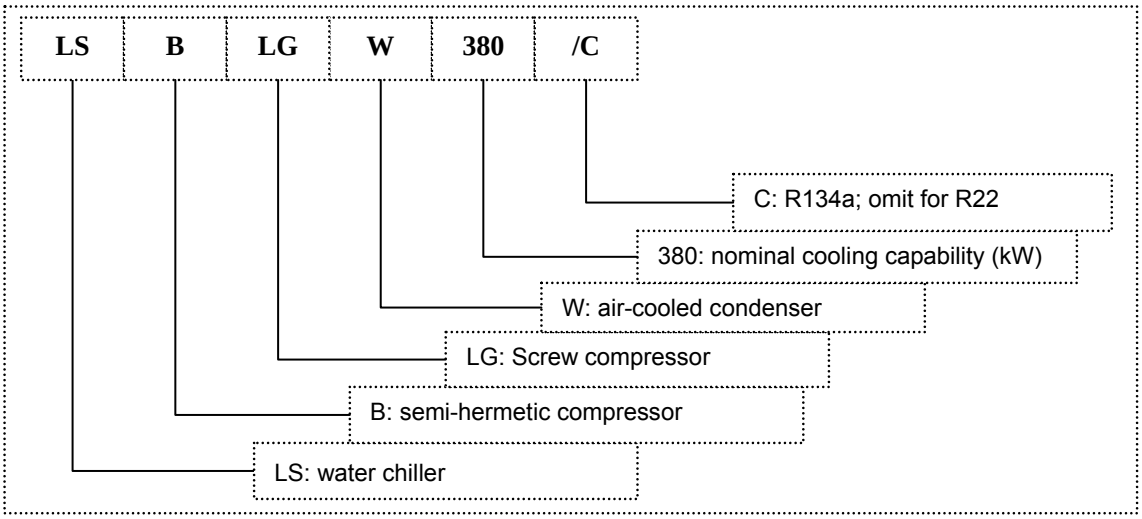
Air cooled screw chiller

Technical service manual (LSBLGW***/C

Contents

I. Product

1. Nomenclature



2. Product Line Up

Model	Power Supply	Cooling Capacity (kW)	Quantity of Compressor	Quantity of Fan
LSBLGW380/C	380V/3Ph/50Hz	376	1	6
LSBLGW500/C	380V/3Ph/50Hz	496	1	8
LSBLGW600/C	380V/3Ph/50Hz	594	1	10
LSBLGW720/C	380V/3Ph/50Hz	720	1	10
LSBLGW880/C	380V/3Ph/50Hz	880	2	14
LSBLGW1000/C	380V/3Ph/50Hz	996	2	16
LSBLGW1200/C	380V/3Ph/50Hz	1203	2	16
LSBLGW1420/C	380V/3Ph/50Hz	1419	2	20

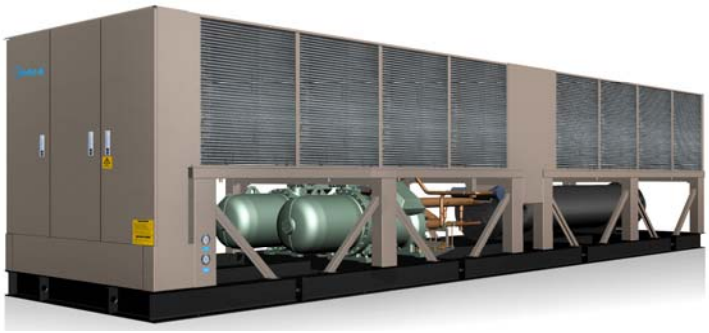
3. External Appearance

LSBLGW380/C module

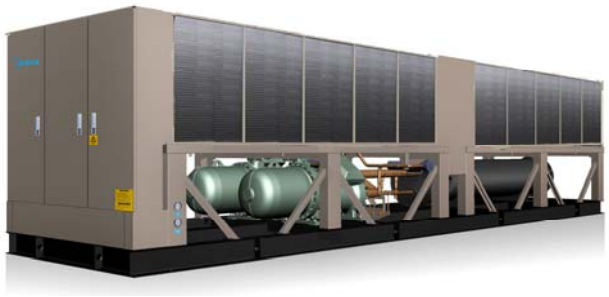
LSBLGW500/C module

LSBLGW600/C LSBLGW720/C module

LSBLGW880/C module



LSBLGW1000/C LSBLGW1200/C module



LSBLGW1420/C module

4. Features

Environmental care

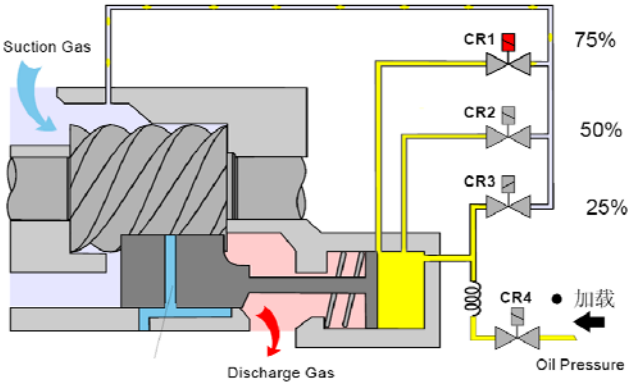
- R134a refrigerant

  Refrigerant of the HFC group with zero ozone depletion potential.

  It is environmentally safe and does not have a phase-out date.

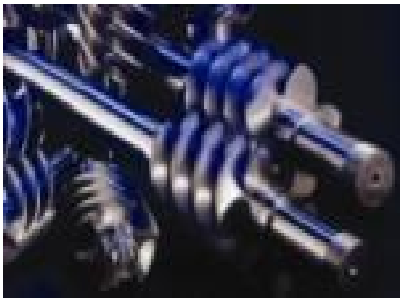
Economical Operation Cost

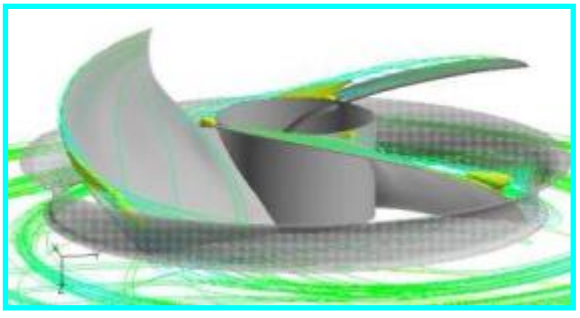
- Extremely high full load and partial load energy efficiency. New twin-rotor screw compressor equipped with a high-efficiency motor and a variable capacity valve that can adjust the capacity of 25%, 50%, 75% and 100% in 4 stages (Stepless control as an option) and permits exact matching of the cooling capacity to the actual load.
- Electronic expansion device permits the operation at a lower condensing pressure and improve the utilization of the evaporator heat exchange surface (superheat control).
- Economizer system with electronic expansion device for increases the cooling capacity. Automatic scheduling of the Chiller's compressors allows the chiller to match the fluctuating cooling load and conserve energy with each unit running at its peak efficiency.



Lower operating noise

- The twin-screw compressor adopts the strong points of gapless-loss, high-efficiency cubage, low-noise, few easy workout parts. Double-wall structure not only compensates the pressure, but also significantly reduces the noise. Cast iron structure of the compressor casing and oil separator can reduce the noise significantly.





- Low-noise fans, made of a composite material are now even quieter and do not generate intrusive low-frequency noise. Rigid fan mounting avoids start-up noise.

  Multiple direct drive dynamically balanced propeller fans operate at low tip speeds for maximum efficiency and minimum noise and vibration. A heavy-gauge vinyl-coated fan guard protects each fan.

Outstanding reliability

- Full factory testing of all the units ensures a trouble free start-up. Extensive test makes certain that each safety and operating control is properly adjusted, and operates correctly. The unit has passed full factory test before being delivered to ensure the reliable working on the site.
- Transport simulation test in the laboratory on a vibrating table.

Simple Structure, Easy Installation

- The unit can be placed in service after being connected with power supply and water supply during field installation .Standard flange connection and wire mesh to the electrical panel make the installation easy and simple.

State of Technique, Accuracy Control

- The sensors related to control and other assemblies are equipped by factory and strictly tested.
- Intelligent control：The unit is controlled by micro-controller(PLC) and has the automatic control functions of fault diagnosis, energy management and anti-freezing monitoring, which ensures the high-efficiency operation of the unit, and more convenient in use. The unit with RS485 open protocol communication interface. BMS compatible. The startup and shutdown of each unit is controlled by the host computer, reducing the running cost to the lowest.
- Complete and safe control system: All electrically control elements are designed and selected with stable quality and reliable function; The unit designed with multiple security measures ensure the safe and reliable running witch including high and low pressure protection, oil pressure difference

protection, anti-freezing protection, water flow protection, power protection, overload protection etc.

Modular design, Flexible combination

- The units adopt modular design, which can makes more unit connect together. The unit can combine 8 modules. Cooling capacity can be within 360kW-7200kW, meanwhile every separate module can operate as master, also each module can be a slave unit with modules combination, more convenient for design and installation.

5. Specification

Single Compressor:

Unit Model		LSBLGCW380/C	LSBLGCW500/C	LSBLGW600/C	LSBLGW720/C
Cooling capacity	kW	376	496	594	720
Power supply		380V/3P/50Hz			
Rated power consumption	kW	124	159	187	234
Compressor	Type	Semi- hermetic, twin screw compressor			
	Quantity	1	1	1	1
Energy adjustable range%		25%,50%,75%,100% 4-step (50%~100% stepless as option)			
Refrigerant	Type	R134a			
Air Side Heat-exchanger	Type	M shape Heat exchanger, High efficient exchanger tube + aluminum fins			
	Fans Quantity	6	8	10	10
	Air Volume（m3/h）	23000×6	23000×8	23000×10	23000×10
	Motor input（kW）	2.8×6	2.8×8	2.8×10	2.8×10
Water Side Heat-exchanger	Type	Shell-and-tube heat-exchanger			
	Water Volume（m3/h）	65.4	86	103.2	123.8
	Water pressure drop（kpa）	39	54	56	58
	Inlet/outlet Pipe diameter（mm）	DN125	DN125	DN125	DN150
Water side fouling factor (m^2·℃/kW)		0.086			
Dimension（mm）	Length（mm）	3810	4680	5880	5880
	width（mm）	2280	2280	2280	2280
	height（mm）	2370	2370	2370	2370
Shipping weight（kg）		3320	4330	5000	5500
Running weight（kg）		3520	4530	5200	5700

Note:

1) Nominal cooling capacities are based on the following conditions:

Chilled water inlet/outlet temp: 12℃/7℃; Outdoor temp (DB/WB):35℃/24℃.

2) The applicable ambient temperature range of R134a air-cooled screw units is 15℃ ~ 43℃。

Dual Compressors:

Unit Model		LSBLGCW880/C	LSBLGCW1000/C	LSBLGW1200/C	LSBLGW1420/C
Cooling capacity	kW	880	996	1203	1419
Power supply		380V/3P/50Hz			
Rated power consumption	kW	285	318	381	466
Compressor	Type	Semi- hermetic, twin screw compressor			
	Quantity	2	2	2	2
Energy adjustable range%		12.5%、25%、37.5%、50%、62.5%、75%、87.5%、100%			
Refrigerant	Type	R134a			
Air Side Heat-exchanger	Type	M shape Heat exchanger, High efficient exchanger tube + aluminum fins			
	Fans Quantity	14	16	16	20
	Air Volume（m3/h）	23000×14	23000×16	23000×16	23000×20
	Motor input（kW）	2.8×14	2.8×16	2.8×16	2.8×20
Water Side Heat-exchanger	Type	Shell-and-tube heat-exchanger			
	Water Volume（m3/h）	151.4	172	206.4	244.2
	Water pressure drop（kpa）	70	75	71	69
	Inlet/outlet Pipe diameter（mm）	DN150	DN150	DN200	DN200
Water side fouling factor (m^2·℃/kW)		0.086			
Dimension（mm）	Length（mm）	8800	9640	9640	11700
	width（mm）	2280	2280	2280	2280
	height（mm）	2430	2430	2430	2430
Shipping weight（kg）		7750	8900	9100	11100
Running weight（kg）		8050	9200	9400	11400

Note:

1) Nominal cooling capacities are based on the following conditions:

Chilled water inlet/outlet temp: 12℃/7℃; Outdoor temp (DB/WB):35℃/24℃.

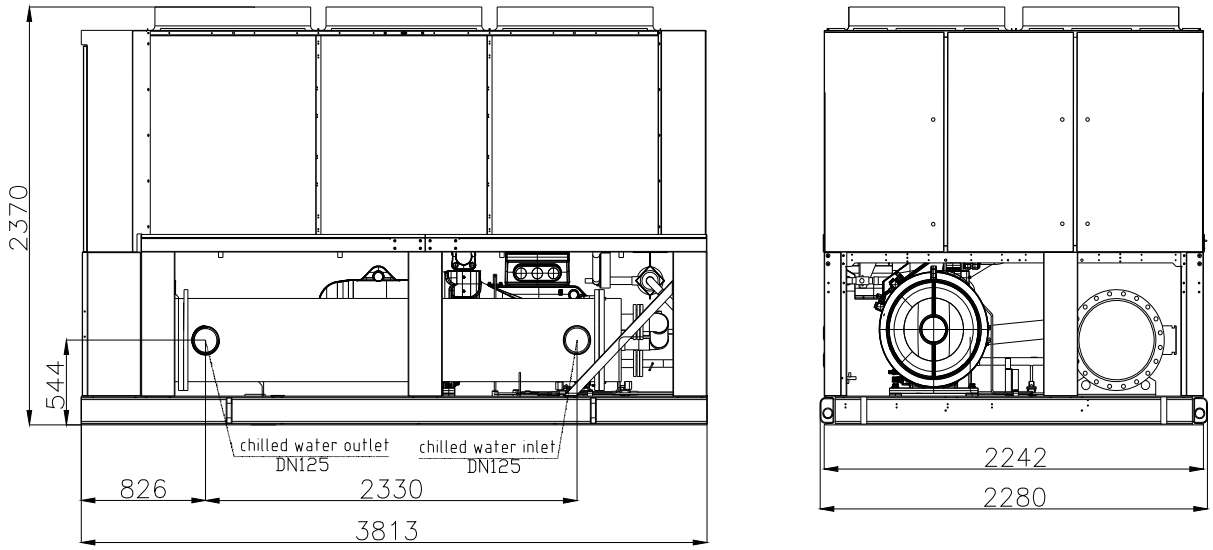
2) The applicable ambient temperature range of R134a air-cooled screw units is 15℃ ~ 43℃。

6. Operating Range

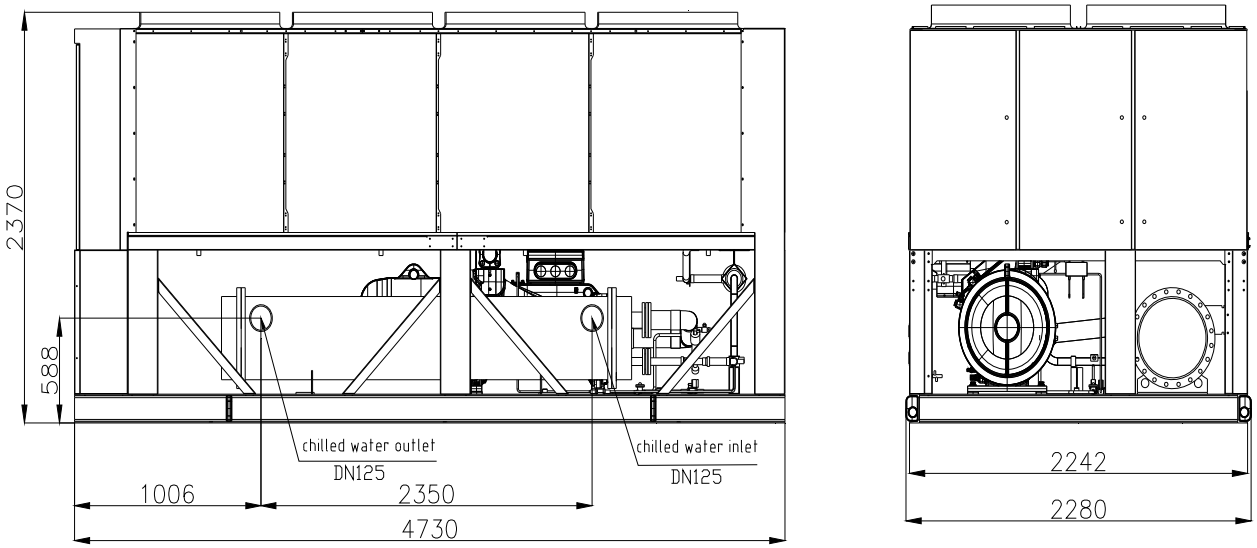
Content	**Running range**
Ambient Temp.	15℃～43℃(T1)
Leaving water Temp.	5℃～15℃
Water flow volume	Rating flow volume±20%
Max inlet/outlet water Temp. difference	8℃
Fouling factor (m^{2}·℃/kW)	0.086
Voltage tolerance	Rating Voltage±10%
Phase tolerance	±2%
Power supply frequency	Rating frequency±2%
Evaporator max working pressure on water side	1.0MPa
Compressor max. start count	4 times/h
Environment quality	High corrosive environment and high humidity should be avoided.
Drainage system	The height of water drainage should not be higher than the base of the unit on the spot
Storage and transport temperature	-25℃～55℃
RH(relative air humidity)	In + 40℃ does not exceed 50%, + 25℃ no more than 90%
Applicable altitude range：	No more than 1000m

7. Outline Dimension

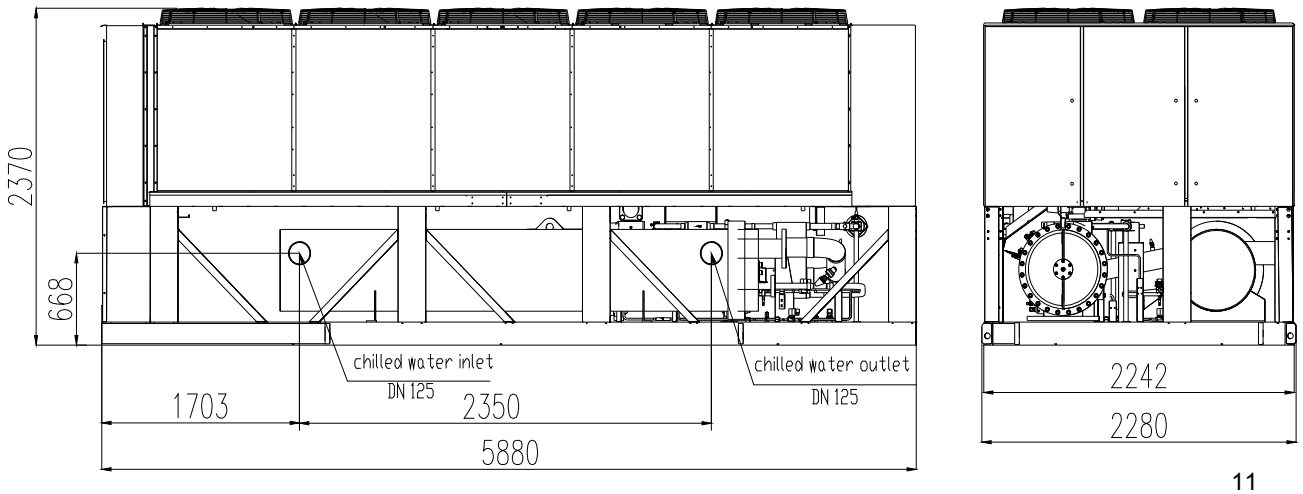
(1) LSBLGW380/C unit (mm)



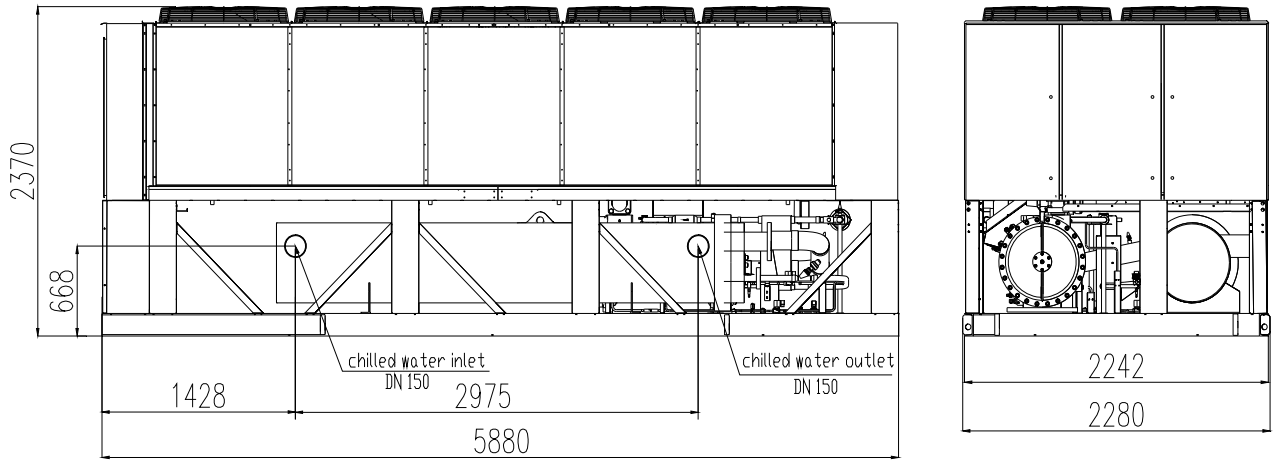
(2) LSBLGW500/C unit (mm)



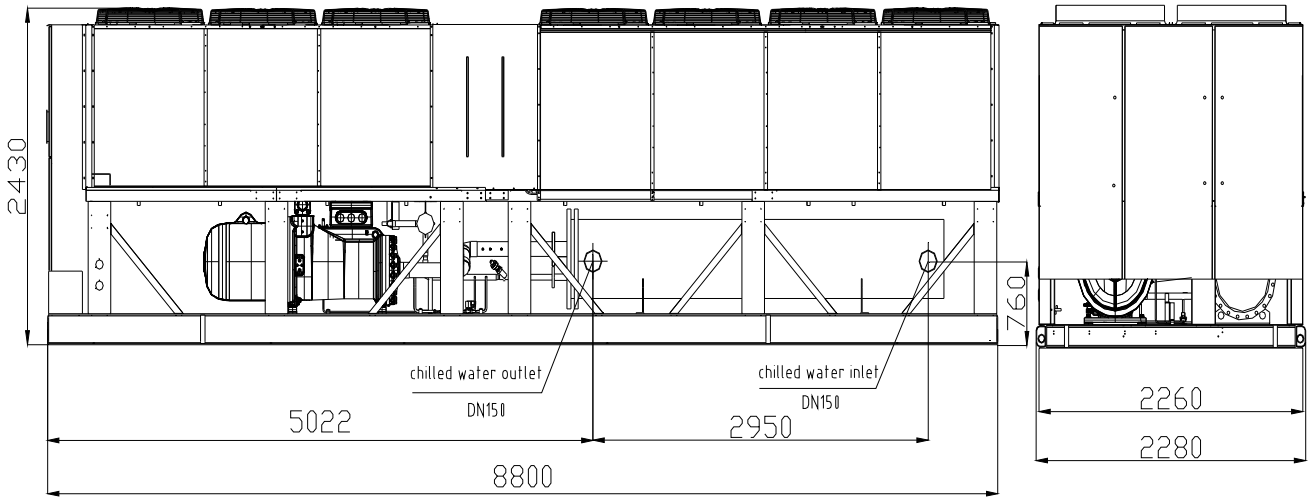
(3) LSBLGW600/C unit (mm)



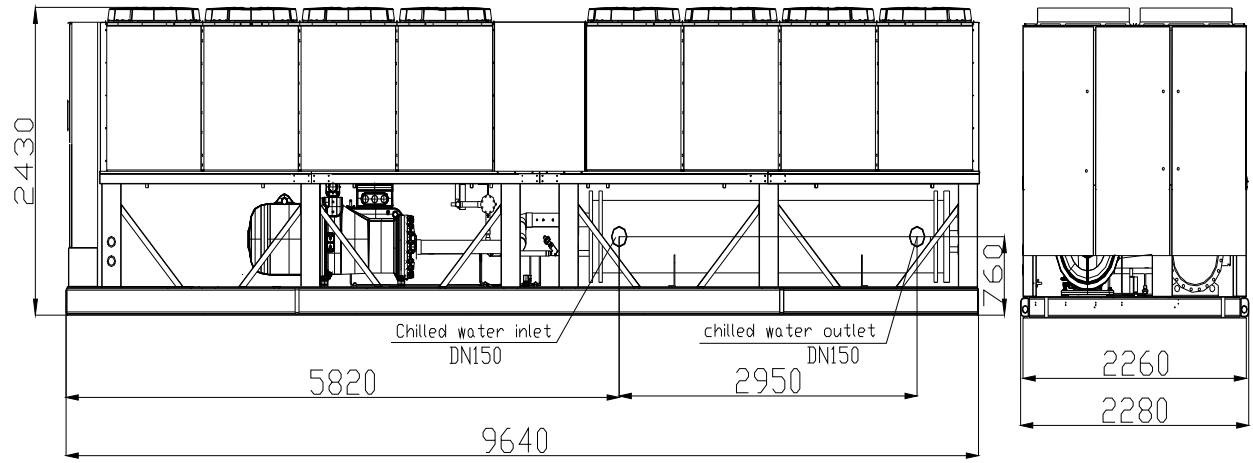
(4) LSBLGW720/C unit (mm)



