

Refrigerated Air Dryer Operating Manual



- Please read this manual before using this equipment must.
- Learn all the safety precautions before using this equipment, please keep.

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■ Introduction

The usability and the life cycle of the refrigerating compressed air-dryer (referred to below as dryers) as well as the avoidance of premature repairs depends on proper operation, care and competent repair under consideration of these operating instructions.

■ Product Information

Due to our position as suppliers of components we do not always know the final usage and total range of products' applications. We constantly improve our products to the latest state of science and technology and therefore, we assume that our products are free from defects in the sense of product liability. However, it cannot be excluded that during faulty operation in critical areas of application especially at danger to life and limb of persons involved, additionally safety measures may be necessary. Therefore, we request the user of our components units, to ensure in his own interest, to inform us about the application of our products in order to initiate additional safety measures, if necessary.

■ Disposal

When disposing of used devices, pay attention to oil and refrigerant in the hermetical sealed refrigerating circuit of the dryers. Therefore, before dismantling, these components must be disposed by a special company.

The remaining materials are listed on the recycling label inside the dryer. Other materials are named at the recycling label inside the dryer.

■ Waste Oil

The owner of waste oil is responsible for its proper disposal. National environmental protection laws must be met.



Do not dispose waste oil into the environment. Do not mix with household rubbish and do not burn in unauthorized plants.

■ Refrigerant

Prevent the escape of refrigerant into the atmosphere during mounting and maintenance by appropriate measures.

■ General Note

The Company does not accept responsibility if these safety measures are not met during, handling, operation, maintenance and repair, even though this is not strictly stated in these operating instructions. We recommend receipt and notice of these operating instructions verified by the operating personnel in writing (personnel file).

We request strict observation of these notes as otherwise we do not accept any liability in respect of this machine (plant).

■ First aid

- Take victim immediately into the fresh air or into a very well ventilated room.
- Splashes of refrigerant in the eyes must be blown out with the mouth. Then rinse eyes with plenty of water. Do not wipe with cloth!
- If the victim does not breathe, perform a mouth-to-mouth resuscitation or use a respirator until the doctor's arrival.
- Call the doctor and inform him that accident has been caused by refrigerants, for refrigerant type, see identification plate!
- Never leave the victim unattended.

■ Light

Dryer is not provide with a local lighting since it is designed for indoor use only. The sufficient illumination of the working area must be fulfilled by the factory in accordance with the appropriate code of practice and factory regulations.

■ General Caution

- Protective or safety devices must not be removed, modified or readjusted.
- During operation of the Dryer none of the protective of safety devices must be removed, modified or readjusted temporarily or permanently.
- Use proper tools for maintenance and repair work only.
- Use original spare parts only.
- All maintenance works must be performed at stopped machine, disconnected power supply and pulled mains plug only. Ensure that the dryer cannot be switched on by mistake.
- Prior to dismounting a part under pressure disconnect the Dryer from all pressure sources or depressurize the complete system respectively.
- Never weld the pressure vessel or modify it in any way.
- Ensure that no tools, loose parts or similar are left in the system.
- Do not use inflammable solvents for cleaning the parts. Keep the environment absolutely clean during maintenance and repair works. Keep free of dirt by covering the parts and free openings with clean cloth, paper or adhesive tape.



The operator has to observe the national working-, operating- and safety regulations. Also existing internal factory regulations must be met. Maintenance and repair work must only be carried out by specially trained personnel and, if necessary, under supervision of a person qualified for this work.

■ Refrigerant Caution

- Wear eye protection and protective gloves
- Avoid contact of liquid refrigerants with your skin (frostbite, chilblains).
- Do not inhale highly concentrated refrigerant vapors(oxygen displacement).
- To Avoid higher concentrations, all working rooms must be ventilated very well. The opening of windows and doors may not be sufficient, so an exhausting system must be used directly at the supply point or near the floor.
- Do not smoke, because fire might decompose the refrigerant. The resulting substances are toxic and must not be inhaled.
- Do not have refrigerants escaped during filling or repair work. Cover with tape.
- Leave the room immediately and only enter after the room has been sufficiently ventilated when refrigerant concentrations (e.g. pipe line leakages) appear suddenly.
- Execute welding and soldering works on refrigerating systems in well-ventilated rooms only. Refrigerants will be decomposed in flames as well as in electrical arcs. Please, prepare the eye protector and protective gloves at the end-user site. The resulting decomposition products are toxic.
- Before welding and soldering at refrigerating systems, drain refrigerant from the corresponding system component and dispose properly.

■ Danger Warning



Hot surface ■

- Copper Tubing of Ref. High Pressure Section
- Fan Motor Surface
- Ref. Compressor Surface



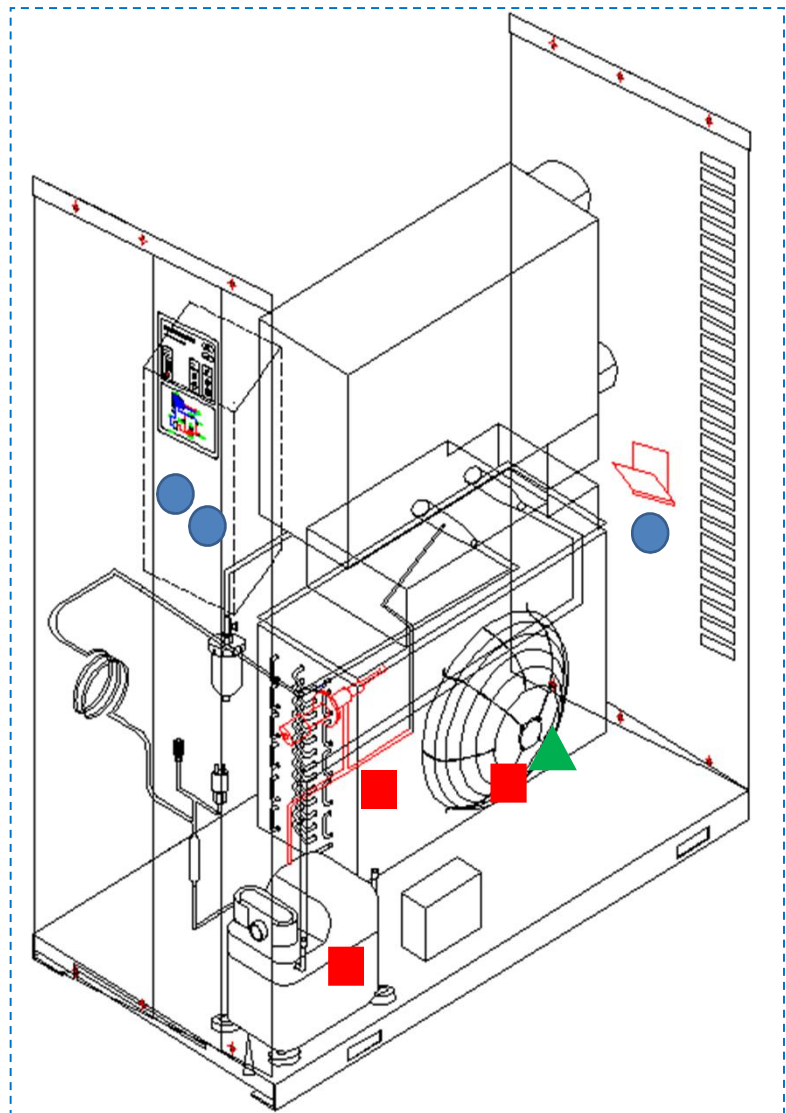
Danger electricity ●

- Control Board
- Power Connection Section



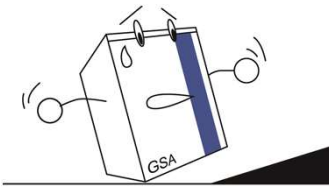
Rotating parts ▲

- Fan Blade



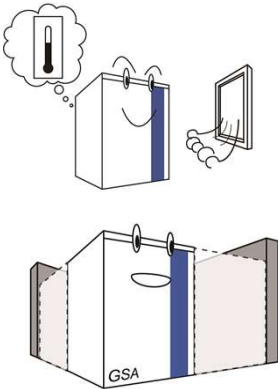
2. Installation

■ Transportation



Transport the air dryer in the upright position only. Air dryers can be transported at a 45° incline position for short distance and time only. In case of greater inclination or horizontal transportation over longer distances, there is the risk that e.g. the refrigerant compressor is damaged in its suspension. The Dryer may be transported by two men or forklift.

■ Installation



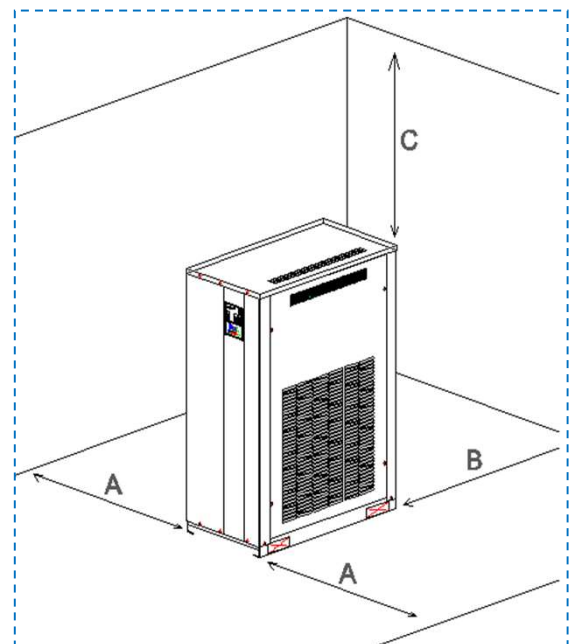
- Install the air dryer on secure level surface a convenient, accessible location.
- The air dryer can be installed anchorage or special foundation at the location desired.
- Select a clean, cool & dry area, free from dust, and protected from atmospheric disturbances.
- Maintain ambient temperature of 1°C(34°F) to 35°C(95°F) at installation place.
- Do not obstruct the cooling air inlet or outlet.
- Allow a sufficient clearance on each side of the dryer for proper ventilation and to facilitate maintenance operations.



Failure to install dryer in the proper ambient conditions will affect the dryer's ability to condense refrigerant gas. This can cause higher loads on the ref. compressor, loss of air dryer efficiency and performance, overheated condenser fan motors, electrical component failure and dryer failure due to the following: ref. compressor failure, fan motor failure and electrical component failure. Failures of this type will affect warranty considerations. Do not install dryer in an environment of corrosive chemicals, explosive gasses, poisonous gasses; steam heat, areas of high ambient conditions or extreme dust and dirt.

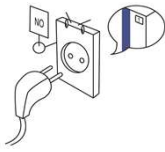
■ Installation Distance

HYD-N	A	B	C
5~20	500	500	500
30~100	1000	1000	1000
150~600	1500	1500	1500
750~2500	2000	2000	2000



2. Installation

■ Electrical Connection



- Before connecting the air dryer to the electrical supply, verify the nameplate for the proper electrical information.
- Voltage tolerance is +/- 10%.

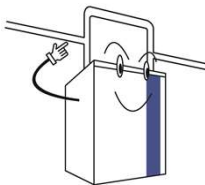


- Must install a suitable earth leakage circuit breaker.



- Qualified personnel should carry out connecting a air dryer to the main power.
- Phase rotation is important if the dryer has a 3 phase ref. compressor & condensing fan motor.
- If the scroll type ref. compressor is installed, press the fan test button and check the rotation direction of the fan motor. In case of reverse phase, change the position of 2 out of 3 power lines.
- Condenser Fan motor must pull air through condenser coil.

■ Piping

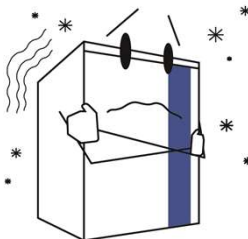


- Connect compressed air lines to the air dryer compressed air inlet and outlet.
- Install an optional bypass line for service purposes.
- If vibration is present, flexible metal hoses must be installed to prevent the vibration.



- Clean the pipelines of welding residual, rust, or other pollutants before attempting to connect to the air dryer.
- Install a suitable compressed air filters.

■ Condensate Drain

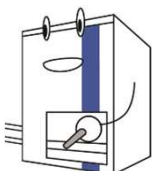


- The air dryer separates a mixture of water and oil from compressed air.
- Water and oil must be separated by suitable separator.
- Condensate drain valve is must opened.
- Prevent condensate drain pipeline from freezing and being bursting in winter.



