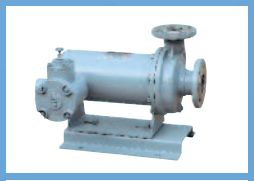
ISO9001 REGISTERED AJA EQS

PETROCHEMICAL SYNTHESIS PROCESS NON SEAL CANNED MOTOR PUMP

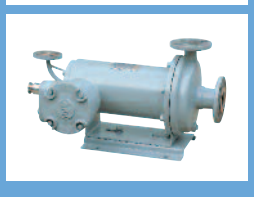
&

POLYMER OLIGOMER 3-WAY JACKETED VALVE ASS'Y Y-VALVE, SAMPLING VALVES

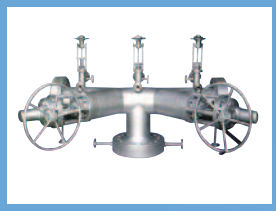
PUMP





VALVE



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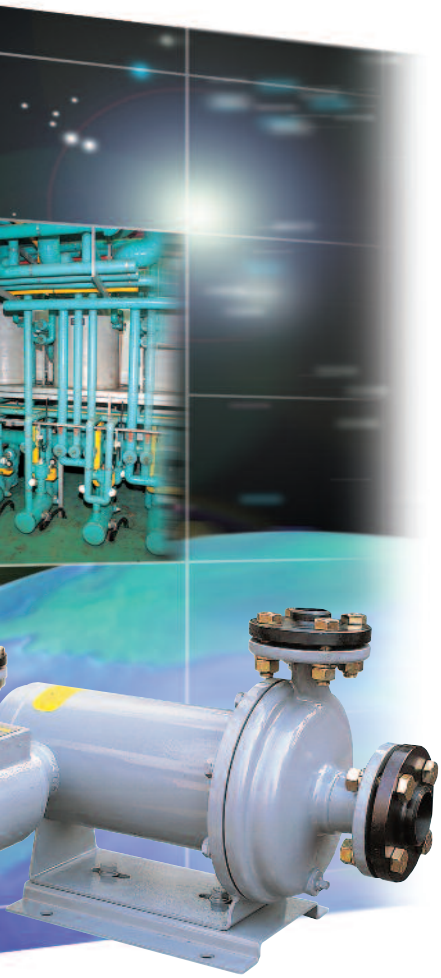


PRESIDENT MESSAGE

고객 여러분께 저희 한라산업을 소개하게 되어 대단히 기쁘게 생각합니다.

저희 한라산업은 1979년 창업 이래 국내 최초로 넌씰캔드모터펌프를 개발하여 화학공장, 원자력 발전소, 섬유공장, 식품 공장등 수많은 산업설비에 공급해 오고 있습니다.

그 동안 터득한 기술력을 바탕으로 흡수식 냉온수기용 용액 및 냉매이송 펌프를 개발하였으며 특히 최근 초고온용 공냉식 넌씰캔드모터펌프를 개발하여 고온의 열매체나 화학물질을 안전하고 경제적으로 이송할 수 있게 되었습니다.

그러나 저희 한라산업은 이에 자만하지 않고 지속적인 기술개발과 품질관리로 세계시장에서 최고의 펌프제작 전문업체가 되도록 최선을 다할 것입니다.

代表理事 金 甲 東

It is a great pleasure to have this opportunity to introduce Halla Industrial Co., Ltd.

Since its establishment in 1979, Halla has manufactured a variety of machinery parts and valves in Korea. The non-seal canned motor pumps were developed by Halla in 1987 and have served with extremely usefulness in chemical plants, nuclear power plants, fiber and food manufacturing plants as well as other plants.

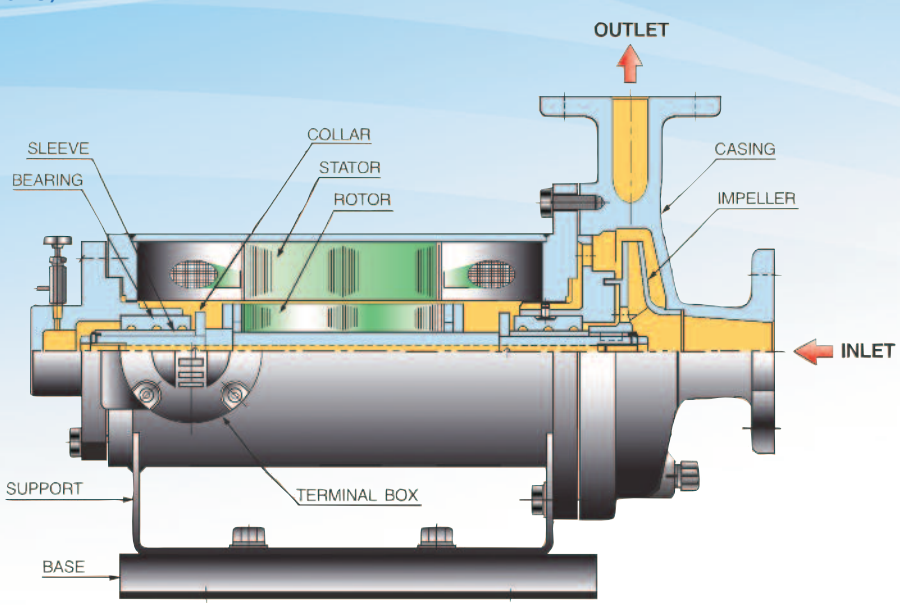
Based on Halla's acquried technical know-how and experience, we have recently developed circulation pumps for Absorption Chillers/Heaters and Refrigeration Plants.
We have also produced air-cooled non-seal canned motor pumps which are able to transfer chemical solution more safely and economically.

With constant development of our technology and the modern management of quality control, we, Halla, continue to do our best to become a world-class pump maker.

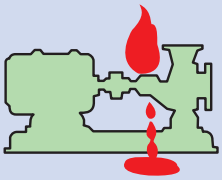
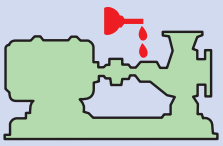
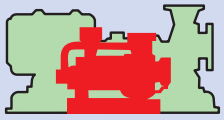
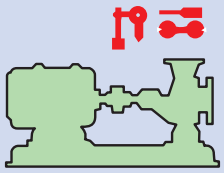
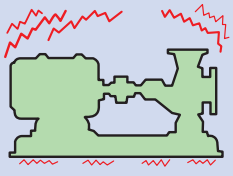
President Gap Dong Kim

NON SEAL CANNED MOTOR PUMPS

■ 구조(Structure)



■ 특징(Features)

완전 무누설 및 방폭형 구조 (Pefectly Leak proof & Explosion proof Design)		
회전축이 외부에 나와있지 않기 때문에 스타핑 박스 및 기타 운전에 의해서 마모가 발생하는 축봉부가 없는 완전 무누설이므로 누설에 의한 위험성, 공해나 환경의 오염 등을 방지하는 방폭형 펌프입니다.	Sealless Canned Motor Pumps are leak proof and explosion proof because the shaft is located completely inside the pump and there are no mechanical shaft seals that can degrade and leak during operation.	
무급유 구조 (No External Lubrication)		
축봉부를 비롯 구동부를 포함해서 일체의 급유를 하지 않기 때문에 취급액에 윤활유가 혼합되는 등 액의 오염을 시키는 일도 없으며 습기나 외기를 흡수하는 일도 없는 펌프입니다.	Sealless Canned Motor Pumps do not contaminate atmosphere sensitive fluids by absorbing moisture from the air through external lubrication ports. Lubrication is provided by the pumping fluid during normal operation.	
소형 디자인 (Compact Design)		
모터와 펌프가 일체형으로 구성되어 있어 타종 펌프에 비해서 1/2 정도 소형이며 설치장소를 크게 요하지 않고 중심잡기가 필요없으며 설치가 용이하고 경비도 대폭 절감됩니다.	Since Sealless Canned Motor Pumps integrate the motor and pump in one housing, the size is very compact, often half that of other pumps. Savings in both installation costs and floor space are achievable with these units.	
편리한 보수 및 유지 (Easy Maintenance)		
급유나 축봉부가 불필요하므로 일일점검이 필요없습니다. 통산 연 1회 정도의 정기점검시의 무급유 베어링 교환 정도가 필요한 보수이며 숙련된 작업자 없이 유지, 보수가 가능합니다.	Sealless Canned Motor Pumps require very little maintenance. Simply change the bearing during annual maintenance checks or when the bearing monitor indicates. These units are easily maintained with relatively unskilled labor.	
저소음 & 저진동 (Low Noise & Vibration)		
소음의 원인인 모터의 팬, 외부 축받이 등이 없으므로 일반적으로 60dB(A) 이하의 소음이고 더욱이 진동도 심하지 않으므로 환경 파괴의 염려도 없습니다.	Because these units have no motor fans or ball bearings, and the shaft is completely enclosed, Sealless Canned Motor Pumps have a very low noise output below 60dB(A) and very little vibration.	

NON SEAL CANNED MOTOR PUMPS

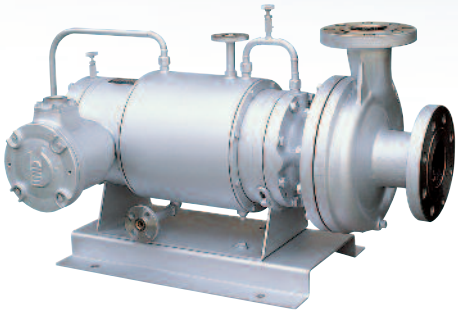
■ 초고온 공냉식의 특징(High Temperature Heat-Proof Type)

- 열매체유, 카프로락탐, 에틸렌글리콜, 지방산, 식용유 등
  (Applications : Dowtherm Oil, Thermal Oil, Caprolactam, EG, Fatty acid, Edible oil, etc)
- 공냉식 펌프와 수냉식 펌프의 연간 운전비용 비교표, 모타 7.5Kw 기준
  (The comparative table of operation cost per year (motor : 7.5 Kw))

공냉식 펌프(Air - Cooling Type Pump)

에너지 절약형
(Energy Saving Type)

수냉식 펌프(Water - Cooling Type Pump)



항목	공냉식 펌프		수냉식 펌프	
동력비	전력료 95원/Kw 연간전력료 7.5Kw×24HR×365일×95 = 6,241,500원	6,241,500원	펌프동력비(7.5Kw) : 6,241,500원 냉각수 수동력비(0.2Kw) : 166,440원 냉각수열손실(9.5Kw) : 7,905,900원	14,313,800원
용수비 (물)	없음		공업용수료 : 150원/Ton×13,140 = 1,971,000원 하수도료 : 66원/Ton×13,140 = 6,570,000원 (공업용수를 버릴 경우)	8,540,000원
인건비	없음		연 2회 냉각수 자켓 세정작업 1회 1인 1일×2회=년 2명×500,000 = 1,000,000원	1,000,000원
계		6,241,500원		23,853,800원
총 절약 금액	17,612,300원			

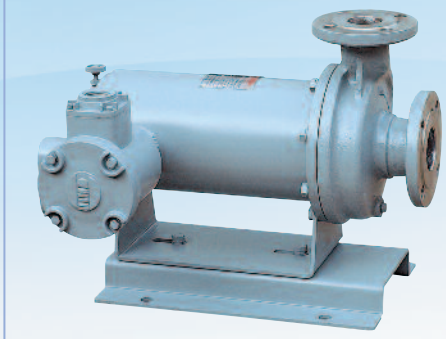
■ 초고온 공냉식의 특징(Features of High Temperature Heat-Proof Type)

· 냉각수를 전혀 쓰지 않기 때문에 상 · 하수도료가 필요없다.
· 냉각수가 필요없으므로 이중 배관작업으로 인한 원가 부담이 없다.
· 메카니칼 씰(축봉장치)을 쓰지 않기 때문에 부품 경비가 절감된다.
· 이송액이 냉각 되지 않기 때문에 열효율을 상승시켜 동력에너지를 절약한다.
· 펌프에 냉각수 자켓이 없기 때문에 부식이 없어 펌프의 수명이 길다.
· 전혀 누수가 없으므로 주위 환경이 깨끗하다.
· 모터와 펌프가 일체형이 되어 화재 위험이 없다.
· 냉각수를 사용하지 않기 때문에 단수나 혹은 처음 운전중 냉각수 확인 절차가 필요없어 운전자에게 정신적 안정감을 준다.
· 섭씨 400℃까지 사용 가능하기 때문에 어떠한 악조건에도 사용된다.
· 펌프의 부품수가 적어 분해 조립이 간단하여 인건비를 대폭 절감한다.
· 모타와 펌프가 일체형이기 때문에 동종 펌프에 비해서 설치공간을 적게 차지한다.