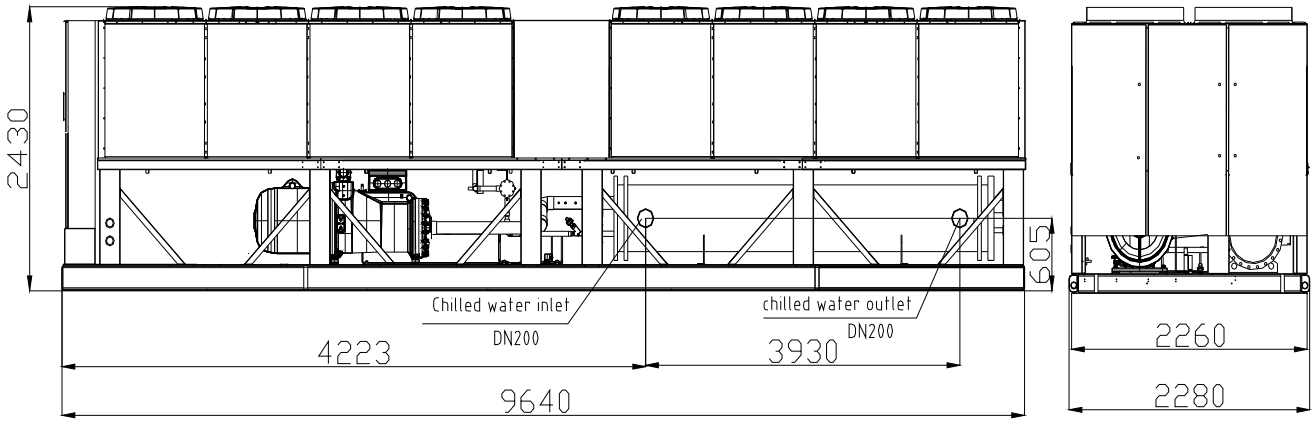
(5) LSBLGW880/C unit (mm)



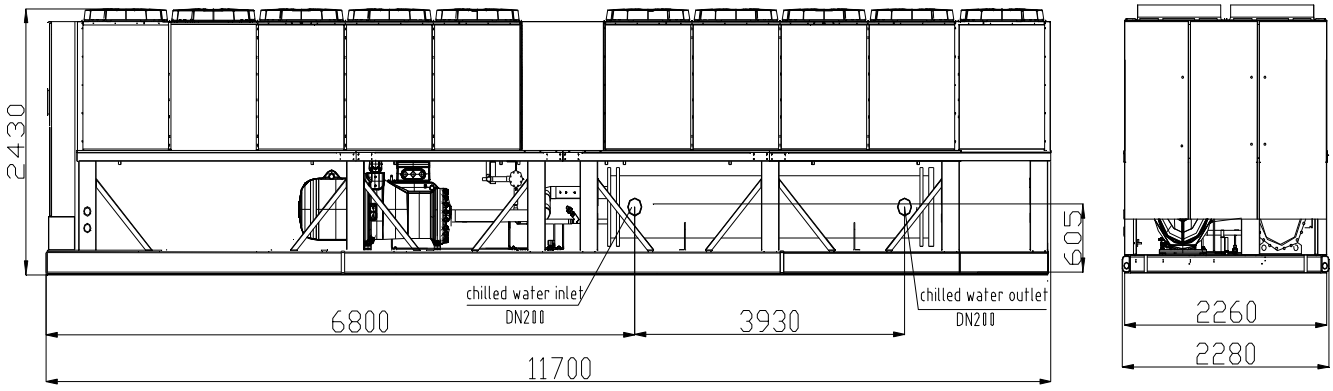
(6) LSBLGW1000/C unit (mm)



(7) LSBLGW1200/C unit (mm)



(7) LSBLGW1420/C unit (mm)

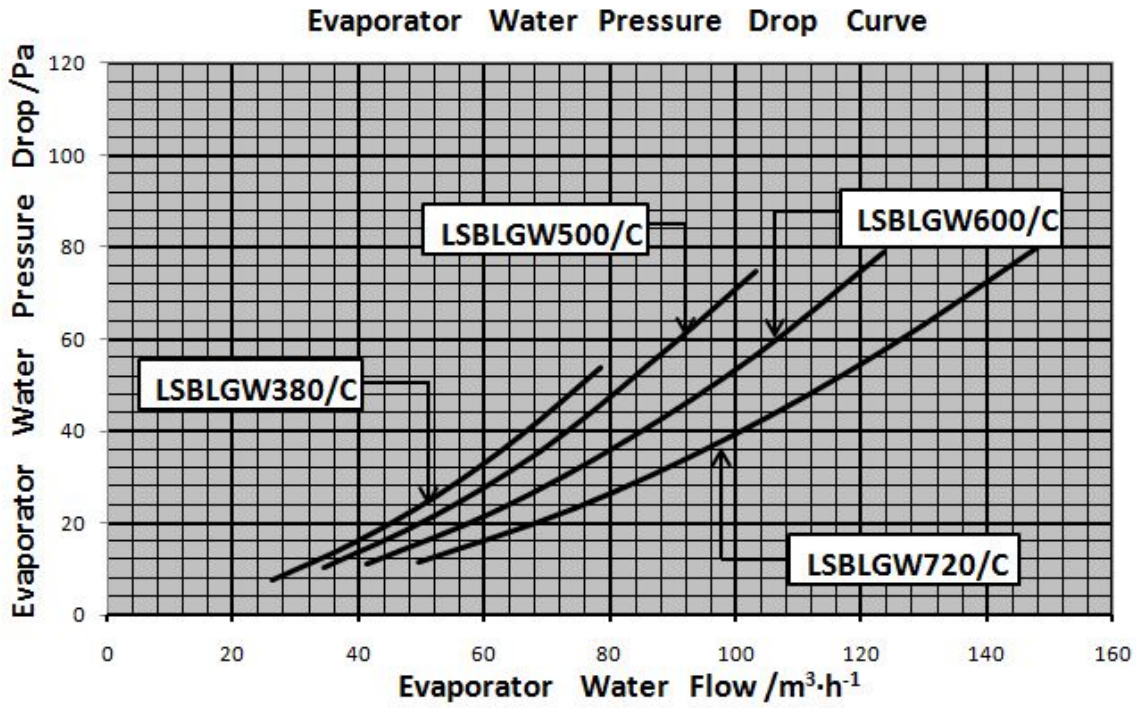


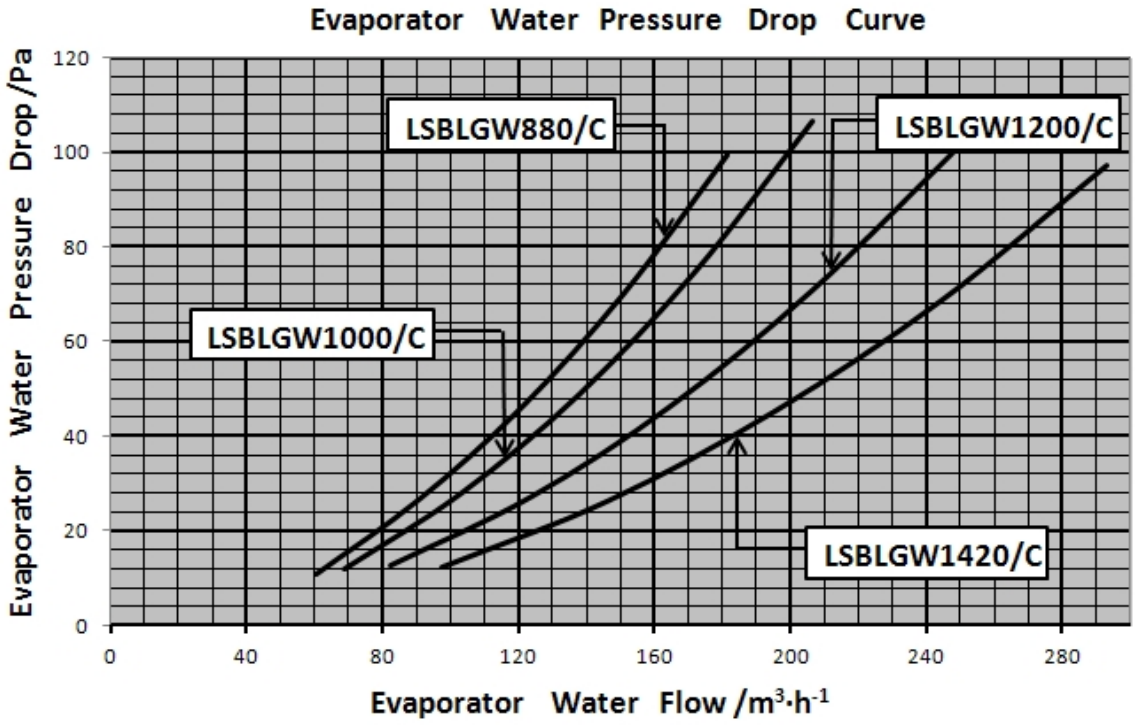
8. Water Flow – Water Drop Pressure Curve

Balance the chilled water flow through the evaporator. The flow rates must fall between the minimum and maximum values shown in the below table. Flow rates below the minimum values shown will result in laminar flow which will reduce efficiency, cause erratic operation of the electronic expansion valve and could cause low temperature cutouts. On the other hand, flow rates exceeding the maximum values shown can cause erosion on the evaporator water connections and tubes, even piping breaking.

Variable chilled water flow through the evaporator while the compressor(s) are operating is not recommended. The chiller control set points are based upon a constant flow and variable temperature.

Unit Model	MIN. FLOW RATE		MAX. FLOW RATE	
SIZE	m^3/h	GPM	m^3/h	GPM
LSBLGW380/C	46	201	85	374
LSBLGW500/C	60	265	112	492
LSBLGW600/C	72	318	134	590
LSBLGW720/C	87	381	161	708
LSBLGW880/C	106	466	197	866
LSBLGW1000/C	120	530	224	984
LSBLGW1200/C	144	636	268	1181
LSBLGW1420/C	171	752	317	1397


Evaporator Water Pressure Drop Curve
Evaporator Water Pressure Drop /Pa
120
100
80
60
40
20
0
LSBLGW500/C
LSBLGW600/C
LSBLGW380/C
LSBLGW720/C
0
20
40
60
80
100
120
140
160
Evaporator Water Flow /m³·h⁻¹


Evaporator Water Pressure Drop Curve
Evaporator Water Pressure Drop /Pa
120
100
80
60
40
20
0
LSBLGW880/C
LSBLGW1200/C
LSBLGW1000/C
LSBLGW1420/C
0
40
80
120
160
200
240
280
Evaporator Water Flow /m³·h⁻¹

II. Installation

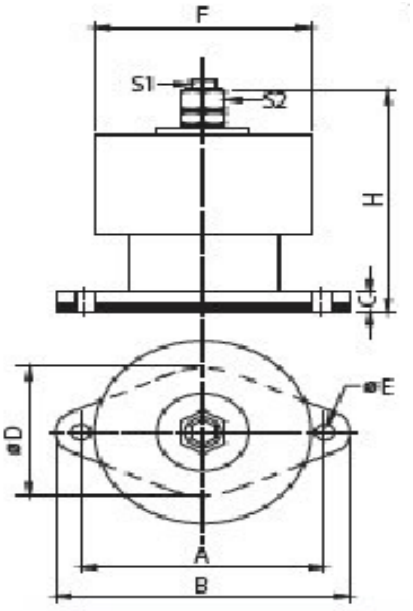
1. Installation Dimensions & Vibration Isolators

Vibration isolators are recommended for all roof mounted installations or wherever vibration transmission is a consideration.

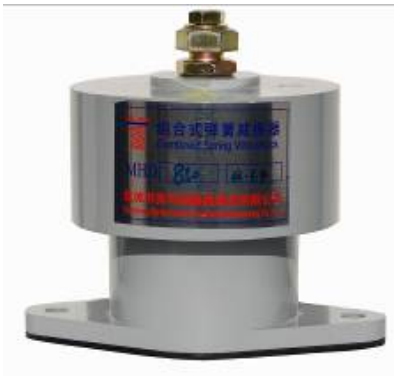
Neoprene Isolation is optional, it is recommended for normal installations and provides good performance in most applications for the least cost.

Spring isolators are level adjustable, spring and cage type isolators, mounted under the unit base rails. Deflection may vary slightly by application.

Isolator model	Midea code	Brand
Spring isolator MHD-850	202502301043	Mei Huan (Yan Cheng City)
Spring isolator MHD-1050	202502301044	Mei Huan (Yan Cheng City)



The housing of MHD series with aluminum-magnesium alloy material could prevent the vibration isolator from rustiness forever and enlarge the use life. The structure also has new improvement with an anti-side-force function for better stability and safety of unit. It can be freely adjusted as per balancing situation of unit to guarantee its work under all situations.

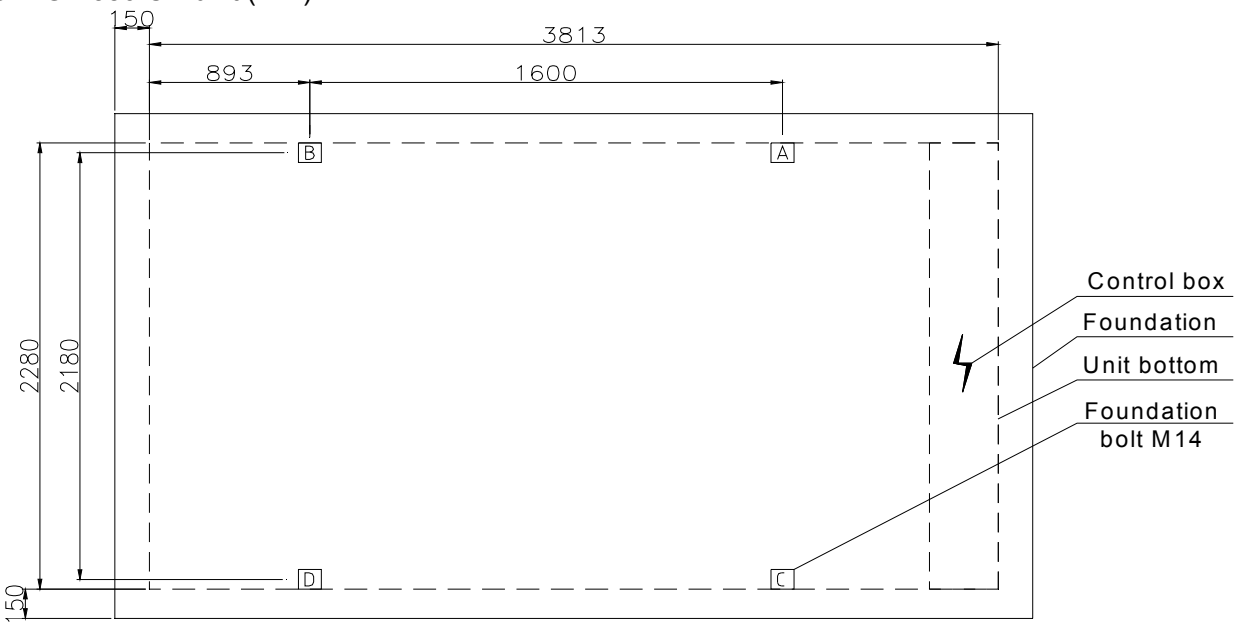


Technical Date of MHD

MODEL	LOAD (kg)	LOAD (N)	DEFLECTION (mm)	VERTICAL (kg/mm)
MHD-850	850	8330	25	34.00
MHD-1050	1050	10290	25	42.00

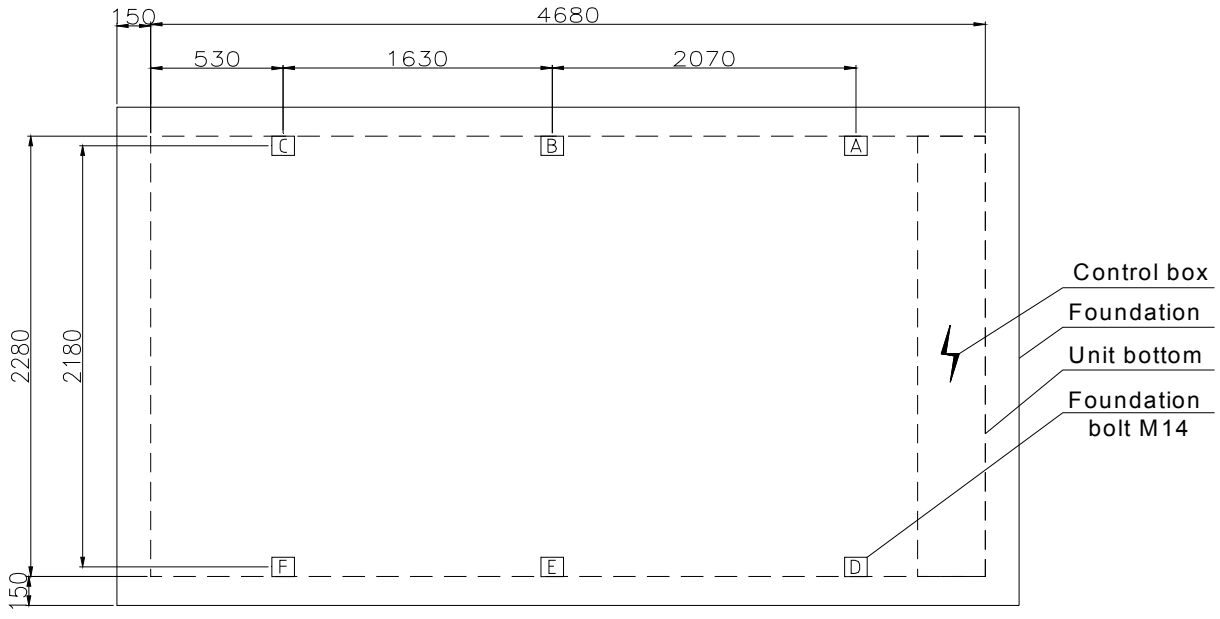
MODEL	OUTER SIZE (mm)								
	A	B	C	ΦE	F	H	S1	S2	ΦD
MHD-850	165	200	13	12.5	147	165	M12*25	M20*60	104
MHD-1050	165	200	13	12.5	147	165	M12*25	M20*60	104

(1) LSBLGW380/C unit (mm)



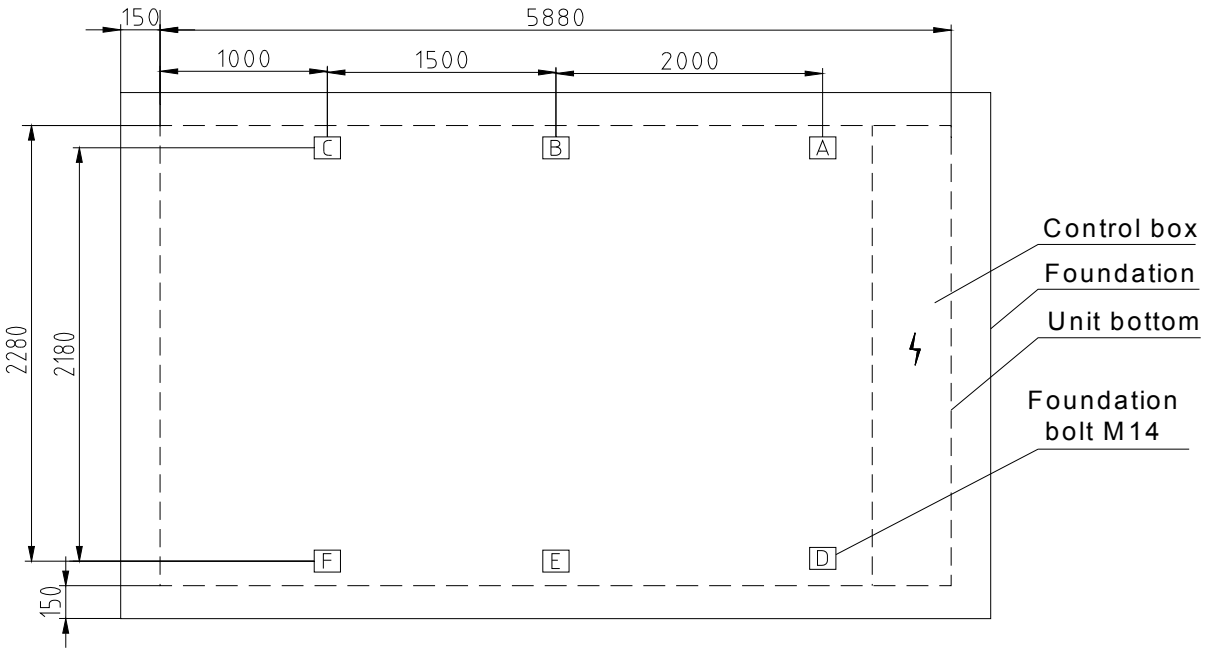
Model	Weight to be supported by spring isolator(kg)			
	A	B	C	D
LSBLGW380/C	864	896	864	896

(2) LSBLGW500/C unit (mm)



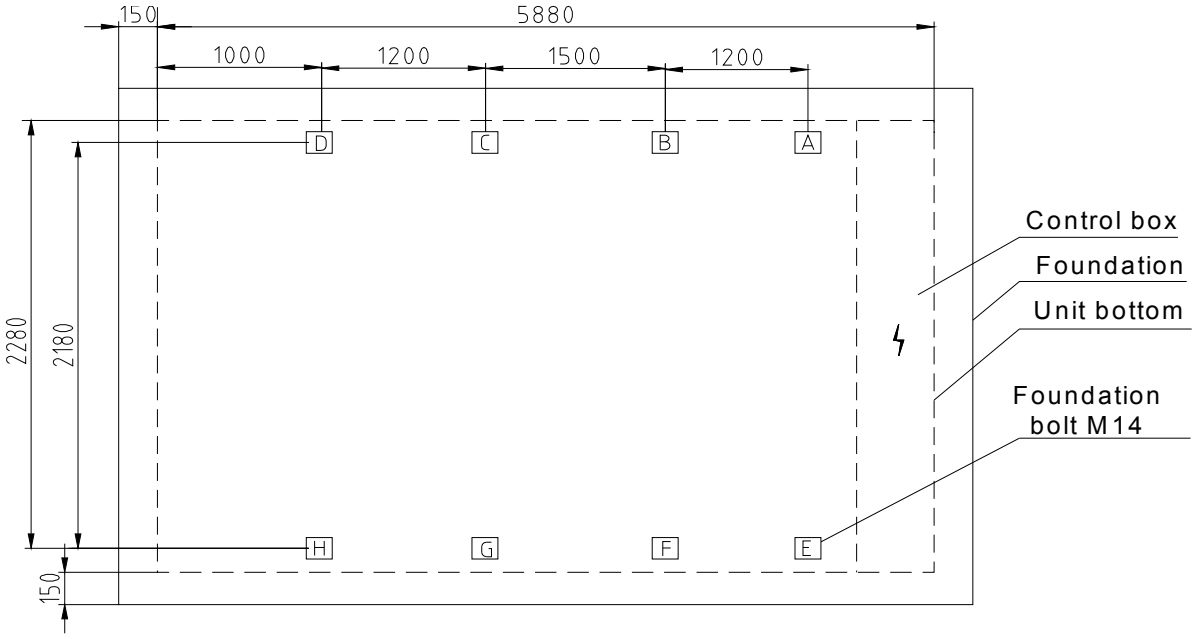
Model	Weight to be supported by spring isolator(kg)					
	A	B	C	D	E	F
LSBLGW500/C	614	837	814	614	837	814

(3) LSBLGW600/C unit (mm)



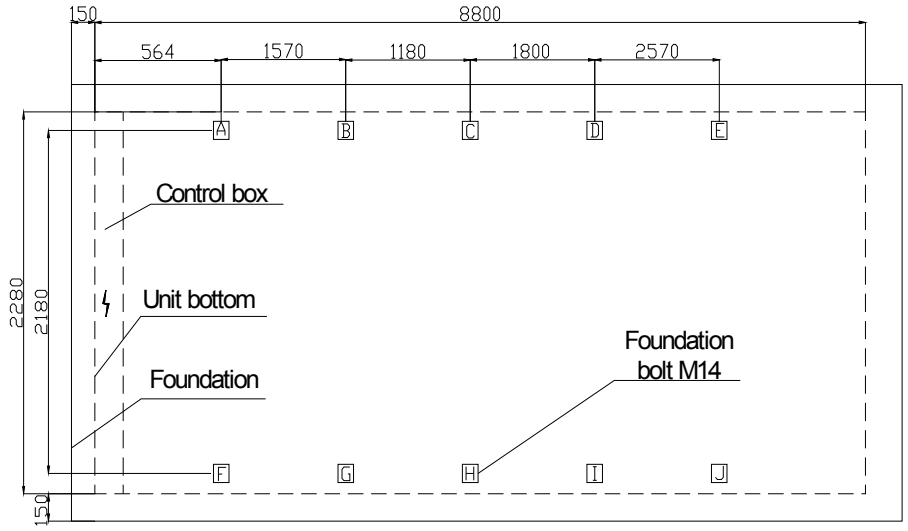
Model	Weight to be supported by spring isolator(kg)					
	A	B	C	D	E	F
LSBLGW600/C	742	934	921	742	934	921

