M8×1	R1/8	14
106022	O		25(0.98")	13(0.51")	M8×1	R1/8	14
℃106023	O		30(1.18")	18(0.71")	M8×1	R1/8	14
℃106024	O		40(1.57")	28(1.10")	M8×1	R1/8	14
℃106025	O		50(1.97")	38(1.50")	M8×1	R1/8	14
℃106026	O		60(2.36")	48(1.89")	M8×1	R1/8	14
186021	O		20(0.79")	8(0.31")	5/16-24	1/8NPT	14
186022	O		25(0.98")	13(0.51")	5/16-24	1/8NPT	14
℃206091	O		25(0.98")	11(0.43")	M8×1	R1/4	14
206092		O	22(0.87")	8(0.31")	M10×1	R1/8	16

Adapters

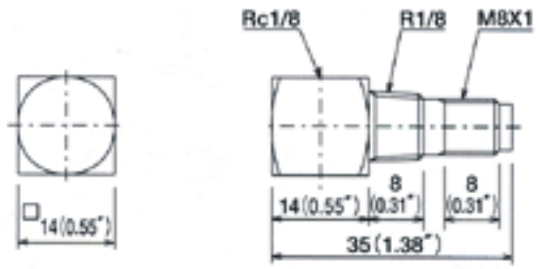
Dimensional drawing



Part Number

Part Number	Tubing O.D.	T1	T2
✆106031	φ4	Rc1/8	M8×1
186031	φ4	1/8NPT	5/16-24UNF

Dimensional drawing

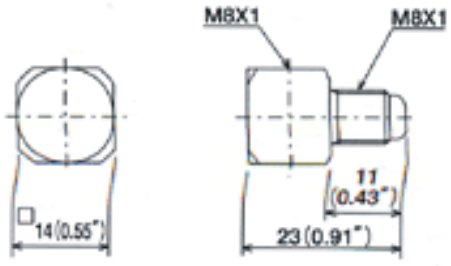


Part Number

Part Number	Tubing O.D.
106071	φ4

Note:Call for other dimensions.

Dimensional drawing

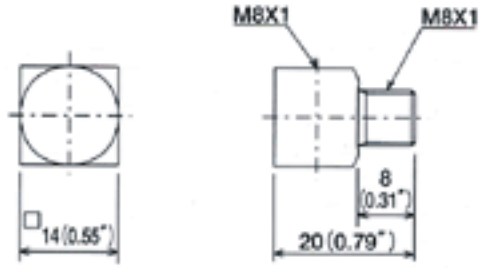


Part Number

Part Number	Tubing O.D.
106028	φ4

Adapters

Dimensional drawing

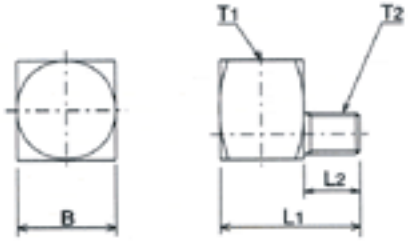


Part Number

Part Number	Tubing O.D.
106029	φ4

PAGE TOP

Dimensional drawing

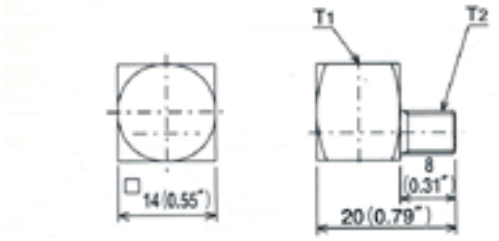


Part Number

Part Number	Material	L1	L2	T1	T2	B
106074	SS330B	20(0.79")	8(0.31")	M8×1	M6×1	14
166036	SUM-21	20(0.79")	8(0.31")	M8×1	1/4-28UNF	14
106033	C3604	20(0.79")	8(0.31")	M8×1	M8×1.25	14
166035	C3604	22(0.87")	8(0.31")	M10×1	M10×1	16
166040	C3604	22(0.87")	8(0.31")	M10×1	1/4-28UNF	16