- Never point the condensate drain line towards anybody.
- The condensate is discharge at the system pressure.
- Drain line should be secured.
- The After-sales service is provided at a cost in case the unit is damaged by debris or freeze or oil

■ Cooling Water Connection(Water Cooled Type)



- Operations to be performed by qualified personnel.
- Cooling water temperature range : 15°C(59°F) ~ 35°C(95°F)
- Cooling water Pressure range : 3barg ~ 8barg

3. Technical Specifications

■ Specification Information

Model	Capacity		Inlet Pressure	Power Consump.	Connection	Power	Size (A*B*C)	Weight	
	Nm ³ /min	SCFM							BARG
H Y D	5N	0.5	17.5	15	0.32	1/2	220V 1Ph 50/60Hz	247*557*723	36
	7N	0.8	28.0		0.33	1/2		247*557*723	36
	10N	1.0	35.3		0.34	3/4		247*557*723	36
	15N	1.5	52.9		0.35	1		428*508*709	45
	20N	2.6	91.8		0.41	1		428*508*709	45
	30N	3.9	137.7		1.01	1		358*658*864	66
	50N	6.7	236.6		1.35	1 1/2		408*708*952	89
	75N	10.5	370.8		1.95	2		458*798*1045	120
	100N	14.2	501.4		2.57	2		458*858*1145	126
	150N	21.0	741.6		3.18	2 1/2		565*1005*1330	172
	200N	30.0	1059.4	9.7	4.18	FLG 3	380/440V 1Ph 50/60Hz	550*1200*1447	240
	250N	39.0	1377.2		5.18	FLG 4		700*1200*1580	260
	300N	47.0	1659.7		6.08	FLG 4		700*1200*1580	270
	400N	56.0	1977.6		10.23	FLG 4		800*1591*1915	600
	500N	66.0	2330.7		13.05	FLG 6		1200*1800*1830	940
	600N	85.0	3001.7		15.45	FLG 6		1200*1800*1830	1100

■ Capacity Correction Factors

Ambient / Cooling Water Temp. [°C]	27	32	37	40	45	50
Factor	1.05	1.00	0.92	0.82	0.76	0.69

Inlet Temp. [°C]	28	33	38	43	48	53	58	63	68	70
Factor	1.46	1.20	1.00	0.85	0.73	0.63	0.55	0.48	0.42	0.40

Inlet Pressure [barg]	4	5	6	7	8	9	10	11	12	13	14	15
Factor	0.84	0.90	0.95	1.00	1.03	1.06	1.09	1.11	1.13	1.15	1.17	1.18

Dew Point [°C]	2	3	5	7	10
Factor	1.00	1.01	1.04	1.09	1.22

Frequency [Hz]	50	60
Factor	0.85	1.00

4. Technical Description

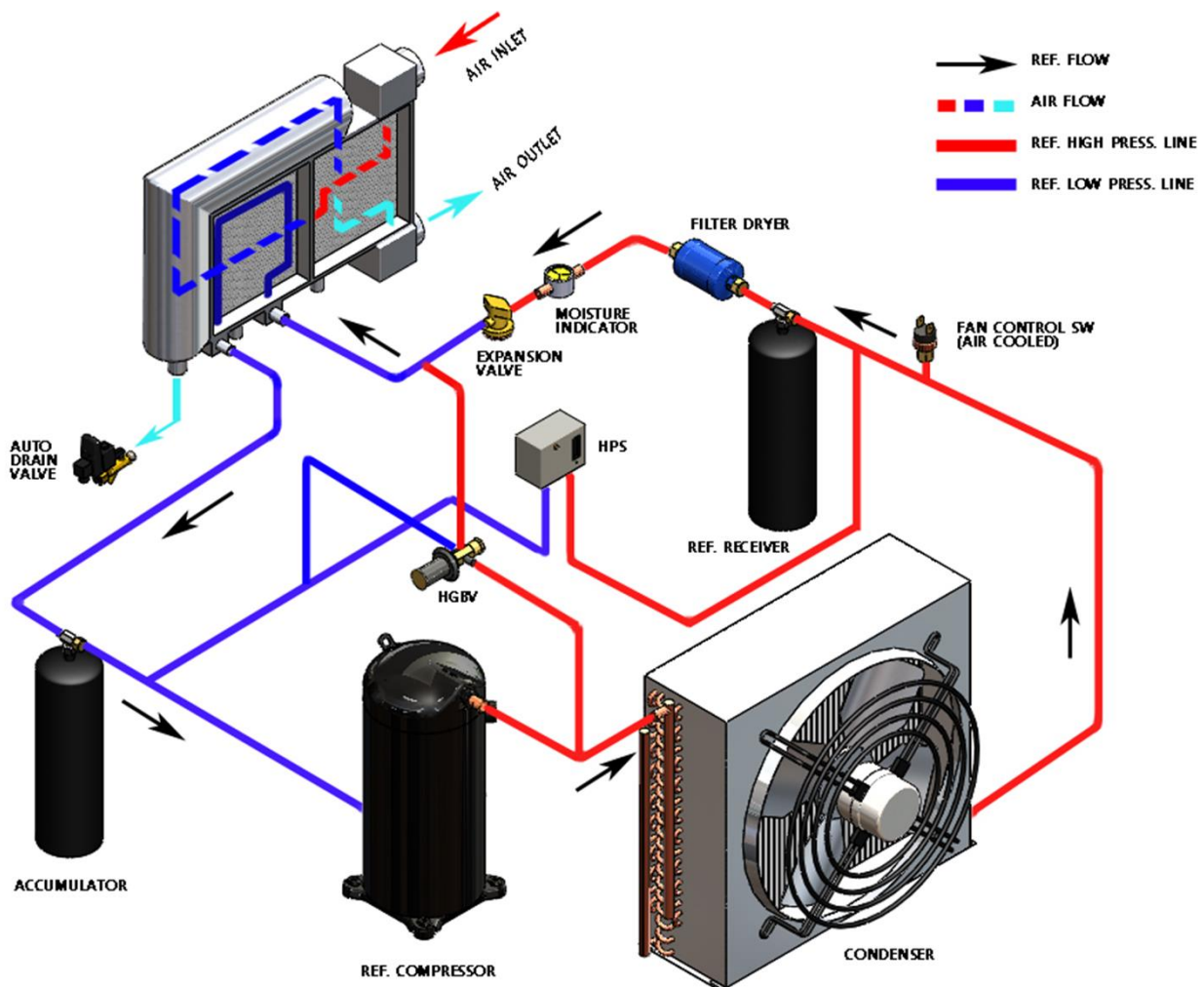
■ Operating Principle

The hot & saturated moisture air enters an air to air heat exchanger. The air then goes through the evaporator, also known as the air to refrigerant heat exchanger. The temperature of the air is reduced to approximately 2°C(36°F), causing water vapor to condense to liquid. The liquid is continuously coalesced and collected in the separator for removal by the condensate drain. The cool air passes back through the air to air heat exchanger to be reheated with incoming air.

■ Refrigerant System

Refrigerant gas is cycled through the ref. compressor and exits at high pressure to a condenser where heat is removed causing the refrigerant to condense to a high-pressure liquid state. The liquid is forced through a expansion valve(Capillary tube or TXV) where the resulting pressure drop allows the refrigerant to boil off at a predetermined temperature. Low-pressure liquid refrigerant enters the heat exchanger where heat from the incoming air is transferred causing the refrigerant to boil; the resulting phase change produces a low pressure, low temperature gas. The low-pressure gas is returned to the ref. compressor, where it is recompressed and begins the cycle again. During those periods when the load is reduced the excess refrigerant is by-passed automatically via the hot gas by-pass valve.

■ Flow Diagram



■ Refrigerant System Parts



- Refrigerant Compressor

It compresses the gasified refrigerant. The cycle of suction and charge of the compressor circulates the refrigerant gas in the system of high pressure and low pressure.



- Oil Separator

Placed on high pressure line of cooling system, it returns the oil mixed with refrigerant to the refrigerant compressor.



- Air Cooled Condenser or Water Cooled Condenser

The condenser is the component in which the gas coming from the compressor is cooled down and condensed becoming a liquid by cooling water(water- cooled) or cooling air.(air-cooled).



- Liquid Refrigerant Receiver

It helps expansion valve work properly by keeping the liquefied refrigerant from the condenser.



- Fan control pressure switch(Air-Cooled Type)

It controls the fan motor that works and helps the refrigerant gas condensing properly by detecting the pressure of high pressure line.



- Cooling Water Regulating Valve(Water-Cooled Type)

It is used to keep the condensing pressure & temperature constant when the water-cooled is being used. Thanks to the capillary tube, the valve detects the pressure in the condenser and consequently adjusts the water flow. When the dryer stops the valve automatically closes the cooling water flow.



- Filter Drier

Humidity and slag can accumulate inside the refrigerant circuit. Long periods of use can also produce sludge. This can limit the lubrication efficiency of the compressor and clog the expansion valve or capillary tube. The function of the filter drier, located before the capillary tubing, is to eliminate any impurities from circulating through the system.



- Sight Glass (Moisture Indicator)

You can check the volume of moisture in the cooling system.



- Expansion Valve(Capillary tube or TXV)

It changes the hot/high pressure refrigerant into cool/low pressure refrigerant.



- Heat Exchanger

A heat exchanger is a specialized device that assists in the transfer of heat from one fluid to the other. A heat exchanger in air dryer system consist of two parts : air to air heat exchanger & air to refrigerant heat exchanger.



- Hot Gas By-pass Valve(HGBV)

HGBV is designed to control refrigerating system capacity control. HGBV is applicable on any refrigeration system that operates during periods of low load.



- Suction Accumulator

Placed on low pressure line of cooling system, it protects the ref. compressor from being damaged by gasifying the liquefied refrigerant.



- Auto Drain Unit

Drain unit discharges condensate water.



- Refrigerant Pressure Switch(DPS, HPS, LPS)

It protects the unit. The low pressure switch works when the refrigerant leaks while the high pressure switch works when the pressure rises abnormally.



- LPS : Low Pressure Switch
- HPS : High Pressure Switch
- DPS L LPS + HPS

4. Technical Description

■ Control Panel

• HYD - 5~20N



Air Dryer Start / Stop Switch



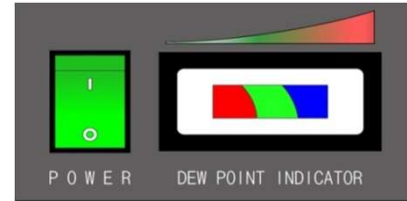
Dew Point Temp. Display

- Blue: below 5°C
- Green : 5°C ~ 15°C
- Red : above 15°C



Dew Point Indication

If compressed air is not flowing or flow rate is low, dew point is likely to be inaccurate.



• HYD - 30~150N



Air Dryer Start / Stop Switch



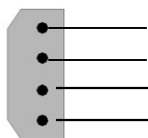
Status Lamp

- RUN : Dryer Operation
- STOP : Dryer Stop
- FAULT : Dryer Fault



Dew Point Temp. Display

- Flickering : below 4°C
- Green : 4°C ~ 10°C
- Yellow : 10°C ~ 15°C
- Red : above 15°C



START

Remote

(Option)

* Start

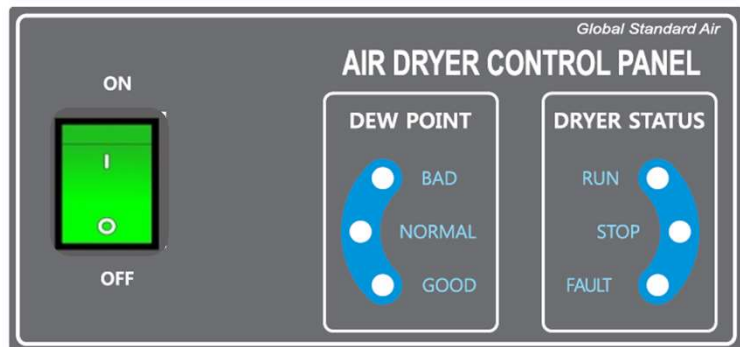
Dryer local start / stop switch

* Remote Start/stop

Remote command must be used by dry contacts

- Remote Start : Continuous Closed

- Remote Stop : Continuous Opened



Dew Point Indication

If compressed air is not flowing or flow rate is low, dew point is likely to be inaccurate.

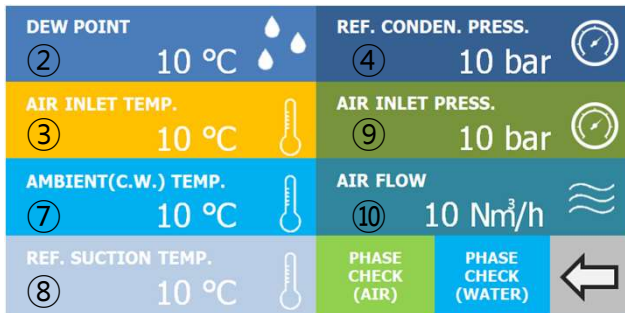
4. Technical Description

- HYD - 200~600N(Color LCD Type)

Main Screen



Status Screen



① : Status of Ref. Air Dryer

- You can check the alarm, operation and stop of a ref. air dryer.

② : Dew Point

- You can check the dew point of a ref. air dryer.

③ : Inlet Air Temperature

- You can check the inlet air temperature of a ref. air dryer.

④ : Condensing Pressure of Refrigerant

- You can check the condensing pressure of a ref. air dryer.

⑤ : WIFI/ Bluetooth(Optional)

- Displayed when connected to a mobile phone via bluetooth or wifi.

⑥ : STATUS

- If touched, it changes from the main screen to the status screen.

⑦ : Ambient Temperature(Cooling Water Temperature)

- You can check the ambient temperature dew or cooling water temperature.

⑧ : Refrigerant Suction Temperature

- You can check the refrigerant suction temperature of a ref. air dryer.

⑨ : Inlet Air Pressure(Optional)

- You can check the inlet air pressure of a ref. air dryer.

⑩ : Flow Rate(Optional)

- You can check the flow rate of a ref. air dryer.

⑪ : Phase Check

- AIR(Air cooled type) : Check the rotation direction of the fan motor. If the direction of rotation is opposite, change the position of 2 of 3 phases.





- WATER(Water cooled type) : Check the rotation direction of the ref. compressor. If the direction of rotation is reversed, the refrigerant low pressure will not decrease.

⑫ : Back to main screen

- Return to the main screen.