· No required cost of cooling water supply and drainage, because no cooling water is required.
· No additional cost needed to arrange the piping for cooling.
· Retrenchment of expenditure for spare parts as no use of mechanical seal.
· Saving the energy from high efficiency of heat.
· Long life by no corrosion of outer casing caused by the cooling water.
· Environmental preservation due to perfect leak-proof.
· Safe from a fire because of integral structure of pump and motor.
· Free the operator from anxiety of checking the cooling system.
· This pumps are designed to be capable of continuous pumping of high temperature fluid up to 400° without cooling water.
· Retrenchment of labor cost due to simple disassembly and assembly
· Small installation space required as compact design.

NON SEAL CANNED MOTOR PUMPS

■ 펌프 종류(Series) 및 사용유체(Application Fluid)



HB Series

일반형

일반적인 화학공정이나 위생처리공정 등에서 누수나 오수의 위험이 없이 안전하게 사용할 수 있는 형식입니다.

적용 예

용제, 정유, 반응장치, 도금
의약품 공업, 식품공업, 발전설비

Basic Type

These basic pumps are designed to prevent any leakage or contamination during chemical or sanitary processes.

Applications

Solvents pumping, Oil refineries, reactors, Plating process, Medical plants, Food industry, Power plant systems.

HA Series

고온 자켓형

열매체유나 고온의 석유류 및 합성공정에 적용되는 구조로서, 이송되는 주 액체와 플러싱되는 액체를 열적으로 분리시켜서 모터를 보호하고 열손실을 줄이도록 되어 있습니다.

적용 예

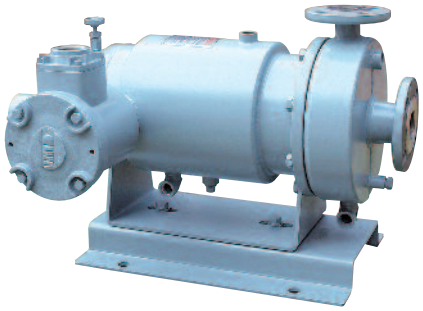
열매체유, 석유 부가반응 공정, 중합공정

High Temperature cooling Type

These high temperature cooling pumps are designed not only for the transfer of medium heating oil and high temperature petroleum but also for the synthesis process. It greatly reduces heat loss and prevents motor failure by thermally separating the main liquid from the flushing liquid.

Applications

Heat transfer oils, Petrochemical synthesis process, Polymerization process.



HM Series

고융점 자켓형

융점이 상온이상으로 높은 액체를 이송하는 경우 도중에 응고되는 현상을 방지하기 위해 펌프와 모터 외부에 자켓을 설치하여 스팀이나 온수를 통과 시킴으로써 기기의 온도를 유지할 수 있도록 되어있습니다.

적용 예

카프로락탐, 카르복실산, 유지, 가성소다

High Melting Point Jacket Type

These pumps are designed to prevent the danger of solidification which is normally found during the transfer of high melting point liquids. This model helps retain the necessary fluid temperature to maintain pumping action by incorporating a high temperature heating jacket through which steam or hot water is circulated.

Applications

Caprolactam, Carboxylic acid, Fatty oils, Caustic soda.

HR Series

역순환형

액화기체와 같이 포화증기압이 높은 유체를 이송하는 장소에 케비테이션을 최대한 줄이기 위하여 기기 내부 순환계통을 가압구조로 설계한 형식입니다.

적용 예

암모니아, 후레온, LPG, LNG

Reverse Circulation Type

Reverse circulation pumps are designed to minimize the cavitation effects which occur during the transfer of liquids, such as liquefied gasses, that have high saturated vapor pressure. Minimization of the cavitation effect is accomplished by the pressurization of the inner structure.

Applications

NH_3, Freon, LPG, LNG.

NON SEAL CANNED MOTOR PUMPS

HT Series

고온내열형

모터의 권선에 특수 내열성 무기물질을 절연제로 사용하여 고온의 유체를 이송할 때에도 냉각수를 사용할 필요가 없는 에너지 절약형으로 개발된 제품입니다.

적용 예

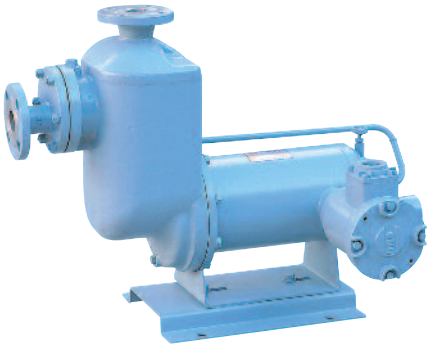
열매체유, 석유 부가반응 공정, 중합공정

High Temperature Heat-proof Type

High temperature heat-proof pumps are designed to save energy by using a thermally resistant, inorganic substance as a motor winding insulator. No cooling water is system required for transferring high temperature liquids.

Applications

Heat transfer oils, Petrochemical synthesis process, Polymerization process.



SP Series

자흡식형

자흡수식은 펌프의 케이싱을 이중으로 설계하여 흡입관내에 공기가 들어있는 상태에서도 공기를 분리시키면서 흡입할 수 있는 구조로 되어 있으므로 펌프보다 낮은 위치의 유체를 흡상하는데 이용됩니다.

적용 예

용제, 톨루엔, 벤젠, 에틸렌글리콜폐수

Self-Priming Type

These self-priming pumps are designed for the transfer of liquids which are below the level of the pump. This model has a double casing and the casing has a specially structured chamber to separate the air from the fluid that is drawn from the suction pipe.

Applications

Solvent, Toluene, Benzene,
EG+waste water.

VS Series

수직식 슬러리 분리형

수직식 라인 취부형으로 펌프와 모터사이에 메카니칼씰을 설치하여 유체중에 함유된 슬러리가 베어링을 손상하는 것을 방지하는 구조로 되어있습니다. 또한 케이싱과 어뎁터에 이중으로 자켓을 설치하여 고융점의 액체 이송용으로도 사용이 가능합니다.

적용 예

에틸렌글리콜 혼합물질, 물+티타늄,
락탐+티타늄, 티타늄+EG

Vertical Slurry Handling Type

Vertical slurry pumps are designed to prevent bearing damage due to slurries in the liquid. A mechanical seal installed between the pump and the motor provides physical separation between the slurry and the motor bearings. These pumps are good for the transfer of high melting point liquids, due to the double heating jackets installed between the casing and the adapter.

Applications

CEG, TEG+slurry, H_2O+TiO_2,
TiO_2+EG

AS Series

흡수식 냉동기형

흡수용액 및 냉매 순환용으로 사용되는 타입으로 냉동기기가 고진공 상태에서 운전되므로 매우 낮은 NPSH를 갖고 있는 것이 특징입니다.

적용 예

리튬브로마이드, 물

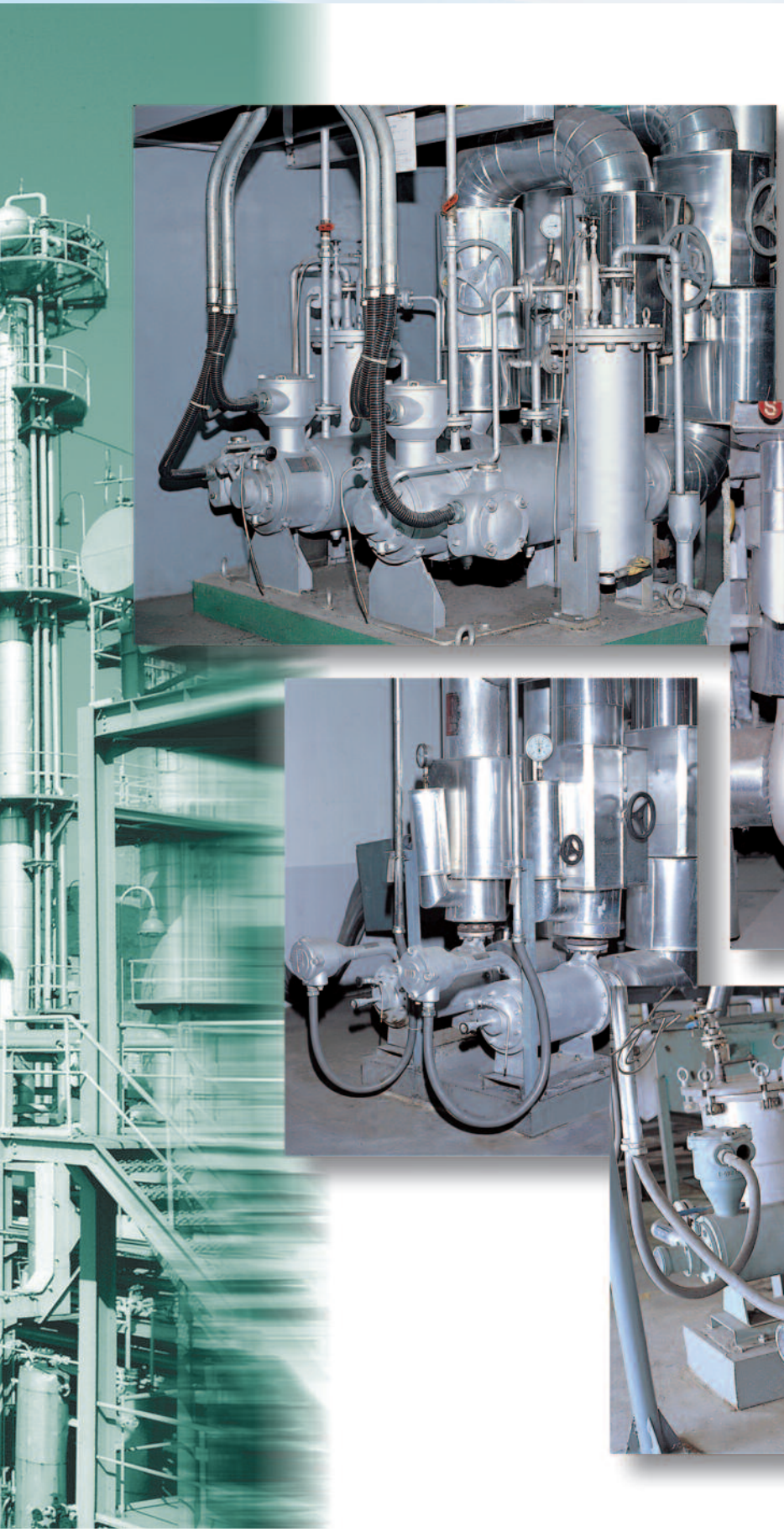
Absorption Chiller / Heater Type

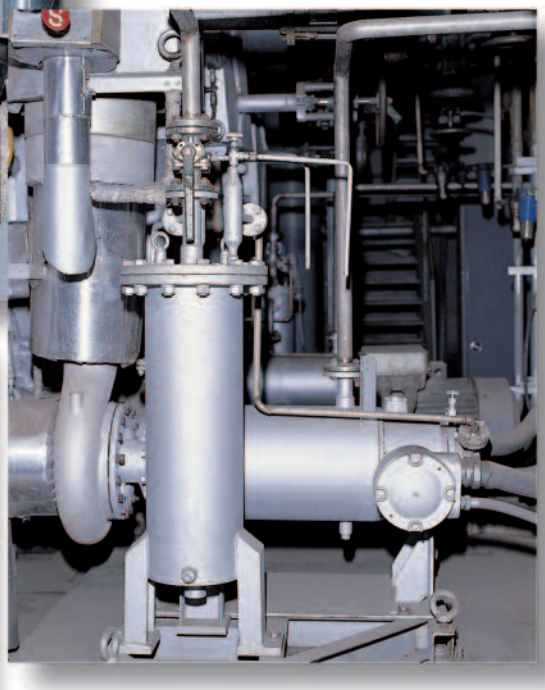
Low NPSH characteristics are required for absorption chiller/heater pumps since the refrigerator operates under a high vacuum state while circulating both absorption solution and absorption refrigeration medium.