Adapters

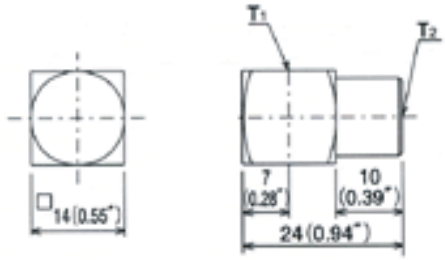
Dimensional drawing



Part Number

Part Number	Tubing O.D.	T1	T2
106075	O	M8×1	M6×0.75
106076	O	M8×1	M6×1

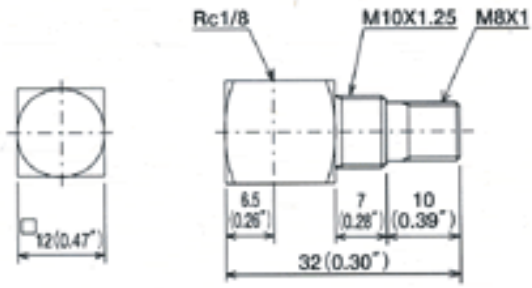
Dimensional drawing



Part Number

Part Number	T1	T2
106041	2-Rc1/8	M8×1
186041	2-1/8NPT	5/16-24

Dimensional drawing

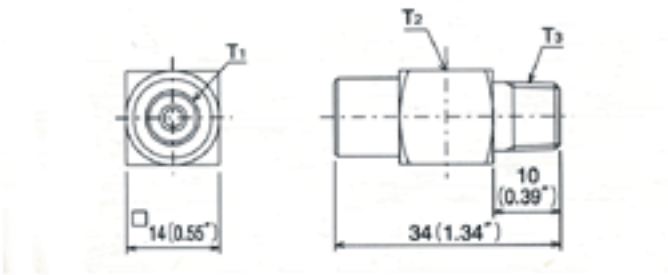


Part Number

Part Number
106049

Adapters

Dimensional drawing



Part Number

Part Number	T1	T2	T3
106051	M8×1	Rc1/8	Rc1/8
186051	5/16-24UNF	1/8NPT	1/8NPT

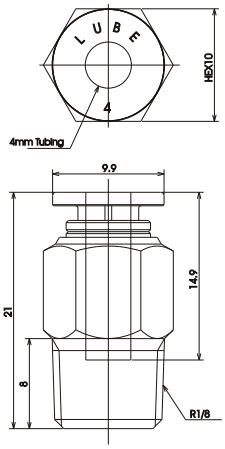
Push to Connect Fittings

Push-to-connect Fitting (Straight)

Model	Part Number	Tubing O.D. (φ)	L1(φ)	L2(φ)	B
KBC4-01	209503	4mm	23	21	10
KBC6-01	209513	6mm	23	21	10

Material: The tubing that can be used is nylon tubing.

Drawing

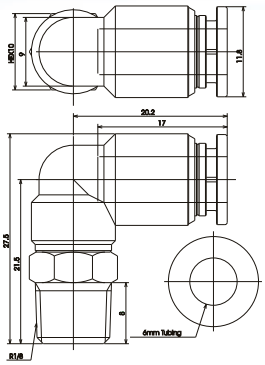


Push-to-connect Fitting (Elbow)

Model	Part Number	Tubing O.D. (φ)	B
KBL4-01	209508	4mm	11.8
KBL6-01	209518	6mm	11.8

Material: The tubing that can be used is nylon tubing.

Drawing



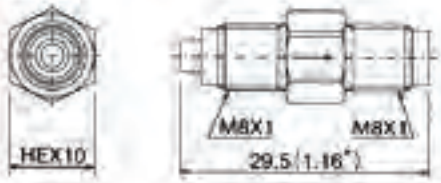
Check valves/Swivel elbow/Banjo elbow

Dimensional drawing

●Check valve

109407

109415



109416

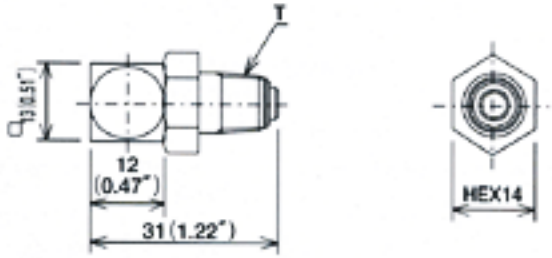
Part Number

Part Nunber	Model	Operating puressure
109407	HSA	0.034MPa (0.35kgf/cm2)
109415	HJB	0.034MPa (0.35kgf/cm2)
109416	HTU	0.016MPa (0.16kgf/cm2)

Check valves/Swivel elbow/Banjo elbow

Dimensional drawing

●Swivel elbow



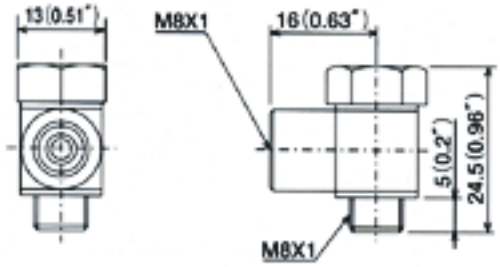
Part Number

Part Number	Model	Operating puressure
109412	100rpm/MAX	R 1/8
189402	100rpm/MAX	1/8NPT

PAGE TOP

Dimensional drawing

●Banjo elbow

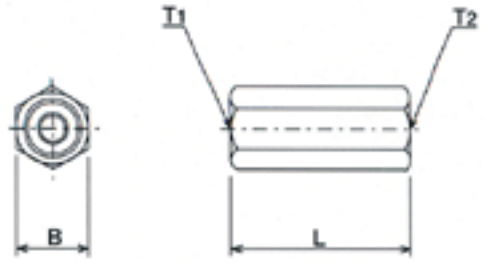


Part Number

Part Number
106027

Couplers/Unions

Dimensional drawing

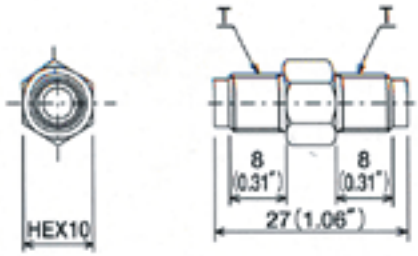


Part Number

Part Number	Tubing O.D.	T1	T1	L	B
106201	φ4×φ4	M8×1.0	M8×1.0	25(0.98")	HEX10
186201	φ4	5/16-24	5/16-24	25(0.98")	HEX10
106202	φ4×φ6	M8×1.0	M8×1.0	27(1.06")	HEX12
106291	φ4	M8×1.0	Rc 1/8	25(0.98")	HEX14
106292	φ6×φ6	M10×1.0	M10×1.0	29(1.14")	HEX14
106293	φ6	M10×1.0	Rc 1/8	25(0.98")	HEX14
106294	-	Rc 1/8	Rc 1/8	25(0.98")	HEX14
207201	φ8×φ8	M14×1.5	M14×1.5	40(1.57")	HEX17
207202	-	Rc 3/8	Rc 1/8	25(0.98")	HEX21