(4) LSBLGW720/C unit (mm)



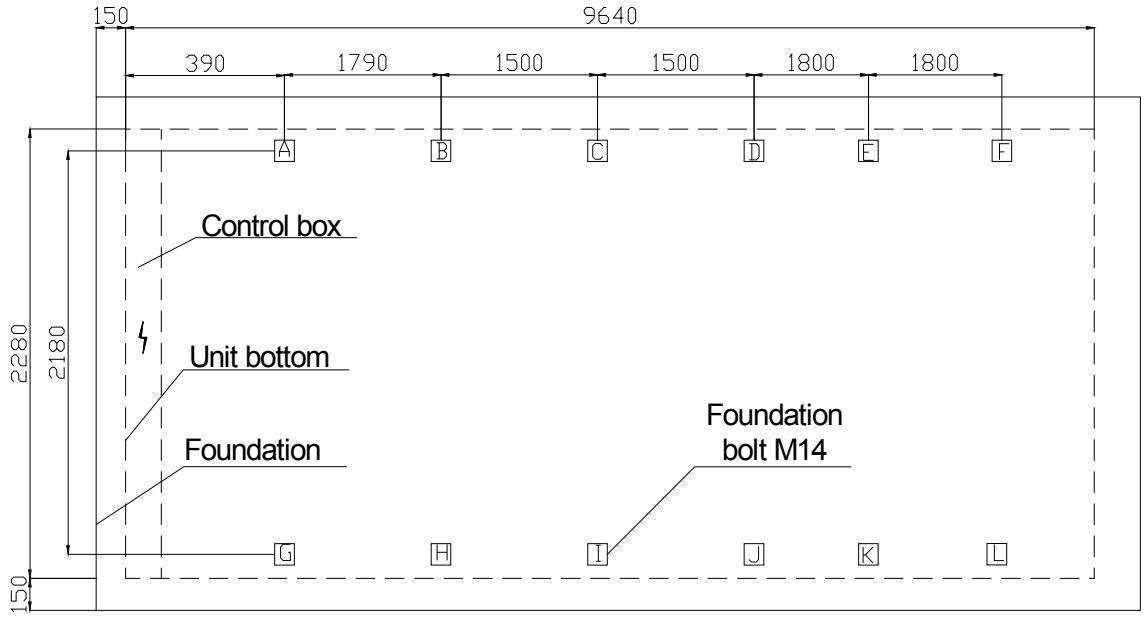
Model	Weight to be supported by spring isolator(kg)							
	A	B	C	D	E	F	G	H
LSBLGW720/C	647	725	760	718	647	725	760	718

(5) LSBLGW880/C unit (mm)



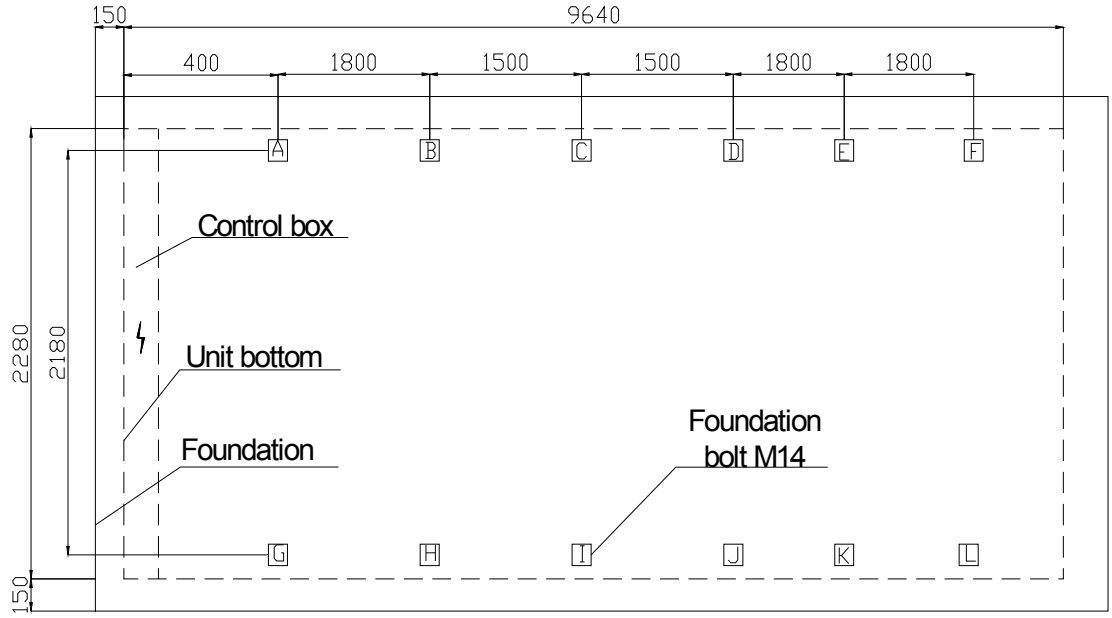
Model	Weight to be supported by spring isolator (kg)									
	A	B	C	D	E	F	G	H	I	J
LSBLGW880/C	781	912	915	715	701	781	912	915	715	701

(6) LSBLGW1000/C unit (mm)



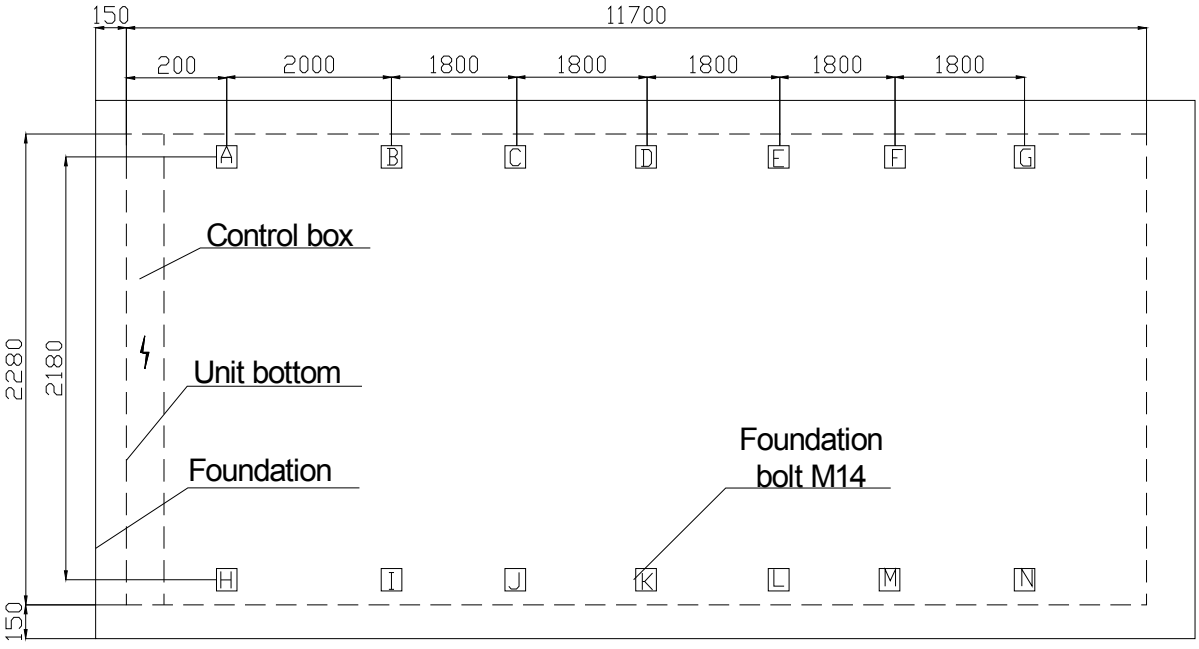
Model	Weight to be supported by spring isolator (kg)											
	A	B	C	D	E	F	G	H	I	J	K	L
LSBLGW1000/C	701	887	892	707	706	707	701	887	892	707	706	707

(7) LSBLGW1200/C unit (mm)



Model	Weight to be supported by spring isolator (kg)											
	A	B	C	D	E	F	G	H	I	J	K	L
LSBLGW1200/C	731	912	905	721	716	715	731	912	905	721	716	715

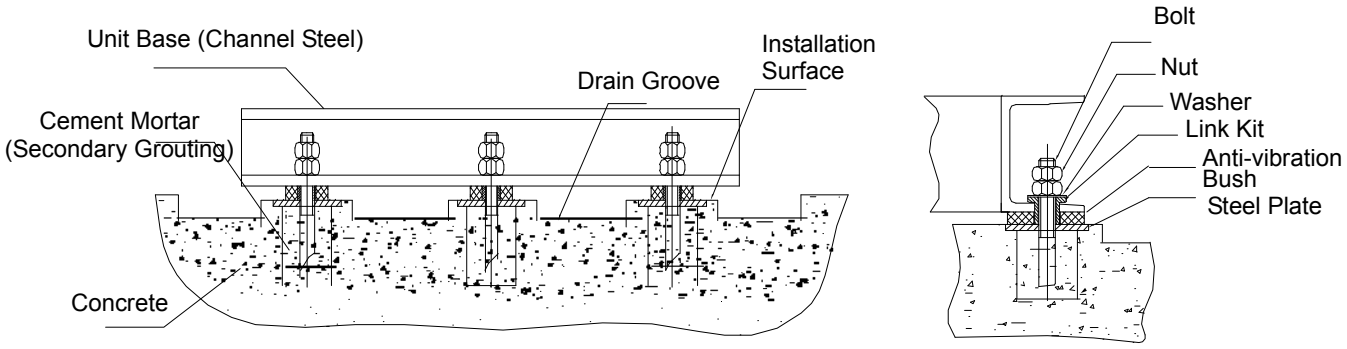
(8) LSBLGW1420/C unit (mm)



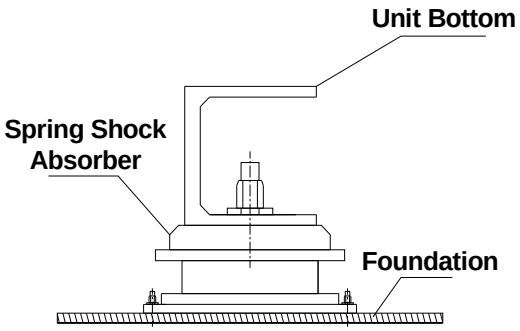
Model	Weight to be supported by spring isolator (kg)													
	A	B	C	D	E	F	G	H	I	J	K	L	M	N
LSBLGW1420/C	717	925	954	936	724	722	722	717	925	954	936	724	722	722

2. Installation Foundation

1) The installation foundation shall be designed by professionals according to the site conditions.
2) The installation foundation of the unit must be of a cement or steel structure, and shall bear the operating weight of the machine, and this face must be horizontal.
3) Please refer to the Diagram for Installation Foundation of Unit, place the steel plate and anti-vibration bush on the foundation accurately, and execute secondary grouting after installing the unit and foundation bolts together. The foundation bolts are generally 60 mm higher than the installation surface .



4) T If the unit will be installed on the top of the building which vibration level should be restricted. It is recommended to use spring isolators as absorber, please refer to following diagram:

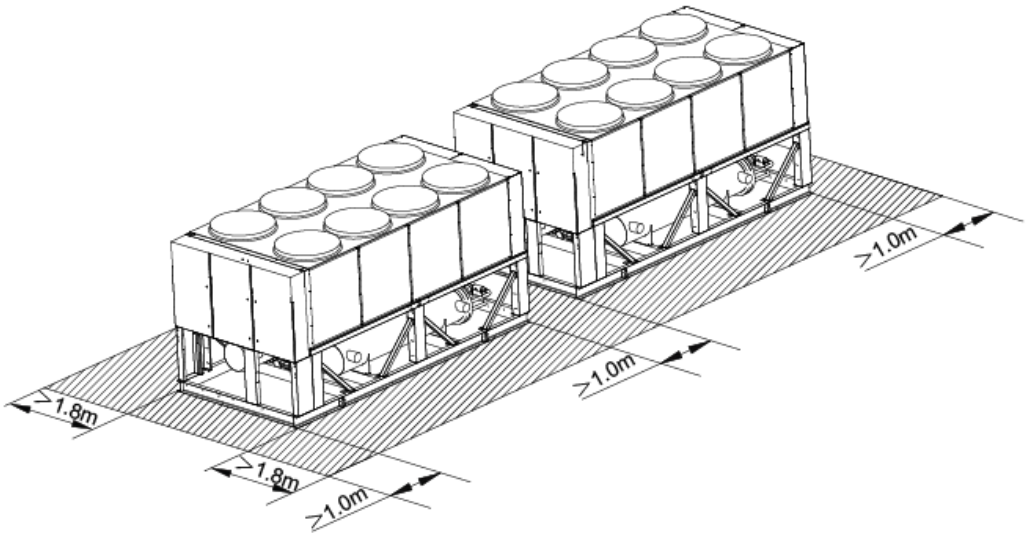


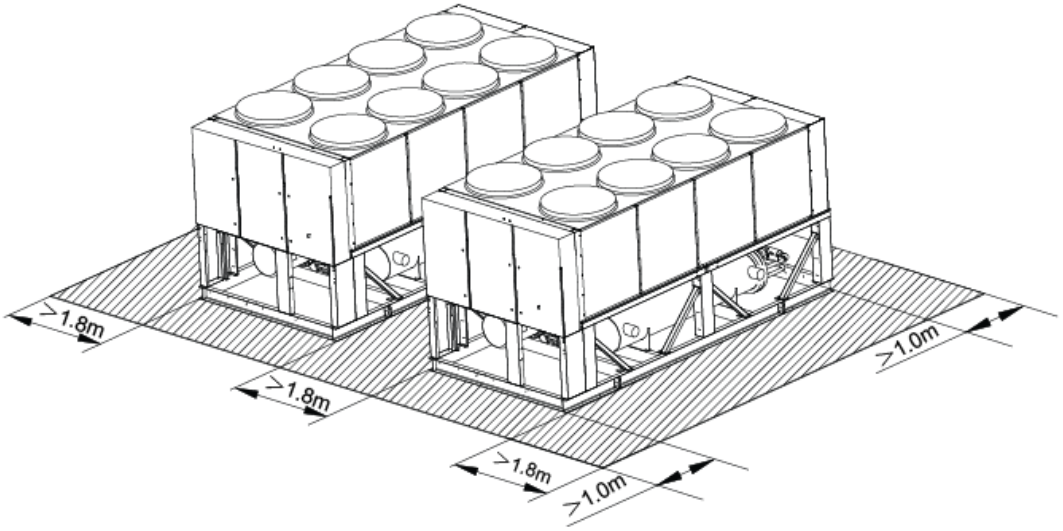
3. Installation Spaces

1) Reserve the spaces required for unit installation, operation and maintenance.
2) The installation place of the unit shall be free from the effects of fire, inflammables, corrosive gas or waste gas as much as possible; the ventilation space shall be reserved there; proper measures shall be taken to reduce noise and vibration whenever possible.
3) When the units are installed on the horizontal plane without obstacles, the longitudinal distance between the units shall be kept above 1m, the transverse distance between the units shall be kept above 1.8 m, and such distances shall be as large as possible; if there are obstacles at both sides of the unit, the distance between the unit and obstacles shall be kept above 1.8 m; if there are obstacles above the unit, the distance between the unit and obstacles shall be kept above 2.5 m.

4) The removable post for compressor service access must not be blocked at either side of the unit.

5) There must be no obstruction under the fans.



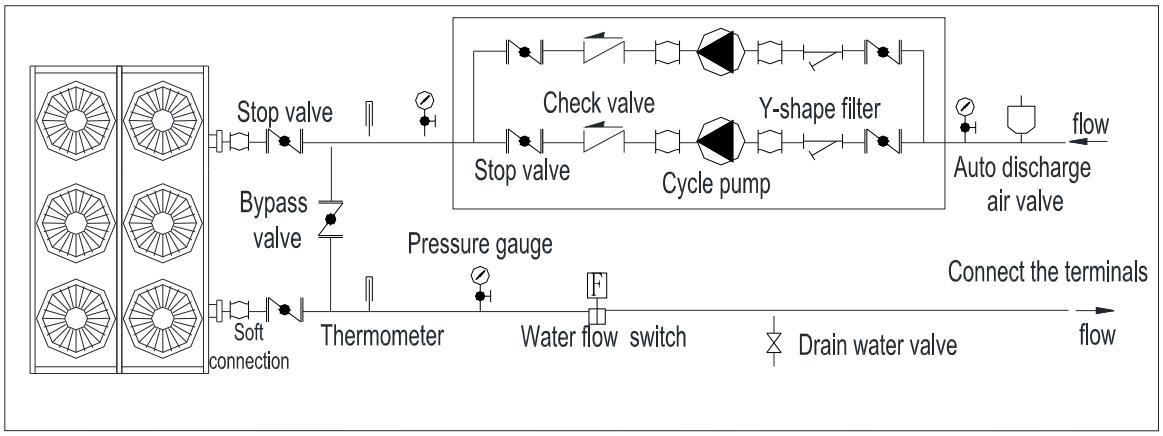


4. Installation of Water Pipeline System

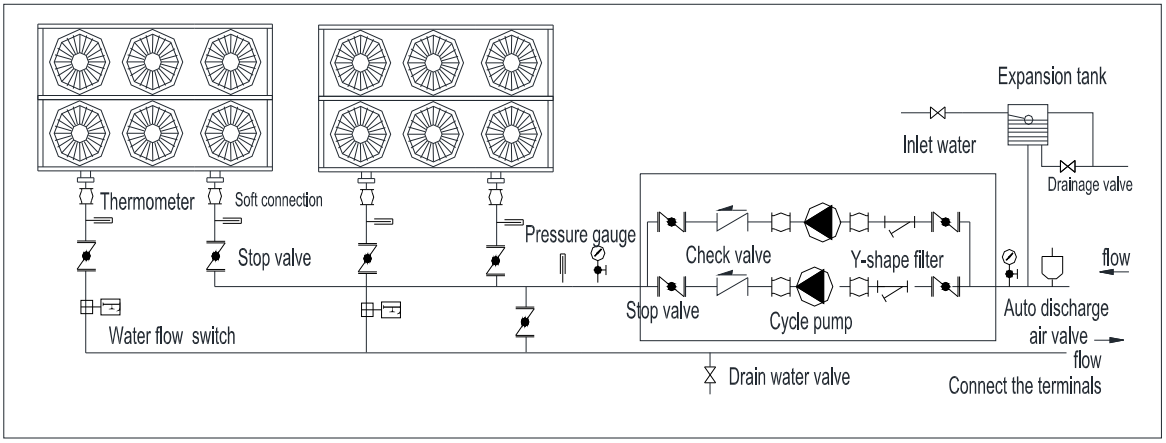
Due to the variety of piping practices, it is advisable to follow the recommendations of local authorities. The installation and insulation of the water pipelines of the air conditioning system shall be designed and guided by design professionals, and confirm to the corresponding provisions of the HVAC installation specifications.

Basically, the piping should be designed with a minimum number of bends and changes in elevation to keep system cost down and performance up.

Single unit:



Parallel connection of units:

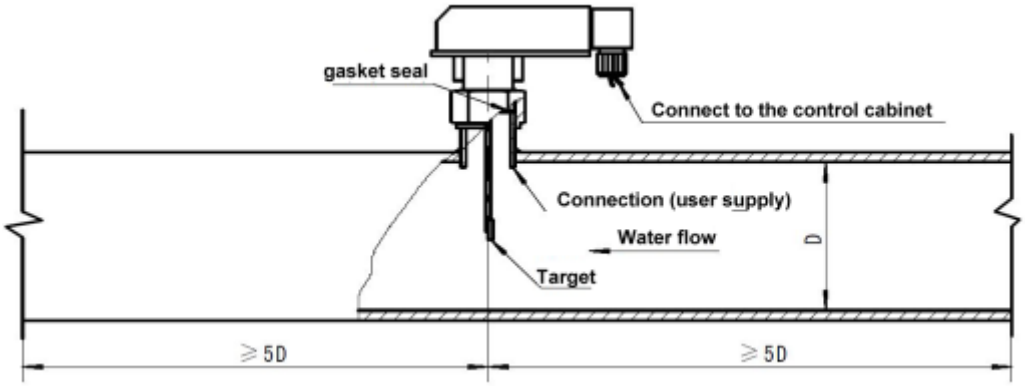


1) The water inlet pipeline and drain pipeline shall be connected according to the requirements of markings on the unit. Generally, the refrigerant pipe side of the evaporator is the chilled water outlet side.
2) The chilled water pipeline system must be provided with the soft connection, thermometer, pressure gauge, water filter, electronic scale remover, check valve, target flow controller, discharge valve, drain valve, stop valve, expansion tank, etc.
3) The water system must be fitted with the water pump with appropriate displacement and head, so as to ensure normal water supply to the unit. The soft connection shall be used between the water pump, unit and water system pipelines, and the bracket shall be provided to avoid stress on the unit. Welding work for installation shall avoid damage to the unit.
   (1) Determination of water pump flow:
   Flow (m3/h) = (1.1 ~ 1.2) * Unit Cooling Capacity (kW)/5.8
   (2) Determination of water pump head:
   Head (m) = (Unit Resistance (see product parameters) + Resistance at Maximum End of Pressure Drop (see product parameters) + Pipeline Resistance (length of the least favorable loop pipe * 0.05) + Local Resistance (length of the least favorable loop pipe * 0.05 * 0.5)) * (1.1 ~ 1.2)
4) The flow switch must be arranged on the drain pipe of the evaporator. The flow switch shall be interlocked with the input contact in the control cabinet. Its installation requirements are as

follows:

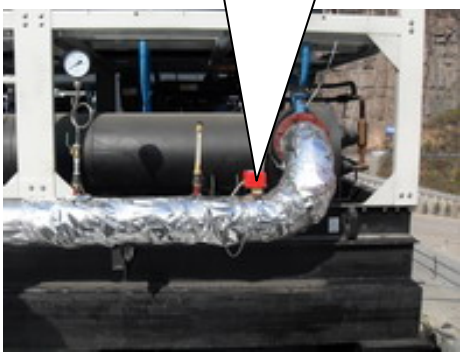
(1) The flow switch shall be installed on the pipe vertically.

(2) The straight pipe section at each side of the flow switch shall have a length that is at least 5 times the pipe diameter; do not install it near the elbow, orifice plate or valve.



The installation of the flow switch is unsatisfied.

The straight pipe section for installation of the flow switch is satisfied.

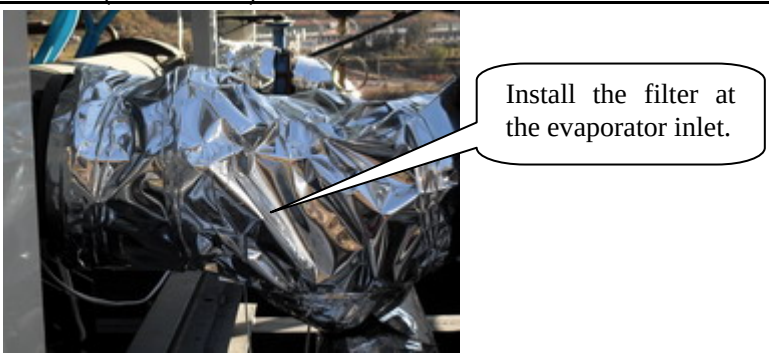


(3) The direction of the arrow on the flow switch must be consistent with the direction of water flow.

(4) In order to prevent vibration of the flow switch, remove all air in the water system.

(5) Adjust the flow switch to keep it in open state when the flow is lower than the minimum flow (the minimum flow is 70% of the design flow). When the water flow is satisfied, the flow switch shall keep in closed state.

5) The water filter must be installed before the water inlet pipeline of the unit, which shall be provided with a 25-mesh screen. This will aid in preventing foreign material from entering and decreasing the performance of the evaporator.