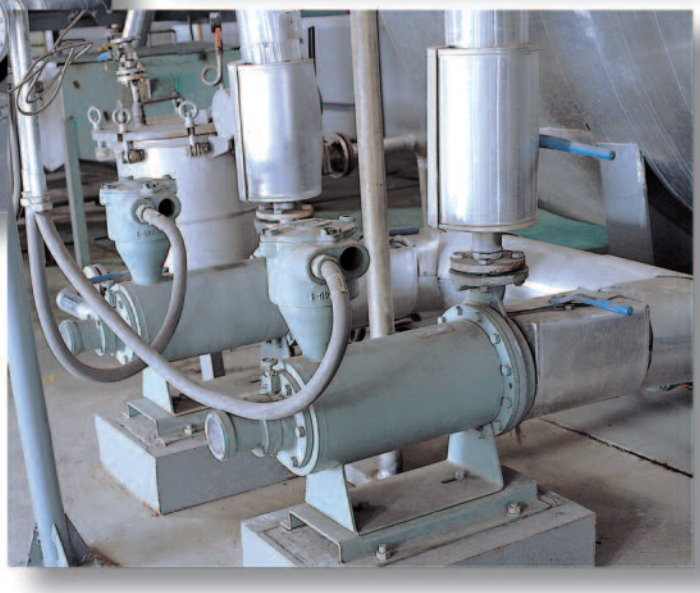
Applications

LiBr, H_2O

• 합섬화학섬유 중합공정(폴리에스테르, 폴리스틸렌, 나이론, PTA)
• 오일 보일러 순환장치 • ABS수지 중합공정
• Synthetic Chemical Fiber Polymerization Process (Polyester, Polystyrene, Nylon, PTA)
• Oil Boiler Circulation Unit • ABS Copolymer Polymerization Process

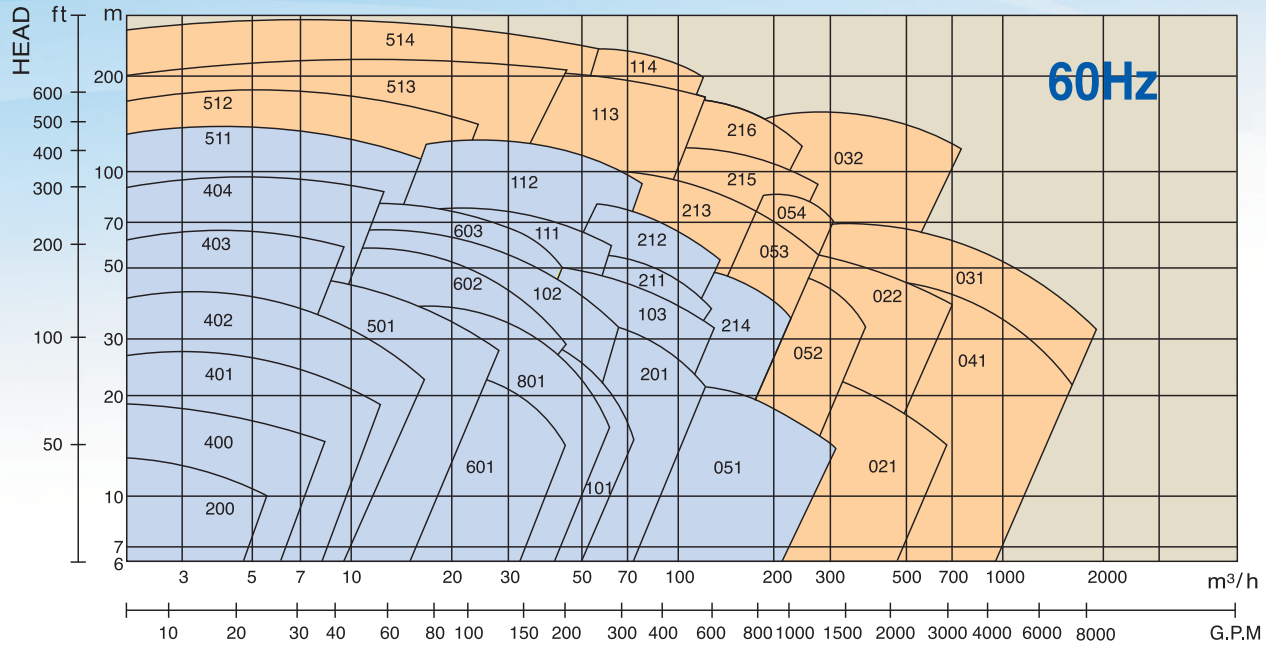






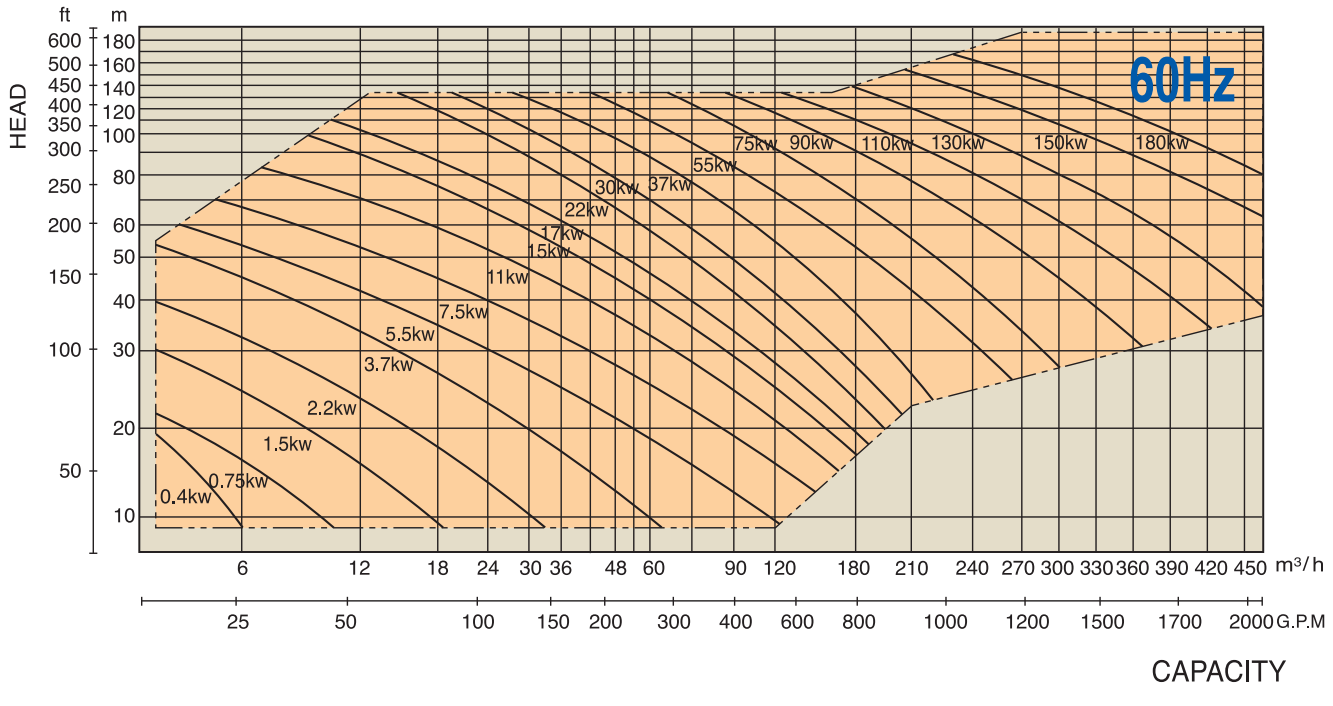
NON SEAL CANNED MOTOR PUMPS

■ 성능곡선(Performance Curve)



■ 펌프용량별 동력 산정표(Chart for Estimating the Power of Motor from H – Q Curves)

비중 = 1.0, 점도 = 1.0CP



NON SEAL CANNED MOTOR PUMPS

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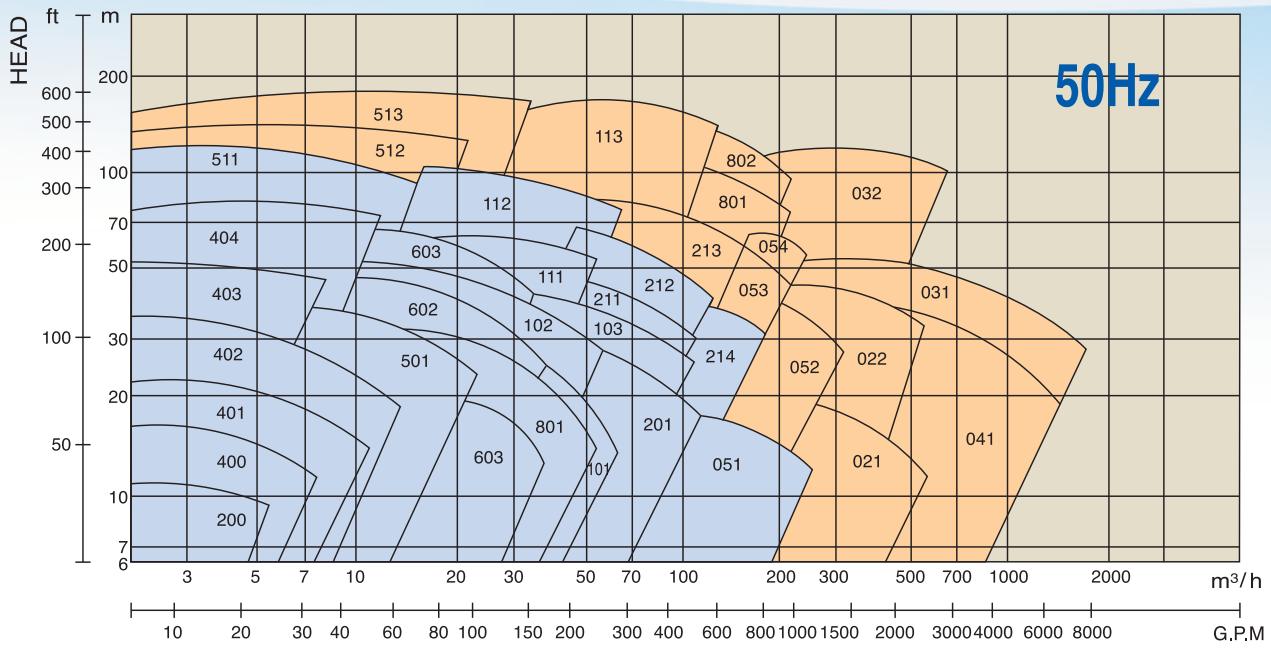

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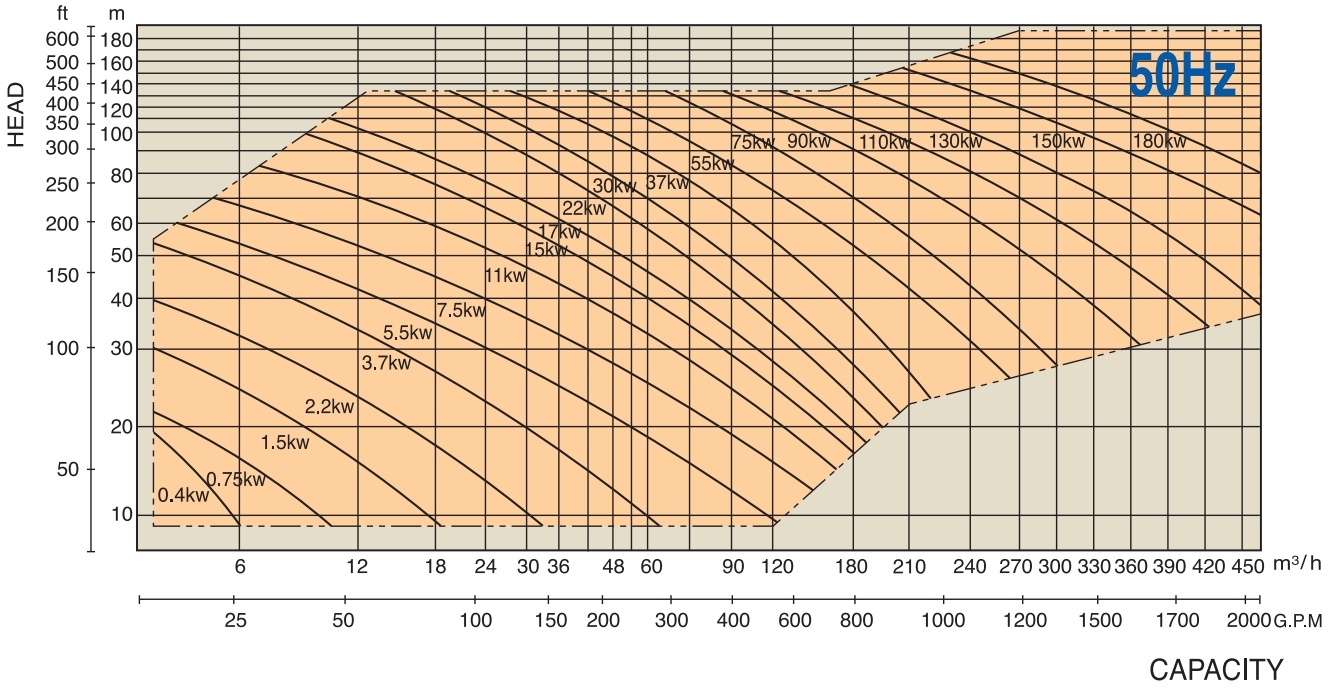
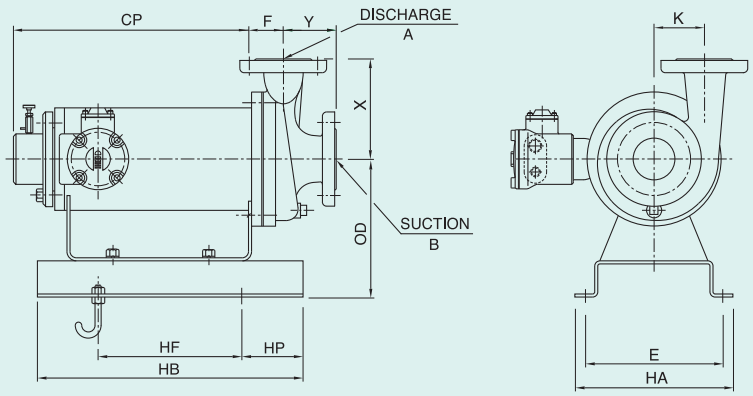