Material:C3604

Dimensional drawing



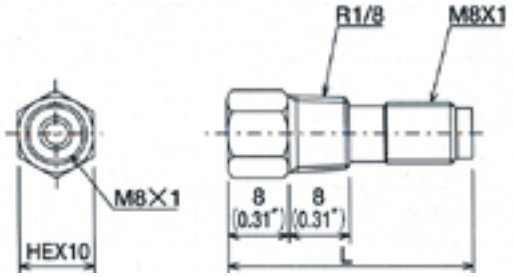
Part Number

Part Number	Tubing O.D.	T
106211	φ4	2-M8×1
186211	5/32"	2-5-16-24 UNF

Material:C3604

Couplers/Unions

Dimensional drawing

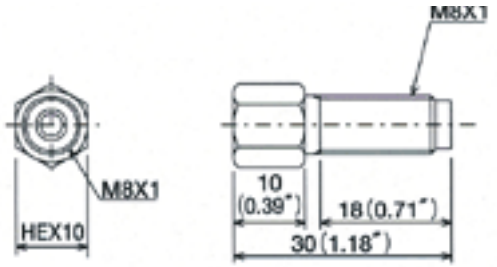


Part Number

Part Number	Ttbing O.D.	L
106221	φ4	32(1.26")
106222	φ4	40(1.57")

Material:C3604

Dimensional drawing

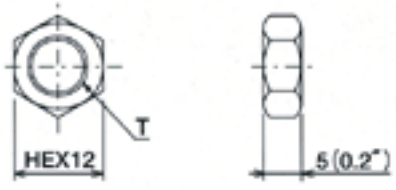


Part Number

Part Number	Tubing O.D.
106231	φ4

Material:C3604

Dimensional drawing



Part Number

Part Number	T
106232	M8×1
186234	5/16-24 UNF

Material:SS400

Drive bushing/Barb fittings

Dimensional drawing

Part Number

Part Number	Tubing O.D.	d1	d2	B
106257	φ4	φ4.7	φ4.5	6
106256	φ4	φ6	φ6	8
106258	φ4	φ7	φ6.8	8

Dimensional drawing

Part Number

Straight tube end

Part Nunber	Specification	T	L	B
106931	Threaded type	M4×0.75	16(0.63")	6
106933		M5×0.8	16(0.63")	6
◐106934		M5×0.9	16(0.63")	6
◐106935		M6×0.75	16(0.63")	8
106936		M6×1	16(0.63")	8
◐106937		M8×1.25	16(0.63")	9

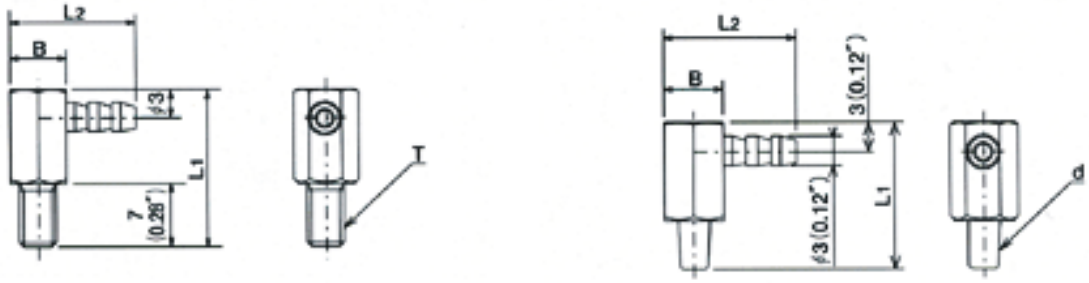
Drive bushing/Barb fittings

Dimensional drawing

Part Nunber	Specification	d	L	B
106921	Driving type	φ3	16(0.63")	6
106923		φ4	16(0.63")	6
106924		φ4.5	16(0.63")	7
106925		φ5	16(0.63")	6
106926		φ5.5	16(0.63")	8
106927		φ6	16(0.63")	7
106928		φ7	16(0.63")	9
106929		φ8	16(0.63")	10
106930		φ6.5	16(0.63")	8
106931		0.125	16(0.63")	6

Drive bushing/Barb fittings

Dimensional drawing



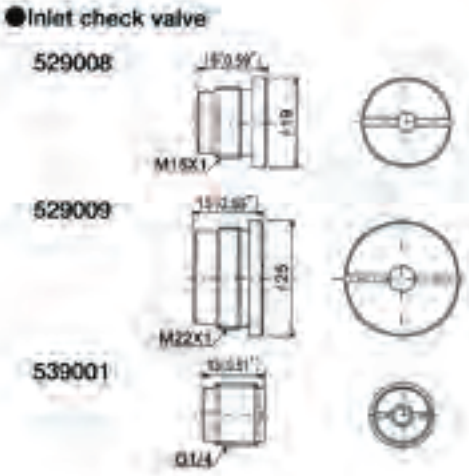
Part Number

Part Number	Specification	T	L1	L2	B
106911	Threaded type	M4	17(0.98")	13.5(0.53")	6
106912		M4.5	17(0.98")	13.5(0.53")	6
106913		M5×0.8	17(0.98")	15(0.59")	8
106914		M5×0.9	17(0.98")	13.5(0.53")	6
106915		M6×0.75	17(0.98")	15(0.59")	8
106916		M6	17(0.98")	15(0.59")	8
106917		M8	17(0.98")	16(0.63")	9
106954		M4×0.75	15(0.59")	13(0.51")	6
106955		M4.5×0.7	15(0.59")	13(0.51")	6
106956		M5×0.8	15(0.59")	15(0.59")	8