6) A strainer should be placed for enough upstream to prevent cavitation at the pump inlet (consult pump manufacturer for recommendations). The use of a strainer will prolong pump life and help maintain high system performance levels
7) The flushing and insulation of the water pipelines shall be carried out before it is connected with the unit, so as to prevent dirt from damaging the unit.
8) The design water pressure of the water chamber is 1.0Mpa. Use of the water chamber shall be not exceeding this pressure in order to avoid damaging the evaporator.
9) The expansion tank shall be installed 1~1.5m higher than the system, and its capacity accounts about 1/10 of the water amount in the whole system.
10) The drain connection is arranged on the evaporator cylinder. The drain outlet has been equipped with a 1/2'' plug.
11) The auto discharge air valve is arranged between the high point of the pipeline and the expansion tank.
12) The thermometer and pressure gauge are arranged on the straight pipe sections of the water inlet pipeline and drain pipeline, and their installation places shall be far away from the elbows. The pressure gauge installed shall be vertical to the water pipe, and the installation of the thermometer shall ensure that its temperature probe can be inserted into the water pipe directly.
13) Each low point shall be fitted with a drain connection so as to drain the remaining water in the system. Before operating the unit, connect the stop valves to the drain pipeline, respectively near the water inlet connection and drain connection. The by-pass pipeline shall be provided between the water inlet pipe and drain pipe of the evaporator, convenient for cleaning and maintenance. Use of flexible connections can reduce vibration transfer.
14) The chilled water pipeline and expansion tank shall be subjected to insulation treatment, and the maintenance and operation part shall be reserved on the valve connections.
15) After the air-tightness test is carried out, and the insulation layer is applied on the pipeline, so as to avoid heat transfer and surface condensation; the insulation layer shall be covered by moisture-proof seal.
16) Any water piping to the unit must be protected to prevent freezing. There are reserved terminals for the auxiliary electrical heater. Logic in PLC will transmit ON/OFF signal by checking the leaving evaporator water temperature.

Note: The unit only supply ON/OFF signal, but not the 220V power. If a separate disconnect is

used for the 220V supply to the cooler heating cable, it should be clearly marked so that it is not accidentally shut off during cold seasons

17) If the unit is used as a replacement chiller on a previously existing piping system, the system should be thoroughly flushed prior to unit installation and then regular chilled water analysis and chemical water treatment is recommended immediately at equipment start-up.
18) Power on the chilled water pump, and inspect its rotation direction. The correct rotation direction shall be clockwise; if not, re-inspect the wiring of the pump.
19) Start the chilled water pump to circulate water flow. Inspect the water pipelines for water leakage and dripping.
20) Commission the chilled water pump. Observe whether the water pressure is stable. Observe the pressure gauges at the pump inlet and outlet, and the readings of the pressure gauges and the pressure difference between the inlet and outlet change slightly when the water pressure is stable. Observe whether the operating current of the pump is within the range of rated operating current; inspect whether the resistance of the system is too large if the difference between the operating current and rated value is too big; eliminate the system failures until the actual operating current is satisfied.
21) Inspect whether the water replenishing device for the expansion tank is smooth, and the auto discharge air valve in the water system enables auto discharge. If the discharge air valve is a manual type, open the discharge valve of the chilled water pipeline to discharge all air in the pipeline.
22) Adjust the flow and inspect whether the water pressure drop of the evaporator meets the requirement of the unit's normal operation. The pressure at the chilled water inlet and outlet of the unit shall be kept at least 0.2MPa.
23) The total water quantity in the system should be sufficient to prevent frequent "on-off" cycling. A reasonable minimum quantity would allow for a complete water system turnover in not less than 15 minutes.

III. Electrical Data

1. Field Wiring

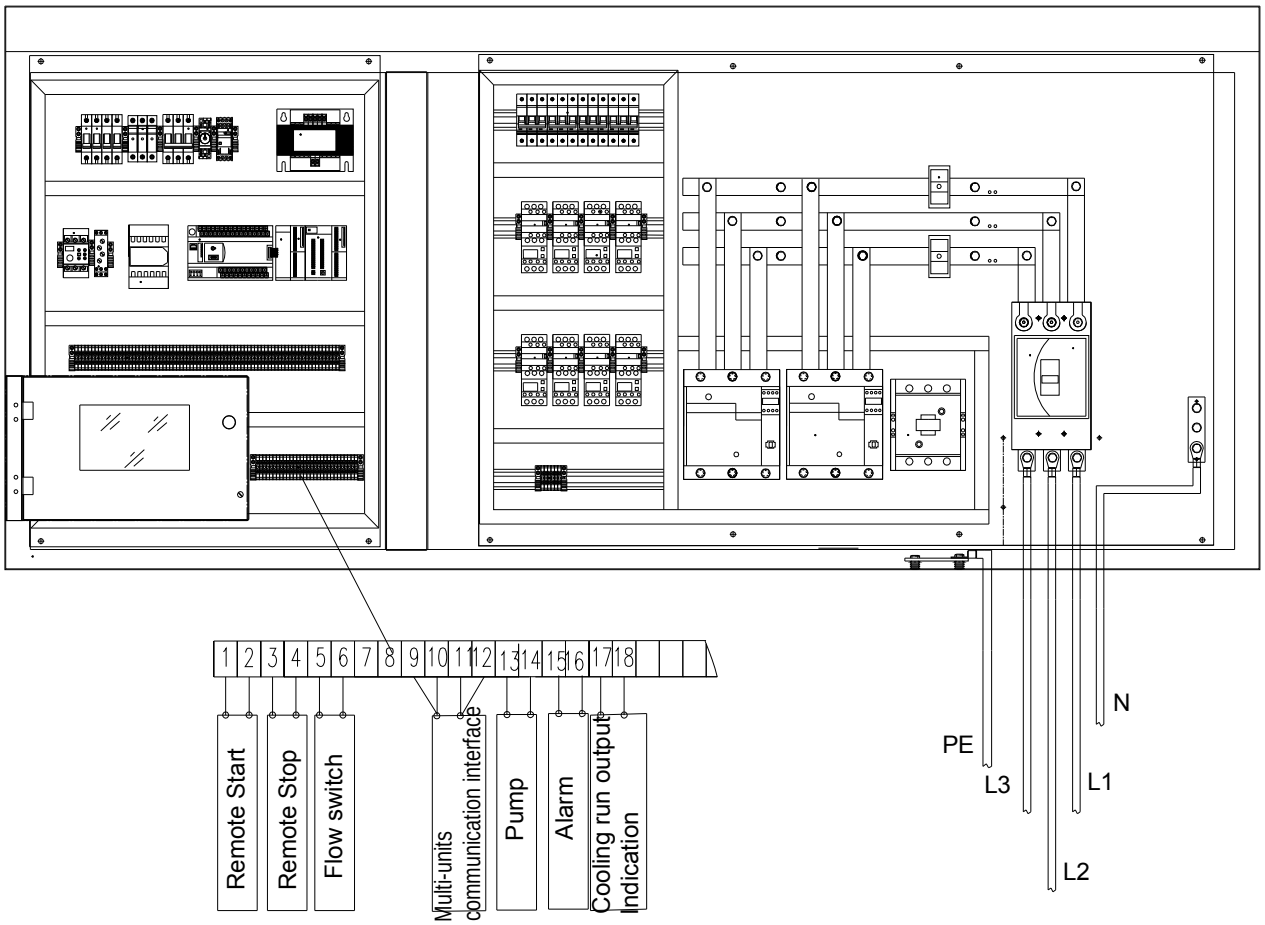
WARNING: In order to prevent any accident of injury and death during the site wiring, the power supply shall be cut off before the line is connected to the unit.

Wiring must comply with all applicable codes and ordinances. Warranty is voided if wiring is not in accordance with specifications. An open fuse indicates a short, ground, or overload. Before replacing a fuse or restarting a compressor or fan motor, the trouble must be found and corrected.

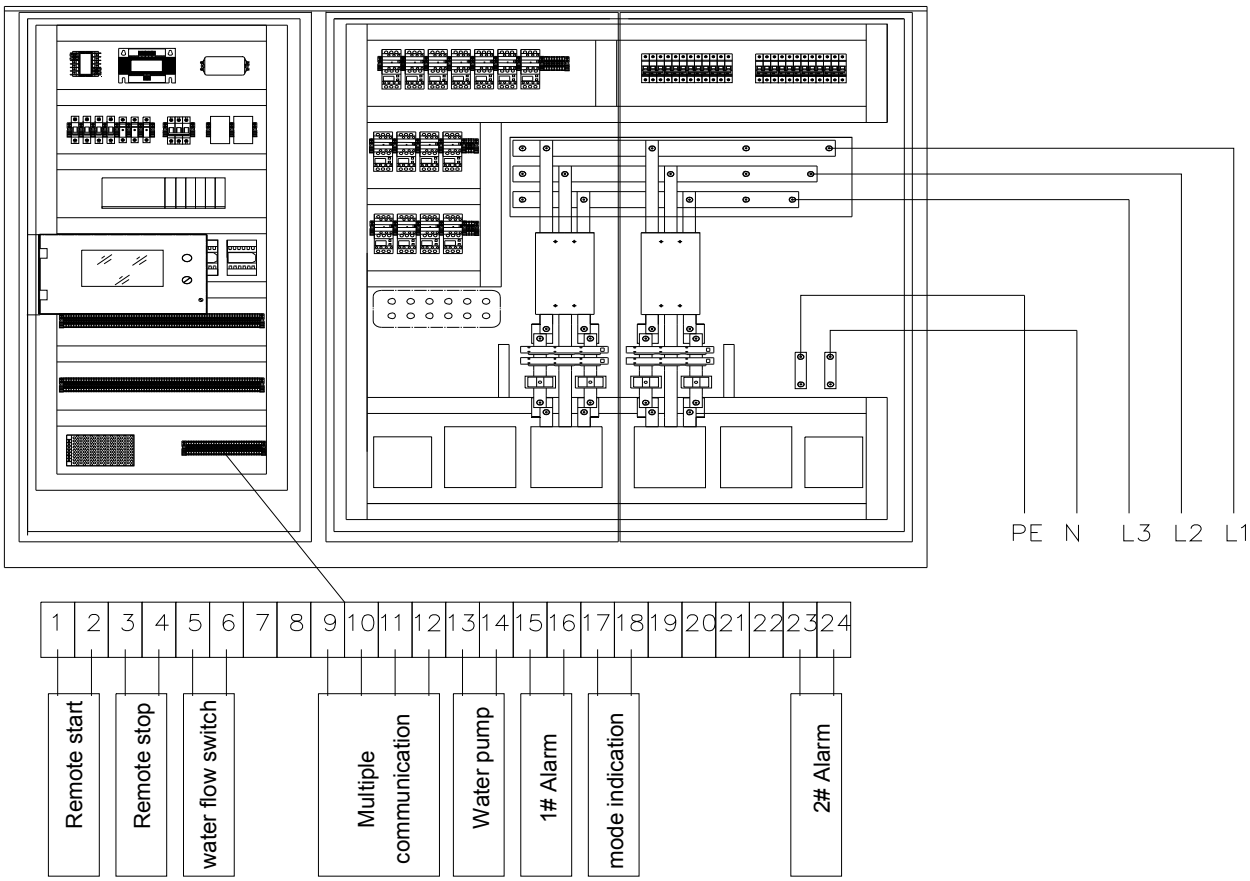
(1) Copper wire is required for all supply lines in field connection to avoid corrosion and overheat at the connection of terminals. The lines and control cables shall be separately paved and equipped with protective pipes to avoid intervention of supply line in control cable.

(2) Power section: It is required to connect the power supply cable to the control cabinet of the unit, when it arrives at the jobsite. The power supply cable is connected to the terminals of L1, L2, L3, N and PE and the terminals need to be fixed again after 24h running (the minimum allowed time). Please seal the entering wiring hole after users installed the main power wires, in order to avoid the dust entering into electric control cabinet.

Caution: it is suggested that to use appropriate tools to make sure there is a enough height to install the main power wires if the basement is higher than 200 mm.

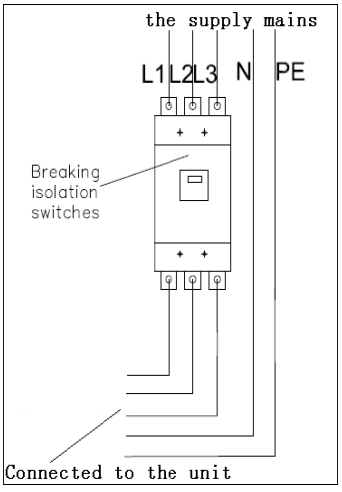


[Diagram for External Wiring of LSBLGW380/C LSBLGW500/C LSBLGW600/C LSBLGW720/C Unit]



[Diagram for External Wiring of LSBLGW880/C LSBLGW1000/C LSBLGW1200/C LSBLGW1420/C Unit]

(3) Breaking isolation switches should be added between the power cord of users and the unit. The capacities of the breaking isolation switches recommended are as follows.



BVR：Copper core PVC insulated soft wire					
Domestic model	Conductor material	Insulator material	Nominal section area (MM ²)	UL model	Note
BVR70	Cu	PVC	70	2/0	The electric cable must be copper core.
BVR95	Cu	PVC	95	4/0	
BVR120	Cu	PVC	120	250	
BVR150	Cu	PVC	150	300	
BVR185	Cu	PVC	185	400	
BVR240	Cu	PVC	240	500	
BVR300	Cu	PVC	300	600	
BVR400	Cu	PVC	400	800	

Model	Recommended Cable	Recommended breaker	Note
LSBLGW380/C	BVR120*4+BVR70*1	330A	The electric cable must be copper core. If units are used in high temperature conditions, the breaker needs larger capacity.
LSBLGW500/C	BVR240*4+BVR120*1	500A	
LSBLGW600/C	BVR240*4+BVR120*1	500A	
LSBLGW720/C	2*(BVR185*4+BVR120*1)	630A	
LSBLGW880/C	(BVR185*4+BVR120*1)+ (BVR240*4+BVR120*1)	830A	
LSBLGW1000/C	2* (BVR240*4+BVR120*1)	1000A	
LSBLGW1200/C	(BVR240*4+BVR120*1)+ (BVR300*4+BVR150*1)	1000A	
LSBLGW1420/C	2* (BVR400*4+BVR240*1)	1260A	

(4) Attention: refrigerant selection: the previous software settings are replaced by the current hardware settings to avoid the possibility of improper operation of the software leading to wrongly selected refrigerant and damage to the unit.

(5) Short circuit 1X：35/1X：36 on the wiring terminal 1X in the cabinet and set R22 refrigerant for the unit, or, R134a is used for the unit.

(6) In order to avoid wrong control in field connection, the liquid control circuit (24 V) shall not be in the same conduit with the lead wire of the voltage higher than 24 V.

(7) The control circuits of various units are all 220 V, and for the wiring ways of the control circuits, please refer to the wiring diagrams supplied along with the units.

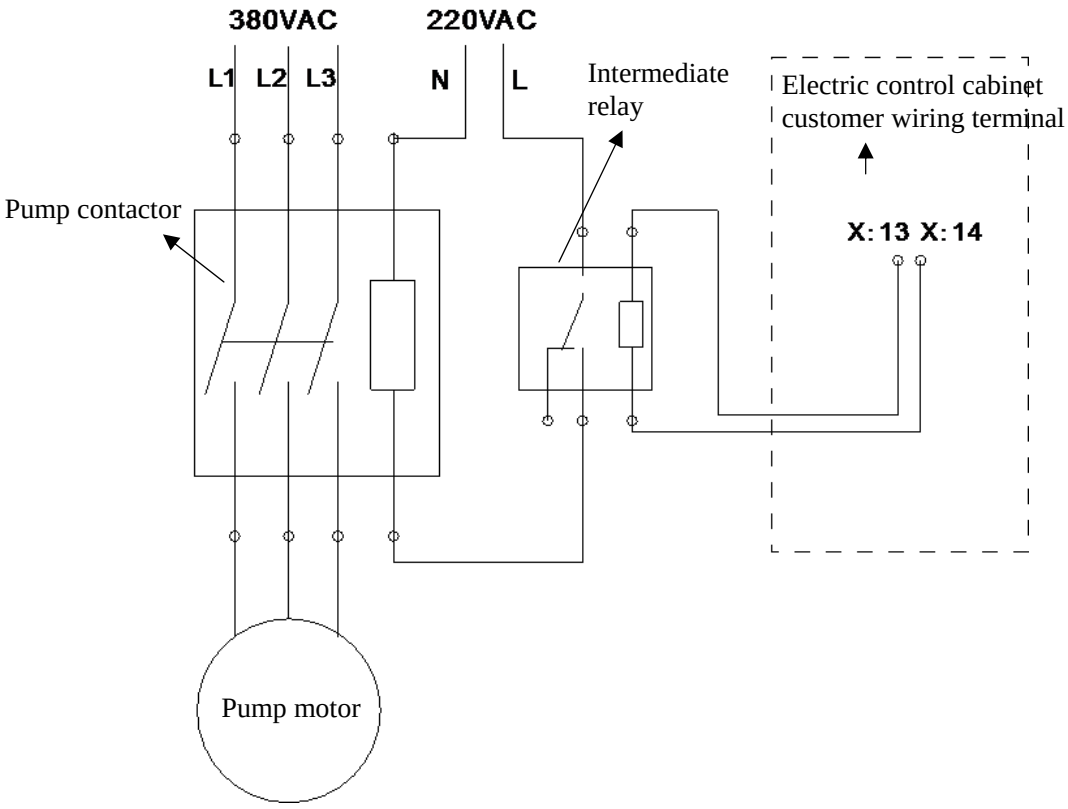
(8) A unit consists of master compressor and slave compressor communicating via shield wire protected by sleeve and separated from supply line.

(9) The control output cable to be connected on site shall be AC250V-1mm2, and 0.75mm2 shield wire (24 V) shall be used for control signal line.

(10) Attentions: Read the electrical wiring principle diagram and connect the wires strictly according to the wiring terminal diagram. Three-core shield cable (RVVP3×0.75mm2) shall be used for the connection of the temperature sensor. Common two-core cable (RVV2×0.75mm2) shall be used for the connection of flow switch to connect to the NO contact of the switch, i.e. the opening point when waterless. Two buttons can be connected to the external of remote start and stop.

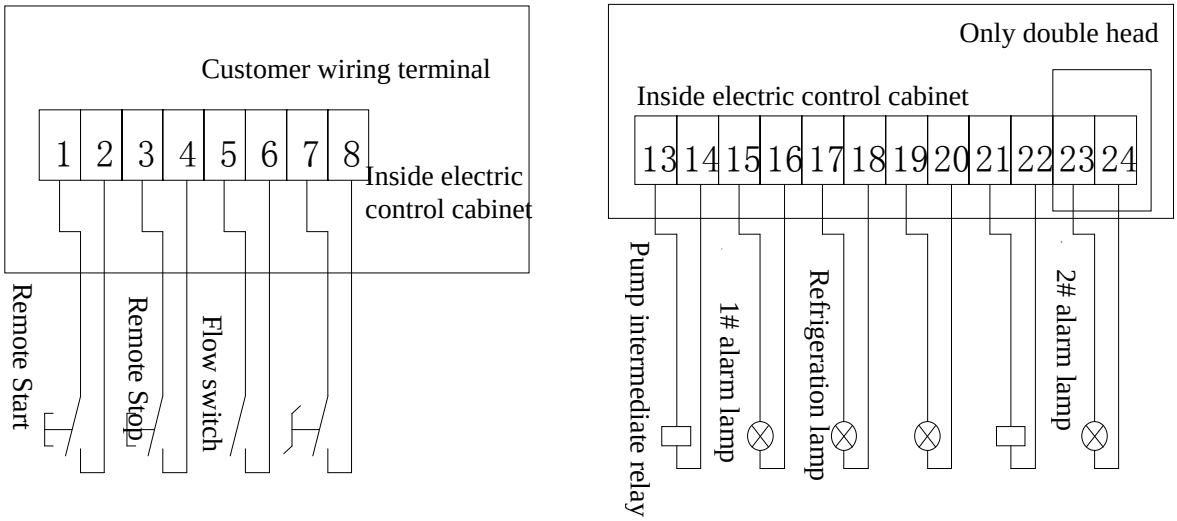
(11) If the customer desires the linked control of the water pump, connect the water pump as shown in the diagram, where an intermediate relay is required. If the function of linked control of water pump is not needed, ensure that the water pump is started before starting the machine.

CAUTION: An independent power supply box needs to be equipped with the power supply of the water pump.



[Diagram for Wiring of Water Pump Linked Control]

(12) The wiring ports for remote start/stop, flow switch, cool/warm switch, water pump linked control, alarm indication, etc. are reserved in the electrical cabinet of the unit, with the numbers shown in the diagram below.



[Numbers of Functional Ports Reserved in Electrical Cabinet]

(13) Passive inching button is used for remote start and stop, and the flow switch must be connected to the NO contact, or the machine cannot be started.

Passive holding switch is used for cool/warm switch, e.g. common selection switch. Controls of

large power electrical appliances such as water pump and user electric heating must be interfaced with a relay, or the PLC might be burned. Other outputs can be directly connected to indicator lamps or alarms.

2. Electric parameter table

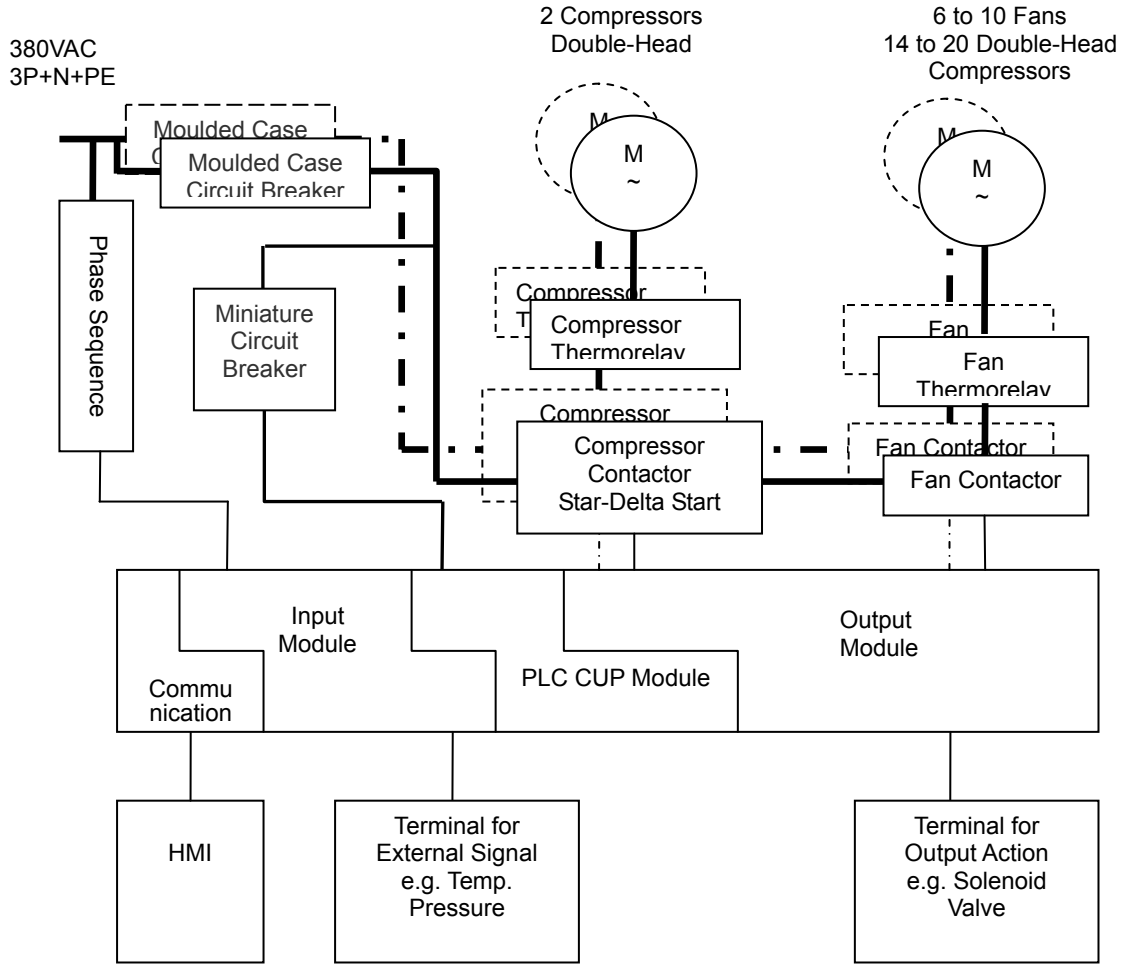
(1) Power Table

Model	Main power		Power Range		Max. allowed running current/A
	V	Hz	Highest/+%	Lowest/-%	
LSBLGW380/C	380	50	+10	-10	261.6
LSBLGW500/C	380	50	+10	-10	375
LSBLGW600/C	380	50	+10	-10	395
LSBLGW720/C	380	50	+10	-10	507
LSBLGW880/C	380	50	+10	-10	636.6
LSBLGW1000/C	380	50	+10	-10	750
LSBLGW1200/C	380	50	+10	-10	790
LSBLGW1420/C	380	50	+10	-10	1014

(2) Compressor & fan

Model	Compressor					Fan		
	Quantity	Start current/ A	Max. running current/ A	Rated current/ A	Rated power/ KW	Fan quantity	Rate of fan /RPM	Rated current/ A
LSBLGW380/C	1	586	228	227.4	124	6	940	5.6
LSBLGW500/C	1	805	340	280.3	159	8	940	5.6
LSBLGW600/C	1	805	340	326.7	187	10	940	5.5
LSBLGW720/C	1	917	507	408.8	234	10	940	5.6
LSBLGW880/C	2	Refer to 380 /C+ 500/C				14	940	5.6
LSBLGW1000/C	2	Refer to 500/C				16	940	5.6
LSBLGW1200/C	2	Refer to 600 /C+ 600/C				16	940	5.6
LSBLGW1420/C	2	Refer to 720 /C				20	940	5.6

3. Control Flow Chart



✧ Guidance of common electric problems treatment:

1) Phase sequence protector:

a) Protective condition: anti-phase, phase lack, overvoltage, undervoltage or imbalance of three-phase voltage of power input terminal of phase sequence protector;

b) Results of action execution: power module failure lamp is ON, touch screen displays power failure and fails to be started;

c) Processing mode: see the power module, exchange any two unit incoming lines if it is anti-phase;

Please do not start until power gets right with failure removed in case of other failures.