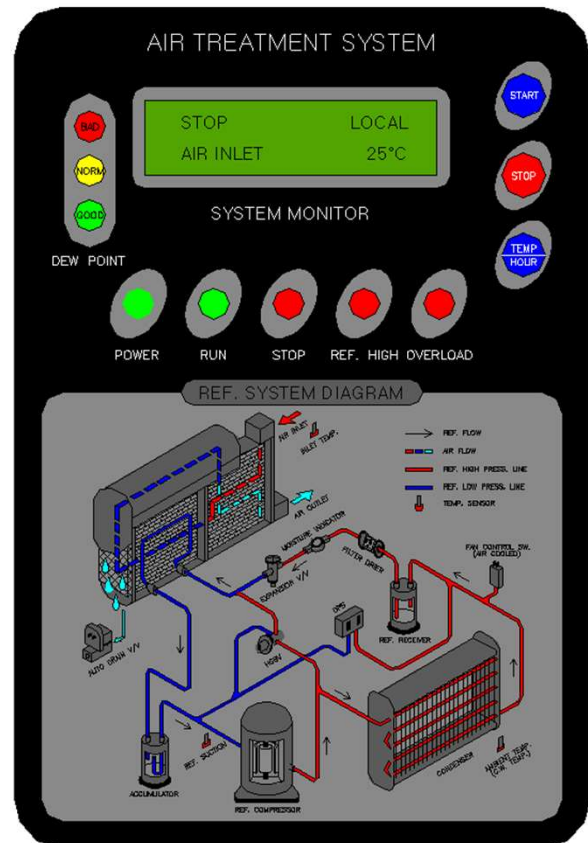
4. Technical Description

- HYD - 200~600N(Mono LCD Type)

-  : Air Dryer Start Button
-  : Air Dryer Stop Button
-  : Temp. & Operating Time button
-  : Power & Run Lamp(Green)
-  : Stop & Alarm lamp(Red)
-  : Dew Point Temp. Display
 - Flickering : below 4°C
 - Green : 4°C ~ 10°C
 - Yellow : 10°C ~ 15°C
 - Red : above 15°C



Dew Point Indication : If compressed air is not flowing or flow rate is low, dew point is likely to be inaccurate.



System Monitoring LCD

Standby Status		Push the start button		Push the stop button	
STANDBY	LOCAL	RUNNING	LOCAL	STOP	LOCAL
AIR INLET	25°C	AIR INLET	25°C	AIR INLET	25°C
RUNNING	LOCAL	RUNNING	LOCAL	RUNNING	LOCAL
AIR INLET	25°C	AMBIENT(C.W.)	25°C	REF. SUCTION	25°C
				RUN TIME	1 HR

Push the temp/hour button

(Air inlet Temp. → Ambient(Cooling Water) Temp. → Ref. Suction Temp. → Operating Hour)

Temp/hour display mode selection : Push & hold the temp/hour button for 3 sec.

- Manual selection : Touch the temp/hour button.
- Auto selection : Display value is changed automatically.

RUNNING	LOCAL	RUNNING	REMOTE
AIR INLET	25°C	AIR INLET	25°C

Local Mode

Remote Mode

Operating Mode Selection

- Local mode is selected by DIP switch 1 on PCB controller.



DIP switch 1 : Local Mode



DIP switch 1 : Remote Mode

4. Technical Description

RUNNING LOCAL
AIR INLET 25°C

Degree Celsius

RUNNING REMOTE
AIR INLET 45°F

Degree Fahrenheit

Temperature Unit Selection

- Temp. unit is selected by DIP switch 2 on PCB controller.



DIP switch 2 : °C



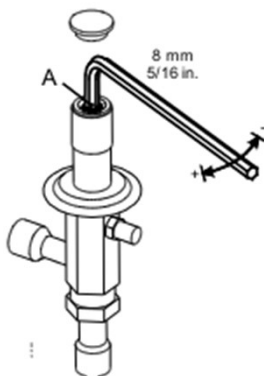
DIP switch 2 : °F

■ Ref. System Adjustment



- The hot gas by-pass valve is adjusted during the manufacturing testing phase. As a rule no adjustment is required; anyway if it is necessary the operation must be carried out by an experienced refrigerating engineer.
- During start-up, a qualified technician should check the condensing pressure & temperature and if necessary adjust the valve by using the screws on the valve itself.

■ HGBV(Adjustment for Ref. Suction Pressure)

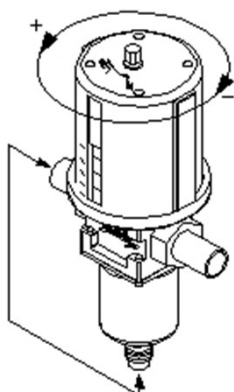


- Recommended tools
 - HYD-5~100 : A Flat-Head Screwdriver
 - HYD-130~ : 5/16" Hex Wrench Sets

- Adjustment
 - Clockwise : Opening direction
 - Count Clockwise : Closing direction

- Ref. Suction Pressure Range
 - R-134a : 1.8~ 2.5barg
 - R-22/R-407C etc. : 4.5 ~ 5.5barg

■ Cooling Water Regulating Valve(Adjustment for Ref. Condensing Pressure)

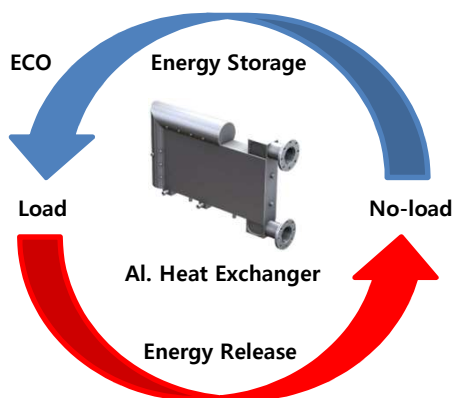


- Only Water cooled Type
- Adjustment
 - Clockwise : Closing direction
 - Count Clockwise : Opening direction
- Ref. Condensing Pressure Range
 - R-134a : 9~ 10barg
 - R-22/R-407C etc. : 15 ~ 16barg

■ 2nd Generation Refrigerated Air Dryer Overview

Refrigerated dryers are divided into Non Cycling and Cycling methods depending on the operation method. The Non Cycling method is always operated by the dryer regardless of the load, and most products fall under this method. However, energy consumption occurs even under no-load or low-load conditions, and various methods of product development are being developed to save energy. In general, a method of saving energy by controlling the rotation of a refrigerant compressor such as a variable-speed drive (VSD) or a brushless DC (BLDC) motor and a method of turning on / off the refrigerant compressor by storing cooling energy in a heat exchanger are used. The method of controlling the rotation of the refrigerant compressor has the disadvantages of complicated system configuration and high cost, so energy saving method using cooling energy of the heat exchanger, which is easy to manage and has excellent energy saving efficiency, is often used. Compressed air is used for many purposes in industrial fields, and the method of use is also diverse. Depending on the amount of compressed air used and the method of use, selecting a suitable refrigeration dryer can save a lot of energy. In particular, it can maximize energy savings when it is used in winter when the load is low or in a process that uses less compressed air. GSA's refrigerated dryers are classified into three types according to the operation method. It is divided into the 1st generation non-cycling refrigerated air dryer and 2nd generation refrigerated air dryer utilizing cooling energy storage method of aluminum heat exchanger, and using pcm(phase change material) to store more cooling energy to increase energy saving effect 3rd generation refrigerated air dryer. The 2nd and 3rd generation products, except the 1st generation product, can realize energy savings of at least 20% up to 90% depending on the user's operating conditions.

- The operation principle of the 2nd generation refrigerated air dryer



GSA's 2nd generation Cycling refrigerated air dryer includes the basic refrigerant circuit of 1st generation refrigeration dryer. It saves energy by stopping the refrigeration dryer by controlling the cooling energy and temperature stored in the heat exchanger when there is no load or low load.

GSA's heat exchanger is made entirely of aluminum and there is no heat resistance between components, so it is possible to store a lot of cooling energy throughout the product. The aluminum heat exchanger has high efficiency and excellent utility of stored cooling energy, so it can increase energy saving efficiency at a low cost. This provides a stable dew point, and the system is simpler than other energy-saving refrigeration dryers for easy maintenance and management.

- Application of the 2nd generation refrigerated air dryer

The 2nd generation refrigerated air dryer can maximize energy saving efficiency when used in the following conditions.

- Process with little compressed air consumption
- Process that uses compressed air intermittently
- Where it is difficult to periodically operate and stop the refrigerated air dryer

4. Technical Description

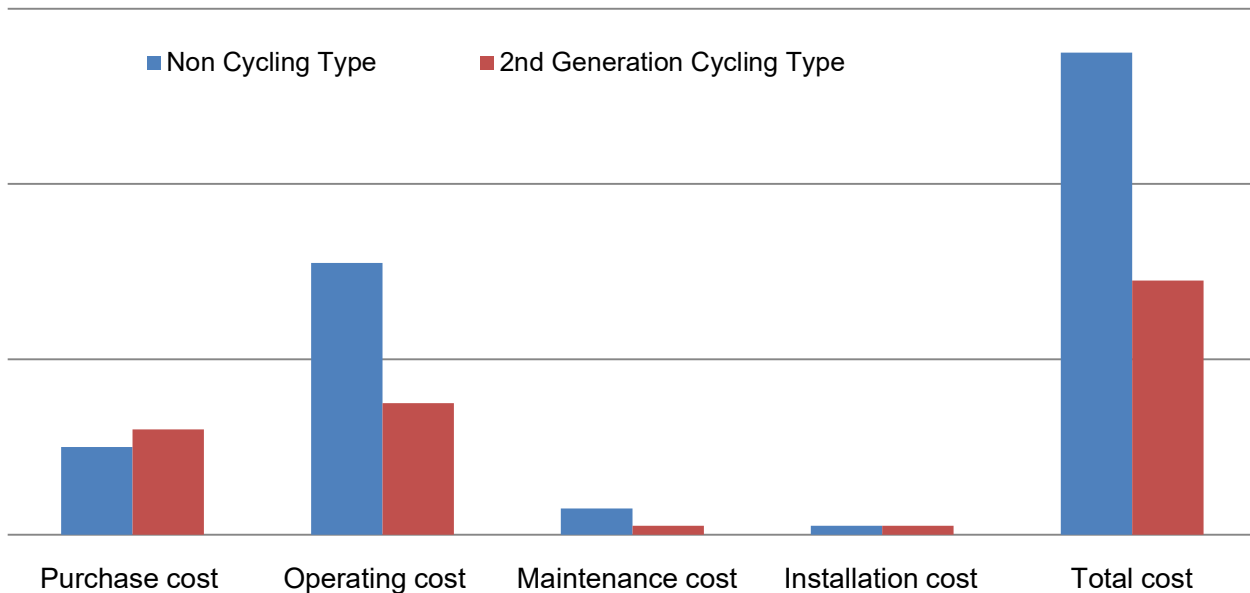
- Aluminum Heat Exchanger of 2nd Generation Cycling Refrigerated Air Dryer

Aluminum has a higher specific heat than heat exchangers made of other materials, so it can store more cooling energy compared to the same mass. In addition, the high thermal conductivity provides excellent cooling effect of compressed air, and provides stable and good dew point. Aluminum can store 2.3 times cooling energy compared to copper and 1.9 times the cooling energy compared to stainless steel.

Heat Exchanger	Material	Specific Heat (J/kg)	Thermal Conductivity (kcal/mh °C)	Calories (1kg, Δ10°C)	Storage ratio
Shell & Tube	Copper	389	332	3890	100%
Plate	Stainless	464	14	4640	120%
Aluminum	Aluminum	896	196	8960	230%

- Energy Saving of 2nd Generation Cycling Refrigerated Air Dryer

The following diagram compares the total operating costs for 10 years, including the purchase cost of the 1st and 2nd generation refrigerated air dryers. As shown in the diagram, you can see that the two products have a lot of difference in operating cost.



The comparison table is based on a specific model, and differences may occur depending on the usage of compressed air or the operation conditions.

4. Technical Description

Information of 2nd generation cycling refrigerated air dryer

Control Panel



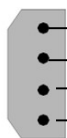
Operation Switch
Dryer start or stop



Status Lamp
- ECO : Energy saving operation
- RUN : Normal operation
- FAULT : Abnormal status



Dew Point Lamp
- GOOD : 2°C ~ 10°C
- NOMAL : 10°C ~ 20°C
- BAD : Over 20°C



START
Remote
(Option)

- Start & Remote command : Dry Contacts
- Remote Start : Continuous close signal
- Remote Stop : Continuous open signal

ECO Lamp / RUN Lamp

When the operation switch of panel is turned on, the refrigerant compressor starts and the run lamp lights up. If there is enough cooling energy in the heat exchanger, the run lamp does not light up even if the switch is turned on, and the eco lamp turns on.

When the eco lamp is on, the refrigerant compressor and fan motor remain stationary and perform energy savings. If the load increases and the temperature rises above the set temperature, the eco lamp turns off and the run lamp turns on. When the run lamp is on, the refrigerant compressor and fan motor will restart. If there is no load or low load condition is maintained and sufficient cooling energy is obtained, the temperature will drop below a set value. At this time, the eco lamp turns on again, switches to energy saving mode, and the run lamp turns off.

FAULT lamp

The fault lamp turns on when the refrigerant high pressure, refrigerant compressor or fan motor overload relay is activated. At this time, the dryer is stopped. The cause of faults varies depending on the product, so please check the specifications and drawings of each product for exact information. Refer to "Chapter 7 Troubleshooting" for the cause and solution of fault due to the occurrence of refrigerant high pressure and overload relay.