NON SEAL CANNED MOTOR PUMPS

■ 외형치수(Outline Dimensions)

OUTLINE DIMENSIONS



■ 모터 치수(Dimensions of motor)

inch
mm

Power	CP		OD		HP		HF		E		HB		HA		REMARK
1.5~2.5Kw	13.6	345	6.5	165	2.0	51	8.3	211	7.5	191	12.2	310	8.7	221	
3.7~7.5Kw	16.7	424	9.3	236	3.2	81	11.0	279	9.5	241	17.3	439	11.0	279	
11Kw	19.7	500	11.0	279	3.2	81	12.6	320	10.2	259	19	483	11.8	300	
15Kw	20.5	521	11.0	279	3.2	81	14.2	361	10.2	259	20.5	521	11.8	300	
22Kw	22.6	574	12.1	307	3.9	99	15.8	401	11.0	279	23.6	599	12.6	320	
30Kw	24.6	625	12.1	307	3.9	99	17.7	450	11.0	279	25.6	650	12.6	320	
37Kw	33.3	846	12.6	320	3.9	99	21.7	551	13.8	351	29.5	749	16.1	409	
45Kw	34.8	884	12.6	320	3.9	99	23.2	589	13.8	351	31.1	790	16.1	409	
55Kw	35.4	899	13.0	330	3.9	99	25.6	650	15.8	401	33.5	851	17.7	450	
75Kw	40.4	1026	17.1	434	4.9	124	22.1	561	17.3	439	31.5	800	19.7	500	
90Kw	42.3	1074	17.1	434	4.9	124	23.6	599	17.3	439	33.5	851	19.7	500	
110Kw	44.3	1125	17.1	434	4.9	124	25.6	650	17.3	439	35.4	899	19.7	500	
130Kw	47.2	1199	19.7	500	5.9	150	27.6	701	19.7	500	39.4	1001	22.8	579	

■ 펌프 치수(Dimensions of pump)

inch
mm

Casing No.	X		Y		K		F		Normal Flange Size			
									Suction		Discharge	
200	4.7	119	2.8	71	0	0	0.6	15	¾B	20A	½B	15A
400	5.5	140	2.6	66	0	0	1.2	30	1½B	40A	1B	25A
401G	6.5	165	3.9	99	0	0	1.2	30	1½B	40A	1B	25A
402G	7.1	180	3.9	99	0	0	1.2	30	1½B	40A	1B	25A
403G	7.9	201	3.9	99	0	0	1.3	33	1½B	40A	1B	25A
404T	7.9	201	3.9	99	0	0	1.3	33	1½B	40A	1B	25A
501G	7.1	180	3.9	99	0	0	1.8	46	2B	50A	1½B	40A
502T	8.3	211	3.7	94	0	0	1.8	46	2B	50A	1½B	40A
504T	9.5	241	3.7	94	0	0	1.8	46	2B	50A	1½B	40A
601G	7.5	191	3.7	94	0	0	1.8	46	2½B	65A	2B	50A
602T	8.3	211	3.7	94	0	0	1.6	41	2½B	65A	2B	50A
604T	9.5	241	3.7	94	0	0	1.8	46	2½B	65A	2B	50A
801T	7.9	201	4.9	124	0	0	1.7	43	3B	80A	2½B	65A
802T	8.7	221	3.9	99	0	0	2	51	3B	80A	2½B	65A
102	7.1	180	3.4	86	4.7	119	2.4	61	4B	100A	3B	80A
111	8.7	221	3.5	89	4.9	124	2.4	61	4B	100A	3B	80A
112	9.5	241	5.1	130	0	0	2.4	61	4B	100A	3B	80A
212	9.5	241	4.3	109	5.9	150	2.6	66	5B	125A	4B	100A
0512	12.8	325	7.1	180	0	0	4.7	119	6B	150A	5B	125A
2005	15.8	401	6.3	160	0	0	3.6	91	8B	200A	6B	150A

NON SEAL CANNED MOTOR PUMPS

■ 베어링 모니터(Bearing Monitor)

캔드모터의 단점 중의 하나는 회전자가 펌프 내부에 위치하고 있어 회전 방향을 알 수 없다는 것입니다. 하지만 한라 베어링 모니터에 정 · 역회전을 감지하여 나타냄으로써 누구나 쉽게 펌프가 올바르게 회전하고 있는지 알 수 있습니다. 또한 베어링 마모도를 나타내줌으로써 유지 및 보수를 용이하게 만들어 줍니다. 베어링 모니터는 모든 한라캔드펌프에 기본으로 제공되며 용도에 따라 터미널 박스 설치용과 원거리 패널 설치용으로 모두 사용 가능합니다.

The one of weakness of canned motor pumps is the difficulty of the recognition of rotation direction since the rotating shaft is located inside of the pump. But Halla's bearing monitor can show rotation direction with green/red light on the bearing monitor. Also it can show the degree of bearing wear so that it enables users to make easy maintenance.
Bearing is standard on all Halla canned motor pumps and can be used for both Mount on Terminal Box Type and Remote Panel Type according to customer's demand.

1) 모터 과열시 권선의 허용온도를 초과하게 될 경우 모터를 보호하여 줍니다.
2) 한라 써모스탯 종류별 세팅온도.

1) Thermostat protects motor in case of motor overheating in excess of thermal limit of wiring.
2) Variety setting temperature by Halla thermostat type.

절연종류(Insulation Class)	작동온도(Operation Temperature)
E	120
F	155
H	180
C	180 초과

3) 모든 펌프에 표준으로 설치됩니다.

3) Standard on all Halla Canned Motor Pumps.

※열전대

1) 고온의 액체를 이송하는 HT펌프(공냉식타입)에 표준으로 설치됩니다.
2) 고객의 요구에 따라 모든 모델에 대해 옵션입니다.

※ Thermocouples

1) Standard on HT Type(High temperature heat proof type) that is capable of continuous pumping of high temperature fluids.
2) Option for all models according to customer's demand.

※공회전 방지기(옵션)

1) 설정 전류치보다 전류가 감소했을 경우(공회전시), 정한시 특성으로 동작하는 부족전류 계전기입니다. 부족전류가 되면 동작표시 LED가 점등되고 설정된 시간후에 보조릴레이가 동작합니다.

2) 장점(Advantage)
- 부족전류보호 / 공회전보호
- 동작표시LED
- 차단시간지연특성
- 수동조작 / 전기적 자동 복귀
- 주위환경에 민감하지 않음
- 무부하시 모터정지
- 오작동 보호기능

▲ 옵션(Option)

※ Dry Running Protection(Option)

1) Load currents are detected by integral current transformers, and the internal solid state circuitry compares with preset underload. When the current level falls off below set point, red LED illuminates and after the preset delay time, internal SPDT relay switches output contacts.

2) Advantage
- Under-load protection / Dry-run protection
- Visual trip indication(LED)
- Characteristics of trip time delay
- Manual(Instantaneous) / Electrical(Remote) Reset
- Insensitive to surroundings
- Shutdown motors when unloaded
- Prevention of any errors

NON SEAL CANNED MOTOR PUMPS

(1) 설치(Installation)

1) 펌프 설치시에는 수평을 맞추어 주십시오.
2) 장치나 배관 내의 녹이나 용접 찌꺼기 등의 고형물은 펌프 파손의 원인이 되므로 설치전에 필히 제거하여 주십시오.
3) 기초는 흔들림이 없도록 시행하십시오.
4) 외적으로 진동이 많은 장소에서는 충분히 재고하여 펌프를 설치하는 것이 기계의 수명을 보장합니다.
5) 습기 침입이나 비상시 침수되지 않는지 잘 검토하여 주십시오.
6) 기기를 사양과 다른 조건에 사용하고자 할 때에는 사전에 당사 기술부로 문의하여 주십시오.

1) Install the pump horizontally.
2) Prior to installation, separate and remove this protective covering and completely remove any foreign materials from the flange orifice and surface. Foreign materials can easily cause the flange to leak or even damage the pump, if the material settles into the pump casing.
3) Set the base firmly into foundation
4) In case of installing at where shock is especially severe, install the pump after full reconsideration.
5) Install the pump to prevent moisture entry or sudden inundation
6) If you use the pump for applications or condition points other than those specified or rated on the nameplate, please consult our engineering department in advance.

(2) 배관(Piping)

1) 관단이나 플랜지의 거친 부분을 제거.
2) 플랜지의 내경과 가스켓의 내경이 같도록 하고 중심이 잘 맞도록 조립할 것.
3) 기포가 생기지 않도록 배관을 하고 굴곡부분이 최대한 적도록 할 것.
4) 열에 의한 비틀림이나 배관중량 등의 응력이 걸리지 않도록 하고 필요시에는 신축이음매와 같은 응력 흡수부를 설치하거나 지주를 설치할 것.
5) 흡입관에 특히 공기가 유입되지 않도록 하고 캐비테이션 발생요인을 제거할 것.
6) 흡입구에는 이물질의 혼입이 없도록 스트레이너를 설치할 것. (60-80 Mesh)
7) 펌프 출구측에는 압력계를 설치하여 운전 상태를 감시할 것.
8) 펌프 보수를 위해 입구와 출구에 밸브를 설치하되 유체 저항을 줄이기 위하여 슬루우스 밸브를 사용할 것.

1) Remove all traces of burrs from piping ends and flanges.
2) Be sure to align the inner diameters of the flanges and gaskets concentrically
3) Arrange the piping in such a way as to prevent the formation of air pockets, by reducing or eliminating elbows and bends as much as possible.
4) During the piping design stage, carefully consider the inclusion of proper piping supports, and where necessary, thermal expansion joints, to avoid stressing the pump casing or connections.
5) Suction piping should be kept airtight to prevent air entrainment and possible loss of prime.
6) Include a strainer in the suction piping to prevent foreign objects from entering the suction side and causing possible pump or motor damage. A 40-60 mesh screen is recommended.
7) To monitor the operating condition of the pump, insert a pressure gauge between the pump and the discharge valve.
8) Insert shutoff valves at both suction and discharge sides to facilitate easier maintenance. The use of a sluice valve at the suction side is recommended because its lower flow-resistance helps prevent the possibility of starving the pump suction or causing cavitation.

(3) 전기배선(Electric Wiring)

1) 전기 케이블은 방수용을 사용하여야 하며, 신축성이 충분한 연선을 사용하십시오.
2) 터미널 박스는 이슬에 의하여 수분이 유입 될 수 있으므로 인입구에 방수가 되도록 조치하십시오.
3) 접속단자는 고리형 압착 단자를 사용하는 것이 안전하며 나사는 풀어지지 않도록 죄어 주십시오.
4) 개폐기는 전자 개폐기를 사용하여야 하며, 과부하계전기는 모터 정격전류의 1.1~1.25배로 설정하십시오.
5) 레벨 스위치는 상하 여유를 두고 설치하여야 하며 수시로 동작상태를 점검하십시오.
6) 펌프 운전반에는 필히 전류계를 설치하여 운전전류를 감시하십시오.
7) 프레임은 3종 접지 하십시오.

1) Use National Electrical Code approved waterproof cable with flexible soft stranded wire conductors.
2) Connections to terminal box opening should be waterproof to prevent moisture entry.
3) Use properly crimped ring style connections on the terminal block. Tighten terminal bolts firmly.
4) Use an appropriately sized magnetic starter with the overload set to 1.1~1.25 times the rated current.
5) Level switch should be installed with margins at top and bottom, and verify its operating condition frequently.
6) An ammeter must be installed to check operating current of motor at operation panel.
7) Ensure that the unit is properly grounded for three-phase operation

(4) 운전(Operation)

1) 액이 없는 상태에서 공회전을 하게 되면 수초이내에 베어링, 슬리브 등이 소부하게 되므로 공회전은 절대 하지 마십시오.
2) 펌프 운전을 하기전에 배관밸브를 열고 펌프의 온도가 액온과 같이 떨어질 때까지 기다려 주십시오. (약 20℃)
3) 운전전 펌프 후단의 에어코크를 열어 공기 빼기를 하여 주십시오.
4) 역회전을 하지 마십시오. 모니터가 없는 기계에는 압력계를 참고로 하고, 설치 전 1초 정도 공회전하여 회전방향을 미리 확인 하십시오.

1) Do not run dry for more than 3 seconds. Canned pumps rely on the pumped fluid to provide bearing lubrication, so even momentary operation without proper priming can cause serious damage.
2) Before startup, open suction and discharge valves fully and allow the temperature of the pump to stabilize. (About 20°°C)
3) Open the bleed valve to purge any vapor from the pump and assure the pump is primed.
4) Avoid running the pump in reverse rotation. If an electronic rotation indicator is not used, confirm the direction of motor rotation by jogging the pump momentarily(1 sec) and checking the discharge pressure gauge for a positive pressure increase.