Notes: this module has the important action of compressor protection. The imbalance rate of voltage of current is usually specified by compressor manufacturers, and burn-down due to overheating will be resulted from long-time operation under abnormal working voltage.

2) Miniature Circuit Breaker:

a) Protective condition: current passing the miniature circuit breaker exceeds its numerical

protection value;

b) Results of action execution: power-fail of corresponding circuit, failure of start, circuit breaker switch positioned in the OFF terminal

c) Processing mode: inspect there is burn-down of component(s) or short-circuit between circuits. If any, please replace the component(s) or modify wiring;

You may attempt to set the circuit breaker to ON terminal, if it immediately trips once again, it indicates that there is always a condition of short circuit, in this case, inspect the line and components until normal pull-in is available.

Notes: Before inspection, please switch on the breaker once without electricity. The existence of heavy current shock may result the damage of the miniature circuit breaker. At this moment, switch-on without electricity is also impossible. When switch-on is successful, please test with a multimeter whether the circuit is conducted. If not, you can sure that mechanical mechanism is normal but electric mechanism is damaged. In such case, please replace the miniature circuit breaker, and inspect the above steps.

3) Fan Thermorelay

a) Protective condition: fans current overload or phase lack;

b) Results of action execution: units stop, display of fans overload on touch screen, thermal overload relay trip, failure of start.

c) Processing mode: inspect whether there are fans wiring loose. Inspect whether the value of fans protection is in a proper position. Inspect whether fins are fouled. Please reset the thermorelay manually, if needed.

Notes: Because the motor and the thermal overload relay have different thermal inertias, the temperature of motor is still very high while the thermorelay can be reset. Please inspect whether the temperature of motor is too high when you can’t sure the failure clearly. Immediate resetting is impossible in the case of overload trip. You have to wait until the thermal effect of the thermorelay is over.

4) Moulded Case Circuit Breaker

a) Protective condition: there exists too heavy current or short circuit in the units

b) Results of action execution: the unit shuts down and power down.

c) Processing mode: inspect whether the electric control part of units and insulation of loads are normal, if yes, power on and start the units again, and measure whether the working current of compressors and system pressure are normal

5) Compressor thermorelay

a) Protective condition: too heavy compressor current or existence of short circuit failure

b) Results of action execution: units stop, display of compressor overload on touch screen,

thermal overload relay trip, failure of start.

c) Processing mode: inspect whether the compressor part and insulation of loads are normal, inspect the pressure value when an alarm is given, and balance the pressure if it exceeds the running range. Please monitor the current of compressors in real time to ensure whether it is within normal running after the compressor thermorelay is reset.

6) Sensor Failures

Sensor failures include short circuit and open circuit of the temperature sensor and the pressure sensor (transformer). The current transformer is also included according to the stepless type unit.

a) Protective condition: any sensor failure

b) Results of action execution: stop of units, display of corresponding sensor failure on touch screen, failure of start.

c) Processing mode: inspect whether the wiring of faulty sensor is proper and firm, and whether the sensor itself is normal.

4. Control Screen Operation

Initial Startup

- Before power up for the first time，make sure that the wiring is firm between the control box and the main switch ， the insulation resistances reach the requirements ,and the earth wire has been properly installed.
- The wiring might be loose due to the factors such as long-distance transport. Carry out complete inspection for the bolts of all wiring terminals for looseness 。
- Be sure that the distribution capacity is compliant with the power of the unit and the diameter of the selected cable can bear the maximum working current of the unit.
- Inspect whether the red emergency stop button on the control box is in natural state.

4.1 Introduction of Control Screen:

【Home Page】

1) Power indicator (yellow), which is on when display is powered on; it is off when powered off.

2) Status indicator (green), which flashes at low frequency when display is normally operative,

otherwise it is off.

3) Communication indicator (red), which flashes at high frequency when display and PLC communicate normally, otherwise it is off.

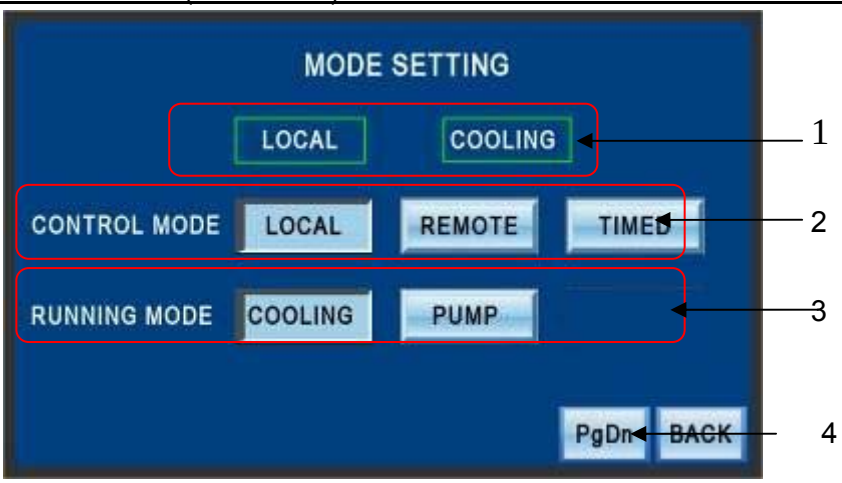
4) PLC and touch screen procedure version: showing the number of PLC and touch screen procedure version used by the current unit.

4.2 Basic Interface and Operations:

After the system initializing is completed, please clink on ENTER button, and the “Password Input” dialog will be popped up, please input the User Password(58806) or User Manage Password (40828),and click “ENTER” into the next interface (Mode Setting Page)

Password Input Page

✧ **Mode Setting Page**



【Mode Setting Page】

Control mode and working mode are to be set in this page:

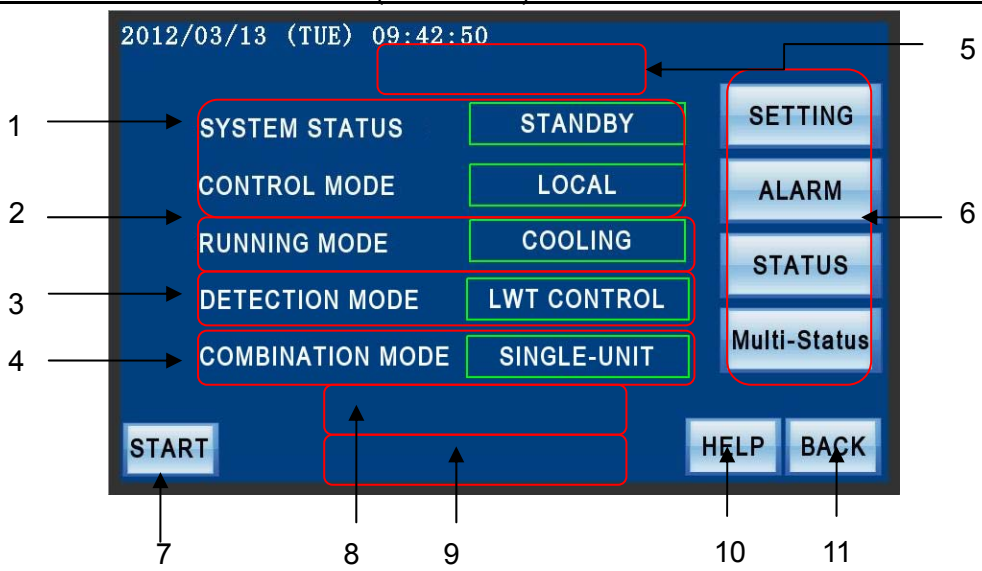
1. Control mode and running mode which have been selected currently for units are displayed here, and this position will correspondingly vary according to the choices of customers when selection of modes is changed.
2. Selection of unit control modes, including three modes: "LOCAL", "REMOTE", "TIMED", i.e. local control, remote control, timing control.
3. Selection of unit operation modes, including three modes: "PUMP", "COOLING", i.e. pump mode, cooling mode.
4. Click on "PgDn" to enter the next page (Main Page).
5. Click on "BACK", return to the homepage of units.

Note:

① The control mode and running mode can be selected optionally in standby status, while only the control mode can be switched in running status.

② Control Mode: The selection of the ways of Unit starting/stopping. "LOCAL" indicates you can only start or stop the unit through "Start/Stop" button in touch screen. "REMOTE" indicates you can only achieve the unit starting or stopping though the "Remote Start" and "Remote Stop" hardware interfaces; "TIMED" indicates the unit can achieve timing start/stop according to the time set by the user.

✧ **Main Page**



【Main Page】

1. System Status: Current system status of units is displayed here. The status of system possibly displayed is as follows:

1) Standby status: in normal condition, displaying “Standby status” after the unit is powered on.

2) Running status: indicating that starting of unit compressors has been finished (entering the running status after double-head Start of one compressor), and it has entered the process of automatic energy adjustment from this point.

3) Pause status：The unit enters “Pause” status when the current detection water temperature (chilled outlet water temperature in single-unit or chilled inlet water temperature in Multi-units) is lower than the setting temperature of unit pause. The compressor start to run until the current detection temperature is higher than the setting temperature of compressor start, then the unit enter “Running” status.

4) Shutting down status: the status display “shutting down” after the unit has been confirmed to execute shutdown action. After finished, the unit enters “Standby” Status.

5) Protection status: indicating that the unit is in a failure status currently, click on "alarm information" to see alarm details.

2. Control mode and running mode: the current mode will be displayed here. For example, the current page displays that the unit is in a “LOCAL MODE”, and the running mode is “PUMP MODE”.

3. Detection Mode: Leaving water control is by default only in the single-unit mode, with entering water control not allowed; entering water control is by default in the multi-units combination mode, with setting of leaving water control not allowed。

4. Combination Mode: indicates “Single-unit” when the unit isn’t in the case of multi-combination control and indicates “Multi-Units” when the unit is in Multi-combination control. (Note: When the system has only one unit, please don’t set to multi-unit control)

5. This position is the unit alarm display area, and alarm information of failure content will be displayed here in a mobile mode in case of any failure in units.

6. Functional key area of units. It has the functional keys of “SETTING”, “ALARM”, “STATUS” and

"Multi-Unit" through which different operating interfaces are accessible. Introduction of their functions will be detailed hereafter.

7. Start is required upon completion of unit set-up, directly click on "START" button on the lower left, and the following dialog box will be popped up at this moment: click on "CANCEL" if you don't expect to execute the start.

【Ensure unit start-up】

8. The sign "Failure to start, please check the status" will appear when the conditions of compressor stating can't be required.
9. There is a rotate button with a key beside the touch screen. When the units need to be maintained by the user or after sale service personnel while expecting to see parameters from the touch screen, the user may rotate the button to the service point, and "System under maintenance, please don't start up!" will be displayed below main page at that moment. Start operation is not allowed at this moment. Any action of maintenance or power operation shall not be taken in the absence of personnel who have been specially trained and certified!
10. Help information, abbreviation of words in units will be explained in detail in help interface.
11. Click on "BACK", return to previous page of units------mode selection interface.

Note:

button disappear when the combination mode is "Single-unit". Click

button to query the current unit status.

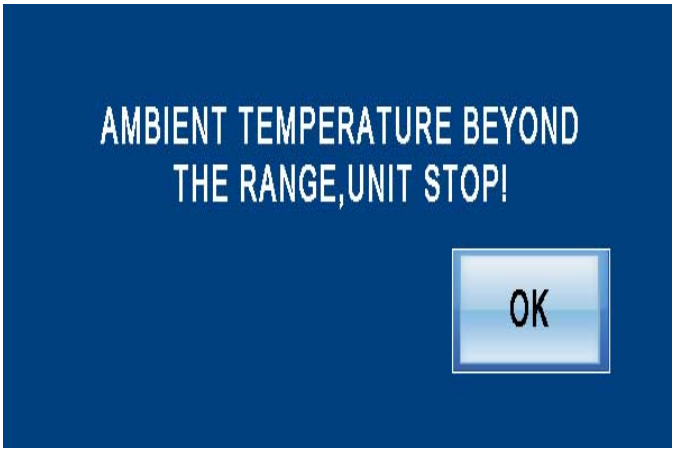
Starting Operation

The system is in pause state when the water pump has been completed to open, but the compressor is unable to start because some other factors can't satisfy the condition of compressor starting, the interface indicates "Failure to start, please check the status". The starting conditions include oil heating time 、restart delay、the temperature of compressor starting. In this case, only when all of the conditions have been meet, the unit starts to operate the compressor, otherwise the sign "Failure to start, please check the status" will keep displaying in the main page.

Note: Clicking on 

button is invalid when the unit is in failure. The unit can start normally only when all of the alarm have been eliminated and reset manually on the touch screen interface.

When the current ambient temperature is beyond the allowed running range, the below page will be popped up:



If the current temperature return to the rage, click to the "OK" and the unit will start to run normally.

Shutting down Operation

Click on 

button , and the "Confirm Shutdown" dialog will be popped up. Click on "Confirm" if you ensure execution of Shutdown action, the system status indicates "Shutting down". (Note: The system status indicates "shutting down" even the requirements of shutting down the compressor are not meet. The unit will execute shutdown action automatically after all of the requirements have been satisfied.)

The action of 4 functional keys in main page will be detailed in subsequent sections:

✧ **Setting**

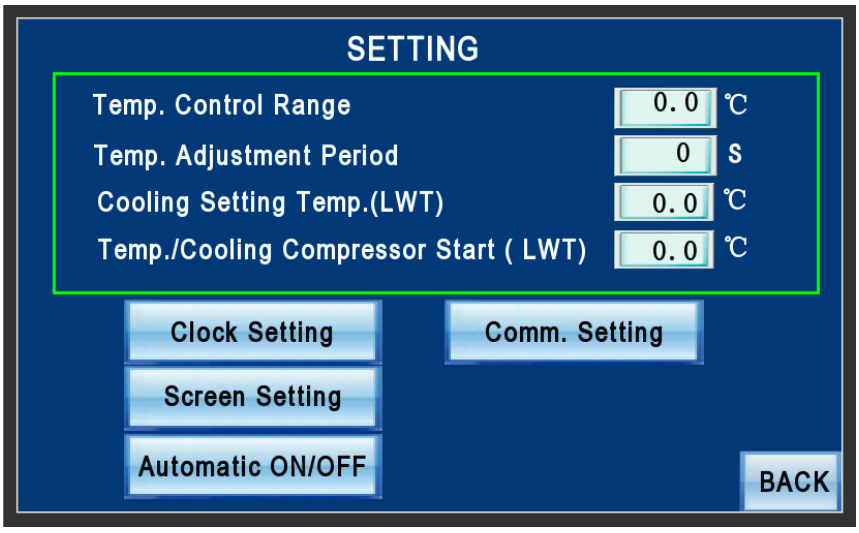
Click on 

in main page to enter the password page. Click on the dialog box of password input, an input keyboard will be popped up in the interface, input user manage password "40828", then click on "Enter" in numeric keyboard, the dialog box disappears, click on "ENTER" to enter "User Parameter Setting Page".

【User Parameter Setting Page 】

Password Error Page

"Password Error Page" will be popped up when the password is wrong, click on Confirm button to return "Password Input Interface", input the password again to enter the next page.



Note:

① "Max" in the upper left indicates the upper limit of the setting parameter; "Min" in the upper right indicates the lower limit.

② "Automatic On/Off": Only displaying under Timed mode.

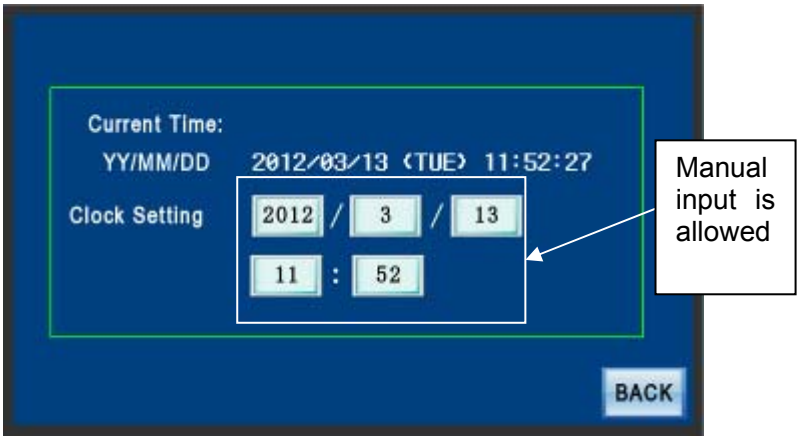
Explanation:

① Target Temp. (Chilled Leaving Water): The target temperature of the chiller leaving water

② Temp. / Compressor start (Chilled Leaving Water): One of the compressor starting conditions required to be achieved for the chilled leaving water temperature. The compressor can start only at the current chilled leaving water temperature ＞ the setting value in cooling mode, or the current chilled leaving water temperature ＜ the setting value in heating mode.

③ Temp. Adjustment Period: The time interval between two temperature detections.

✧ **Clock Setting**

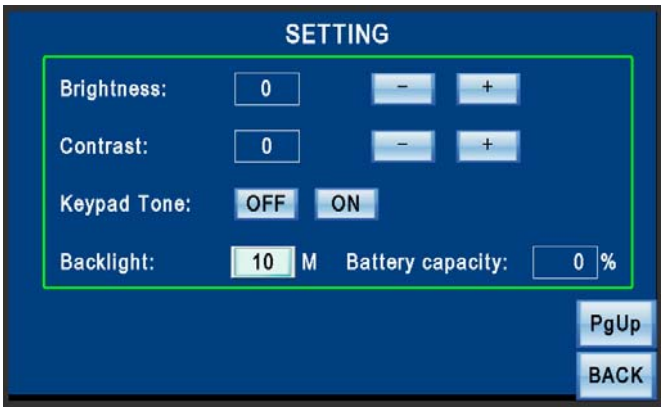


Clock Setting

Click on the numerical box, the numeric keyboard will appear, input the time, click “ENT” to save and take effect. Click “ESC” to cancel the input value.

Note: Please pay special attention in setting of time and date to the fact that setting of non-existent date or time is not allowed, and we assume no liability or responsibility for setting of non-existent date or time and consequence resulting from this setting.

✧ **Adjust Screen**



User can increase and reduce the brightness and contrast of screen by clicking on “+”and “-” in this page.

User can also open and close the keypad tone of screen by clicking on “ON” and “OFF”.

User can modify the time of backlight by clicking on the numeric box following the time of backlight.

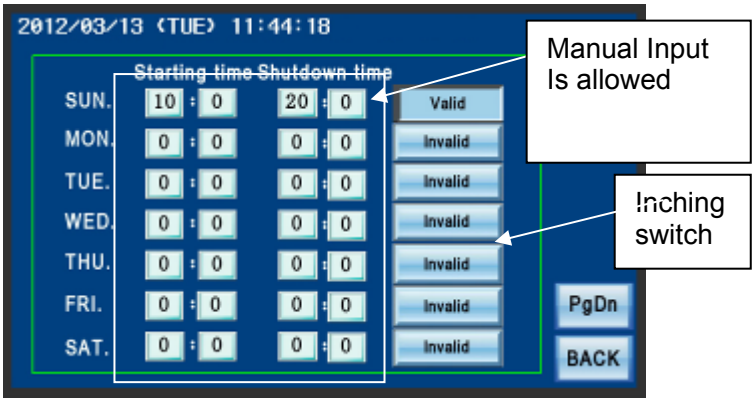
Electric control capacity displays the battery capacity of PLC whose battery is used for supplying power for PLC interior time in the case of failure to engage PLC. Reset of PLC interior event will be resulted

from too long power-fail time of PLC module without battery.

✧ **Automatic On/Off**

If the automatic on/off function is needed, please switch to “TIMED” mode in control mode (as shown in Picture 2) firstly, then enter user parameters setting page, click on 

button to enter the following page ,and set the starting times and shutdown times.

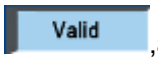


Automatic On/Off Setting

Any time every day in a week can be selected, and the units will be started or stopped at the time points. When a period of continuous running time (for example from 10:00 Tuesday to 16:00 Thursday) is necessary, you can set the time 10:00 in starting time and 0:00 in shutdown time on Tuesday and click on “ 

to switch to 

, set the time 0:00 in starting time and 16:00 in shutdown time on Thursday and click on “ 

to switch to 

,all of the others time buttons are 

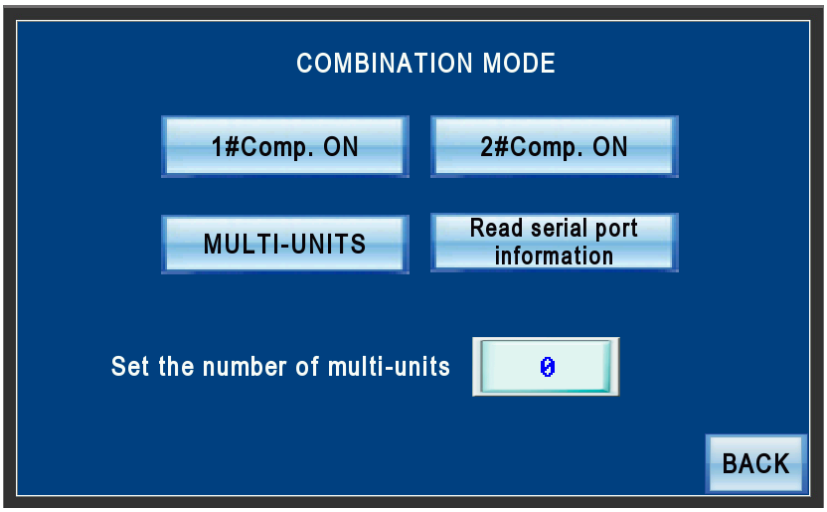
. Pay attention to that the starting time must be before the shutdown time.

Since system interior time is used for timing start / stop, please draw attention to check whether the time of the system is correct when you are using this function.

✧ **Comm. Setting**

Click on 

to enter the below page:



Note: “1#Comp. ON” “2#Comp. ON” only appear in dual-compressors units.

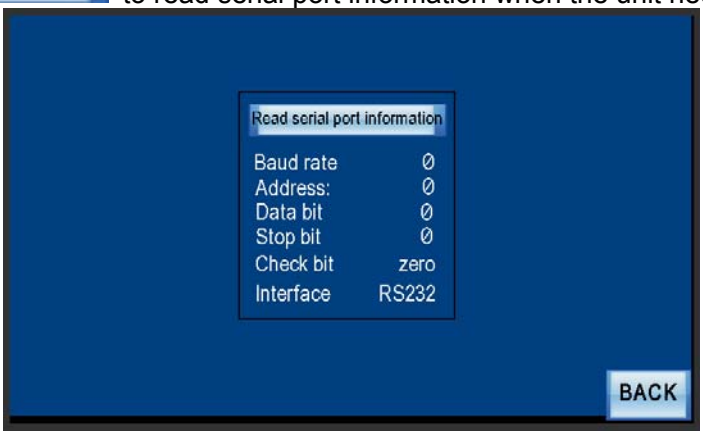
① Mult-Units: When the unit need to be multiple controlled, please contact the after-sale service

engineers to do settings of the unit. After setting well, press the Single unit button, it will turn to Multi units, then the number of multi units should be set according to the practical situation.

② "1#comp. on" "2#comp. on": No.1 or No.2 compressor can be selected to work or not, when the compressor meet the conditions it will shut down refer to the stop progress if user want to stop one compressor.

Read serial pot information

Click on Read serial port information to read serial port information when the unit need to be multiple controlled.



✧ **Status**

Click on STATUS in main page to check the current unit status information.

Status Information

The upper left in the page display the refrigerant type; the upper right display the station number address, the station number of master is set to 1.

Note:

To start up, following conditions are required:

① "Restart Delaying" need to display "NO" ,if "YES", it indicates the delaying period has not achieved.

② "Water Temp. Allow Compressor Start" need to display "YES", if "NO", it indicates the current temperature is not able to meet the compressor starting condition.

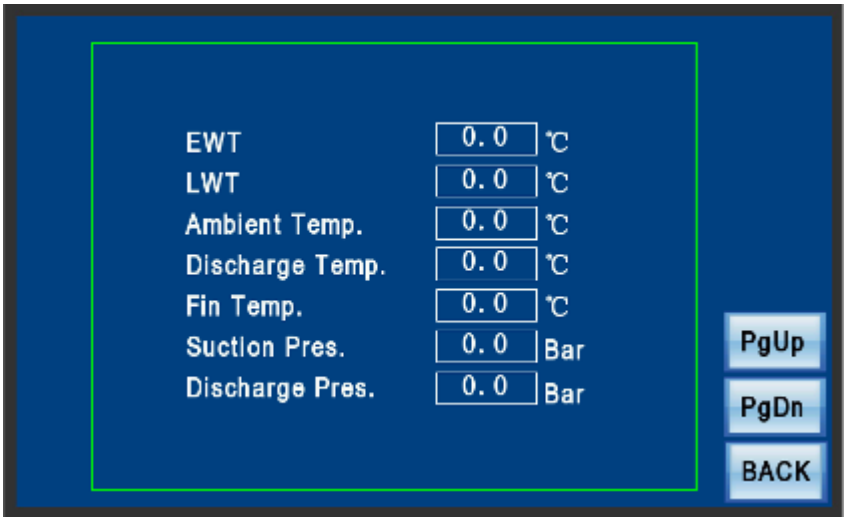
③ "Remaining Oil Heating Time" need to display "0", if more than 0, it indicates the oil heating is in process.