Part Number	Specification	d	L1	L2	B
106901	Driving type	φ3	15(0.59")	13.5(0.53")	6
106902		φ3.5	15(0.59")	13.5(0.53")	6
©106903		φ4	15(0.59")	13.5(0.53")	6
©106904		φ4.5	15(0.59")	13.5(0.53")	6
©106905		φ5	14(0.55")	13.5(0.53")	6
©106907		φ6	15(0.59")	15(0.59")	8
©106908		φ3	15(0.59")	15(0.59")	10
©106909		φ8	14(0.55")	17(0.98")	8
106910		φ6.5	15(0.59")	15(0.59")	8

Replacement parts/Brush

Dimensional drawing



Part Number

Part Nunber	Pump
529008	MMX-II for 2.5cc

Part Nunber	Pump
529009	MMX-II for 5.5cc, for L-8, L-20

Part Nunber	Pump
539001	For EX

Replacement parts/Brush

Dimensional drawing

●Outlet check valve

509001

549048

Part Number

Part Number	Pump
549001	For MMX-II, EX, L-8, L-20

Part Number	Pump
549048	For MLZ, LK

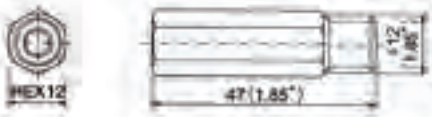
PAGE TOP

Dimensional drawing

●Relief valve

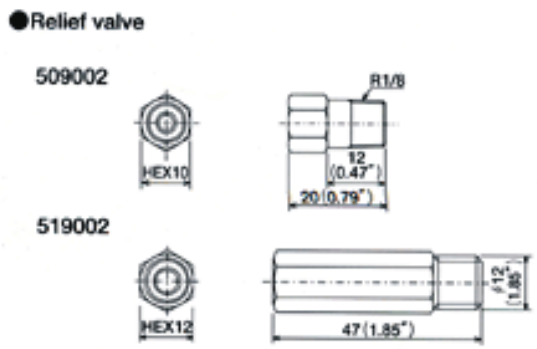
509002

519002



Replacement parts/Brush

Dimensional drawing

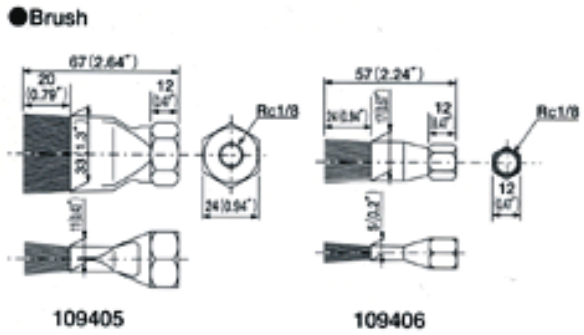


Part Number

Part Nunber	Pump
509002	For AM, ACM, 0.8MPaADM, AMS ($8kgf/cm^2$)

Part Nunber	Pump
519002	For AMI-300, 100S, 200S, 2,5MPa300S, 1000S ($25kgf/cm^2$)
519003	For AMI-300□0.5MPa ($5kgf/cm^2$)

Dimensional drawing



Part Number

Part Nunber
109405

Part Nunber
109406

Fill Port / Strainer/ Suction Filter Table

	Model	Code No.	Target Products
Refill Port	OC-4	529409	AMZ-III, AMZ100S, AMO-150S-III, AMO-II-150S, MMXL-III, MMX-II, AMR-III-150
	OC-3	529432	MLZ, L5
	OC-2	549005	EX, L20, ACM-II, AM, ADM
	OC-1	549006	L3, L8
Strainer	OS-1	521037	AMZ-III, AMZ100S, AMO-150S-III, AMO-II-150S, MMXL-II, MMX-II
Suction Filter	SF-11	**510323**	AMZ-III, AMZ100S, AMO-150S-III, AMO-II-150S, AMR-III-150
	SF-08	489008	AMI-300S, AMI-1000S, AMI-300, AMI-1000
	SF-07	489007	MLZ
	SF-10	489010	MMXL-III
	SF-A	500324	AMS
	SF-13	489013	MMX-II, L8
	SF-12	489012	ACM-II
	SF-01	489001	AM, ADM
	SF-05	489005	L20, EX
	SF-L3	540727	L3
	SF-L5	540562	L5
	SF-LK	540562	LK
Inlet Check Valve	IC-2.5	529008	MMX-II(2.5ml)
	IC-5.5	529009	MMX-II(5.5ml),L-8, L-20
	IC-EX	539001	MLZ, LK
Outlet Check Valve	OC-1	509001	MMX-II, EX, L-8, L-20
	OS-2	549048	MLZ, LK
Relief Valve	RB-0.8	509002	AM, ACM, ADM, AMS <0.8MPa>
	RB-2.5	519002	AMI-100S,200S,300S,1000S <2.5MPa>
	RB-0.5	519003	AMI-300 <0.5MPa>

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■Centralized lubrication system planning

(1) System planning sequence

Objective of lubrication : Decrease friction, cooling and extend bearing life.