Product classification

- 1) HYD – XXX N : 1st generation refrigerated air dryer(Non cycling type)
- 2) HYD – XXX N2 : 2nd generation refrigerated air dryer(Cycling type)
- 3) HYD – XXX N3 : 3rd generation refrigerated air dryer(Cycling type, PCM type)

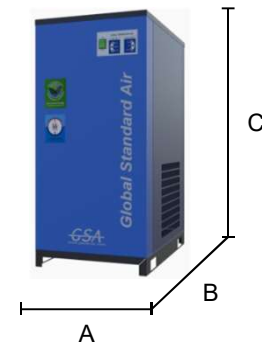
4. Technical Description

• Product Information

Model	Connet.	Air Comp.	Capacity	Min. Power Consumption	Power	Size			Weight	
	A(B)	HP	Nm ³ /min	kW	V / Ph / Hz	A	B	C	kg	
H Y D	5N2	PT15A(1/2")	5	0.5	0.16	220/1/50/60	247	557	723	36
	7N2	PT15A(1/2")	7	0.8	0.16		247	557	723	36
	10N2	PT20A(3/4")	10	1.0	0.17		247	557	723	36
	15N2	PT25A (1")	15	1.5	0.24		428	508	709	45
	20N2	PT25A (1")	20	2.6	0.26		428	508	709	45
	30N2	PT25A(1")	30	3.9	0.51		358	658	864	66
	50N2	PT40A(1-1/2")	50	6.7	0.68		408	708	952	89
	75N2	PT50A(2")	75	10.5	1.04	458	798	1045	120	
	100N2	PT50A(2")	100	14.2	1.29	380/3 /50/60	458	858	1145	126

• Design Conditions

- Operating Pressure : 7 barg
- Inlet Temperature : 38 °C
- Dew Point : 2 ~ 10 °C
- Design Pressure : 15 barg
- Design Temperature : 70 °C
- Ambient Temperature : 32 °C



• Correction Factors

Correction factor for inlet air temperature change												
Inlet air temp. (°C)	28	33	38	43	48	53	58	63	68	70		
Correction factor	1.46	1.20	1.00	0.85	0.73	0.63	0.55	0.48	0.42	0.40		
Correction factor for inlet air pressure change												
Inlet air pressure (bar)	4	5	6	7	8	9	10	11	12	13	14	15
Correction factor	0.84	0.90	0.95	1.0	1.03	1.06	1.09	1.11	1.13	1.15	1.17	1.18
Correction factor for ambient temperature change												
Ambient temp. (°C)	27	32	37	40	45	50						
Correction factor	1.05	1.00	0.92	0.82	0.76	0.69						

■ Preliminary Start Up Check



- Verify that the operating parameters match with the nominal values stated on the data nameplate of the dryer.
(voltage, frequency, air pressure, air temperature, ambient temperature, etc.)
- Qualified personnel must perform the first start-up.

- Check that the connection to the compressed air system is correct and that the piping is suitably fixed and supported.
- Check that the condensate drain pipe is properly fastened and connected to a collection system or container.
- Check that the by-pass system (if installed) is closed and the dryer is isolated.
- Check that the manual valve of the condensate drain circuit is open.
- Remove any packaging and other material which could obstruct the area around the dryer.
- Check the cooling water flow and temperature is adequate (Water-Cooled).
- Check the condenser for cleanliness (Air-Cooled).
- Check the piping for air leakage.

■ Start Up



- Wait at least 3 hours after transporting or moving the air dryer before starting unit.
- The number of starts must be no more than 10 per hour..

- Switch on the air dryer.
- Wait a few minutes; Check that the dew point temperature.
- Check ampere with multi-meter.
- During the operation, the ref. compressor will run continuously. The dryer must remain on During the full usage period of the compressed air, even if the air compressor works intermittently.

■ Shut Down

- Shut down the air dryer pressing the stop button on control panel.
- Long-term Shut Down : Disconnect power supply.

■ Maintenance Schedule

Check	Time	Daily	Weekly	Monthly	Bi-Annually	Annually
	Ref. Pressure		Check			
Ref. Compressor Operation		Check				
Condenser Fan Motor Operation (Air Cooled)		Check				
Dew Point Indication		Check				
Cooling Water Pressure/temp.		Check				
Condensate Drain units & Strainer		Check	Check Clean			
Fan Control Switch(Air Cooled)			Check			
Air Cooled Condenser				Check Clean	Clean	
Ref. Pressure Switch(HPS, DPS)				Check		
Water Cooled Condenser					Check	Check Clean
Inside of Unit					Clean	
Ref. Leakage & Ref. System					Check	



- Only qualified personnel should perform maintenance operations.
- Before attempting any maintenance operation on the dryer, shut it down and wait at least 10 minutes.

■ Check Point



- Ref. Pressure(Standard)
 - Ref. Suction Pressure (R-134a) : 1.8~2.5barg
 - Ref. Suction Pressure (R-22, R-407) : 4.5~5.5barg
 - Ref. Condensing Pressure (R-134) : 7~12barg
 - Ref. Condensing Pressure (R-22, R-407) : 12~18barg



- Ref. Compressor Operation
During the operation, the ref. compressor will run continuously.



- Condenser Fan Motor Operation
During the operation, the fan motor will repeat on/off.



- Dew Point Indication
Green lamp or blue band is good status.
Red lamp or red band is bad status.



- Water Cooled Condenser(Standard)
- Cooling Water Pressure : 2~8barg
- Cooling Water Temp. : 25~35°C



- Condensate Drain Unit & Strainer
- During the operation, condensate water is discharged by drain unit periodically



- Fan Control Switch(Standard)
- During the operation, Condenser fan motor is operated by fan control switch.

Fan Control Switch Operating Range

- R-134a : Cut Out(7barg) / Cut In(12barg)
- R-22, R-407C etc. : Cut Out(12barg) / Cut In(18barg)



- Air Cooled Condenser

The condenser can be cleaned by using a vacuum or compressed air. Dust and oil stain on the condenser can be the cause of the performance degradation and unit trouble.



- Water Cooled Condenser
- Water Cooled Condenser

Oil stain & other impurities in water cooled condenser can be the cause of the performance degradation and unit trouble.



- Ref. Pressure Switch(Standard)

As safety and protection unit of the air dryer, pressure switches are installed in the ref. system.

HPS : Ref. Condensing Pressure

- Cut Out : R-134a(15barg) / R-22 etc.(25barg) / R-407C(26barg)

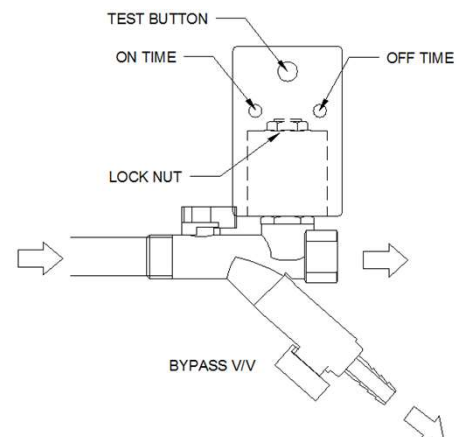
LPS : Ref. Suction Pressure

- Cut Out : R-134a(1barg) / R-22 etc.(2.5barg)

DPS(Dual Pressure Switch) : LPS + HPS

■ Timer Drain Valve Maintenance

- Push the test button and check how it works, when check air compressor system.
- Please clean the valve core, it valve does not work properly.
- Clean the strainer once every month.
- If the valve is not closed properly although the valve has no problem, we can suspect that some particles get caught between valve core and valve body. You need to clean valve core.



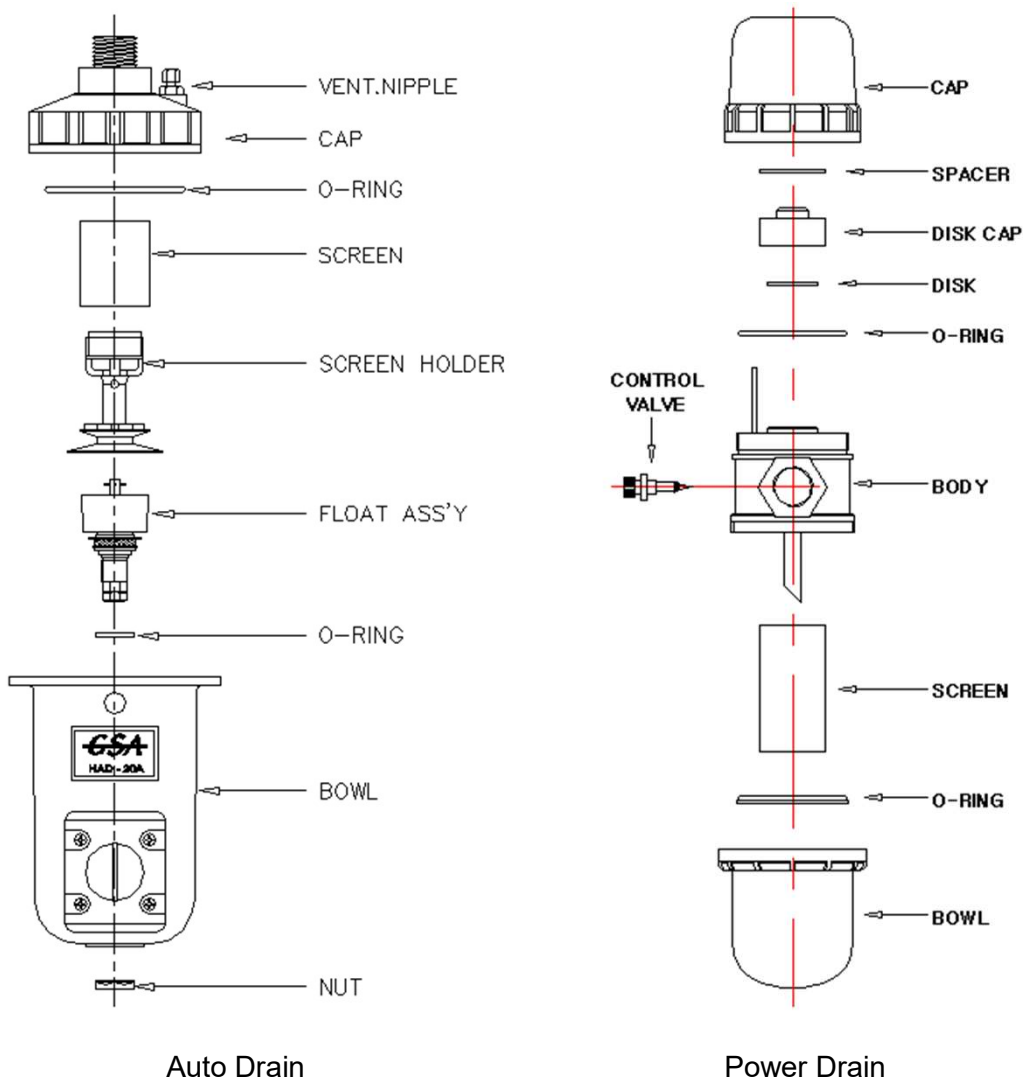
The After-sales service is provided at a cost in case the unit is damaged by debris or freeze or oil

■ Auto Drain Maintenance

Prior to disassembling under pressure disconnect from all pressure sources or depressurize the complete system by pressing the cock on vent nipple respectively. Do not use inflammable solvents for cleaning the parts. Keep the environment absolutely clean during maintenance and repair works. Keep free of dirt by covering the parts and free openings with clean cloth, paper or adhesive tape. (See Unit layout)

- A. Unscrew the cap by hand.
- B. Flush the screen by clean air.
- C. Unscrew the bowl by hand and clean it by air.
- D. Check the parts especially wear state of O-ring and float surface.

Assemble in reverse order and especially inserting O-ring, grease it.



Please drain the internal condensate when the unit is not used because the automatic drain valve can freeze and burst if the temperature drops below zero degree. The After-sales service is provided at a cost in case the unit is damaged by debris or freeze or oil

7. Troubleshooting

■ The air dryer doesn't start

Probable Cause	Remedy
System power or electric wiring	Check the system power & electric wiring
Circuit breaker or fuse	Check the main/control circuit breaker or fuse
Alarm status	Check the ref. high press. or overload alarm status

■ The ref. compressor doesn't operate

Probable Cause	Remedy
Trip of the ref. compressor internal thermal protection	Wait for 30 minutes then retry
System power	Check the system power.
The ref. compressor still doesn't operate	Check the ref. compressor Insulation resistance test then replace it

■ Condenser fan motor doesn't operate

Probable Cause	Remedy
System power or electric wiring	Check the system power & electric connection.
Fan control Switch problem	Check the fan control Switch then replace it
Fan motor problem	Check the fan motor then replace it.