To shut down, the following condition is required:

① ”Min. Running Time Elapsed” need to display “YES”, if ‘NO’, it indicates the shortest running period has not achieved.

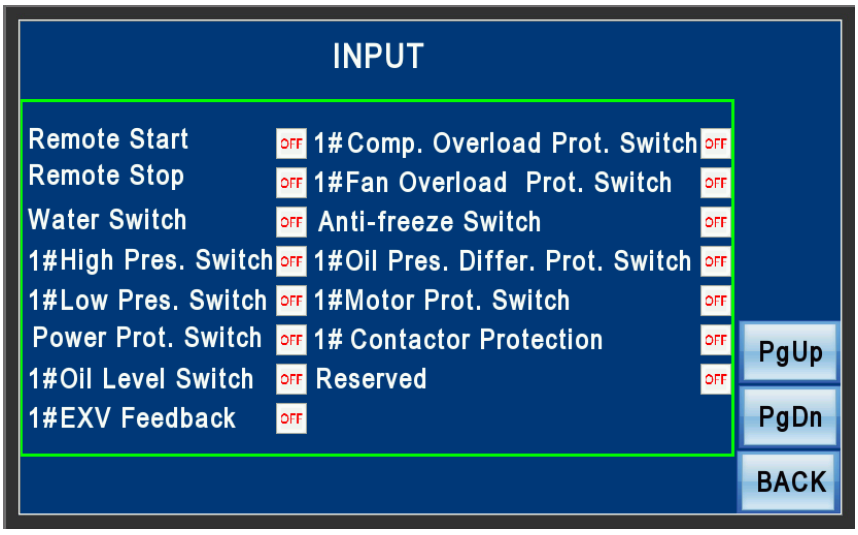
Current Data Display

Please click on PgDn button to enter the current data interface, the interface indicates current detection data. User can enter this interface to query the temperature information when there are alarms such as temperature too high or too low.



Current Data Display

Input



Input Status

“ON” as displayed indicates the input point is closed; “OFF” as displayed indicates the input point is open.

Note:

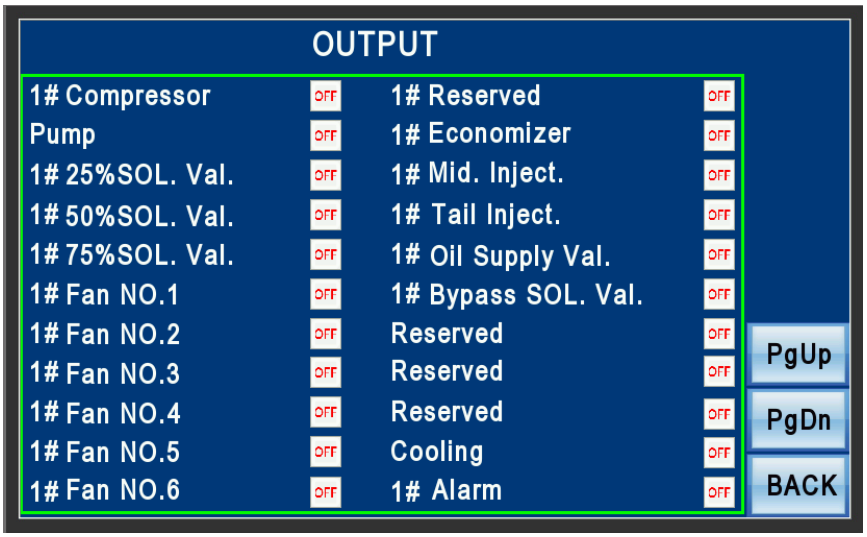
① “Remote Start/Stop” is available only under REMOTE mode.

② “Water Switch”: indicating that current water flow status of chilled water system. “OFF” displayed in no water flow state, otherwise “ON”.

③ “Contactor Protection”: indicating that when the compressor start to run, the contactor act normally, “OFF” switch to “ON”.

④ All of protection switch is “ON” in normal condition and “OFF” in failure status.

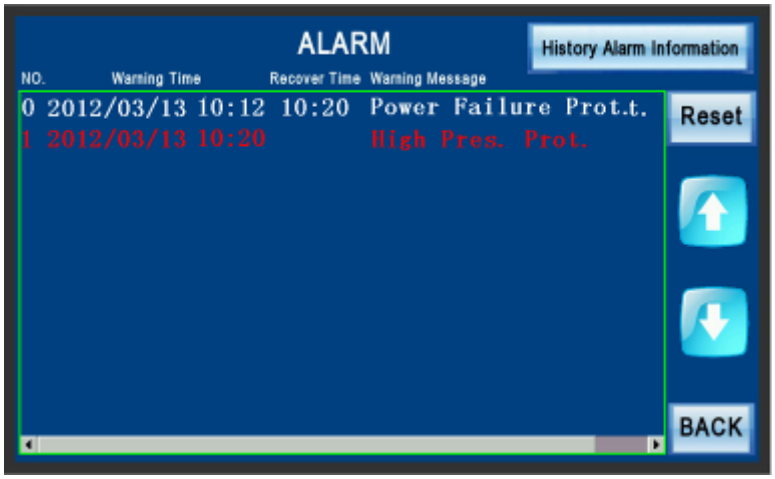
Output Status



Output

“ON” as displayed indicates the output point is energized; “OFF” as displayed indicates the output point is de-energized.

✧ **Alarm**



Alarm Information Page

Click on 

button in Main Page to enter the alarm information page.

If there is any alarm, the unit will execute alarm procedure action. The unit alarm status can’t be removed until all of the alarms have been eliminated and alarm shutdown process has been finished. Click on 

button and “Fault” in main page disappear, the unit returns to normal. If the warning message is more, please click on  to check. These in red color indicate the alarms which have not been eliminated; these in white color indicate the alarms which have been eliminated.

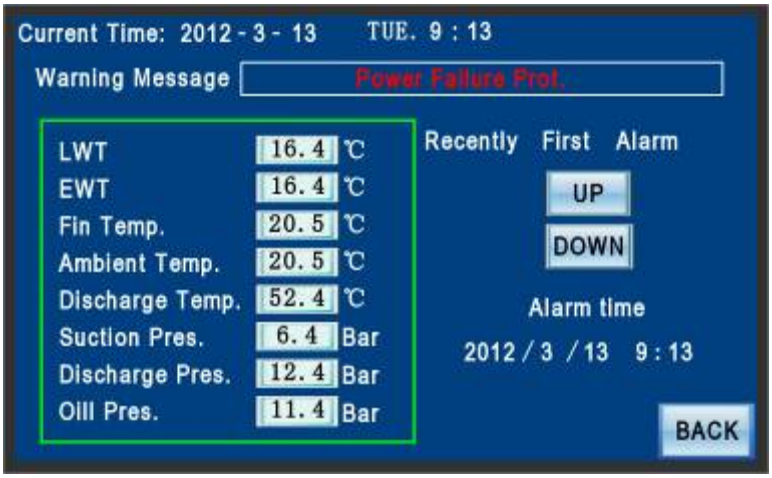
Note:

1. High-Pressure Protection is unable to reset in alarm information page, manual reset in the high pressure switch (installed in the discharge pipe) is needed.
2. Compressor and fan overload protection are unable to reset automatically, please check the

relevant thermal relay in the control box to reset manually.

History Alarm Information

Click on History Alarm Information button in Alarm Page to enter history alarm information query information, as shown in Picture 8.2. Max.5 warning messages can be recorded meanwhile. The messages will be updated automatically if there are more messages.



History Alarm Information Query

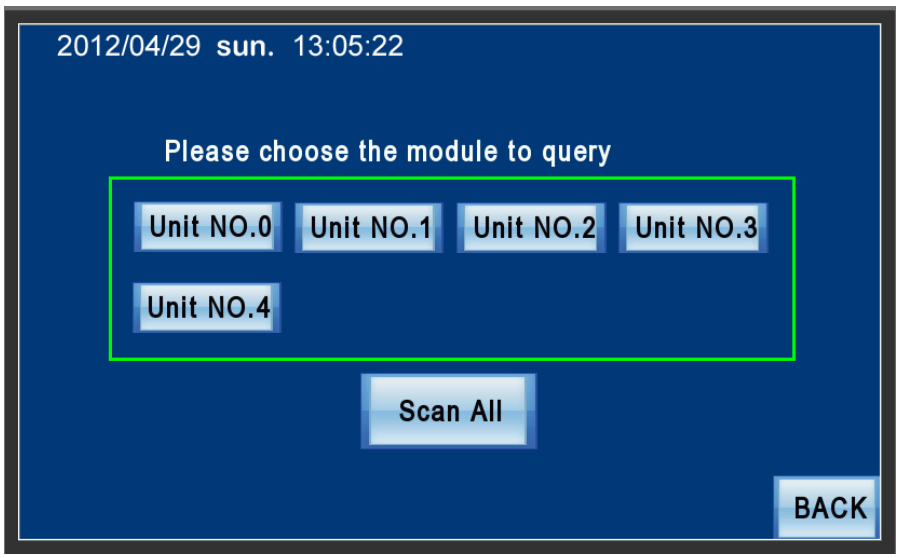
Note:

1. The history alarm information record the unit operating parameters when there happen unit alarms during the compressor running.

Content of Failure	Interface in English
水流断	Water flow fault
防冻保护	Anti-freeze Protection
1#高压保护	1# High-pressure protection
1#低压保护	1# Low-pressure protection
1#机内保护	1# Compressor Motor Protection
1#油位过低保护	1# Low Oil Level Protection
1#接触器保护	1# Contactor protection
1#油压差保护	1# Oil differential pressure protection
1#压缩机过载	1# Compressor overload
1#风机过载	1# Fans overload
电源保护	Power Failure Protection
进水温度传感器故障	Entering water temp. sensor failure
出水温度传感器故障	Leaving water temp. sensor failure
环境温度传感器故障	Ambient temp. sensor failure
1#翅片温度传感器故障	1# Fin temp. sensor failure
1#排气温度传感器故障	1# Discharge temp. sensor failure
2#翅片温度传感器故障	2# Fin temp. sensor failure
2#排气温度传感器故障	2# Discharge temp. sensor failure
1#吸气压力变送器故障	1# Suction pressure failure
1#排气压力变送器故障	1# Discharge pressure failure

2#吸气压力变送器故障	2# Suction pressure failure
2#排气压力变送器故障	2# Discharge pressure failure
1#排气温度过高保护	1# High discharge temp. protection
1#翅片温度过高保护	1# High Fin temp. protection
1#压差保护	1# Differential pressure protection
1#吸气压力过低保护	1# Low Suction Pressure protection
1#排气压力过高保护	2# High discharge pressure protection
1#模式切换失败	1# Mode switch failure
模式水温保护	Mode water temp. protection
1#膨胀阀模块故障	1# EXV module failure
2#高压保护	2# High pressure protection
2#低压保护	2# Low pressure protection
2#机内保护	2# Compressor motor protection
2#油位过低保护	2# Oil level protection
2#接触器保护	2# Contactor protection
2#油压差保护	2# Oil differential pressure protection
2#压缩机过载	2# Compressor overload
2#风机过载	2# Fans overload
2#排气温度过高	2# High discharge temp. protection
2#翅片温度过高	2# High Fin temp. protection
2#压差保护	2# Differential pressure protection
2#吸气压力过低	2# Low Suction Pressure protection
2#排气压力过高	2# High discharge temp. protection
2#模式切换失败	2# Mode switch failure
2#膨胀阀模块故障	2# EXV module failure
站号设定不成功	Invalid Address Number

✧ **Multi-Units Status**



Multi Units Status

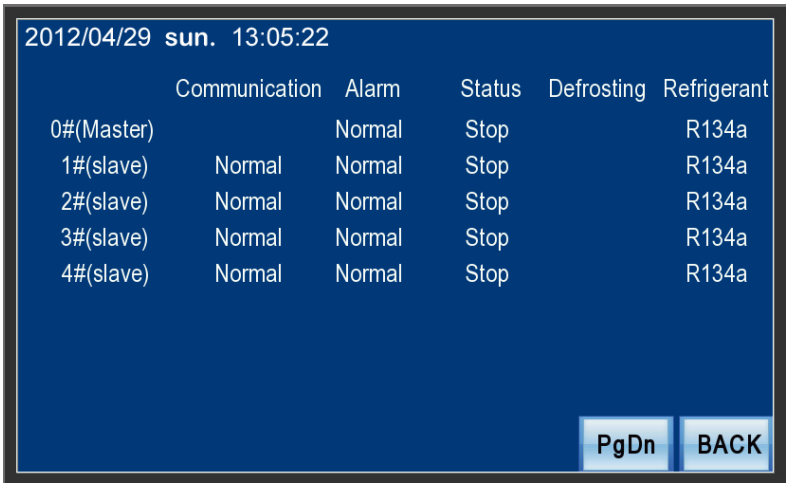
In this page, you can query the status of different modules through choosing the corresponding module

button, also can check the status of all modules meanwhile through master-monitoring.

Master-Monitoring Page

Click on 

to enter the next page, it will show the information of all connected units as following: The communication, alarm information, status, refrigerant type of each unit can be inquired in the following pages.



Click on 

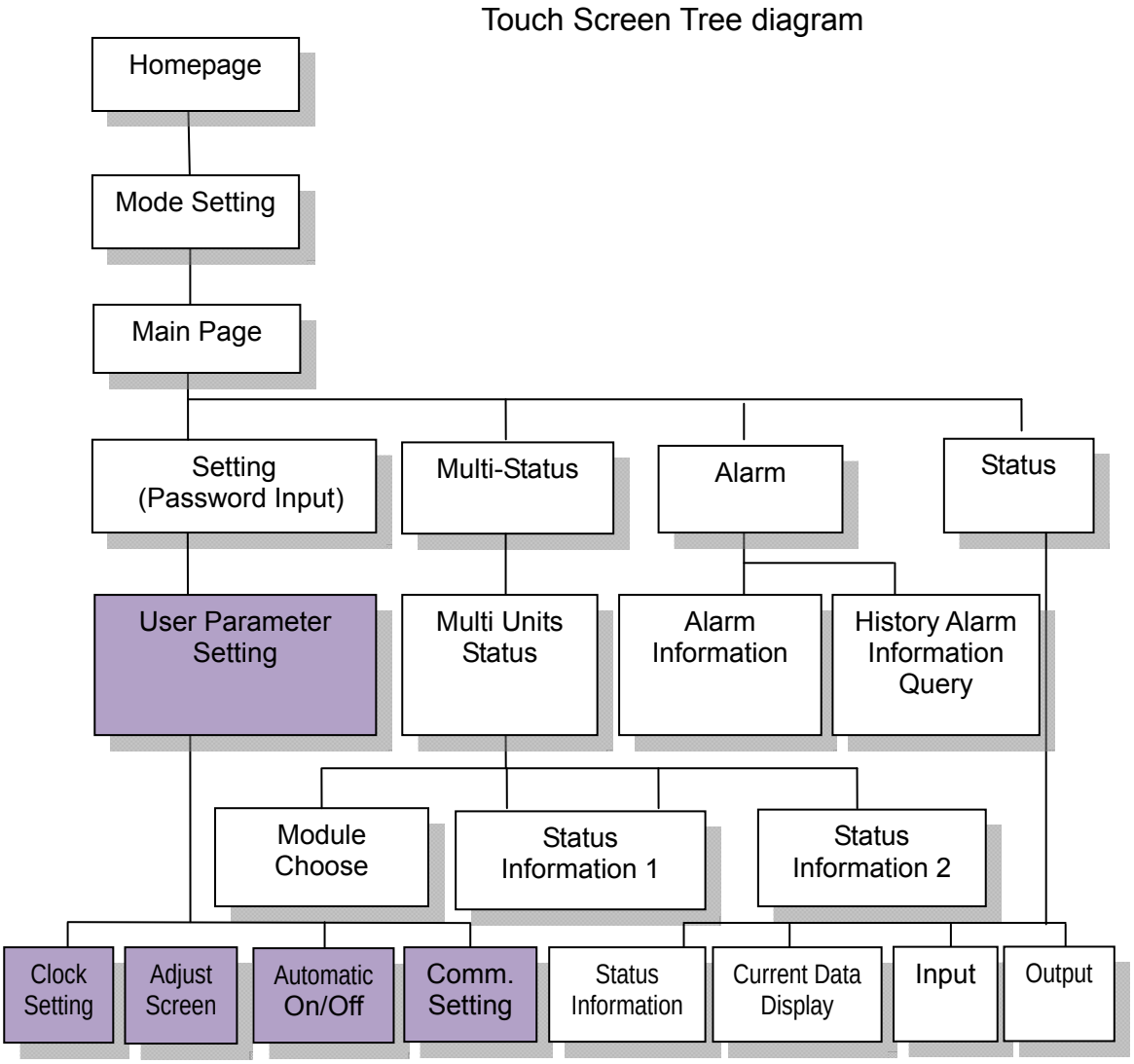
to enter the next page.

Note:

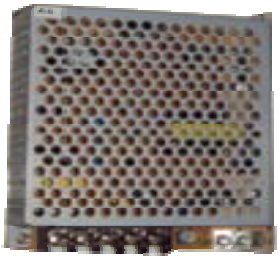
① Max.8 units can achieve combination control, the unconnected unit can access the combination control system at any time as long as the unit is powered on and connected with the system by communication cable.

② The “Status” displays “Run” until the unit finish the starting action and enter the process of automatic energy adjustment, otherwise displayed “shutdown”

5. Control Screen Menu Structure



6. Introduction of Major Electric Components

Programmable Logic Controller (PLC)		Collect all digital quantities and analog quantities on units as well as inputs of quantities and touch screen commands, and realize different outputs by judgment of procedures to meet the requirement or normal and safe running of units.
Touch Screen Human-Machine Interface (HMI)		Communicate with PLC to display the running status of units, set the running mode of units and control the running parameters of units.
Switch Power Supply		Achieve AC220V/DC24V to provide power supply for touch screen, also for PLC and intermediate relay in some tailor-made products.
Time Relay		An element necessary for achieving compressor contactor star-delta switchover. The time set above is defined as the star running time (3 to 6S)
EXV Control Module		Work out the suction superheat in the running process of compressors through the temperature sensor (NTC) and the pressure sensor connected to the module, and regulate the opening of EXV through the suction superheat to enable units to run in a stable status of energy-saving
Thermal Overload Relay		Heat will be generated when current passes through a conductor. Heat effects are different due to different types of current passing through thermal sheet metal inside the thermorelay. When the heat effects are accumulated to certain degree, the thermal sheet metal will be deformed so as to switch off front and rear parts of the thermorelay forcibly to achieve the purpose of protection.

Power Protection Module	  (for CE)	Detect the quality of power supplied to units by the user, detect the voltage range of the power, the imbalance rate of three-phase voltage, phase sequence and phase lack, and protect the units by inspecting the quality of power.
Isolating Transformer		Transform the electrical system applied by the user into AC220V for supplying power to the control circuit. It can isolate harmonic disturbance between circuits and increase control accuracy.
Moulded Case Circuit Breaker		The moulded case circuit breaker acting as a main circuit switch with circuit protection is generally applied for newly developed units.
Intermediate Relay		The intermediate relay has the major action of separating control circuit from power circuit to avoid heavy current of the latter from returning to control circuit in case of any failure and burning down PLC and other important components.
Miniature Circuit Breaker		Control on/off of circuit, and also has the action of short circuit protection on control circuit.
Current Transformer		Transform main incoming current into low current to be accessed to the thermal overload relay to enable the thermal overload relay to judge whether the current is too heavy so as to play a role of current protection.

IV. Maintenance and Commissioning

1. Commissioning

1.1 Electrical System Connection Inspection

1) Inspect whether power distribution capacity is compliant with the power of the unit before the first start-up, and whether the diameter of the selected cable can bear the maximum working current of the master compressor.

The max economical conveying distance:

The max loading time in a year（h）	Copper core length(m)
<3000h	264
3000～5000h	294
>5000h	331

2) Inspect whether the electric mode is compliant with that of the unit, three-phase five-line (three phase lines, one zero line and one earth wire, 380V±10%).

3) Inspect whether the maximum phase voltage unbalance is compliant with the requirement, 2% for the maximum permissible phase voltage unbalance and 5% for the phase current balance. The machine must not be started up when the phase voltage unbalance exceeds 2%. If the measured unbalance% is excess, the power supply sector shall be informed of immediately. The formula for calculation of phase voltage unbalance% based on the maximum deviation from the average voltage is: voltage unbalance% = maximum deviation from average voltage/average voltage.

e.g. at nominal voltage 3N~, AC380V, 50Hz, the measured UAB=376V, UAC=379V, UBC=385V.

Average voltage = (376+379+385) 3= 380V

Determined deviation from average voltage:

△UAB=380-376=4V, △UAC=380-379=1V, △UBC=385-380=5V,

Maximum deviation: 5V

5/380=1.3%, the maximum phase voltage unbalance is 1.3%.

4) Inspect whether the supply circuit is the compressor is firmly and properly connected, and tighten it if there is any looseness. The screws might be loose due to the factors such as long-distance transport and hoisting of the master compressor. Or, the electrical elements (e.g. air switch, AC contactor, etc.) in the control cabinet of the master compressor and the compressor might be damaged.

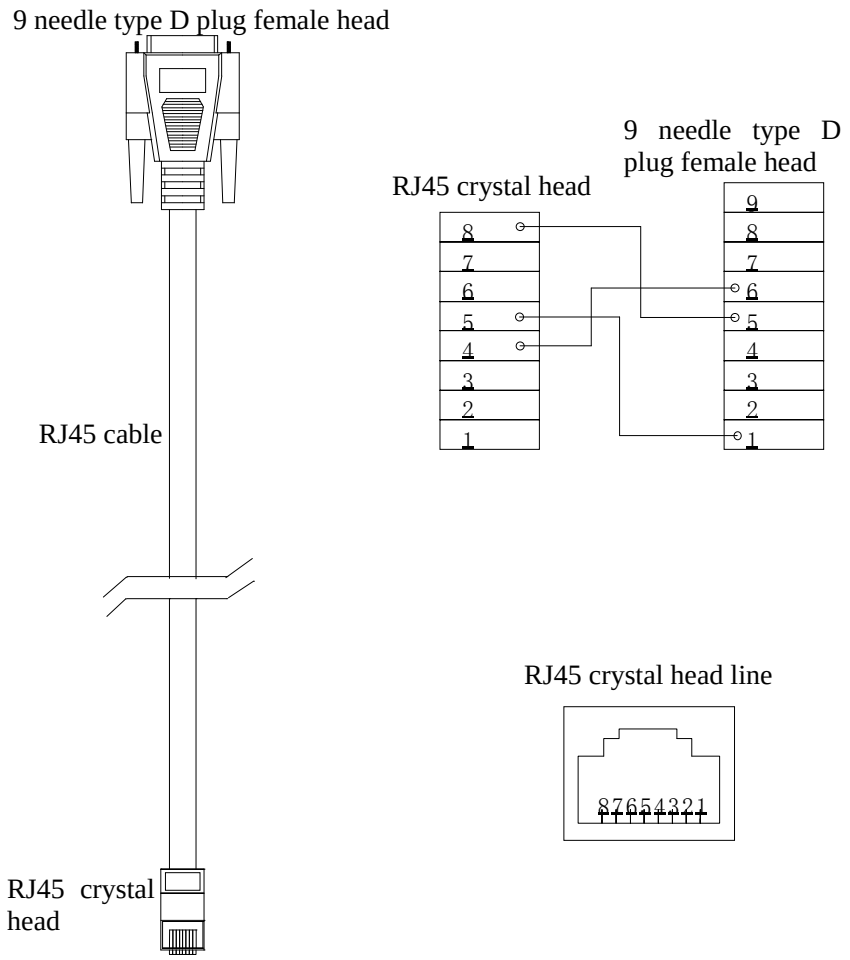
5) Carefully inspect all the electrical lines with a multimeter, and whether the connections are properly installed. Carry out measurement in mega ohm and ensure that there is no short circuit at the shell. Inspect whether the earth wire is properly installed, and whether the insulation resistance to ground exceeds 2MΩ. And inspect whether the supply line meets the requirement of capacity.

6) Inspect whether disconnection switch is installed to the supply line of the supply unit.

7) Carry out complete inspect for all connections of the main circuit in the control cabinet and all external connections of the control circuit before power connection (e.g. oil heater, compressor electronic protection, circulatory water temperature sensor, target-type flow switch connection, water pump linked control, communication line connection, etc.); inspect the bolts of the wiring terminal for looseness. Inspect whether various electric meters and appliances are properly installed, complete and available. Inspect the interior and exterior of the electrical cabinet, especially various wiring ports, for cleanness. If the communication lines of the PLC and control screen are damaged, refer to the diagram below.