- **Locate all wear surfaces that need to be lubricated :** bearings, slides, cams, gears, chains etc. Take into consideration RPM, load, ambient temperature and nearby hazard.
- **Selecting lubricant :** Determine frequency required (min. -hrs. -days). Select lubricant oil or grease, and note viscosity
- **Selecting Desired Delivery Method :** Automatic or manual. Intermittent or continuous. Single Line Resistance, Positive Displacement Injector, Series Progressive.
- **Calculate Lubricant Requirements :** For each lubrication point, calculate the necessary requirement of lubricant in cubic centimeters per hour. Then multiply or divide by desired frequency to determine necessary requirement per interval cycle. Add all the requirements together to get the total system requirement.
- **Select Distributor :** Based on the desired delivery method, choose the correct distributor for that method that will deliver the amount of lubricant required per interval period.
- **Select Pump and Tank :** Based on the desired delivery method and the system total requirements, choose a pump that meets those requirements. Take into consideration it is not recommended to use more than 80% of the pump output. Choose a tank that will meet the desired refilling interval.
- **Select any Protection and Monitoring Device :** Based on the type of system there are different monitoring devices that could be used if desired, flow sensor, pressure switch, cycle switch, low level switch or visual indication.
- **Select Controlling Method :** Determine if an external system controller will be required and select controls that will not only meet the system requirements, but also the chosen monitoring device if necessary.
- **System Layout :** Arrange nearby lubrication points into groups if desired. Based on the particular distributor chosen, arrange the distributors into same groups. Based on the system delivery method and necessary main and branch tubing, engineer the tubing layout and distributor locations.
- **Select Necessary Tubing Parts :** After system layout is complete, choose the correct amount of desired fittings, adapters, compression hardware, tubing etc. that will be required to plumb the system.

(2) Calculating oil requirements

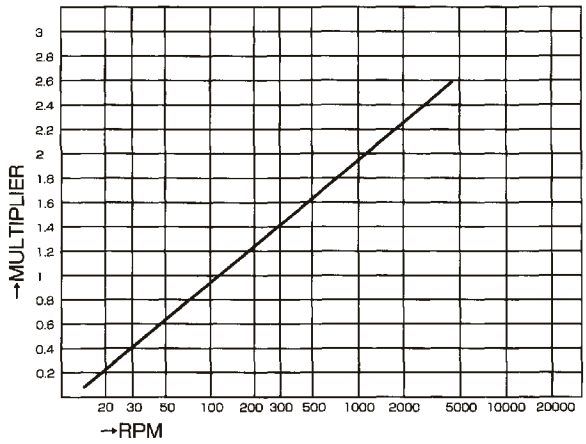
The amount of oil that is required for lubrication point is calculated by the following formulas and are based on experience and actual testing.

The necessary requirement is calculated in cubic centimeters per hour. These formulas are based on an average of of 120 RPM. In general, the requirement should be doubled for every ten fold speed increase. There have been many calculating formulas published before that use surface smoothness, different operating conditions, RPM, load, ambient temperature, oil type, hazardous conditions, sealing conditions etc. Thus, the formulas below for calculating the oil requirements are not absolute. They are rather a benchmark, and based on the actual operating conditions should be adjusted for each particular application.

● Oil requirements calculation formulas

AF.	Anti-friction bearing (Ball bearing, roller bearing, needle bearing) Oil volume Q(cc/h) =0.04×diameter×rows	BW.	Ball bearing way Oil volume Q(cc/h)=0.012×length×rows
P.	Plain bearing Oil volume Q(cc/h)=0.023×shaft diameter×bearing length	CA.	Cam Oil volume Q(cc/h)=0.0017×Contacting circumference ×width
FW.	Flat slide a. Oil volume Q(cc/h)=0.0017×length×width(horizontal slide) b. Oil volume Q(cc/h)=0.006×length ×width(vertical slide)	G.	Gear Oil volume Q(cc/h)=0.013×pitch circle diameter×width of gear
CW.	Cylinder slide Oil volume Q(cc/h)=0.023×diameter×length	CH.	Chain Oil volume Q(cc/h)=0.008×length

● The relationship between rpm and multiplier



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Single Line Resistance(SLR) - (Lube-Matic)

(1) System Overview

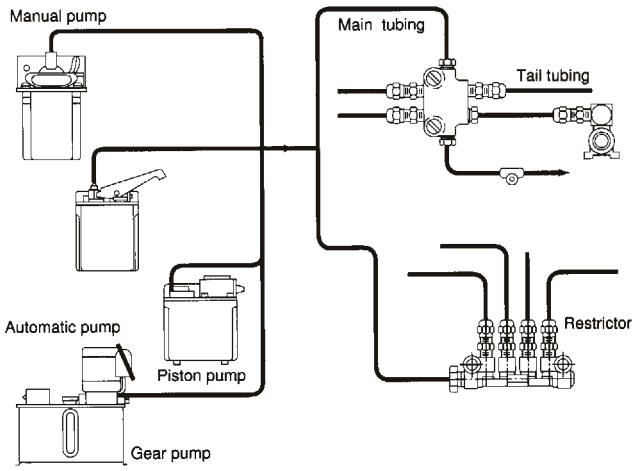
The basic principle of the Lube-Matic centralized lubrication systems is that oil will travel to the path of least resistance. These systems can be engineered to be either intermittent or continuous depending on the particular requirements. For intermittent systems the metering restrictors are called Flow Units and have 8 restriction sizes to choose from. For continuous systems the metering restrictors are called Control Units and have 10 restriction sizes to choose from. In either case for every size increase or decrease the amount of restriction will be either half or doubled from the previous size. Flow and Control units will deliver oil in a low pressure and small volume either intermittently or continuously depending on the chosen system, and have a wide range of working viscosities. Lube-Matic systems can be used from small high precision machine to large casting machinery.

Characteristics:

1. Because it is a single main line system, the layout engineering and installation are simple, and visual inspection is easy.
2. There are numerous Lube-Matic manual piston pumps with various outputs and sizes to fit and lubricate just about any manual intermittent application.
3. There are numerous Lube-Matic electric piston pumps with various outputs, sizes and voltages to fit and lubricate just about any automatic intermittent application.
4. There are numerous Lube-Matic electric gear pumps with various outputs, sizes and voltages to fit and lubricate just about any automatic continuous application.
5. All pumps have a suction filter to help prevent blockage, but recommend an in line filter to help ensure proper oil delivery.
6. Be sure to choose the right size Flow or Control Unit to deliver the correct amount of oil to your lubrication surfaces.