■ High dew point

Probable Cause	Remedy
Air dryer stop	Check the air dryer status. Power, alarm etc.
DP temp. sensor problem	Check the dew point temp. sensor
Ref. compressor problem	* See specific point
High ambient temperature	Proper ventilation or Duct system
High inlet temperature	Restore the nominal conditions
Low inlet pressure	Restore the nominal conditions
Dirty condenser	Clean it
Fan motor problem(air cooled)	* See specific point
Hot cooling water(water cooled)	Restore the nominal conditions
Cooling water insufficiency (water cooled)	Restore the nominal conditions
Condensate not drained	* See specific point
Refrigerant leakage	Contact a engineer
Hot gas by-pass valve problem	Readjustment by a engineer(more closing)

7. Troubleshooting

■ The air dryer doesn't drain the condensate

Probable Cause	Remedy
Drain service valve is closed	Open the valve
Power & coil problem (electrical timer drain valve)	Check the power & coil/core of timer drain valve
Frozen condensate	Dew point is too low * See specific point
Drain unit is not operate.	* See specific point

■ The drain unit doesn't operate

Probable Cause	Remedy
Power (electrical timer drain valve)	Check the power
Strainer is blocked	Clean it
Sol. coil & valve core	Check the solenoid coil / Clean the valve core

■ High pressure drop

Probable Cause	Remedy
Condensate is not drained	* See specific point
Low dew point (Freezing in heat exchanger)	* See specific point Disconnect unit and maintain compressed air flow
Higher inlet air flow rate	Reduce the flow rate

■ Low dew point

Probable Cause	Remedy
The fan is always on(air cooled)	Check the fan control switch (If ambient temperature is too high, fan motor will run always)
Ambient temperature is too low (air cooled)	Restore de nominal condition
Hot gas by-pass valve problem	Readjustment by a engineer(more opening)
Cooling water temp. is too low (water cooled)	Restore de nominal condition Reduce the cooling water flow rate

■ Water within the compressed air line

Probable Cause	Remedy
By-pass valve open	Close the by-pass valve
High dew point	* See specific point
Condensate is not drained	* See specific point

7. Troubleshooting

■ High pressure switch activation

Probable Cause	Remedy
Ambient temp. is too high (air cooled)	Proper ventilation or Duct system
The condenser fan motor doesn't operate(air cooled)	* See specific point
The fan control switch doesn't Operate(air cooled)	* See specific point
Insufficient cooling water Hot cooling water(water cooled)	Check the cooling water system.
Cooling water regulating valve Problem(water cooled)	Check the Cooling water regulating valve
Dirty condenser	Clean the condenser
High pressure switch malfunction	Contact a engineer

■ Low pressure switch activation

Probable Cause	Remedy
Refrigerant leakage	Contact a engineer

■ Overload relay activation

Probable Cause	Remedy
D-time check(Delay time)	Readjustment delay time : 3~5 sec
O-time check(Over current time)	Readjustment over current time : 3~5 sec
Over current set value	Readjust the over current set value RLA(rated load ampere x 1.2)
Overload relay malfunction	Check the overload relay then replace it

8. Appendix

■ Spare Parts

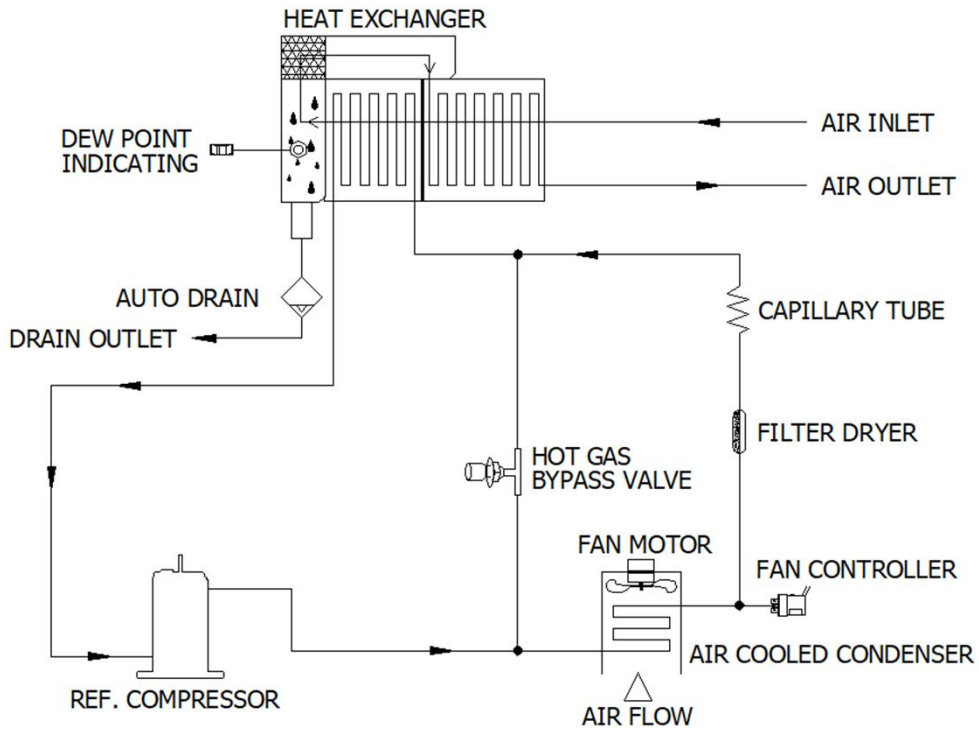
DESCRIPTION	PART NUMBER	HYD - N																
		5	7	10	15	20	30	50	75	100	150	170	200	250	300	400	500	600
Ref. Comp.	10RC01	1	1															
Ref. Comp.	10RC02			1														
Ref. Comp.	10RC03				1	1												
Ref. Comp.	10RC04						1											
Ref. Comp.	10RC05							1										
Ref. Comp.	10RC06								1									
Ref. Comp.	10RC07									1								
Ref. Comp.	10RC08										1							
Ref. Comp.	10RC09											1	1					
Ref. Comp.	10RC10													1	1			
Ref. Comp.	10RC11															1		
Ref. Comp.	10RC12																1	1
Fan Motor	10FM01	1	1	1	1	1												
Fan Motor	10FM02						1											
Fan Motor	10FM03							1	1									
Fan Motor	10FM04									1								
Fan Motor	10FM05										1	1	1	1	1			
Fan Motor	10FM06															1	1	1
Fan Control Sw.	10FC01	1	1	1	1	1												
Fan Control Sw.	10FC02						1	1	1	1	1	1	1	1	1	1	1	1
Control Board	10CP01						1	1	1	1	1							
Control Board	10CP02											1	1	1	1	1	1	1
Auto Drain Unit	10AD01	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Water Reg. v/v	10WR01										1	1	1					
Water Reg. v/v	10WR02													1	1			
Water Reg. v/v	10WR03															1	1	1
Ref. High Press. Sw.	10PS01						1	1	1	1								
Ref. Dual Press. Sw.	10PS02										1	1	1	1	1	1	1	1
Filter Drier	10FD01	1	1	1	1	1												
Filter Drier	10FD02						1	1	1	1								
Filter Drier	10FD03										1							
Filter Drier	01FD04											1	1					
Filter Drier	10FD05													1	1			
Filter Drier	10FD06															1		
Filter Drier	10FD07																1	1
Press. Gauge	10PF01										1	1	1	1	1	1	1	1
Press. Gauge	10PG02								1	1	1	1	1	1	1	1	1	1
Press. Gauge	10PG03															1	1	1

8. Appendix

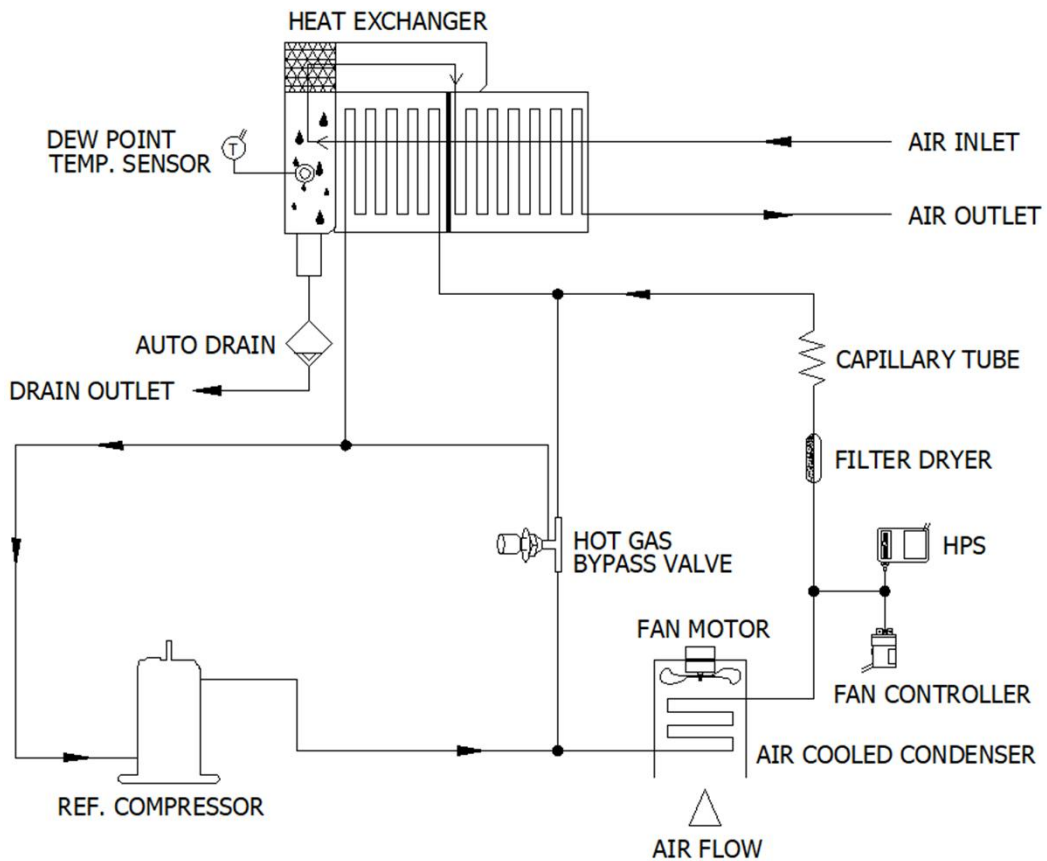
■ Refrigerant Circuit(Standard)

(* Technical modifications are subject to change without notice.)