NON SEAL CANNED MOTOR PUMPS

5) 토출압력계와 모터의 운전 전류를 수시로 점검 하십시오.
6) 캐비테이션이 발생하는 상태에서는 운전하지 마십시오.
7) 쇄절 운전을 하게되면 가스층의 발생으로 캐비테이션의 원인이 되므로 피하여야 합니다.
8) 보호장치(Thermostat, Overload Relay, etc.)가 작동하면 그 원인을 정밀히 조사하여 문제점을 조치한 다음 재가동 하십시오.
9) 제작 사양과 다른 조건에서 운전하지 마십시오.

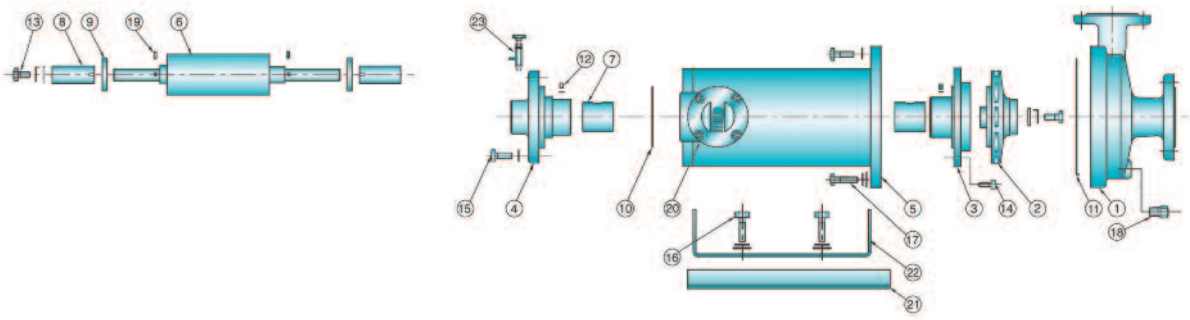
5) During a test-run period, frequently compare current usage and discharge pressure to nameplate specifications.
6) To prevent possible damage, avoid operating the pump under poorly primed or cavitating conditions.
7) Do not operate the pump with the discharge valve closed, as such operation promotes the formation of air pockets, provides poor bearing lubrication, and may result in cavitation.
8) If protection device such as thermostat and overload relay starts to operate, do not restart the unit until the cause has been determined, and resolved completely and permanently.
9) Do not utilize the pump for applications or condition points other than those specified or rated on the nameplate.

(5) 정기보수(Maintenance)

1) 펌프의 내부부품과 구조는 아래 그림과 같으며 왼쪽이나 오른쪽 부품부터 차례로 분해하여 깨끗한 헝겊 위에 잘 정돈하여 부품의 손상이나 분실이 없도록 주의하여 주십시오.
2) 모터의 절연저항을 측정하여 2MΩ 이상이 되면 사용상 지장이 없습니다. (출고시 20MΩ 이상)
3) 슬리브 외경과 베어링 내경의 공차를 측정하여 0.5mm 이상이 되면 교환하여야 합니다.
4) 베어링은 교환주기를 두고 점검합시다.
5) 일반적으로 베어링의 수명은 연속사용시 8000시간이나 유체나 배관압력 캐비테이션 등으로 조기 마모 현상이 발생할 수 있으므로 신품 부착시 700시간 운전 후 점검 그 상태를 확인하여 보수점검의 자료로 사용하십시오.
6) 잘 닦고 정비된 부품을 분해의 역순으로 조립하면 됩니다. 이때 부품에 흠이나 무리한 충격을 피하여야 하며, 가스켓 등은 신축성이 떨어지므로 교환하는 것이 좋습니다.
7) 조립시 볼트는 힘의 평형이 잘 맞도록 대각으로 조립하십시오.
8) 수냉식 자켓이나 열교환기가 부착된 형의 펌프는 정기적으로 점검, 청소하여 냉각능력을 유지하도록 하십시오.
9) 교환 부품이 당사 제품이 아닌 경우에는 그 품질을 인정할 수 없으므로 당사는 사후 봉사의 의무가 없습니다.

1) Following figure shows the structure and parts of the pump. Disassemble from right(left) to left (right)in order and lay the parts on a clean cloth. Pay attention not to damage or lose any parts.
2) Measure insulation resistance. Allowable resistance must be more than 2MΩ. At the time of shipment, it is more than 20MΩ.
3) Replace bearing and sleeve in case the tolerance between the outer diameter of sleeve and the inner diameter of bearing exceeds 0.5mm.
4) Periodically check and replace bearings.
5) The bearings can normally withstand 8,000 hours of continuous operation. However, wear may be accelerated by cavitation and erroneous operation. After 700 hours from initial operation, check wearing condition of the bearings and keep the result as a useful data for maintenance.
6) Assembly is the reverse of disassembly. Pay careful attention not to damage any parts. Replace gasket in case its elasticity is deteriorated.
7) Clamp the bolts diagonally in order to keep the balance of clamping torque.
8) For the pumps with heat exchanger or/and cooling-water jacket, routine check and cleaning should be performed to maintain high cooling efficiency.
9) Halla is not obliged to repair or replace any parts which are not the products of Halla. We warrants the quality of Halla's products only.

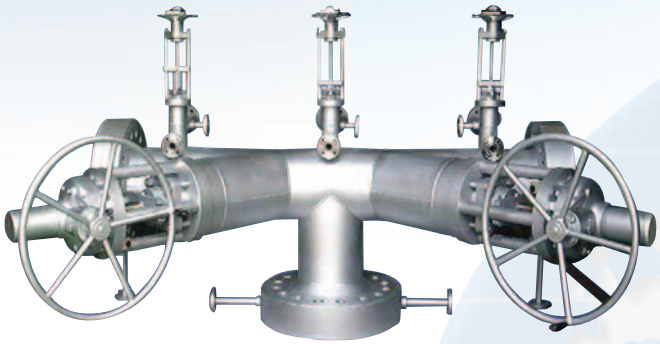
(6) 표준형 펌프의 분해 조립도(Disassembling & Assembling the basic type pumps)



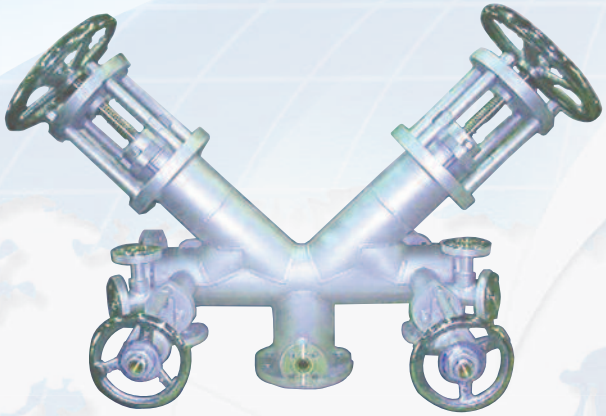
No.	DESCRIPTION.	No.	DESCRIPTION.	No.	DESCRIPTION.	No.	DESCRIPTION.
1	CASING	7	BEARING	13	BOLT	19	PIN
2	IMPELLER	8	SLEEVE	14	WRENCH BOLT	20	TERMINAL BOX
3	F.B HOUSING	9	COLLAR	15	HEX' BOLT	21	BASE
4	R.B HOUSING	10	GASKET	16	HEX' BOLT	22	SUPPORT
5	STATOR ASS'Y	11	GASKET	17	HEX' BOLT	23	AIR COCK
6	ROTOR ASS'Y	12	SET SCREW	18	DRAIN BOLT	24	

Petrochemical Symthesis Process Polymer
OLIGOMER 3-WAY JACKETED VALVE ASS'Y

■ DIVERTER 3-WAY VALVE



Jacketed 3-Way valve
(250A/180A×200A/150A, 320kgf/㎠, 500℃)



Jacketed 3-Way × Sampling valve
(125A/100A×40A/25A, 30kgf/㎠, 500℃)

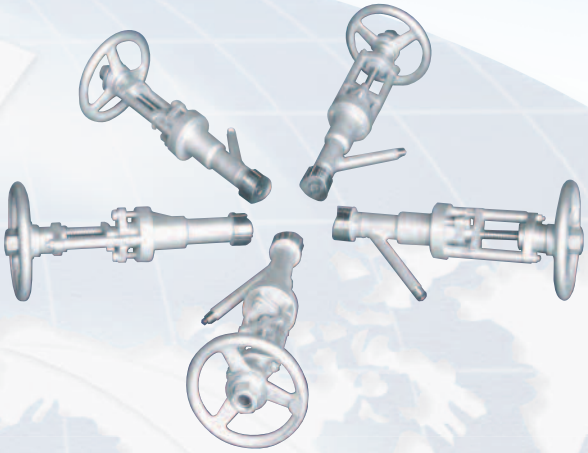
■ Y-GLOBE VALVE

Jacketed Y-valve
(300A/250A, Geared operation, 30kgf/㎠, 500℃)

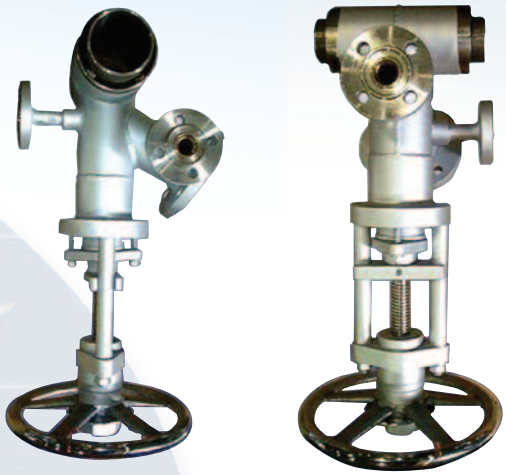
Jacketed Y-valve
(200A/150A, Geared operation, 20kgf/㎠, 500℃)

Petrochemical Symthesis Process Polymer
OLIGOMER 3-WAY JACKETED VALVE ASS'Y

■ SAMPLING / DRAIN VALVE

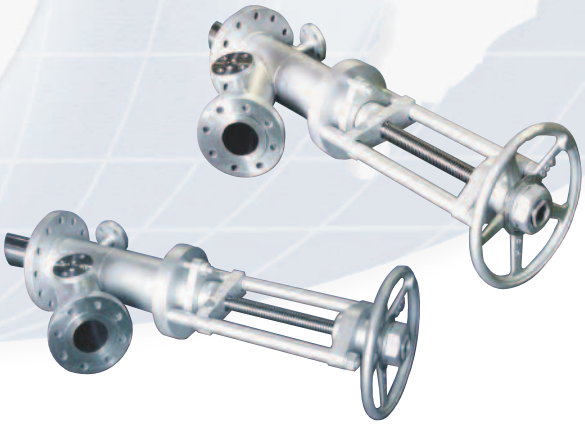


Jacketed Sampling valve
(20A/15A, 100kg/㎠, 500℃)



Jacketed Sampling valve
(100A/80A, 20kg/㎠, 500℃)

■ FLUSH BOTTOM TANK VALVE

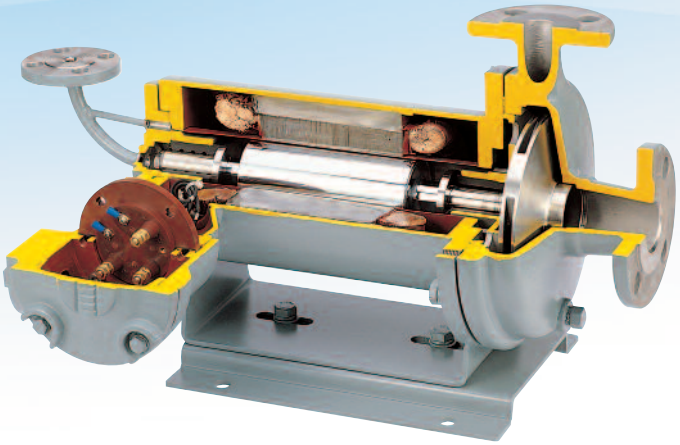


Jacketed Bottom valve
(100A/50A, 20kgf/㎠, 500℃)

NON SEAL CANNED MOTOR PUMPS

Refrigeration Pumps

■ 냉매이송펌프 내부 구조도
(Inside Structure of Reverse Circulation Type Pump)