8) After the inspection for all the above items is complete, connect the control cabinet and the supply indication lamp will light up, indicating that the oil heater is working. Observe whether the phase loss protection is in normal condition, if it is (green light on), close the single-pole switch (QF2) in the control cabinet, then the control circuit begins working, and the touch screen and PLC control are put into operation.

9) Before start up the machine, inspect whether the external system of the unit meets the conditions for start-up (e.g. whether the water cooling pump of the system is externally controlled or interlocked with the master compressor, and that the water pump must be started before starting up the master compressor via external control).

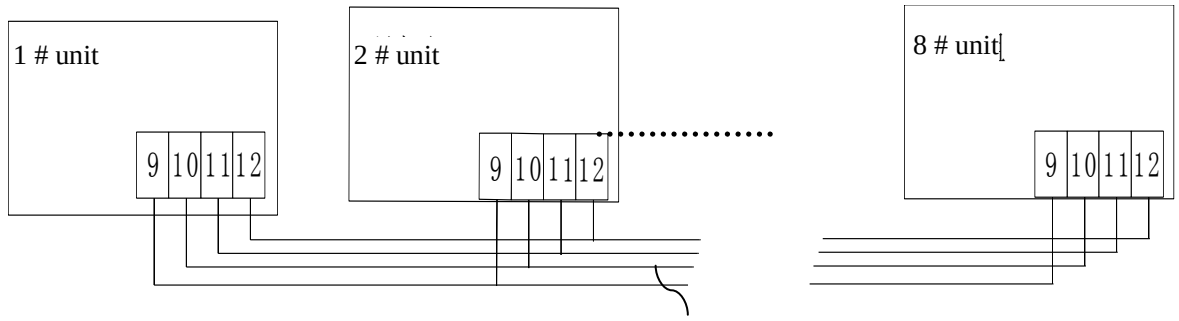


[Communication Lines of PLC and Control Screen

1.2 Electrical Elements Parameters Settings Inspection

1) Inspect whether the ports of linked controlled unit are properly connected.

The connection way for linked controlled unit is as below:



Multi-link connection:

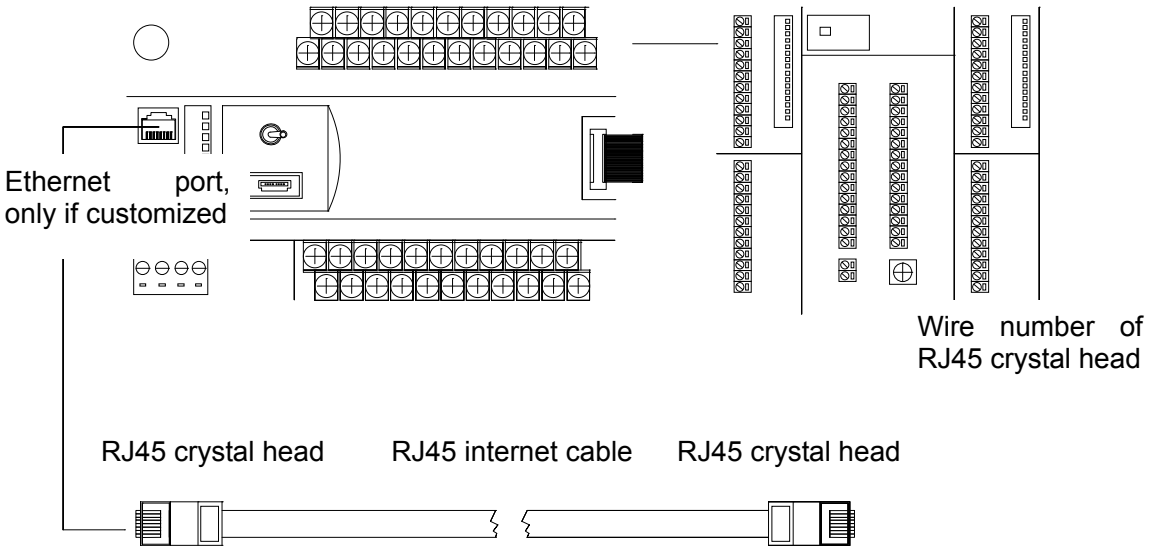
The user wiring terminals 9, 10, 11, 12 of each unit are communication line terminals for multi-link. These terminals can also be used if the upper computer is selected. Attention: either upper computer or multi-link function can be chosen. The use of both requires application for customization.

Use 0.5mm^2 3-core shield wires to connect the unit.

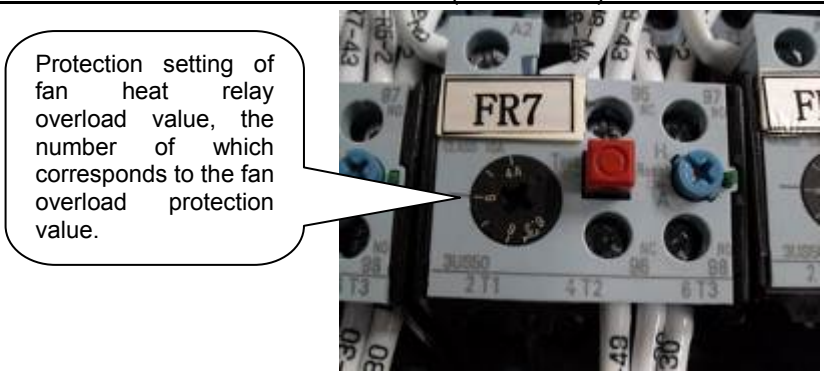
Double-head unit is considered as one unit. Maximum 8 sets can be connected.

The method of connecting upper computer via Ethernet port:

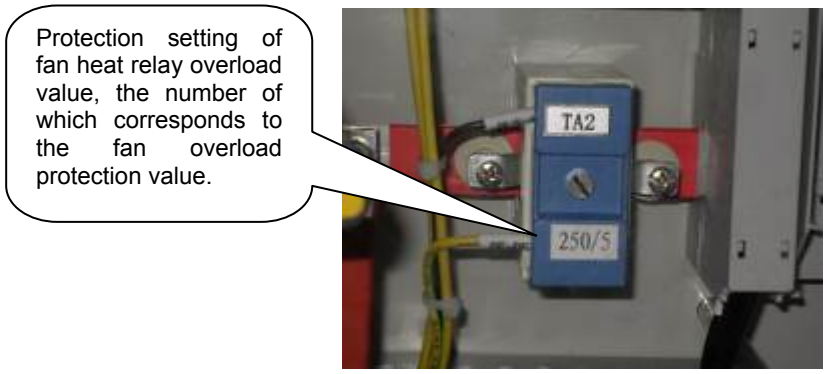
The connection via Ethernet instead of RS485 serial connection required customization. The connection way is as below:



2) Inspect whether the fan overload protection value is set correctly. The current value for normal operation fan is 3.5~4A. After a fan overload trouble, press the blue button in the heat relay to reset.



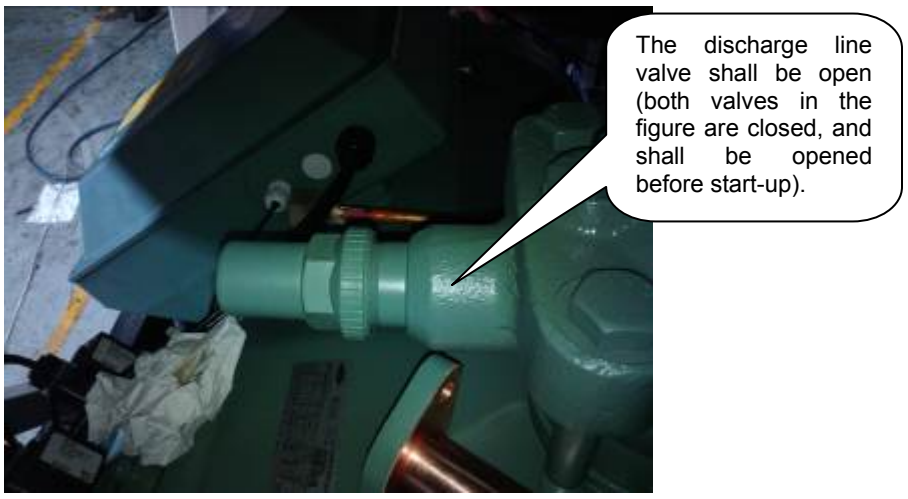
3) Inspect whether the compressor overload protection value, which shall not exceed the maximum compressor permissible current value indicated in the nameplate on the compressor, is set correctly. The compressor overload protection value generally equals to the set value of heat relay (similar to fan heat relay) multiplied by variable ratio of current inductor, which is (250/5)50 in the following case.



3) Inspect whether the value of phase loss and reversal protection is set correctly. The over-/under-voltage protection value shall be ±10% of the rated voltage.

1.3 Unit Parts and Inspection of Leak Points

1) The discharge line valve and suction line valve of the compressor must be fully open (turn anticlockwise to open) and the cores shall be tightly locked to prevent leakage of refrigerant.



2) Inspect whether moisture content of the system exceeds the limit

Excessive moisture content in the refrigerant system of the unit might cause ice block, copper plating, etc. that would seriously affect the safety of the unit. Therefore, the dryness of the refrigerant system of the unit shall be inspected from the sight glass before and during operation of the unit, purple indicating dry, and pink moist, as shown in the below figure. When the color turns to red, the filter core in the unit shall be replaced with a dry one.

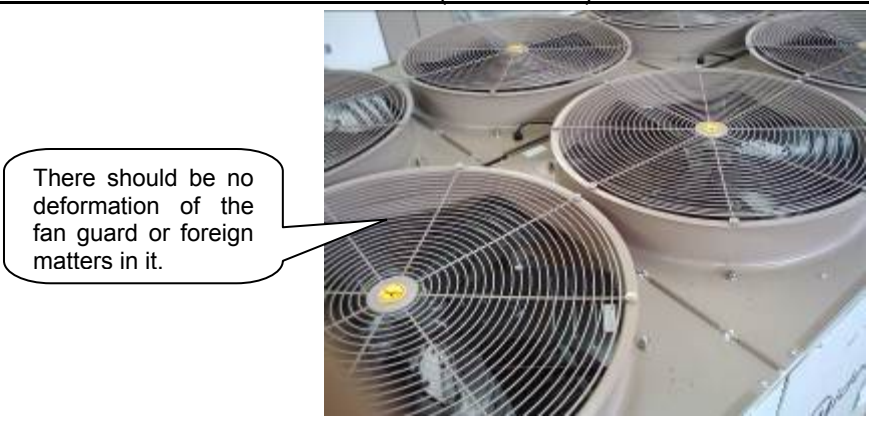
3) Sufficient lubricating oil in the oil tank (not lower than 1/2 of the oil level in the high oil immersion lens), and no deterioration (blackness).

Inspect the oil level and quality before start-up for the two factors have direct impact on the performance and reliability of the unit. There must be sufficient lubricating oil in the unit. And during the shutdown of the unit, the high oil immersion lens must be full of oil.

When the unit is in stable operation, the oil level in the high oil immersion lens should be at least above the 1/2 position. And there shall be no deterioration (blackness) of the lubricating oil, or else, qualified lubricating oil shall be changed before operating the unit.

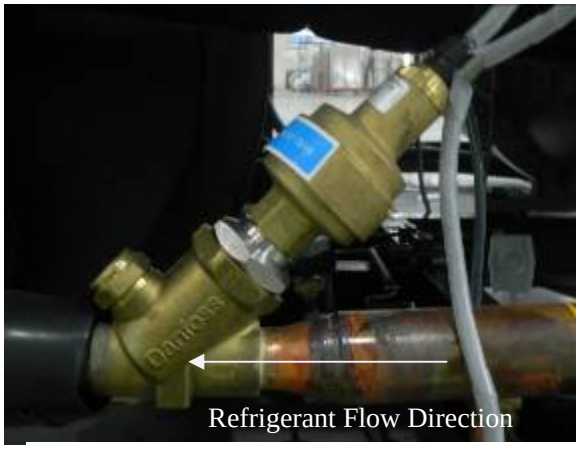
4) Coil fin cooling fan shall rotate in correct direction without reverse rotation or shutdown.

Before operation of the unit ,Inspect whether the fan networks are deformed under stress, whether there is friction and collision between the networks and the blades, whether there are foreign matters in the network, and whether the fin is deformed or damaged caused by collision.



Operate the fans one by one before operating the unit, and inspect whether there is abnormal noise in the fan caused by poor lubrication of the bearing or friction of foreign matters, and whether the fan rotates reversely or does not rotate.

5) Inspect whether the directional elements such as one way valve, solenoid valve, electronic expansion valve, etc. are installed properly. The directions of the one way valve and solenoid valve are indicated on the valves. As for the thermostatic expansion valve and electronic expansion valve, if the valves are upward, the direction is generally high-in and low-out.



Refrigerant Flow Direction in Electronic Expansion Valve

6) Inspect whether the pressure sensor stop valve, dry filter front/rear angle valve, liquid/air sampling stop valve and injection stop valve, etc. are all open.

When the unit stops, the high and low voltages shall be almost the same. After the start-up, the low voltage decreases, and the high voltage increases. If there is no voltage change certain time after the start-up, inspect whether the liquid/air sampling stop valve is open.

7) After the unit is installed and before connected, it is required to tighten the connections in the electrical cabinet of the unit one by one.

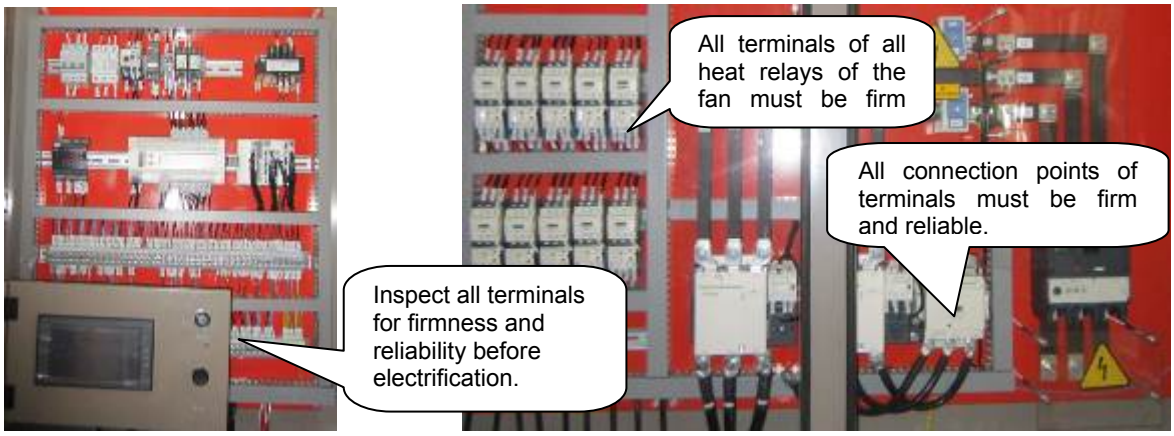
8) Inspect the bolts of the unit for looseness.

After the unit is transported and installed, it is required to inspect whether the fixing bolts of the unit (e.g. fixing bolts at compressor base angle, at post and beam of the unit, and at pipe clamp, etc.) and of the electrical elements (e.g. fixing bolts of PLC and of insulating transformer, and

connection bolts of upper/lower terminals of AC contactor, etc.) are firmly fixed.

9) Inspect the looseness of the connections in the electrical cabinet, especially the electric part in the cabinet. The parts connected by bolts might be loose due to transportation. If there is any looseness, tighten it to avoid burnout of circuit or element caused by poor contact.

Inspect the looseness of the terminals and poor contact caused by vibration and collision during transportation and installation (especially the electric part; ensure the connection points of all terminals are firm and reliable before electrification).



Inspect whether there is poor contact and short circuit caused by dust, moisture, etc. in the electrical cabinet, and whether the values of all temperature sensors are normal. During the shutdown of the machine, the indicated temperatures of discharge, fin, and the environment shall be almost the same, and the entering and leaving chilled water temperatures shall be almost the same.

10) Before the unit leaves the factory, the control cabinet is well connected with main motor, electrical actuator, and sensor elements of pressure temperature, etc. Therefore, the wiring on site for the user is very simple. Only the chilled water flow switch line and chilled water pump linked control line (control contact is active) need to be connected. For the detailed connection way, please refer to the circuit wiring diagram in the operation manual for the unit. (The attached circuit diagram represents the case of air-cooled heat pump unit for user's reference, as for the details, the operation manual supplied with the unit shall be final.)

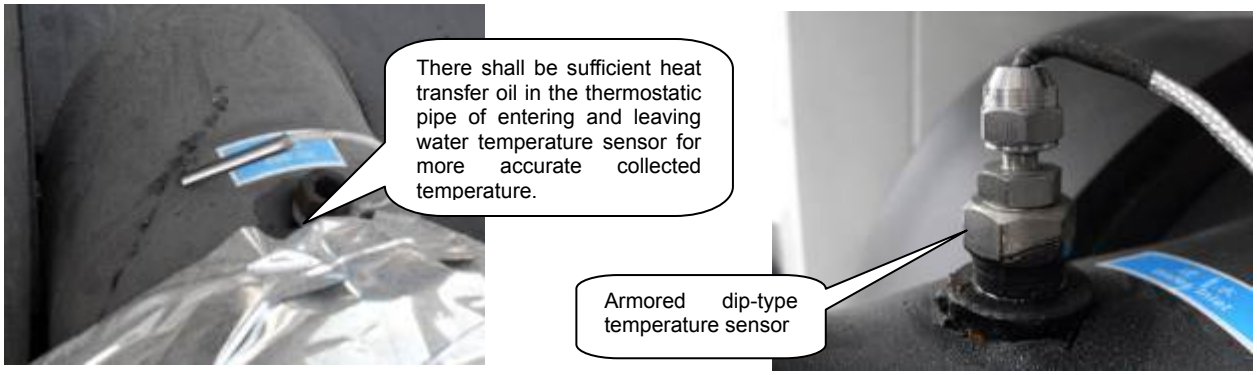
11) Target-type flow switch is set on the chilled water pipeline which shall be installed at the outlet of the chilled water. The NO contact of the target-type flow switch shall be connected to the control circuit as per the wiring diagram.

Note: Disordered water flow may lead to wrong action of the flow switch; therefore, the control cabinet will command the unit to stop after receiving continuous disconnection signals during 10 s.

12) The tube where the temperature sensing probe is installed shall be filled with lubricating oil or other grease that will not freeze at the temperature of the leaving chilled water for the convenience of heat transfer. Thermostatic insulation and enclosing measures shall be taken for the temperature sensing device.

Inspect whether there is temperature deviation for the entering and leaving water temperature

sensor caused by insufficient heat transfer oil in the thermostatic pipe.



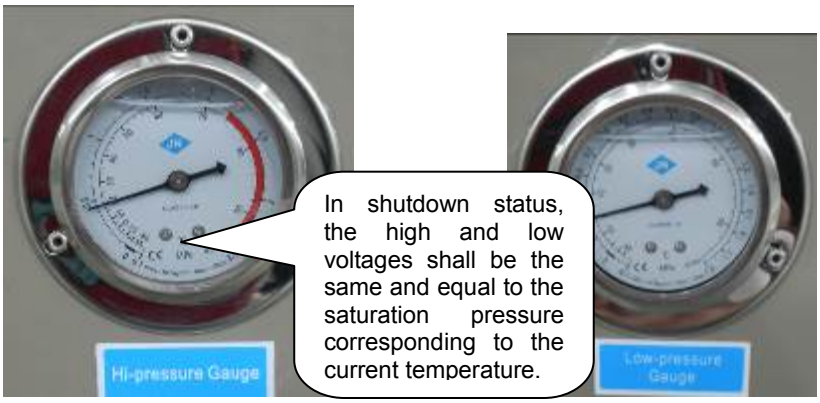
For later armored dip-type temperature sensor, no lubricating oil is required for heat transfer.

1.4 Complete Machine Performance Parameters Inspection

1) Parameters Inspection before Start-up

Before start-up of the unit, the following performance parameters need to be inspected:

(1) High/low voltage value of the system. In the case of the unit shut-down and waterless in a long time, the liquid and gas of the system shall be equivalent and close to the saturation pressure corresponding to the current ambient temperature. The correlation of saturation temperatures and pressures (the pressures in the list are gage pressures, among which, the atmospheric pressure is 0.1MPa) of R134a refrigerant is shown in appendix 1:



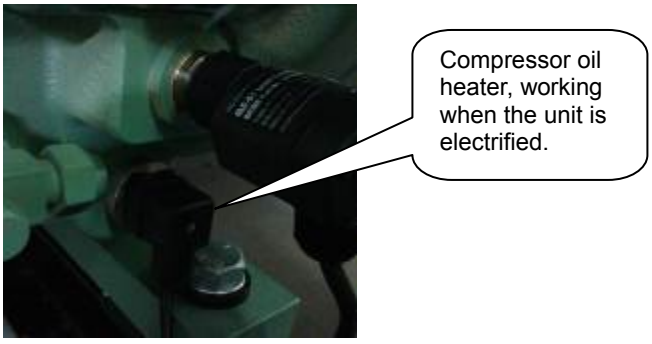
In the pressure gauge scale, taking the right figure for example: the outside values are pressure values (unit: bar), and the inside values indicate saturation temperatures of refrigerant R134a respectively under the relative pressure. The types of refrigerants indicated in different pressure gauges might differ. [Table 1]

Refrigerant Temperature ℃	R134a Refrigerant Pressure (Gage Pressure) MPa	Refrigerant Temperature ℃	R134a Refrigerant Pressure (Gage Pressure) MPa
0	0.19	25	0.57
5	0.25	30	0.67
10	0.32	35	0.79
15	0.39	40	0.92
20	0.47		

If the high/low voltage deviates much from the saturation pressure corresponding to the current temperature (more than 2bar), maybe there is leakage or insufficient refrigerant in the system.

(2) Inspect whether the oil heating of the unit is normal .

Before start-up, it is necessary to inspect whether the oil heating in the unit is available, and whether there is the condition that the oil heater does not work because of no power supply. It is particularly important in winter when the temperature is low and the failure of oil heating might lead to poor lubrication of the unit. The optimum working temperature for current types of lubricating oil is generally around 40℃.

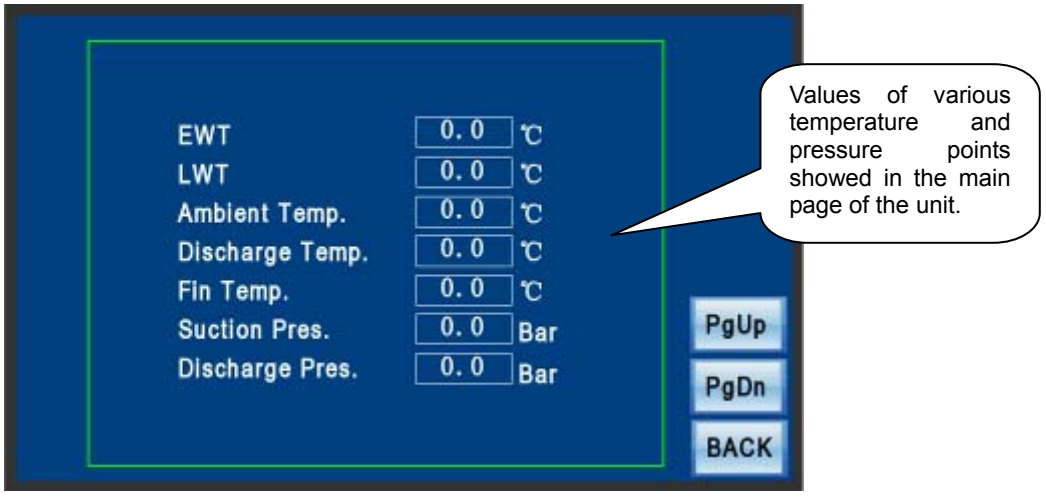


(3) Inspect whether there is alarm for trouble of the display screen. if there is, the trouble must be corrected.

(4) Inspect the electronic expansion valve control module for alarm trouble.

(5) Inspect whether various temperature points displayed on the display screen are within the normal range.

Before the operation of the unit, the showed temperatures of discharge、fin and the ambient temperature are close to the current actual ambient temperature, and whether the entering and leaving water temperatures are close to the water temperature at the user side. If there is any obvious deviation of the above temperatures, inspect whether the temperature sensor is in normal condition and whether the connection is firm and reliable.



(6) Inspect whether the flow in the water pump meets the requirements of the unit.

(7) Inspect whether the power supply of the unit is stable.