• HYD - 5~20N

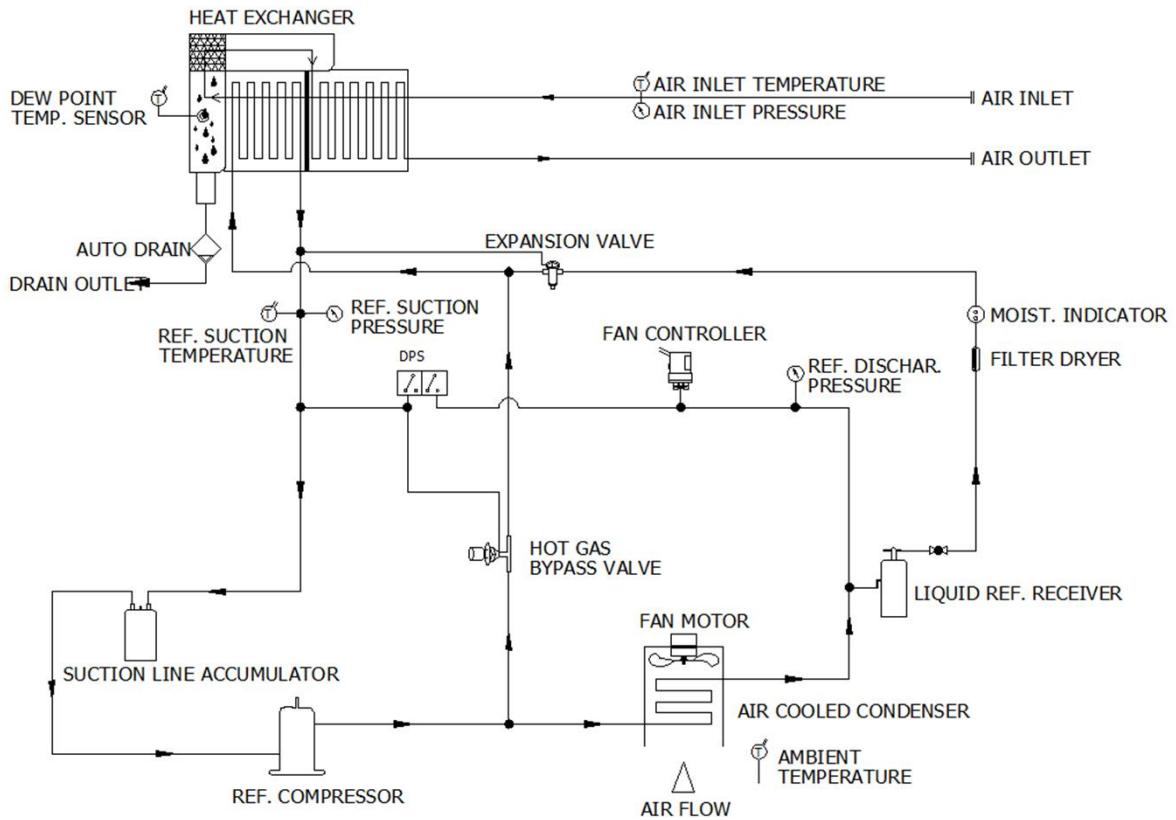


• HYD - 30~100N

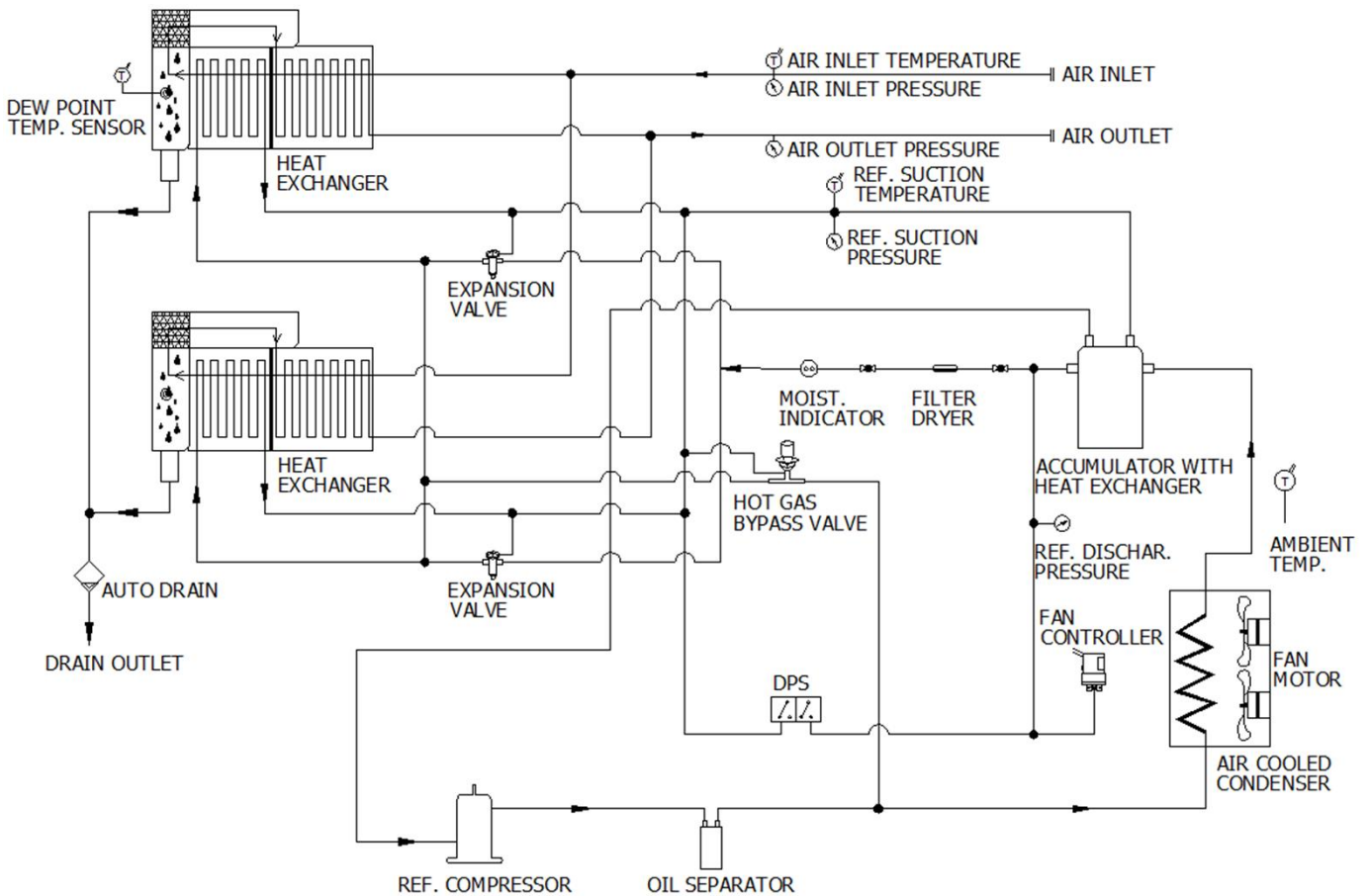


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- HYD - 150~300N(HYD-150N : Pressure gauge not included)

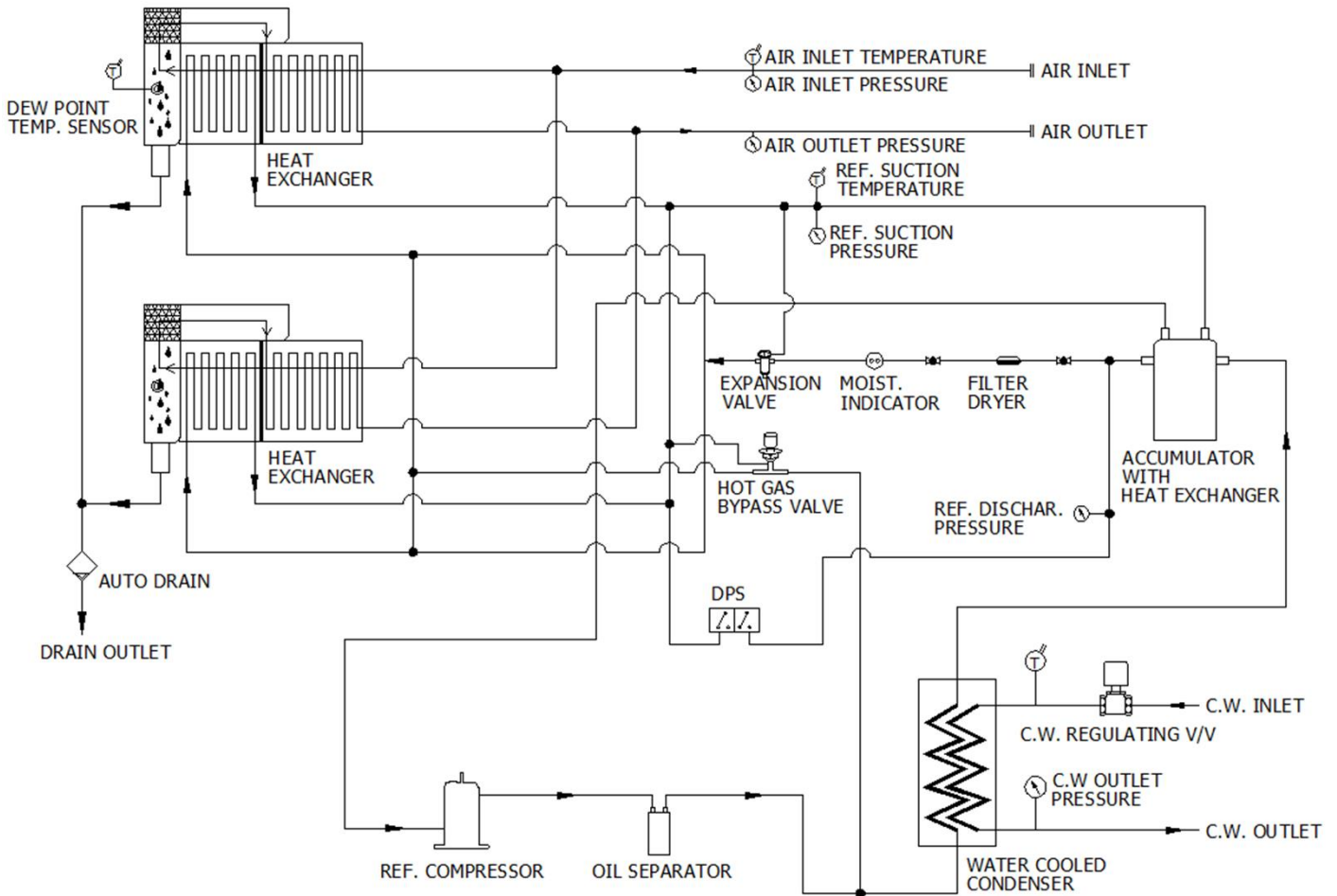


- HYD - 400~600N(600N Standard Diagram)



8. Appendix

- Water Cooled Type(Large Capacity Dryer / Standard)

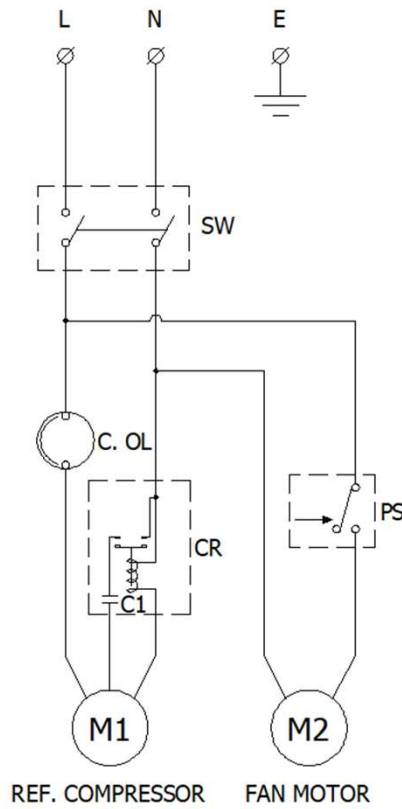


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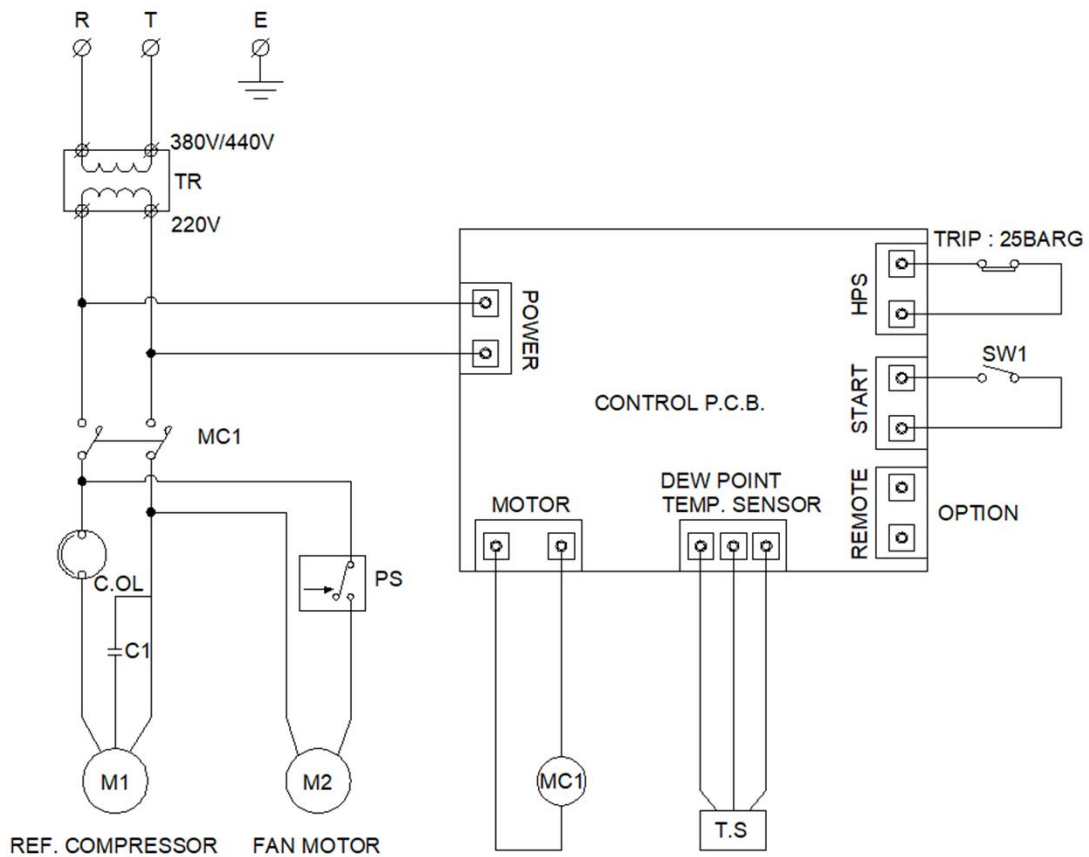
■ Electrical Diagram(Standard)

(* Technical modifications are subject to change without notice.)