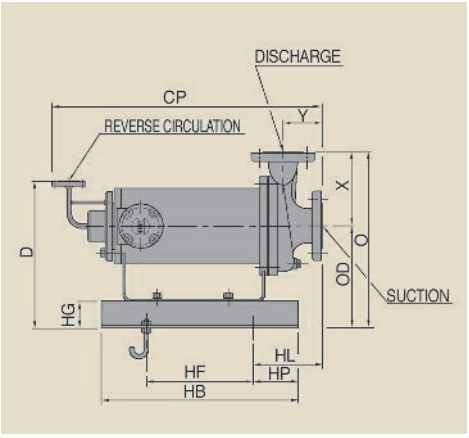


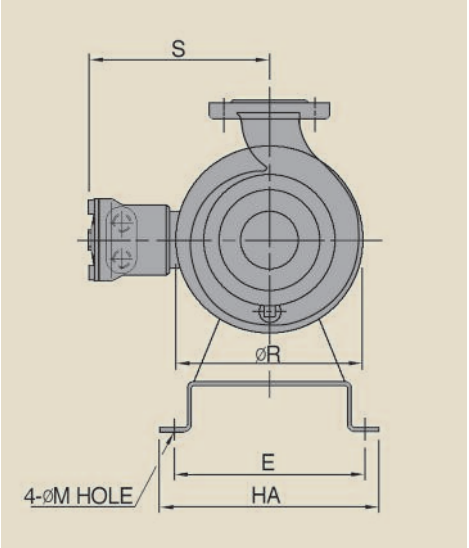
■ 베어링 마모 및 방향 표시기
(Bearing wear indicator & Rotation detector)

◀ 분리형 /
Panel type

■ 외형치수(Outline Dimensions)

inch
mm





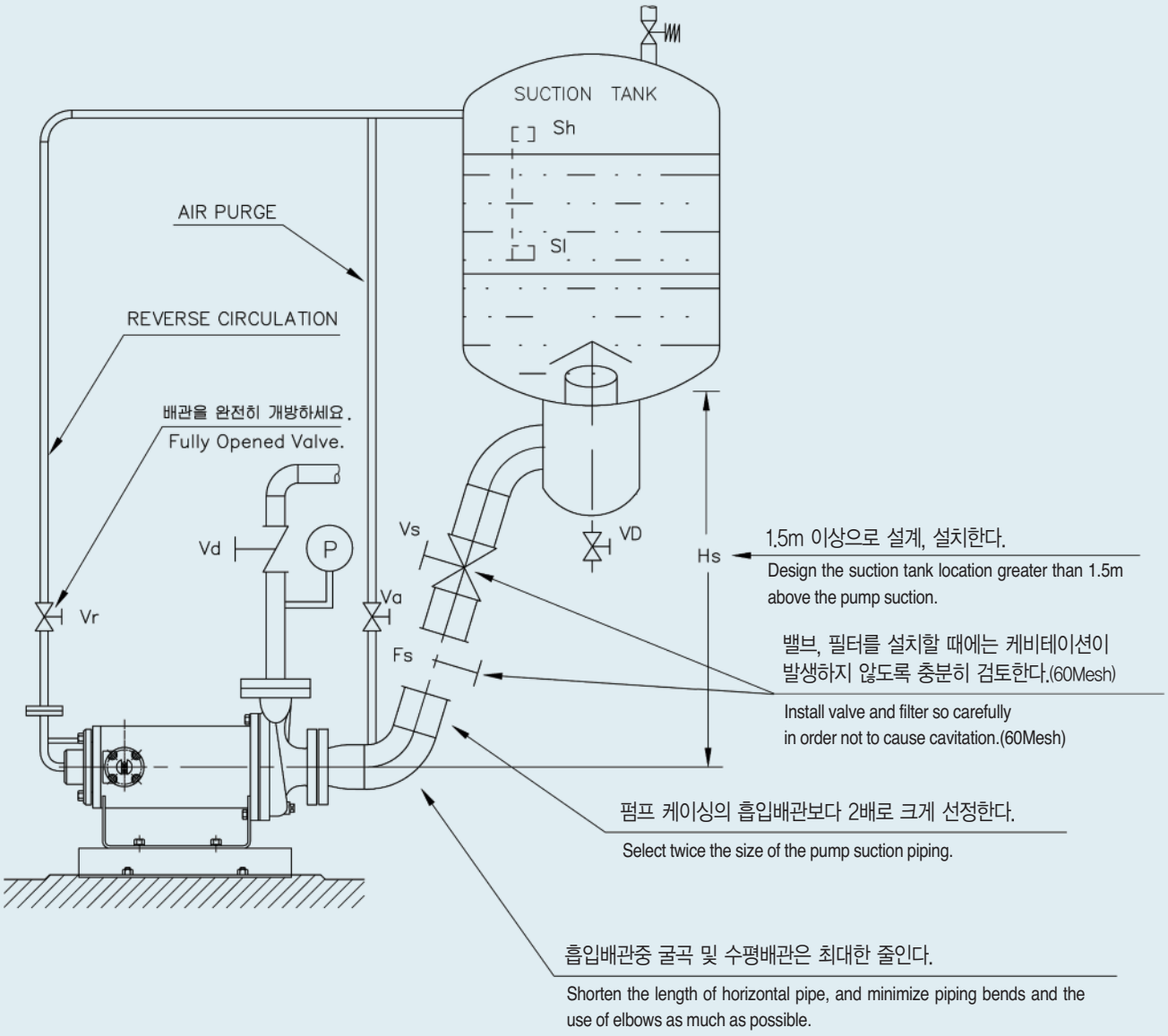
Code No.	MODEL No.	X	CP	Y	D	HG	HL	HF	HB	HP	E	HA	M	O	OD	R	S	Suction	Discharge
1	HR2E-401G	6.5	24.2	3.9	10.0	1.0	6.5	8.3	12.2	2.0	7.5	8.7	0.6	13.0	6.5	9.5	11.6	1? B	1B
		165	615	100	255	25	165	210	310	50	190	220	15	330	165	240	295	40A	25A
2	HR3E-401G	6.5	24.2	3.9	10.0	1.0	5.7	8.3	12.2	2.0	7.5	8.7	0.6	13.0	6.5	9.5	11.6	1? B	1B
		165	615	100	255	25	145	210	310	50	190	220	15	330	165	240	295	40A	25A
3	HR2E-501G	7.1	24.2	3.9	10.0	1.0	6.3	8.3	12.2	2.0	7.5	8.7	0.6	13.0	6.5	9.5	11.6	2B	1? B
		180	615	100	255	25	160	210	310	50	190	220	15	330	165	240	295	50A	40A
4	HR3E-501G	7.1	24.2	3.9	10.0	1.0	6.3	8.3	12.2	2.0	7.5	8.7	0.6	13.6	6.5	9.5	11.6	2B	1? B
		180	615	100	255	25	160	210	310	50	190	220	15	345	165	240	295	50A	40A
5	HR5E-501G	7.1	24.8	3.7	10.2	1.2	6.3	10.2	15.0	2.4	7.5	8.7	0.6	13.8	6.7	9.5	12.2	2B	1? B
		180	630	95	260	30	160	260	380	60	190	220	15	350	170	240	310	50A	40A
6	HR6E-501G	7.1	25.6	3.7	10.2	1.2	5.3	11.0	15.0	2.4	7.5	8.7	0.8	13.8	6.7	9.5	12.2	2B	1? B
		180	650	95	260	30	135	280	380	60	190	220	19	350	170	240	310	50A	40A
7	HR5E-502T	8.3	24.4	3.9	12.4	1.2	5.9	11.0	17.3	3.2	9.3	11.0	0.8	17.1	8.9	11.2	12.2	2B	1? B
		210	620	100	315	30	150	280	440	80	235	280	19	435	225	285	310	50A	40A
8	HR6E-502T	8.3	24.4	3.9	12.4	1.2	5.9	11.0	17.3	3.2	9.3	11.0	0.8	17.1	8.9	11.2	12.2	2B	1? B
		210	620	100	315	30	150	280	440	80	235	280	19	435	225	285	310	50A	40A
9	HR7E-403G	7.9	25.6	3.9	12.3	2.0	5.9	11.0	17.3	3.2	9.5	11.0	0.8	16.6	8.7	20.1	12.2	1? B	1B
		200	650	100	312	50	150	280	440	80	240	280	19	422	222	510	310	40A	25A
10	HR10E-403G	8.7	26.4	3.9	12.3	2.0	5.9	11.0	17.3	3.2	9.5	11.0	0.8	16.6	8.7	20.1	12.2	1? B	1B
		220	670	100	312	50	150	280	440	80	240	280	19	422	222	510	310	40A	25A
11	HR7E-502T	8.3	25.8	3.7	12.3	2.0	6.1	11.0	17.3	3.2	9.5	11.0	0.8	16.6	8.7	20.9	12.2	2B	1? B
		210	655	95	312	50	155	280	440	80	240	280	19	422	222	530	310	50A	40A
12	HR10E-502T	8.3	26.6	3.7	12.3	2.0	6.1	11.0	17.3	3.2	9.5	11.0	0.8	16.6	8.7	20.9	12.2	2B	1? B
		210	675	95	312	50	155	280	440	80	240	280	19	422	222	530	310	50A	40A

* Flange Rating can be changed according to customers' demands.

NON SEAL CANNED MOTOR PUMPS

Refrigeration Pumps

■ 그림-1. 냉매이송펌프의 설치배관도(Figure-1. Reverse Circulation Type Pump Piping)



Vs : SUCTION VALVE
Vd : DISCHARGE VALVE (CHECK VALVE)
Vr : REVERSE CIRCULATION VALVE
Fs : SUCTION FILTER
Sh : HIGH LEVEL SWITCH
Sl : LOW LEVEL SWITCH
P : DISCHARGE PRESSURE GAUGE
Hs : NPSH AVAIL
VD : OIL DRAIN VALVE
Va : AIR PURGE VALVE

NON SEAL CANNED MOTOR PUMPS

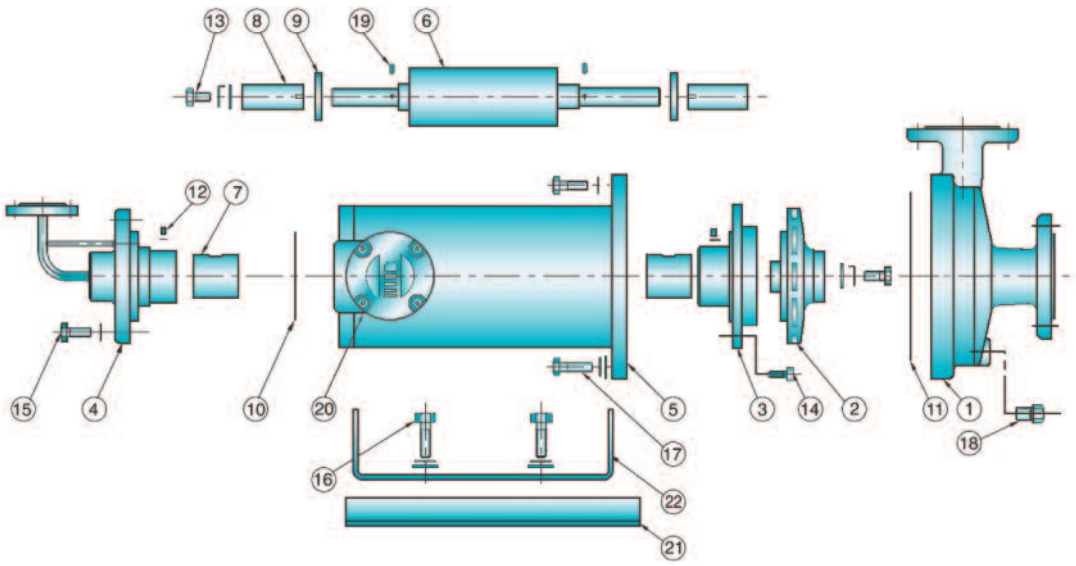
Refrigeration Pumps

(1) 배관설계(Piping Design)

1) 역순환형 펌프의 내부 부품과 구조는 아래 그림2와 같습니다. 배관은 그림1과 같은 구조로 하는 것이 일반적입니다.
2) 석션탱크의 유효흡입 높이 Hs는 필요 NPSH의 1.5m 이상으로 설계하는 것이 안전합니다.
3) 펌프 흡입관의 크기는 흡입 구경의 2배로하고 배관중 굴곡은 최대한 피하여야 합니다.
4) 흡입관에 와류, 흐름장애를 일으키는 밸브, 필터등을 설치할 때는 캐비테이션에 대하여 충분히 검토하십시오.(60Mesh)
5) 가스층이 생기는 상하 굴곡은 절대 피하여야 하며 위로부터 아랫방향 혹은 수평으로 펌프를 향하여 배관되어야 하며 수평배관은 가능한 짧게 시공하십시오.
6) 비틀림이나 배관 중량 등 펌프에 응력이 걸리지 않도록 하고 필요시 신축 이음매나 지주를 설치하십시오.
7) 과다한 토출량이 우려되는 곳에는 토출측에 오리피스를 설치하십시오.
8) 배관과 펌프에 단열공사를 충분히 하십시오.
9) 배관후 누액 부분이 없는지 검사하십시오.