Type of Lubrication system	Intermittent or continuous resistance			
Tubing	Single line(main tubing 4mm, tail tubing 4mm)			
Lubricant	Oil			
Pump	Manual	Automatic		
	Piston pump	Solenoid driven lubricating pump	Motor driven piston pump	Motor driven gear pump
Reservoir	0.22ℓ,0.4ℓ,0.5ℓ 0.8ℓ,1.8ℓ	1.8ℓ	0.8ℓ,1.8ℓ,3ℓ,4ℓ,8ℓ	2ℓ,3ℓ,4ℓ,8ℓ
Metering restrictor	Intermittent	Flow unit~8 sizes(03,02,0,1,2,3,4,5)		
	Continuous	Control unit~10 sizes(05,04,03,02,0,1,2,3,4,5)		

〈System layout〉

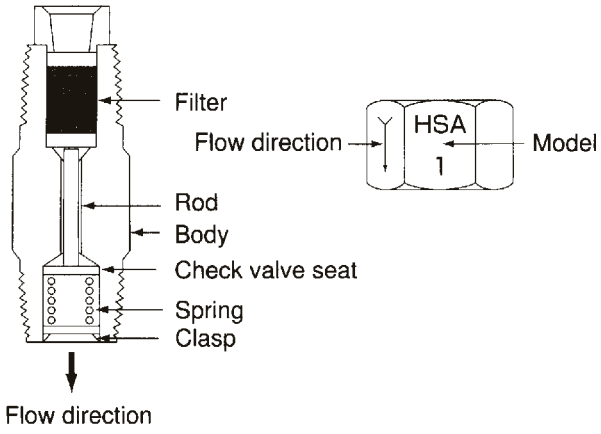


(2) System planning sequence

Designing an Intermittent System

Selection of Flow Unit

After calculation of required oil volume for each lubrication point, selection of Flow Unit determines whether or not the calculated oil volume will be discharged to each point. A random selection of Flow Unit will not produce any good results. In addition, it is not a perfect lubrication system if Flow Units with the same number provide different oil output depending on the places they are installed. (ie : being close v.s. far away from pump, or high v.s. low position) In LUBE-MATIC centralized lubrication system, each Flow Unit is assigned the Flow Constant (ϕ value) and, by selecting the pump to be used according to the total of ϕ value of each Flow Unit in the system, the discharge volume from the Flow Units becomes perfectly balanced.



How to make Data Sheet (Table 5)

(1) Put lubrication data in Column 1-4.

(2) Calculate the required oil volume to each lubrication point using the previous calculation formulas and put the results in Column 5.

(3) Pick the smallest value in Column 5 as the divider and divide the other values in Column 5 to get relative oil volume ratio. Put the results in Column 6. Now the relative oil volume ratio for the smallest value is 1. Therefore let's decide its multiplier as 1 as well and put it in Column 8. As shown in Table 4, Flow Unit number for the multiplier 1 is 02. Put 02 in Column 7.

(4) Compare Table 4 and the relative oil volume ratios calculated in Column 6. Pick multipliers from Table 4 that are closest to each relative oil volume ratio in Column 6 and put them in Column 8. (ie : If a relative oil volume ratio in Column 6 is 7.5, put 8 in Column 8. If 13.2, put 16 in Column 8.)

(5) After completion of the above, select Flow Unit number and Flow Constant, using Table 4, that correspond to each multiplier in Column 8 and put them in Column 7 and 9 respectively

(6) Multiply the smallest value in Column 5 by the multipliers in Column 8 to obtain Actual Oil Volume (cc/h) and put them in Column 10.
(ie : If the smallest value in Column 5 is 0.5cc/h and the multipliers in Column 8 are 4, 16, 2 and 1, put the products 2, 8, 1 and 0.5 in Column 10.)

(7) Calculate the total of each Column 9 and 10 and put them in the total sections in Table 5. (ϕ T and FT)

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●Flow constant of Flow Unit (ϕ value) and multiplier (Table 4)

Flow unit number	Flow constant	Multiplier
03	1.2	0.5
02	2.5	1
0	5	2
1	10	4
2	20	8
3	40	16
4	80	32
5	160	64

Note：The oil viscosity should be 32～1300 cSt under operation temperature.

●Data sheet (Table 5)

LUBRICATION SYSTEM DATA SHEET

(LUBE-MATIC)

Name of Company
Add.
Section in charge
Person in charge

Mechanical name
Name of machine model

Name of sales office
Date
Quote No.

System specifications			Pump unit specification					
Type of system		☐ Cyclic ☐ Continuous	Model			Discharge volume		cc/h
		☐ Manual ☐ Automatic	Part Number					cc/shot
Oil	Oil name		Motor	Voltage	V	Discharge pressure		kgf/cm²
	Working viscosity	cSt (40℃/104°F)		Output	W			kgf/cm²
		cSt (100℃/212°F)		Phase	ϕ	Interval		Min
				Frequency	Hz			(Cam setting No.)
				Condenser	μF	Reservoir capacity		ℓ
						Oil level switch		With/without
							Model	

Calculation of required oil volume											
Lubrication points	Abbreviated name	Dimension	Width		Condition	Calculating value		Flow unit/Control unit			
Antifriction (ball,roller,needle) bearing	A F	0.04	Bearing diameter	Row number	RPM or stroke(stroke/min)	Required oil volume(cc/h)	Oil volume ratio	Flow unit or Control unit Number	Multiplier	Capacity constant (ϕ value)	Actual oil volume (cc/h)
Plain bearing(metal)	P	0.023	Diameter	Length							
Flat slide way	F W	0.0017 / 0.006	Width	Length							
Cylinder slide way	C W	0.023	Diameter	Length							
Ball roller bearing slide way	B W	0.012	Length	Row number							
Gear	G	0.046	Pitch diameter	Gear							
Cam	C A	0.013	Contacting circumference	Width							
Chain	C H	0.008	Length	Width							
Item	Name of lubricating parts	1	2	3	4	5	6	7	8	9	10
									Total	ϕ T	F T

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Selection of Lubrication Pump

(1) The total required oil volume has been calculated in Table 5. Now, let's select a pump with the most appropriate output.