• HYD - 5N~20N

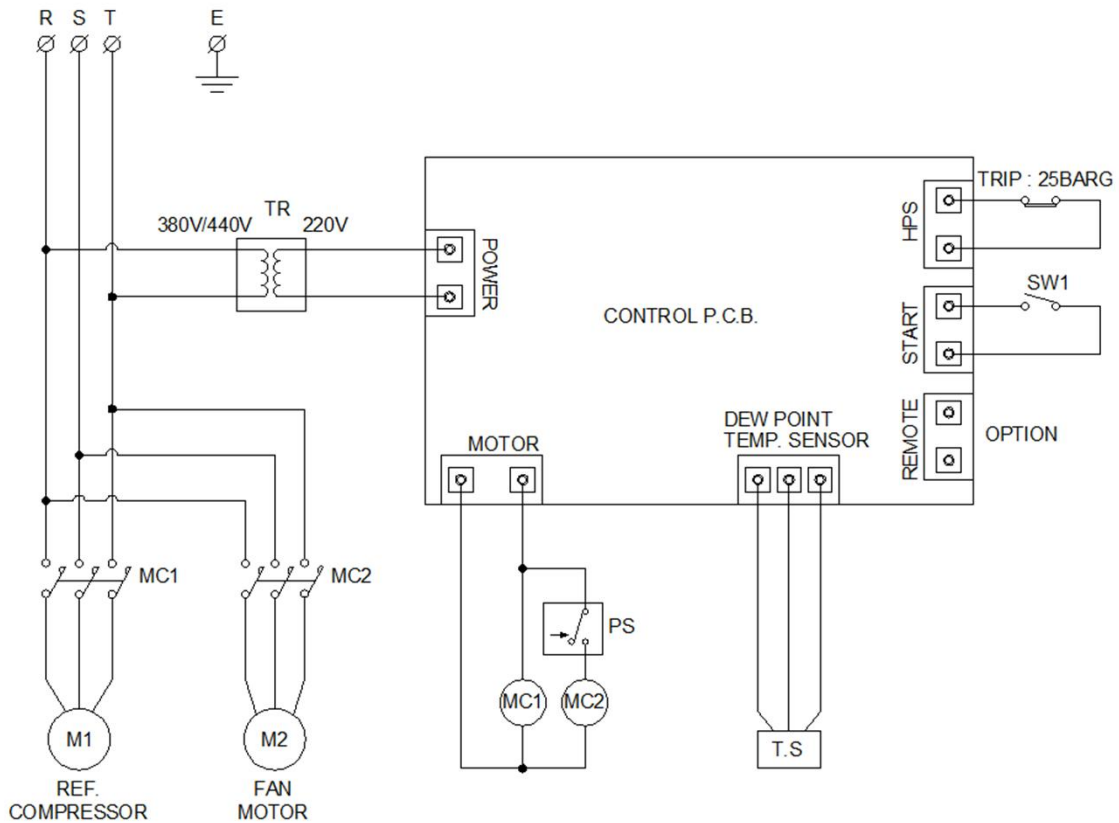


• HYD - 30N~75N

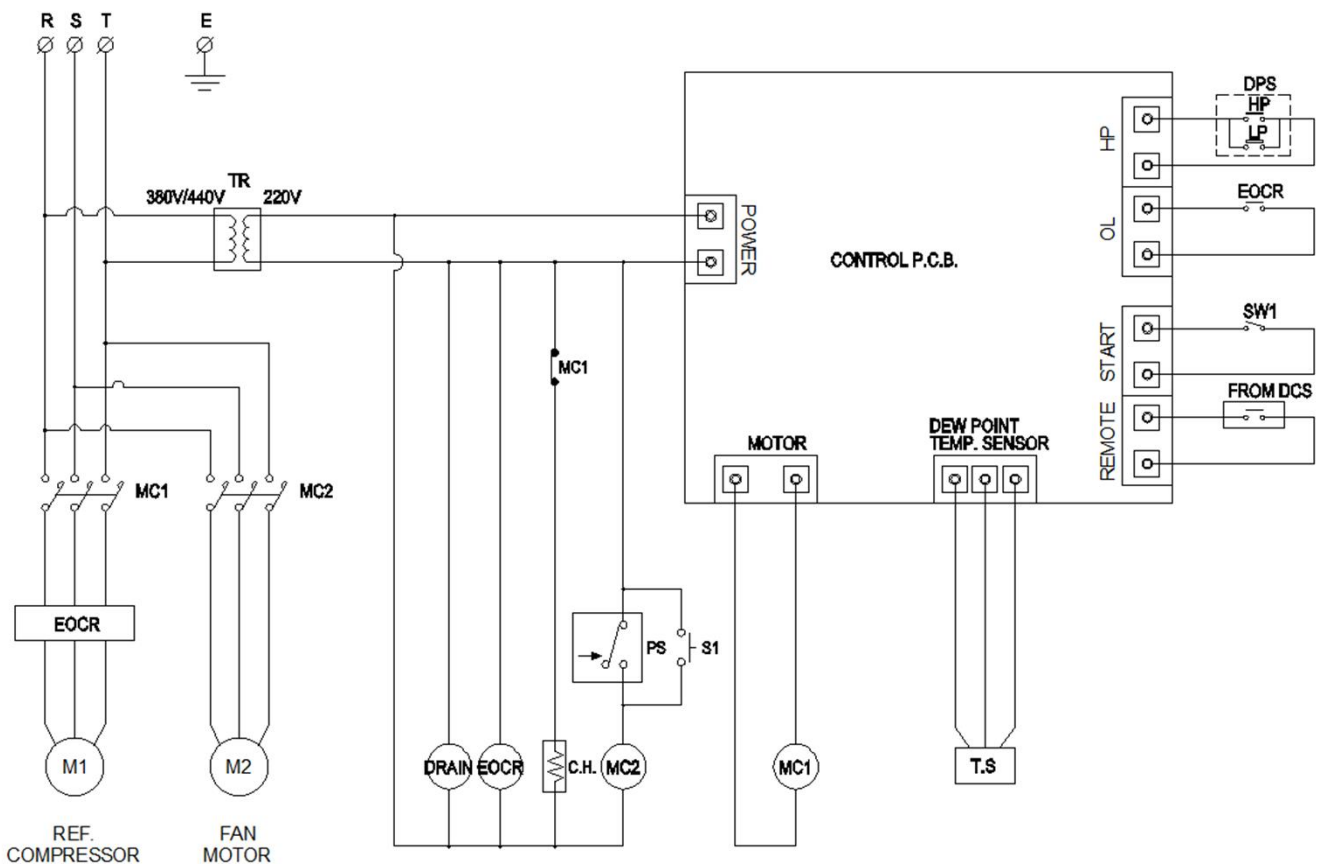


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• HYD - 100N

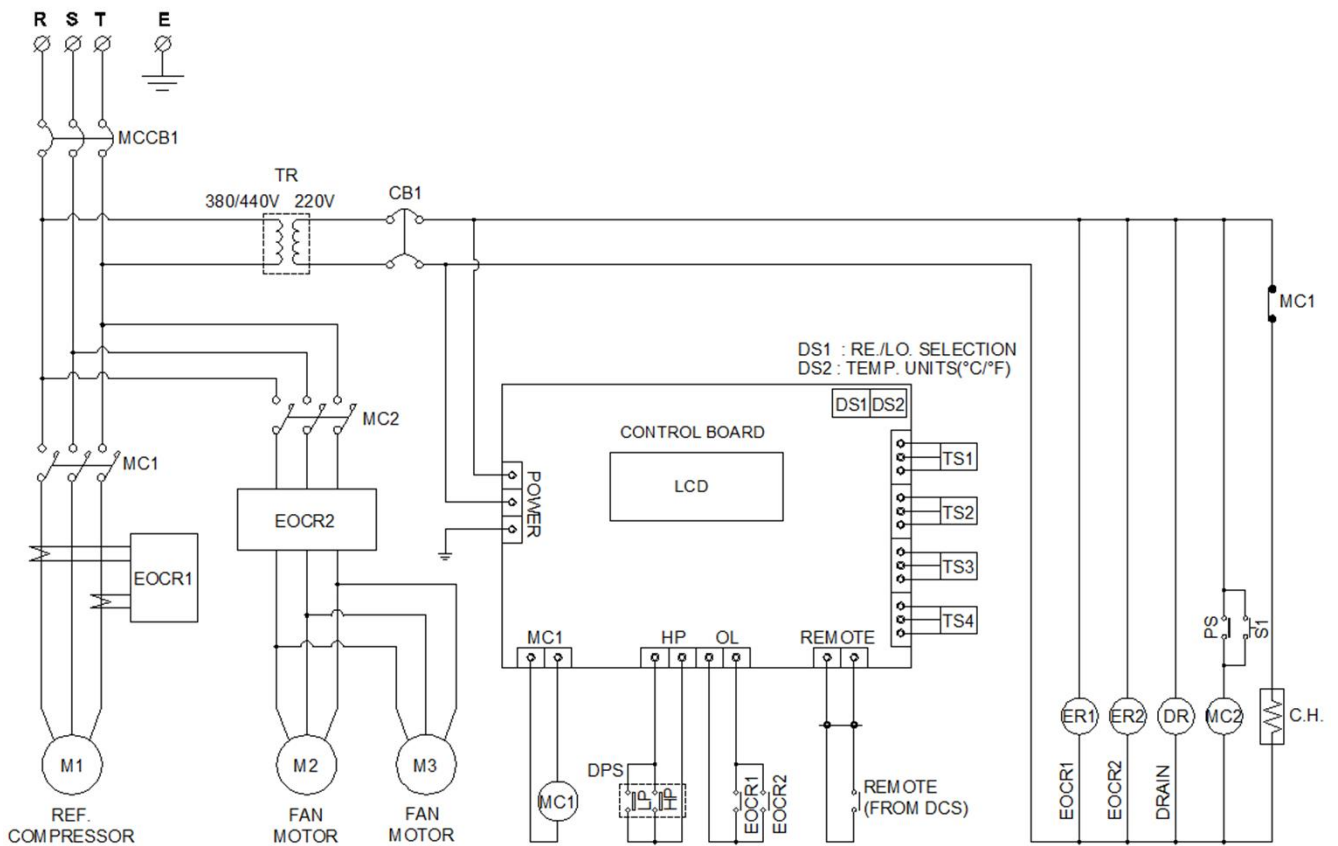


• HYD - 150N

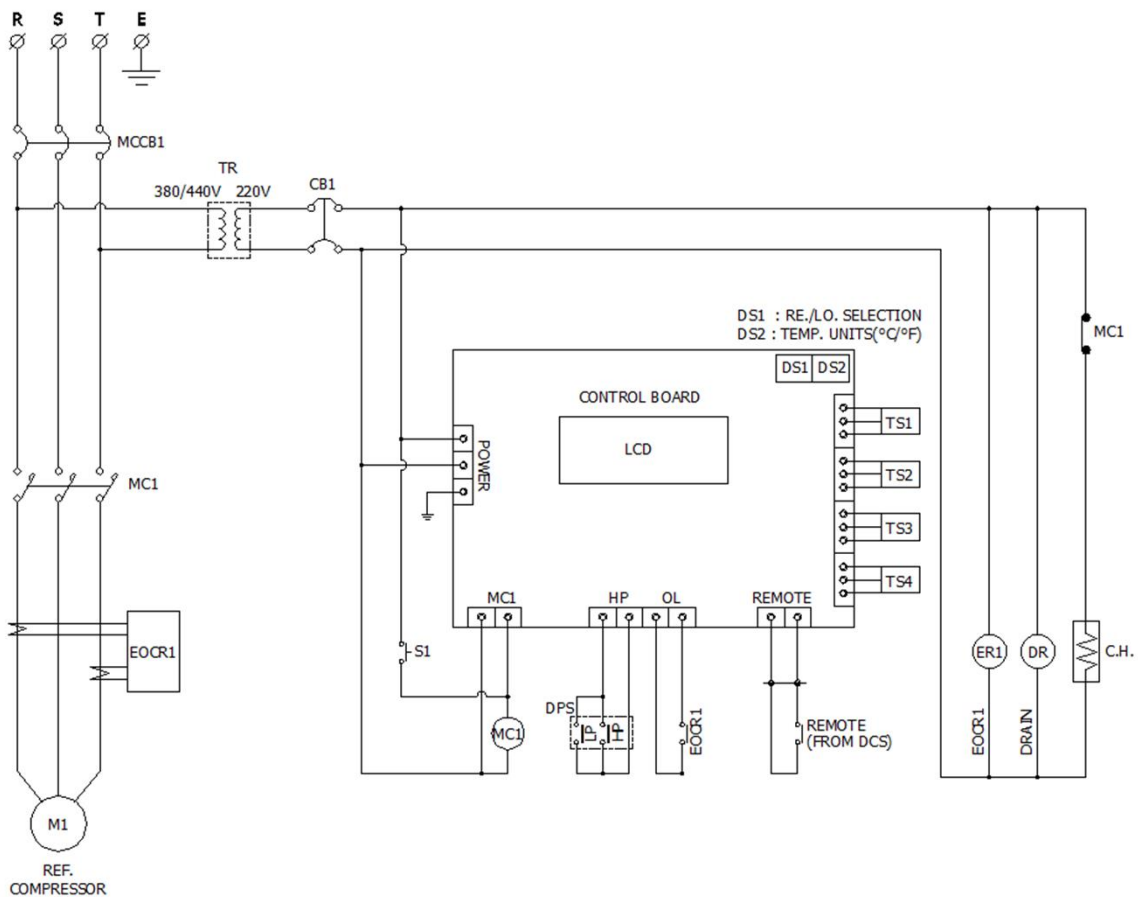


8. Appendix

• HYD - 200N~600N(Mono LCD Type)