1) Figure-2. shows the typical inside parts and structure of an reverse circulation pump. Figure-1. shows typical piping configuration of this pump.
2) Wherever possible it is desirable to increase the NPSH available by designing the suction tank location greater than 1.5m above the pump suction.
3) Suction piping twice the size of the pump inlet should be selected for minimzing flow restrictions. Minimize piping bends and the use of elbows when piping.
4) Any flow restrictions may become a source of cavitation. Therefore, carefully consider valve and strainer designs for the suction piping, since many designs cause vortex flows or increased flow resistance.(60Mesh)
5) Arrange the piping downward or horizontally to pump suction, shorten the length of horizontal pipe runs to the pump suction casing, and minimize piping bends and the use of elbows as much as possible to help eliminate the possible development of vapor pockets.
6) Make certain that the design and installation of piping supports is properly considered and implemented not to be subjected to undue stresses and deformation before pump installation begins.
7) Utilize an orifice plate on the discharge side of pump if excessive discharge capacity is expected.
8) Use of sufficient adiabatic analysis of the pump and system is desirable to avoid system problems.
9) Always check each connection carefully for leakage after an installation or reinstallation.

(2) 그림-2. 역순환형 펌프의 분해 조립도(Figure-2. Disassembling & Assembling the Reverse Circulation Type Pumps)



No.	DESCRIPTION.	No.	DESCRIPTION.	No.	DESCRIPTION.	No.	DESCRIPTION.
1	CASING	7	CARBON BEARING	13	BOLT	19	PIN
2	IMPELLER	8	SHAFT SLEEVE	14	WRENCH BOLT	20	TERMINAL BOX
3	F.B HOUSING	9	THRUST COLLAR	15	HEX' BOLT	21	BASE
4	R.B HOUSING	10	GASKET	16	HEX' BOLT	22	SUPPORT
5	STATOR ASS'Y	11	GASKET	17	HEX' BOLT		
6	ROTOR ASS'Y	12	SET SCREW	18	DRAIN BOLT		

NON SEAL CANNED MOTOR PUMPS

Refrigeration Pumps

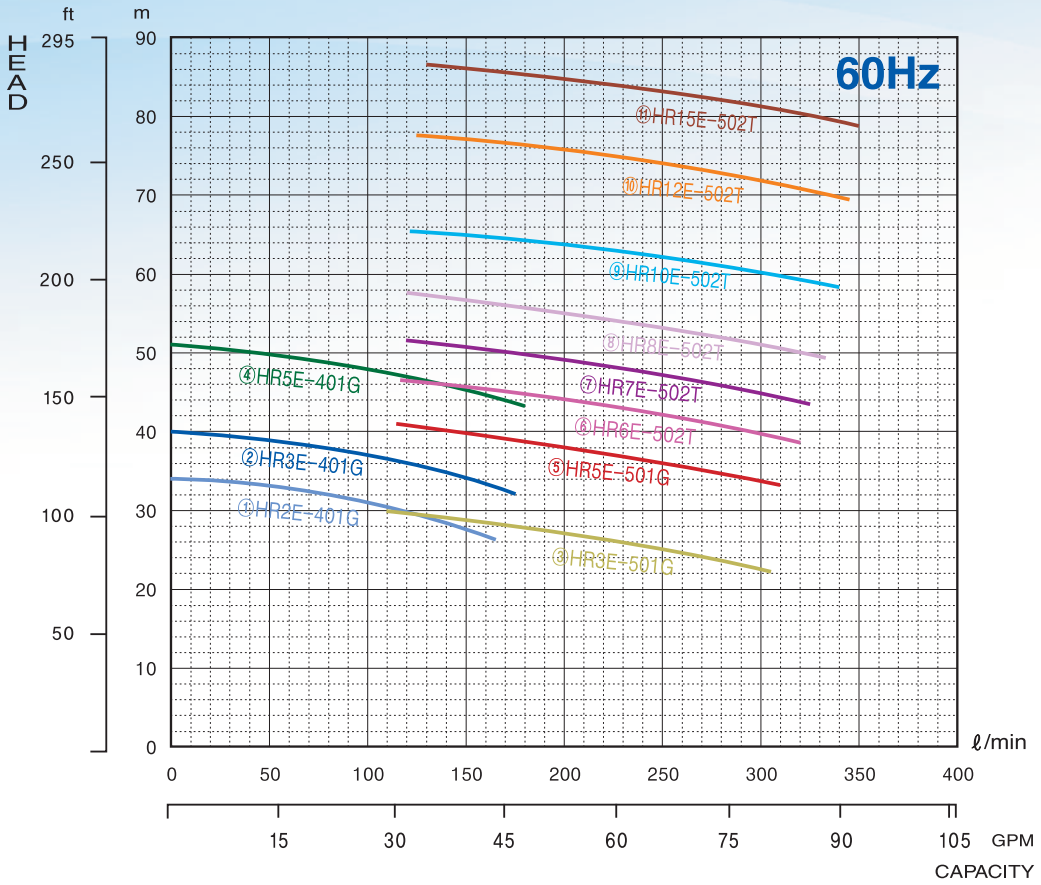
- 냉동창고 : Cold Storage
- 냉동장치어선 : Freezer Boat

◀ 냉동공장에 설치된 한라펌프
(Halla Pumps installed in cold storage)

NON SEAL CANNED MOTOR PUMPS

Refrigeration Pumps

■ NH3 펌프 성능곡선도 / NH_3 Pump Performance Curve



■ NH3 펌프 모델 및 사양서 / NH_3 Pump Specification Sheet

ℓ/min m mm GPM ft inch

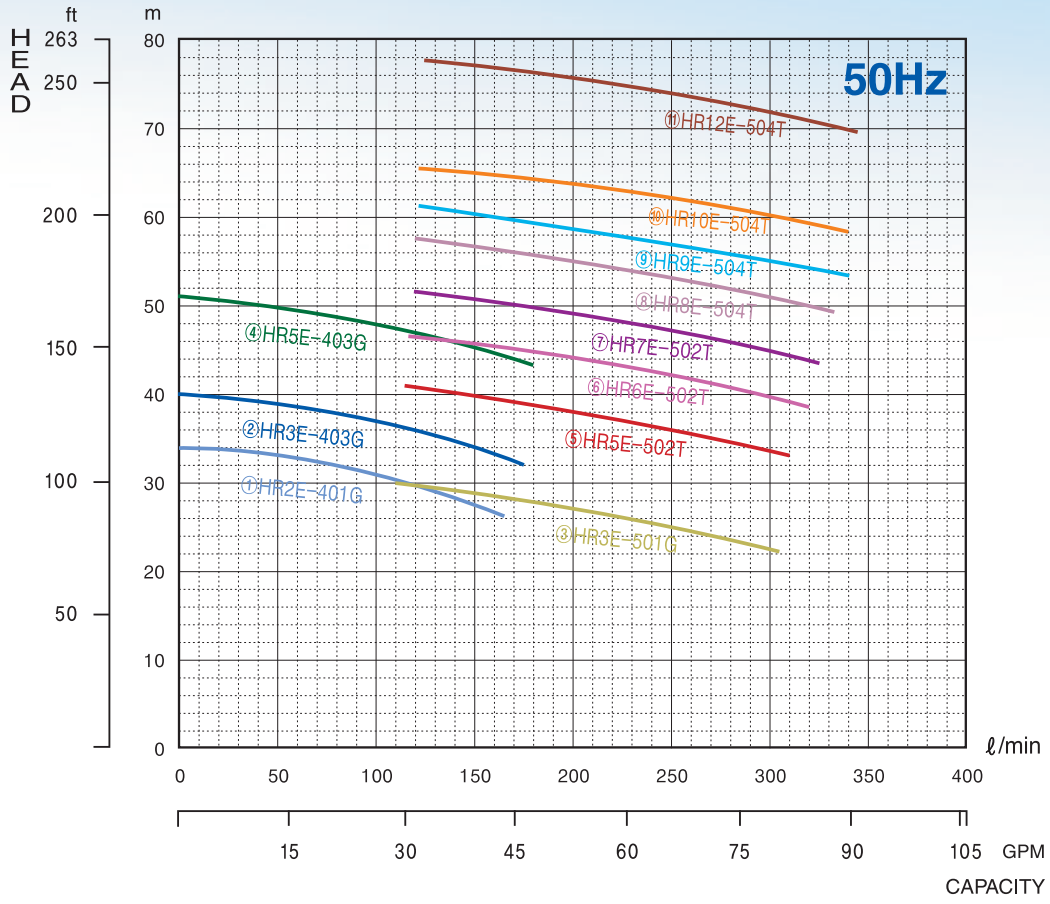
No.	MODEL No.	Capacity		Head		Power(KW)	Current(A) (220V)	Size			
		ℓ / min	GPM	m	ft			Suction		Discharge	
1	HR2E-401G	100	26.4	31	101.7	1.7	8.2	40A	1½B	25A	1B
2	HR3E-401G	100	26.4	37	121.4	2.5	10.5	40A	1½B	25A	1B
3	HR3E-501G	200	52.8	27	88.6	2.5	10.5	50A	2B	40A	1½B
4	HR5E-401G	100	26.4	48	157.5	3.7	15	40A	1½B	25A	1B
5	HR5E-501G	200	52.8	38	124.7	3.7	15	50A	2B	40A	1½B
6	HR6E-502T	200	52.8	44	144.4	4.5	18	50A	2B	40A	1½B
7	HR7E-502T	200	52.8	49	160.8	5.5	22	50A	2B	40A	1½B
8	HR8E-502T	200	52.8	55	180.4	6.2	25	50A	2B	40A	1½B
9	HR10E-502T	200	52.8	64	210.0	7.5	30	50A	2B	40A	1½B
10	HR12E-502T	200	52.8	76	249.3	9	36	50A	2B	40A	1½B
11	HR15E-502T	200	52.8	85	278.9	11	44	50A	2B	40A	1½B

* The models above mentioned are just standard of our products, we can also manufacture big size pumps and special usage pumps.

NON SEAL CANNED MOTOR PUMPS

Refrigeration Pumps

■ NH3 펌프 성능곡선도 / NH_3 Pump Performance Curve



■ NH3 펌프 모델 및 사양서 / NH_3 Pump Specification Sheet

ℓ/min m mm GPM ft inch

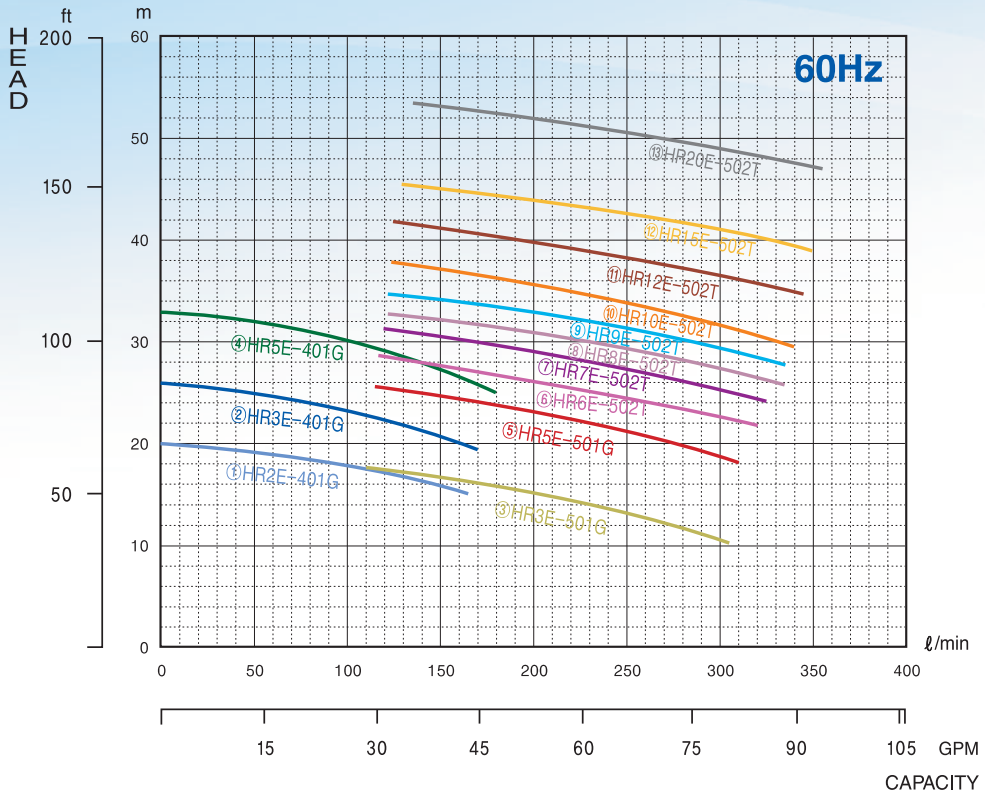
No.	MODEL No.	Capacity		Head		Power(KW)	Current(A) (220V)	Size			
		ℓ / min	GPM	m	ft			Suction		Discharge	
1	HR2E-401G	100	26.4	31	101.7	1.7	8.2	40A	1½B	25A	1B
2	HR3E-403G	100	26.4	37	121.4	2.5	10.5	40A	1½B	25A	1B
3	HR3E-501G	200	52.8	27	88.6	2.5	10.5	50A	2B	40A	1½B
4	HR5E-403G	100	26.4	48	157.5	3.7	15	40A	1½B	25A	1B
5	HR5E-502T	200	52.8	38	124.7	3.7	15	50A	2B	40A	1½B
6	HR6E-502T	200	52.8	44	144.4	4.5	18	50A	2B	40A	1½B
7	HR7E-502T	200	52.8	49	160.8	5.5	22	50A	2B	40A	1½B
8	HR8E-504T	200	52.8	55	180.4	6	25	50A	2B	40A	1½B
9	HR9E-504T	200	52.8	59	193.6	6.8	27	50A	2B	40A	1½B
10	HR10E-504T	200	52.8	64	210.0	7.5	30	50A	2B	40A	1½B
11	HR12E-504T	200	52.8	76	249.3	9	36	50A	2B	40A	1½B

* The models above mentioned are just standard of our products, we can also manufacture big size pumps and special usage pumps.