(2) Count the actual total number of Flow Unit in the system and pick the closet number of the Flow Unit from the first column in Table 6. Then choose the ϕ T value, for the number of Flow Unit selected above, from Table 6 that is closest to the ϕ T value calculated in Table 5. ϕ T calculated needs to be smaller than ϕ T selected from Table 6.

(3) The selected ϕ T value indicates the minimum required output of the pump (cc/shot)- See the top row of Table 6. It is recommended to choose the pump with the output that is a little larger than the minimum required output.

(4) If system is automatic and pump output needs to be larger than 5.5cc, please select from AM or ADM gear pumps.

Selection of Model A Pump (AM, ADM-intermittent) and Flow Units

(1) To use Model A pump the following conditions must be met.

T value should be smaller than X, but larger than Y. (Yc < ϕ T > Xc)

Xc = 9.1 x V at 40℃

Yc = 1.1 x V at 20℃

V : Viscosity of oil at given temperature (cSt).

(2) If ϕ T does not falls between X and Y :

a) When ϕ T is smaller than Y, increase the size of all Flow Units selected on the Data Sheet by one size and calculate new ϕ T. This procedure may be repeated, if necessary.

b) When ϕ T is larger than X, decrease the size of all Flow Units selected on the Data Sheet by one size and calculate new ϕ T.

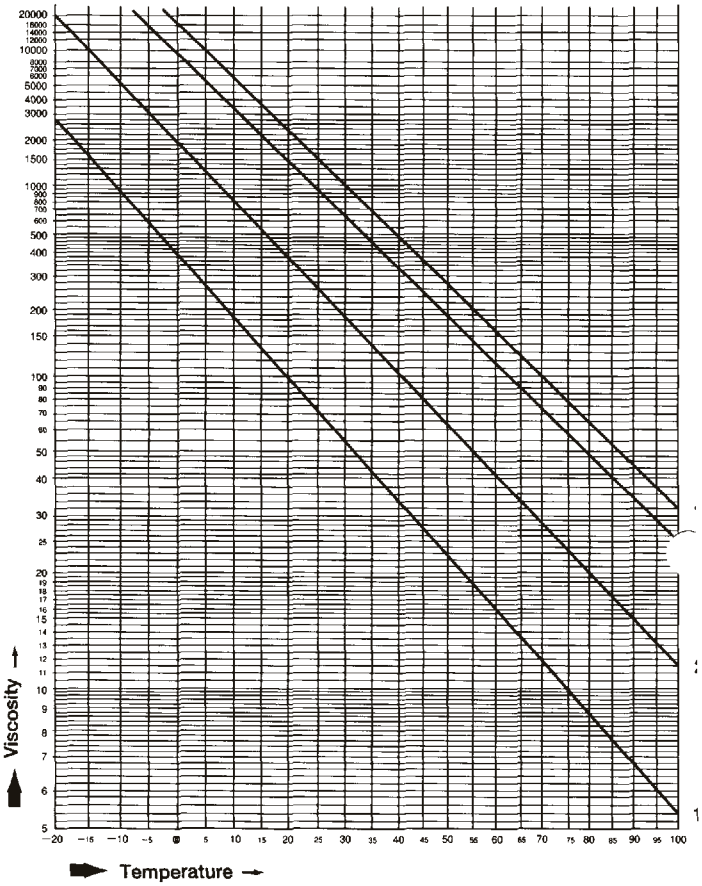
c) When ϕ T can not be increased or decreased using a) or b) above, increase the size of the smallest Flow Units in the system by one size.

(ie : When among 30 lubrication points in total, 8 points require size 03, increase the size of these 8 Flow Units to size 02.) Even though these 8 lubrication points may get oil more than actually needed, it insures that the total lubrication is done well.

●The maximum ϕ T value for intermittent system (Table 6)

Pump / Number of flow unit	Discharge volume of pump cc/shot					
	0.5	1	2	3	4	5
5	150	250	450	700	800	
10	115	180	320	560	680	750
15	96	150	255	450	570	640
20	82	128	225	360	480	550
25	68	108	180	320	400	470
30	58	90	155	280	330	400
40	48	65	120	215	250	290
50		60	94	155	185	215
60			72	115	135	160
70				84	84	125
80						96
90						

●Viscosity Temperature graph (Table 7)



	40℃/104° F	100℃/212° F
1 : Oil #32	32.7cSt	5.6cSt
2 : Oil #100	101.0cSt	11.9cSt
3 : Oil #320	319.0cSt	26.0cSt
4 : Oil #460	454.3cSt	32.3cSt