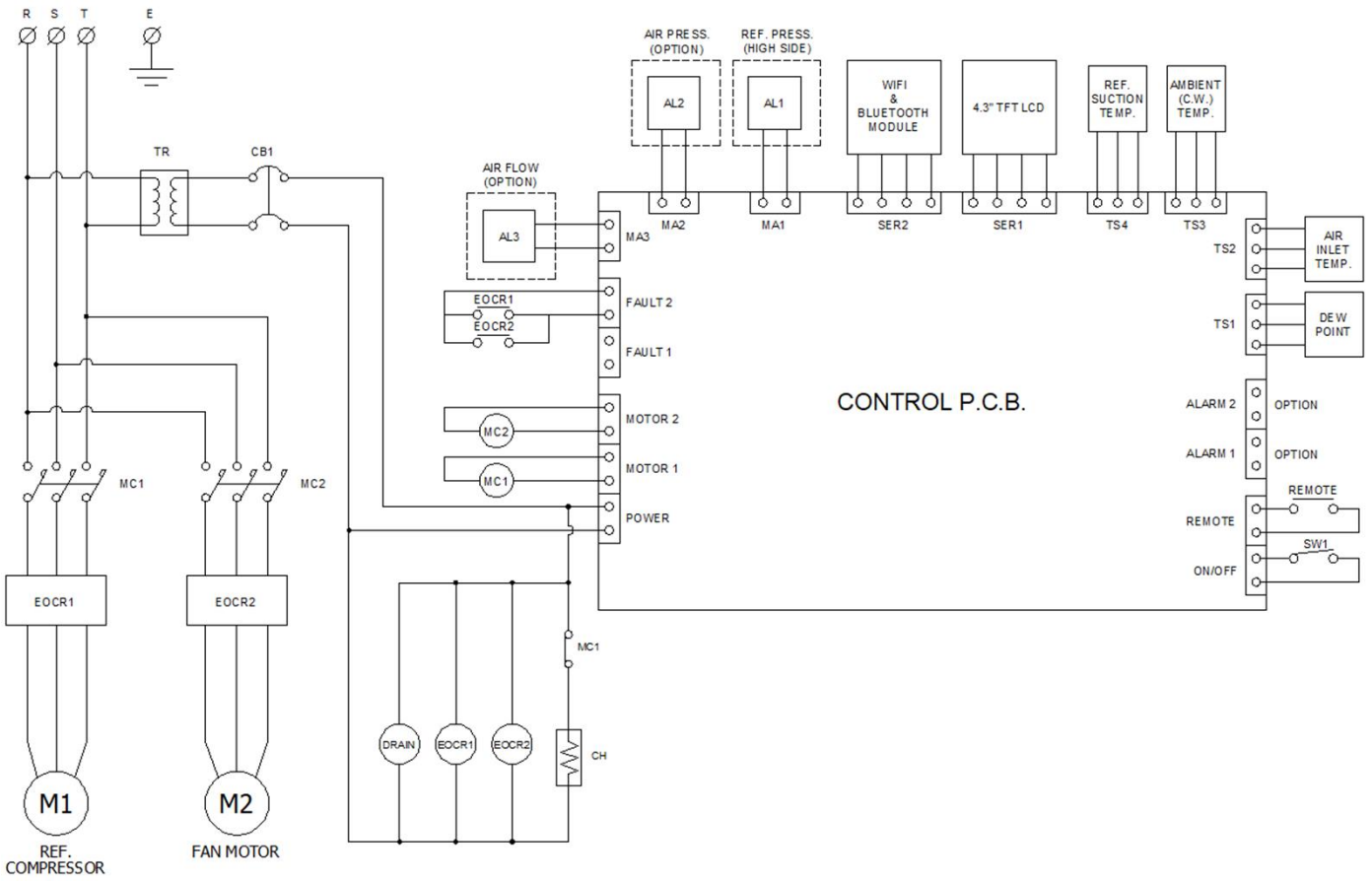


• Water Cooled Type(Standard)



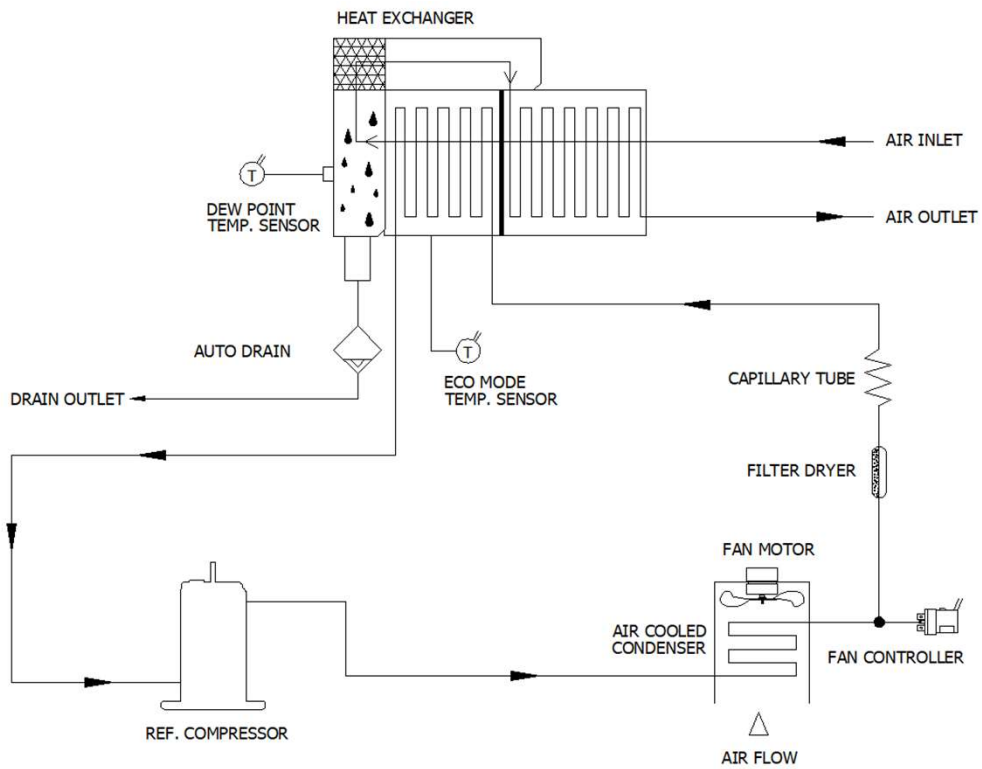
8. Appendix

• HYD - 200N~600N(Color LCD Type)

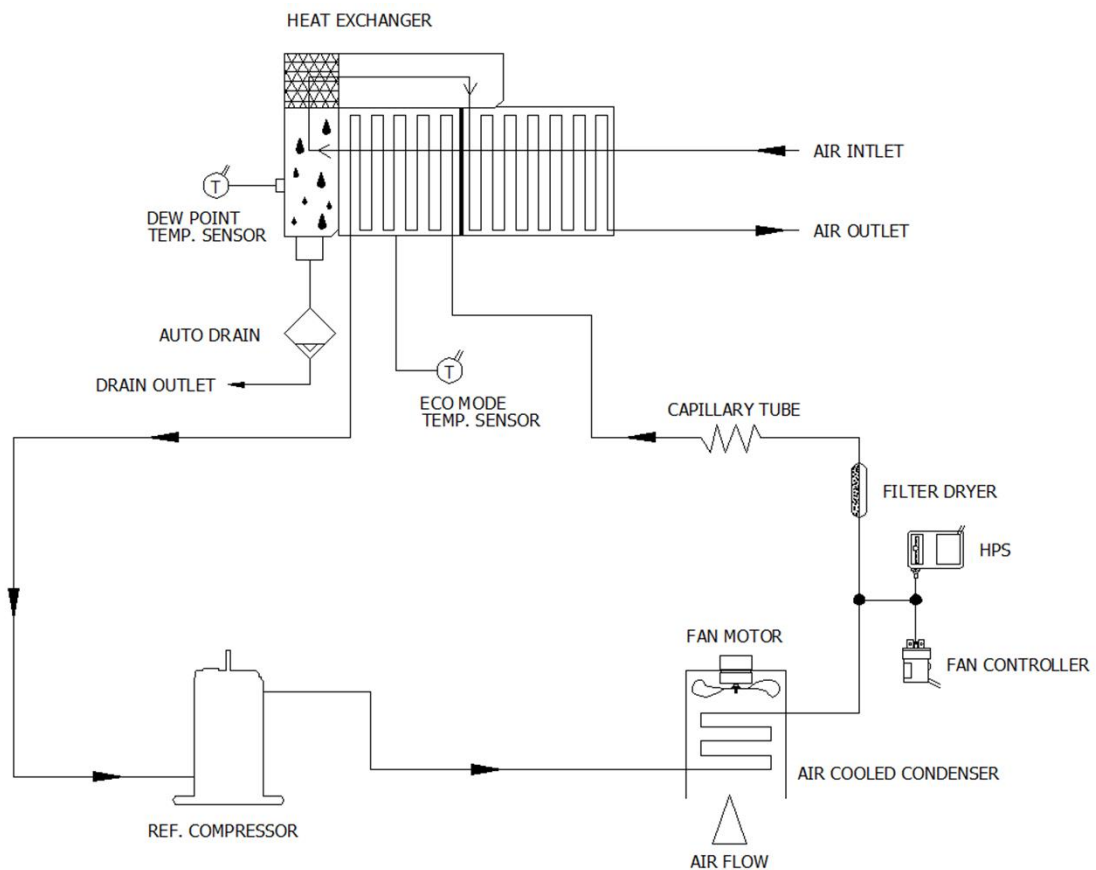


■ Refrigerant Circuit(N2 Type)
 (* Technical modifications are subject to change without notice.)

• HYD - 5N2~20N2



• HYD - 30N2~100N2

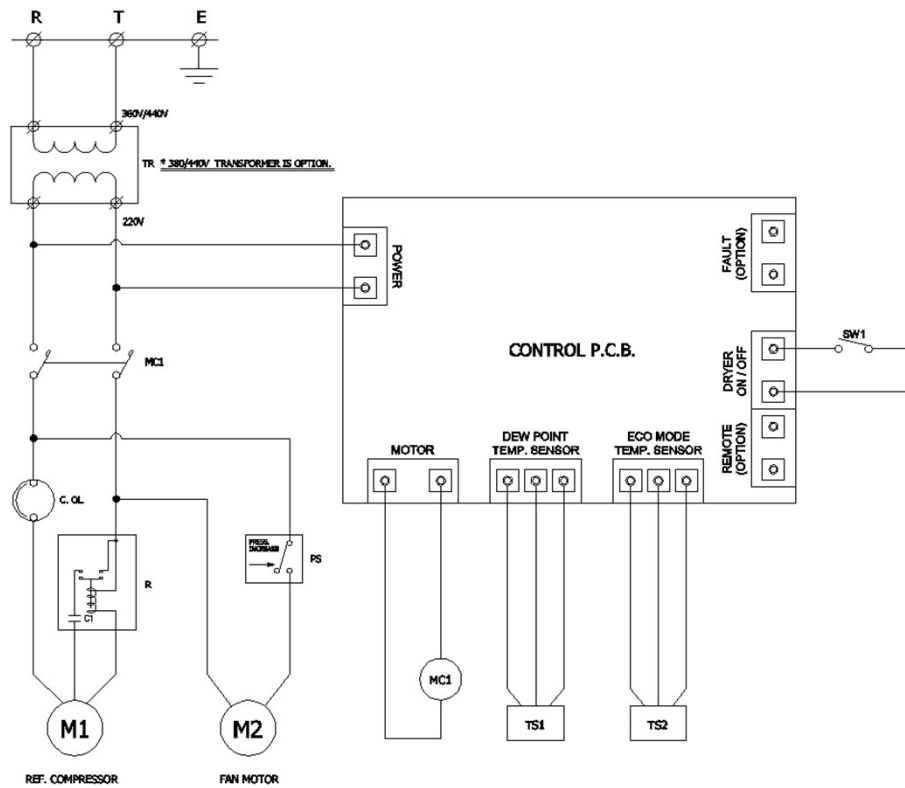


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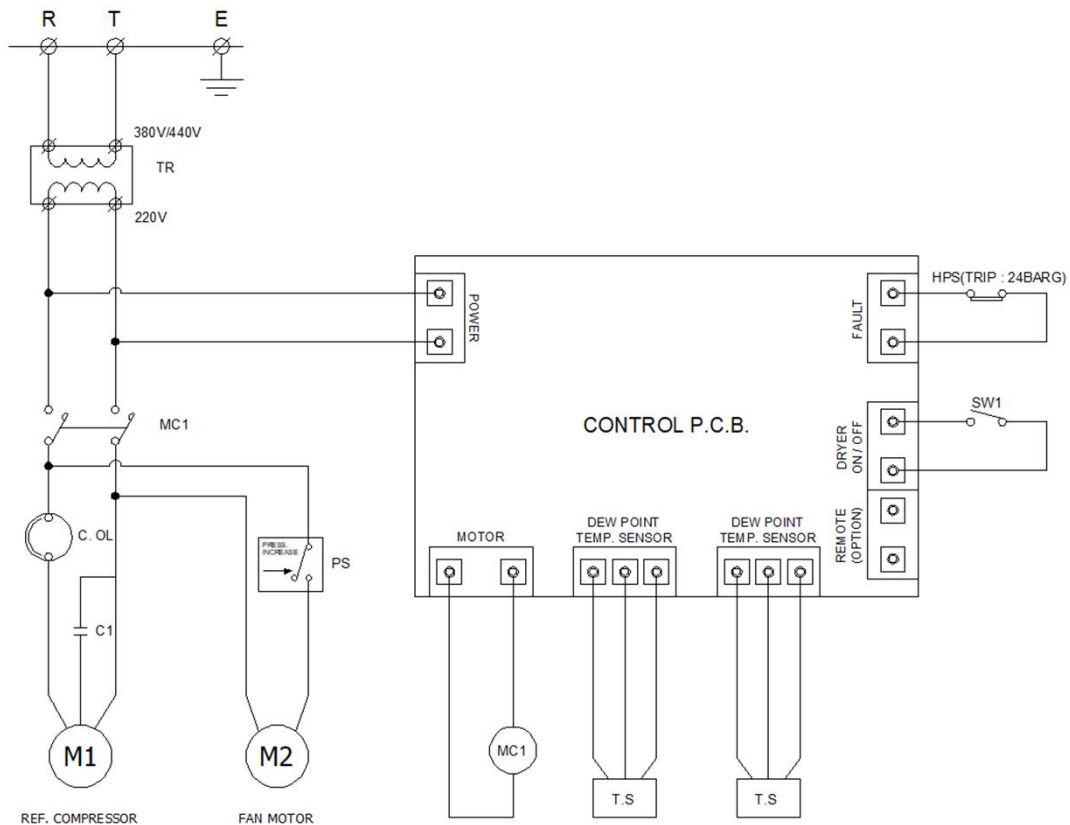
■ Electrical Diagram(N2 Type)

(* Technical modifications are subject to change without notice.)

• HYD - 5N2~20N2



• HYD - 30N2~100N2(HYD-100N2 is 3phase system.)





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