NON SEAL CANNED MOTOR PUMPS

Refrigeration Pumps

■ R-22 펌프 성능곡선도 / R-22 Pump Performance Curve



■ R-22 펌프 모델 및 사양서 / R-22 Pump Specification Sheet

ℓ/min m mm GPM ft inch

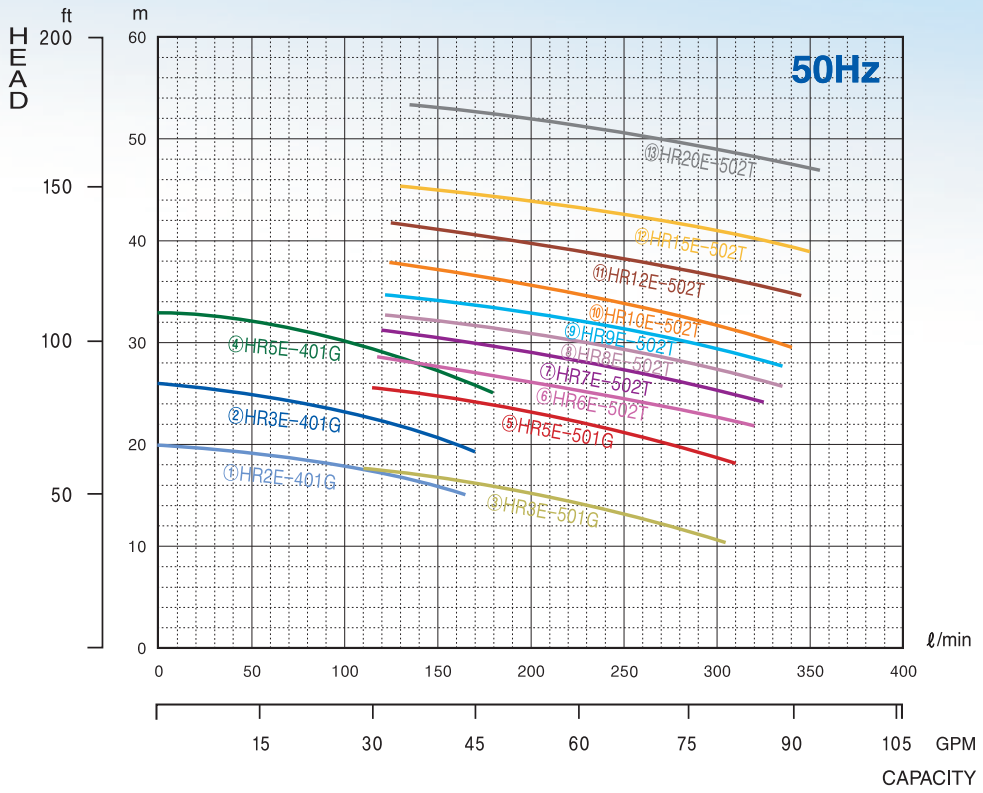
No.	MODEL No.	Capacity		Head		Power(KW)	Current(A) (220V)	Size			
		ℓ / min	GPM	m	ft			Suction		Discharge	
1	HR2E-401G	100	26.4	18	59.1	1.7	8.2	40A	1½B	25A	1B
2	HR3E-401G	100	26.4	23	75.5	2.5	10.5	40A	1½B	25A	1B
3	HR3E-501G	200	52.8	15	49.2	2.5	10.5	50A	2B	40A	1½B
4	HR5E-401G	100	26.4	30	98.4	3.7	15	40A	1½B	25A	1B
5	HR5E-501G	200	52.8	23	75.5	3.7	15	50A	2B	40A	1½B
6	HR6E-502T	200	52.8	26	85.3	4.5	18	50A	2B	40A	1½B
7	HR7E-502T	200	52.8	29	95.1	5.5	22	50A	2B	40A	1½B
8	HR8E-502T	200	52.8	31	101.7	6.2	25	50A	2B	40A	1½B
9	HR9E-502T	200	52.8	33	108.3	6.8	27	50A	2B	40A	1½B
10	HR10E-502T	200	52.8	36	118.1	7.5	30	50A	2B	40A	1½B
11	HR12E-502T	200	52.8	40	131.2	9	36	50A	2B	40A	1½B
12	HR15E-502T	200	52.8	44	144.4	11	44	50A	2B	40A	1½B
13	HR20E-502T	200	52.8	52	170.6	15	58	50A	2B	40A	1½B

* The models above mentioned are just standard of our products, we can also manufacture big size pumps and special usage pumps.

NON SEAL CANNED MOTOR PUMPS

Refrigeration Pumps

■ R-22 펌프 성능곡선도 / R-22 Pump Performance Curve



■ R-22 펌프 모델 및 사양서 / R-22 Pump Specification Sheet

ℓ/min m mm GPM ft inch

No.	MODEL No.	Capacity		Head		Power(KW)	Current(A) (220V)	Size			
		ℓ / min	GPM	m	ft			Suction		Discharge	
1	HR2E-401G	100	26.4	18	59.1	1.7	8.2	40A	1½B	25A	1B
2	HR3E-401G	100	26.4	23	75.5	2.5	10.5	40A	1½B	25A	1B
3	HR3E-501G	200	52.8	15	49.2	2.5	10.5	50A	2B	40A	1½B
4	HR5E-401G	100	26.4	30	98.4	3.7	15	40A	1½B	25A	1B
5	HR5E-501G	200	52.8	23	75.5	3.7	15	50A	2B	40A	1½B
6	HR6E-502T	200	52.8	26	85.3	4.5	18	50A	2B	40A	1½B
7	HR7E-502T	200	52.8	29	95.1	5.5	22	50A	2B	40A	1½B
8	HR8E-502T	200	52.8	31	101.7	6.2	25	50A	2B	40A	1½B
9	HR9E-502T	200	52.8	33	108.3	6.8	27	50A	2B	40A	1½B
10	HR10E-502T	200	52.8	36	118.1	7.5	30	50A	2B	40A	1½B
11	HR12E-502T	200	52.8	40	131.2	9	36	50A	2B	40A	1½B
12	HR15E-502T	200	52.8	44	144.4	11	44	50A	2B	40A	1½B
13	HR20E-502T	200	52.8	52	170.6	15	58	50A	2B	40A	1½B

* The models above mentioned are just standard of our products, we can also manufacture big size pumps and special usage pumps.

NON SEAL CANNED MOTOR PUMPS

■ 형식선정(Selection of Halla Pumps)

• MODEL NO. INDICATION

	Motor			Type		Pump		Material	
EX	1	2	3	4	5	6	7	8	9

EX : EXPLOSION – PROOF TYPE ELECTRIC CONNECTION BOX ⇨ Proof Type Pump

MOTOR

① MOTOR OUTPUT (HP)

② MOTOR INSULATION CLASS
- E : E class
- F : F class
- H : H class
- C : C class
- Z : Z class

③ MOTOR POLE NUMBER
- Blank : 2 - pole
- 4 : 4 - pole
- 6 : 6 - pole
- 8 : 8 - pole

PUMP TYPE

⑥ PUMP CASING NO.
(Standard Type No.)
Example : 403G
501G
601G

⑦ PUMP CASING FLANGE PART NO.
- BLANK : Standard Casing
- KS 10K RF Flange
- ALPHABET : Special type
- 2 : KS 20K RF Flange
- 3 : KS 30K RF Flange
- A : ANSI #150 RF Flange
- A_3 : ANSI #300 RF Flange
- A_4 : ANSI #400 RF Flange

TYPE DIVISION

④ PUMP INSTALLATION
- H : Horizontal Type
- V : Vertical Type
- L : Line Type

⑤ PUMP APPLICATION CONDITION
- B : Basic Type
- O : Outlet circulation
- T : Non-cooling High Temp
- R : Reverse Circulation Type
- M : High Melting Point Heating Jacket Type
- A : High Temperature Cooling jacket Type
- S : Slurry Separate Type
- G : Gas inlet Type
- K : Slurry Separate Type With Steam Jacket
- N : Oil Circulation Type
- Q : Motor & Pump Separate Type
- C : Special Type

MATERIAL

⑧ CONTACTING FLUID PART
(Main Material)
- S4 : Stainless Steel 304
- S6 : Stainless Steel 316
- SL : Stainless Steel 316L
- Di : Ductile iron
- CS : Cast Steel
- MO : Monel
- HB : Hastelloy - B
- HC : Hastelloy - C
- Ti : Titanium

⑨ SPARE PARTS
- Blank : Standard Spare Parts
- Others : Special Spare Parts

■ Example

EX 2 H H B 401G SL

- 8 Main Material : Stainless Steel 316L
- 6 Casing Size : 40/25A (Suction/Discharge)
  Others : Purchaser's Standard
- 5 Basic Type Pump
- 4 Horizontal Type Pump
- 2 Motor Insulation Class : H Class
- 1 2HP Motor (1.5Kw)
- Explosion - Proof Type Pump

NON SEAL CANNED MOTOR PUMPS

주문사양서 / Inquiry Data Sheet

Campany : **Department :** **Name :** **Position :** **Tel :** **Fax :**

TEL : 82-51-264-2201 / FAX : 82-51-264-2207	
SALES	
DESIGN	

· **Inquiry Data**

1. Liquid Pumped

· Name :_____ Conc.: _____ % · Specific Gravity (Max._____Norm._____)
· Temperature 〔Max._____℃(℉) Norm._____℃(℉) Min._____℃(℉)〕 Melt. Point _____ · Viscosity (Max._____Norm._____)
Vapor Pressure (Max._____Norm._____) Specific Heat _____
· Suspended material (Yes) (No) Name_____ Conc._____wt.% Grain Size (Max._____Norm._____)
Specific Gravity _____ Viscosity (Mother Liquid _____ Apparent _____)
Remarkable Characteristics : _____
(Adhesiveness, Sedimentation, Hardness, Shape, Solubility, Degeneration Grain - size Distribution)
Others : _____
(Corrosion/Erosion, Compressibility, Boiling point, Crystallization, Thermal Conductivity, Polymerization, Degeneration, etc)

2. Pump Specification

Pump Type (Normal/Self-Priming / Submerged)
Impeller Type when requested (Open, Closed)
· Flow Rate (Max._____Norm._____Min._____) · Total Head _____m(ft) Differential Pressure _____
· Suction Pressure (Max._____Norm._____Min._____) Dis. Pressure (Max._____Norm._____Min._____)
Pump Operation (Independently, In Series, In Parallel)
Back Flushing (Yes/No) Liquid _____ Temperature _____℃(℉) Pressure _____
Starter (Direct · Transformer · Reactor)
Operating Condition (Continuous, Intermittent _____hr/dy)
Terminal Box Cable Entry (Steel conduit Type / Packing Type)
Liquid End
Materials _____ Flange St'd (Suc. _____ Disc. _____)
Others : _____
(Material Selection, Restriction to Dome curve, Suction Height, Submerged Depth, Back Flushing Volume Limit Flange Direction, Designated Motor Revolution Speed, Possibility of Operation with Water, Impeller Diameter Limit etc.)

3. Installation Conditions

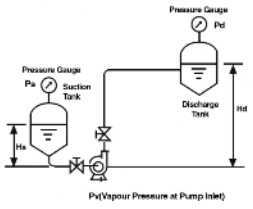
Ambient Temperature 〔Max._____℃(℉) Norm._____℃(℉) Min._____℃(℉)〕 Elevation _____
· Location (Indoor, Outdoor) Mounting (Horizontal, Vertical, In-Line)
· Electric Source (3Ø_____Hz _____V) · Explosion Proof Class _____
Applicable Regulations _____
Utilities : _____
(Cooling Water, Steam, Electric Source for Instrument Limit, Piping Load etc.)

4. Piping Condition

· NPSH(A) 〔_____m(ft)〕

(Suction Side)	Ps		Hs		Dp1
	Lp1		Le1		Pv
(Disc. Side)	Pd		Hd		Dp2
	Lp2		Le2		

Dp1, Dp2 (Pipe Inner Dia.)
Lp1, Lp2 (Pipe Actual Length)
Le1, Le2 (Pipe Equivalent Length)



5. Others

Spare Parts _____
Accessories _____
Remarks _____
(Note) Items marked with · are minimum information required for selection of pump.

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