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Designing Continuous System

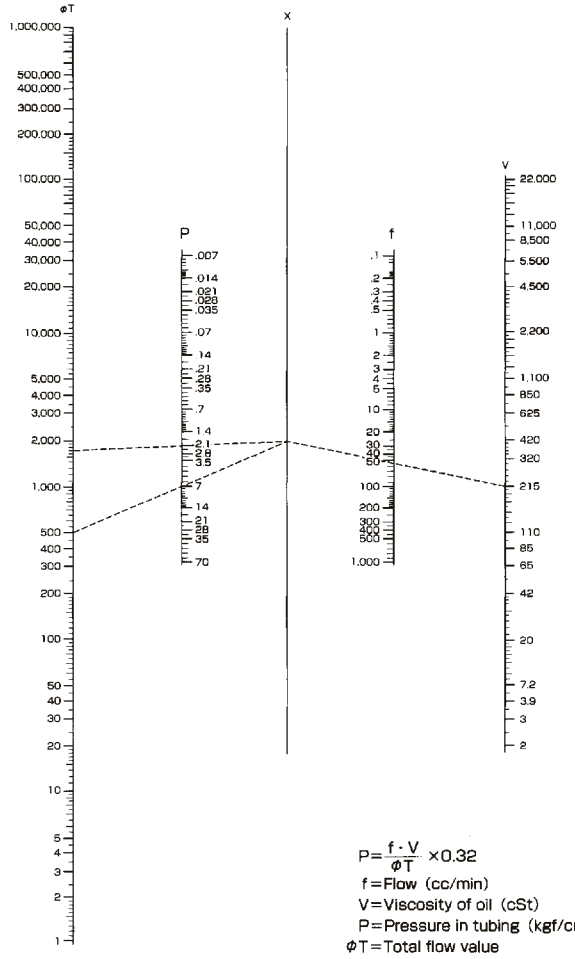
Select Control Unit for continuous system by completing the Data Sheet as is done for selection of Flow Unit for intermittent system. Refer to Table 9 for the relation between Control Unit selected, pump output and pump output pressure.

(1) Mark the viscosity (cSt) of the given oil on V-axis.
(2) Divide the total of Column 10 (FT) on the Data Sheet by 60 and mark the result on f-axis.
(3) Join the above two (2) marks with a straight line and extend the line until it intersects with X-axis.
(4) Mark the maximum and minimum pump discharge pressure on P-axis, (Generally, a well-balanced relation between pump pressure and discharge volume is attained when the pump is used at the pressure 2-6kgf/cm2.)
(5) Join the point on X-axis and two (2) points on P-axis above (Max. & Min. discharge pressure) with straight lines and extend them until they intersect with ϕ T-axis. These two (2) points on ϕ T-axis indicate the maximum and minimum value for the ϕ T value for the system being designed now. Therefore, the calculated ϕ T value needs to fall in this range.
(6) To increase ϕ T value, increase the size of Control Unit selected by one size and calculate new ϕ T value. Repeat the same procedure until ϕ T value falls into the range.
(7) To decrease ϕ T value, decrease the size of Control Unit selected by one size and calculate new ϕ T value. Repeat the same procedure until ϕ T value falls into the range.
(8) Mark the final ϕ T value on ϕ T-axis and join it with the point on X-axis. The point on P-axis, where the line from ϕ T-axis to X-axis crosses, indicates the pump discharge pressure.

●Flow constant of flow unit (ϕ value) and multiplier (Table 8)

Control unit Number	Flow constant	Multiplier
05	0.3	0.13
04	0.6	0.25
03	1.2	0.5
02	2.5	1
0	5	2
1	10	4
2	20	8
3	40	16
4	50	32
5	160	64

●Relation between oil discharge pressure and oil discharge volume of pump (Table 9)



$P=\frac{f \cdot V}{\phi T} \times 0.32$

f=Flow (cc/min)
V=Viscosity of oil (cSt)
P=Pressure in tubing (kgf/cm²)
φT=Total flow value

Safety and trouble shooting

● For oil

Pump not discharging oil

○Low oil level in reservoir — add currently used oil
○Clogged suction filter — clean or change oil filter and clean reservoir
○Check for incorrect oil — if not correct, purge complete system, clean reservoir and fill with correct oil
○Motor turns in wrong direction — check motor wiring
○Damaged tubing within the pump — fix or replace
○By-pass valve out of adjustment — adjust by-pass valve
○Check inlet and outlet check valve — disassemble and clean
○Incomplete operation of handle (hand pump) — operate the pump handle to the end of the stroke

No pressure increase in the main line

○Ball seat of relief valve is clogged — clean relief valve
○Air in tubing — check for leaks, open system at furthest point and run pump to remove air
○Improper selection of control unit or flow unit — check manufacturers recommendation and replace with correct unit
○Improper pressure setting (gear pump) — ajust by-pass setting
○Damaged "O" ring on the piston (piston pump) — replace
○Oil leaking from junction — tighten fitting properly or replace tube fitting

Air in system

○Oil level in the reservoir is too low — fill with correct oil and follow above procedure for removing air
○Damaged tubing — replace damaged tubing

No oil passing thru flow or control unit

○Check flow direction on hex of flow or control unit — if incorrect, replace with correct unit
○Check for clogged unit — replace unit

The pump is not running, but light is on (if equipped)

○Motor is wired wrong — check motor wiring
○Circuit protector is in off position — press reset button

Trouble indication light is on (if equipped)

○Discharge time is set too short, pump is not reaching proper pressure — check time setting
○The oil level switched because of low oil level — fill reservoir with correct oil

Reservoir has proper oil level, but oil level warning is on

○Mistake on A, B contacts of oil level switch — consult with us

Cannot turn off trouble light (if equipped)

○Reset button has not been pressed — press the reset button
○Oil has not been added to reservoir — fill reservoir with correct oil
○Pump did not reach the specified pressure — consult with us