2) Parameters Inspections during Start-up and Operation

(1) The maximum range of parameters for normal operation of R134a refrigerant unit

See table 2 for the maximum range of performance parameters of R134a refrigerant:

[Table 2]

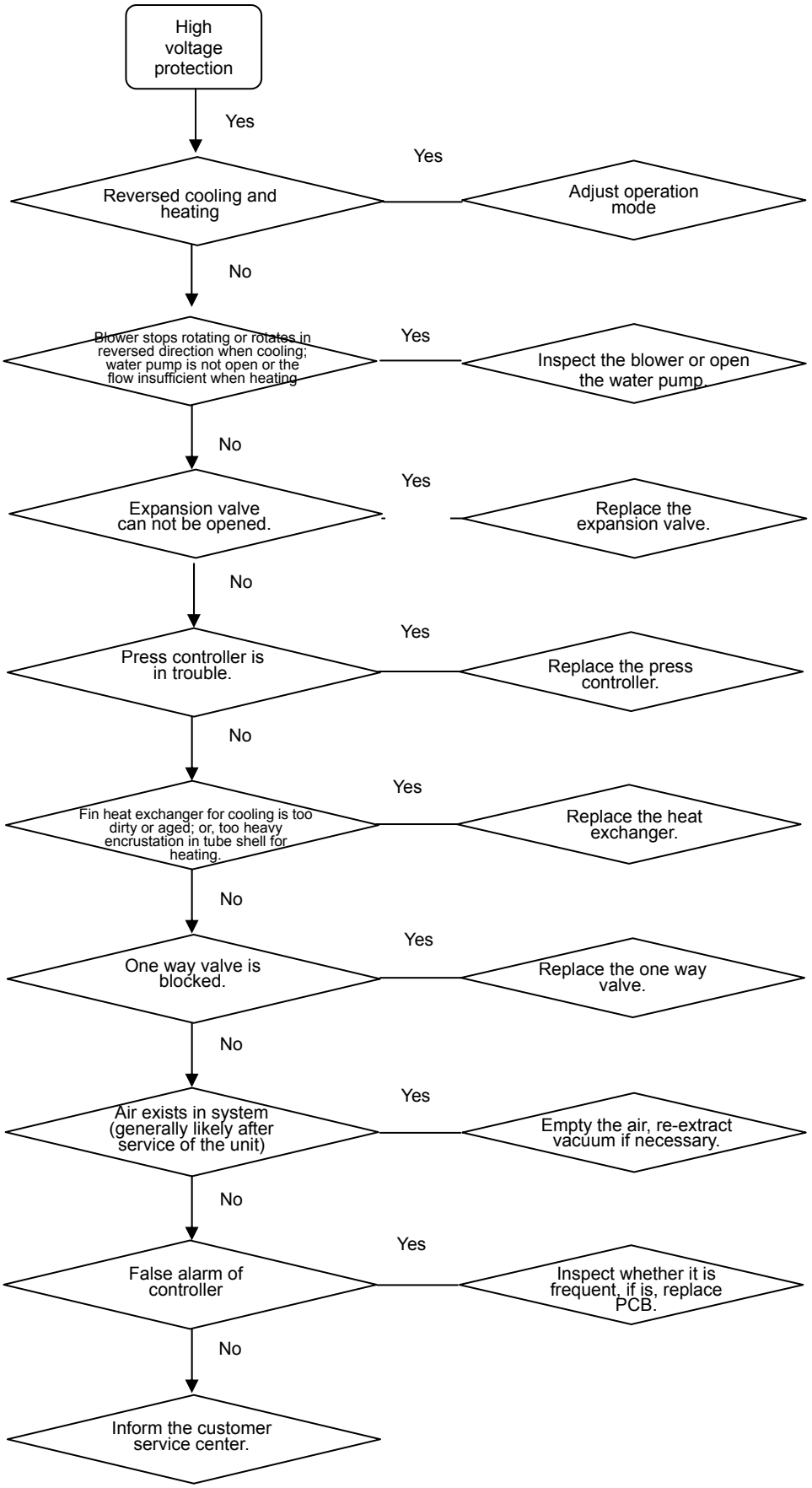
Working Condition	Refrigeration
Discharge temp. ℃	<110
Suction temp. ℃	--
Condensation temp. ℃	<65
Evaporation temp. ℃	<15
Economizer super-cooling degree ℃	--
Suction super-heating degree ℃	～
Discharge pressure MPa	<1.8
Suction pressure MPa	<0.38

(2) Keep good record of unit data during commissioning.

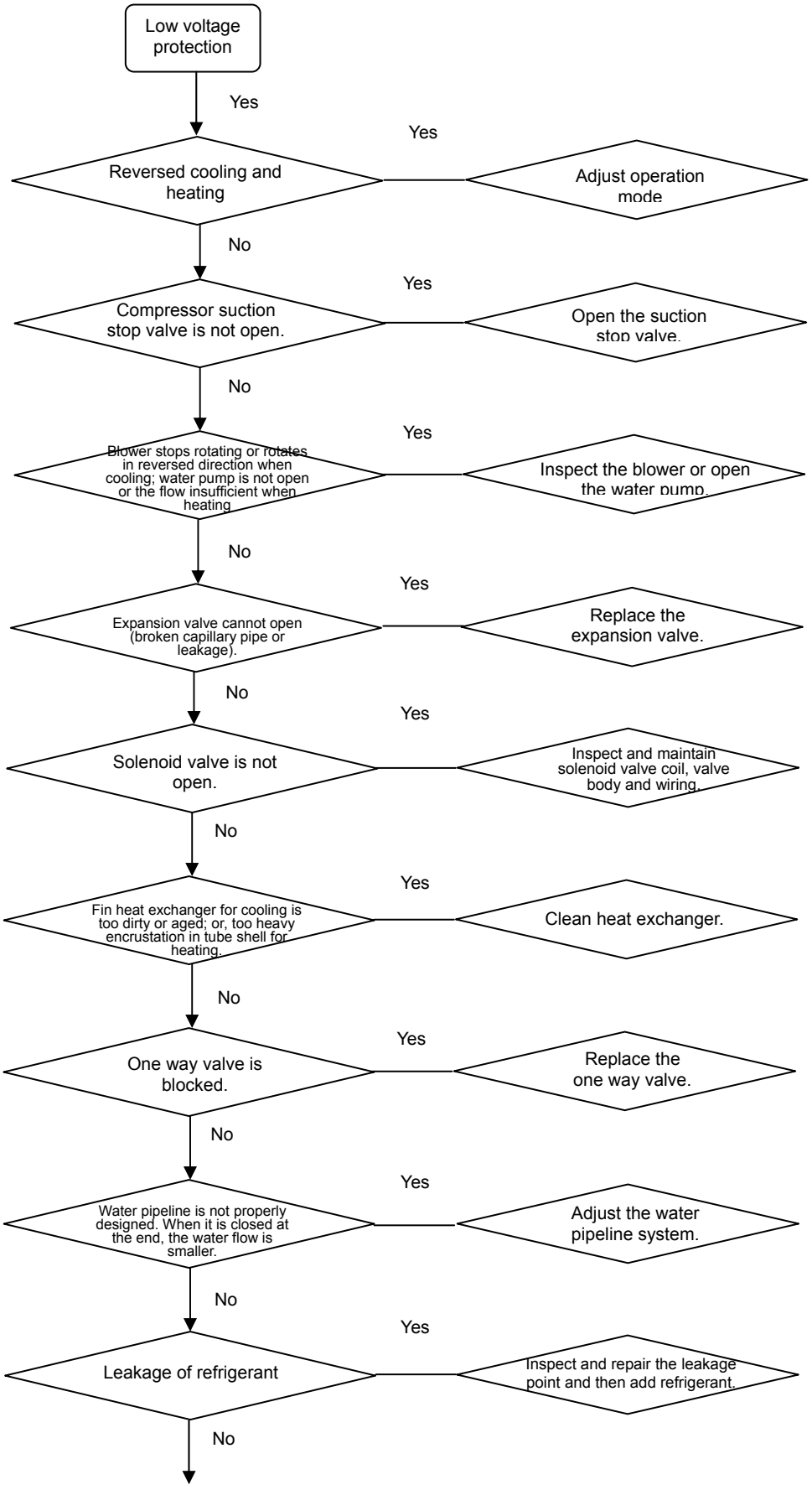
2. Maintenance

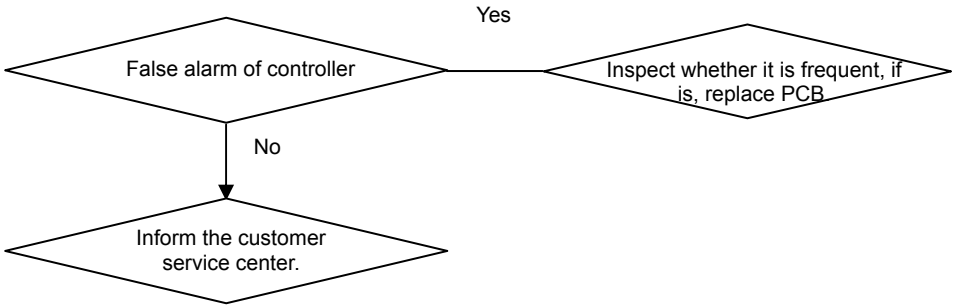
2.1 Common Troubleshooting

1) High Voltage Protection

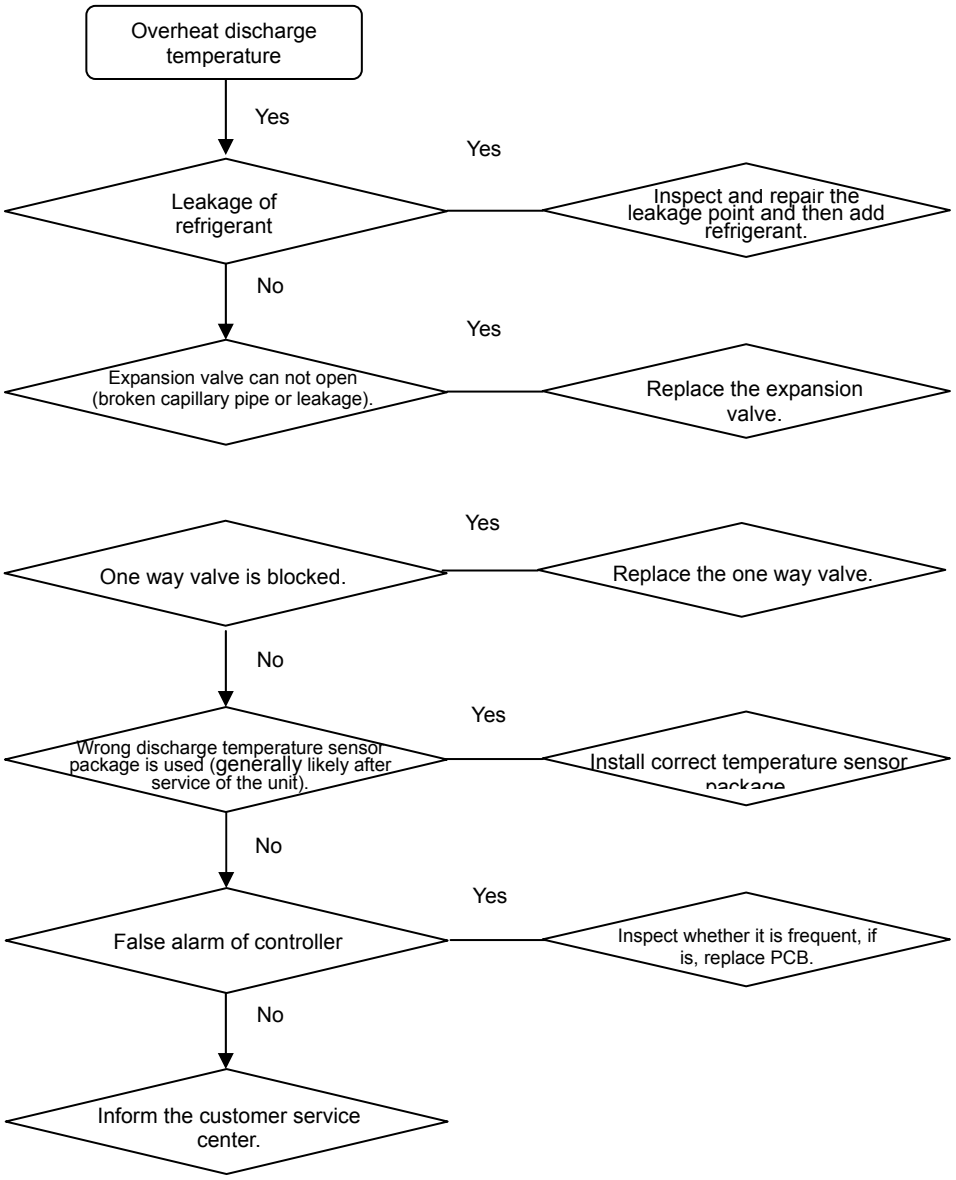


2) Low Voltage Protection

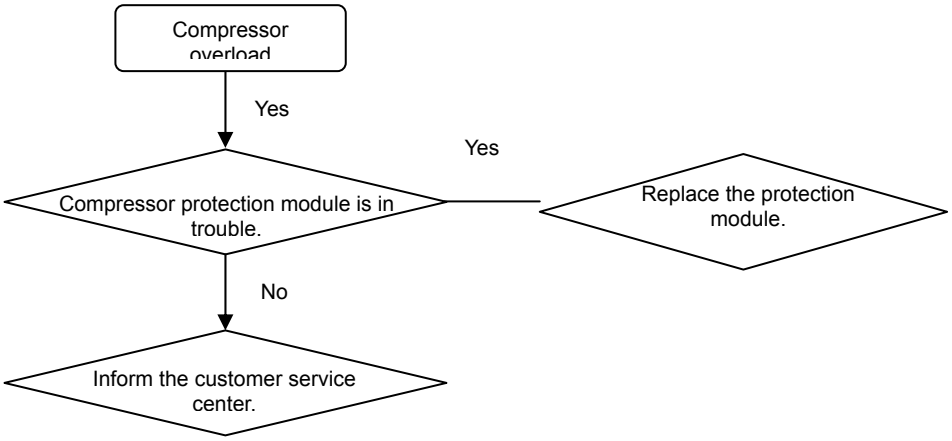




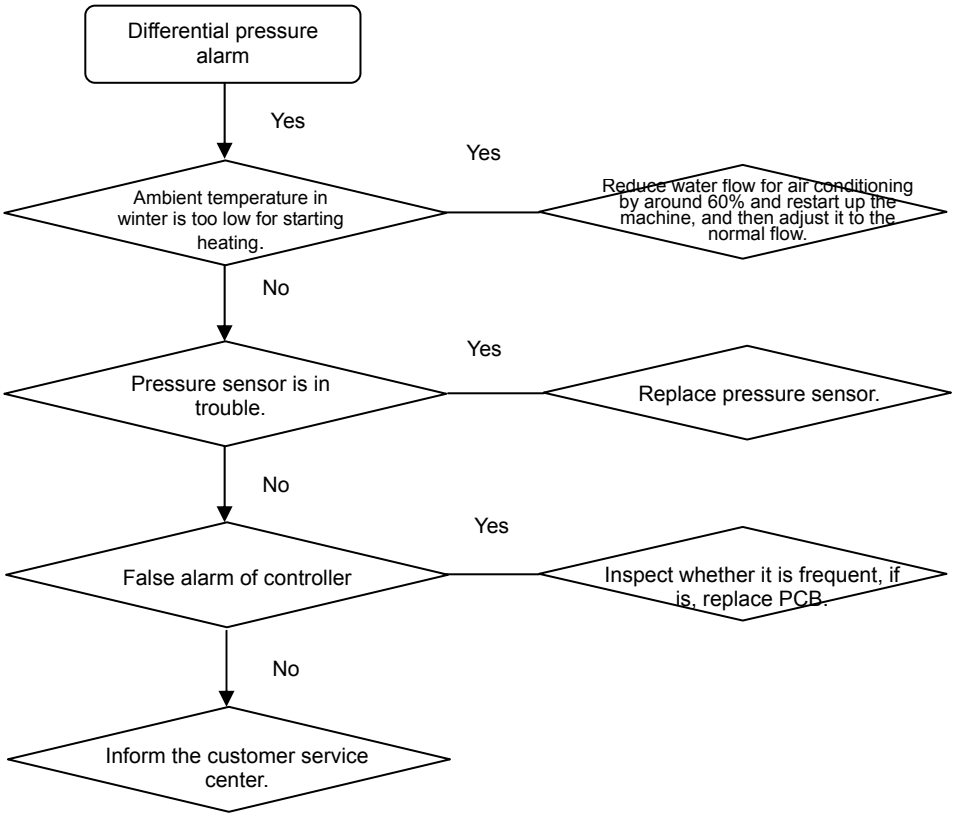
3) Overheat Discharge Temperature Protection



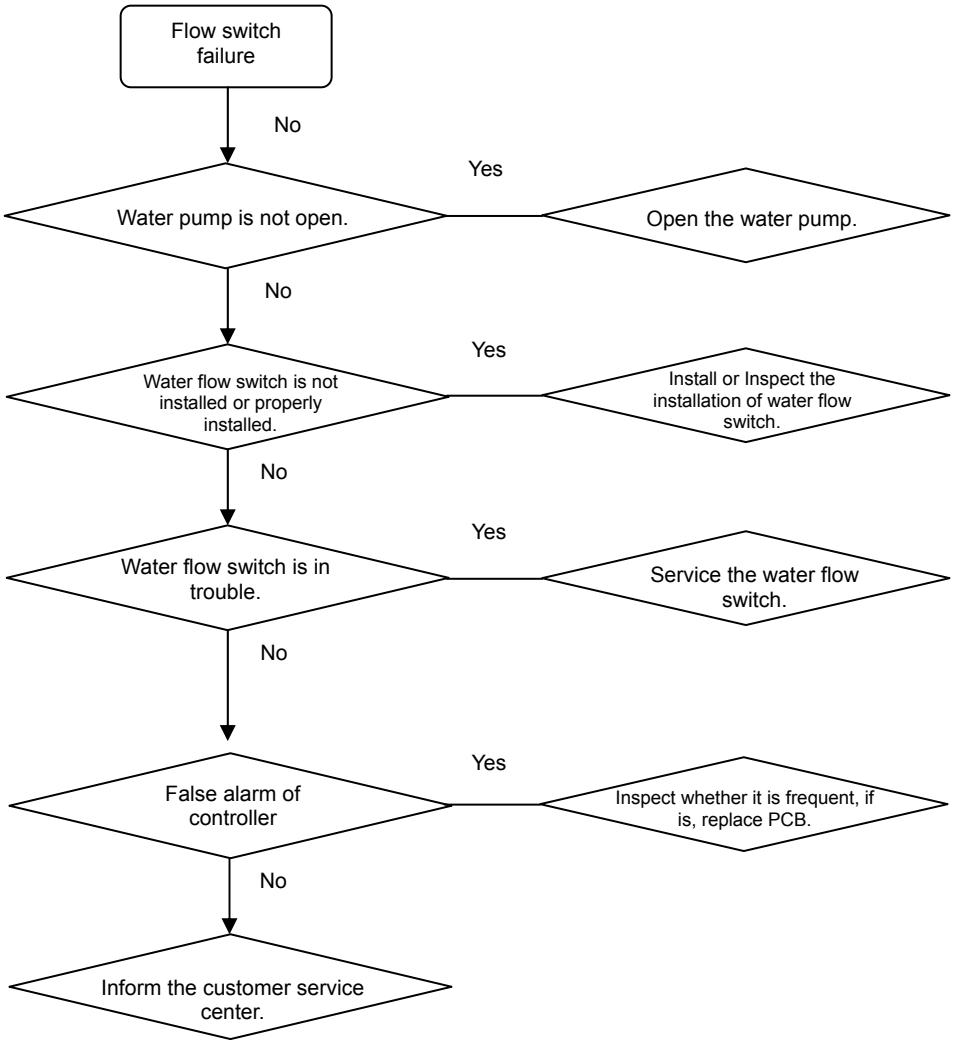
4) Compressor Overload Protection



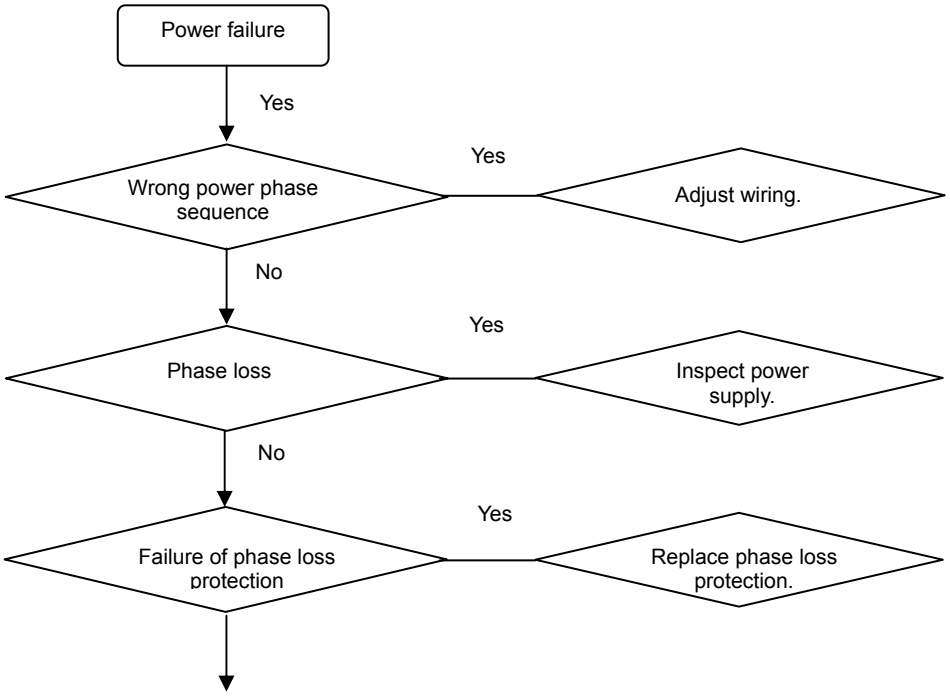
5) Differential Pressure Alarm

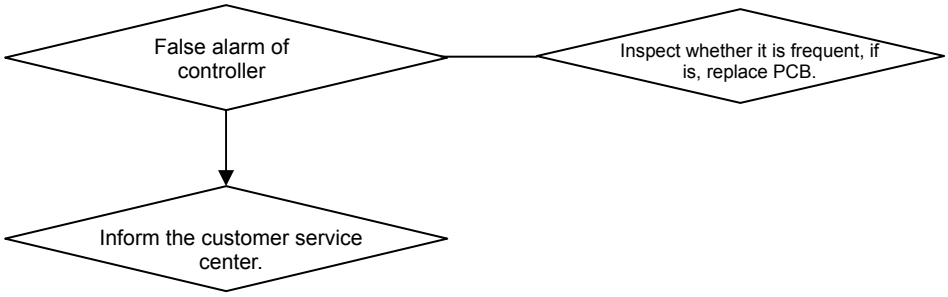


6) Flow Switch Failure



7) Power Failure





2.2 Common Items and Tools for Unit Commissioning and Service

In order to realize immediate and effective commissioning, maintenance and service, the following tools and items shall be available depending on units.

I. Common tools and applications:

1) External hex wrench, incl. adjustable and non-adjustable wrenches.
2) Internal hex wrench, comp. better
3) Pressure gauge, incl. gas/liquid gauge and connective gauge pipe, mainly for measuring pressures of various locations in the system, monitoring the pressure during adding of refrigerant, and functioning as a switch.
4) Refrigerant recycling machine, recycling refrigerant in the system.
5) Welding torch and relative equipment, welding torch, electrode (both common electrode and high silver electrode), and scaling powder. For copper pipe with diameter above 9.52mm, larger welding torch is required to facilitate even heating of the copper pipe.
6) As for vacuum pump and connection gauge pipe, if the vacuum pump connection is not common for the general gauge pipe, the connection transition pipe must be prepared.
7) As for the refrigerant tank and connection, the refrigerant tank connection must be sound and not damaged. In addition, it is important that the connection is common for related connection gauge pipe.
8) Scissors, generally used for connecting gasket of relative connective parts of cutting unit.
9) Brush, used for cleaning dry filter and oil filter, etc.
10) Cutter, used for cutting copper pipe. Cutters with appropriate sizes shall be prepared for cutting copper pipes of different sizes.
11) Pliers, auxiliary tool.
12) Mouth expander, consisting of bell mouth and mouth expansion.
13) Screwdriver, incl. slotted screwdriver and Phillips screwdriver, with complete sizes.
14) Leak detector (Leak detection powder is alternative if leak detector is not convenient for carrying.)
15) Universal meter, for measuring current and voltage of the unit (incl. compressor, fan and other parts), as well as coil resistances of compressor, fan and electronic expansion valve, line connection and disconnection, etc.
16) Temperature detector, for measuring temperatures of various points in the system of the unit.

17) Pipe bender, for bending the copper pipe to certain degree, and frequently used for tubing of pipeline in the unit.

18) Measuring tape, for measuring distance and length, etc.

II. Common items and application:

1) Copper nut, incl. metric and British systems, for making connective pipe with copper pipe.

2) Gasket cardboard, for making gasket seal as sealing is frequently required during maintenance and service.

3) PTFE tape, for tightening nut, connection, etc.

4) Insulating tape

5) Tighten strip, for tightening wire or sensor, etc.

The above are only common tools and materials. Exceptional cases require particular considerations.

2.3 List of Failures

Failure Display	Name of Failure	Source of Failure	Control Logic
Flow switch failure	Flow switch failure	Flow switch	The flow switch will be detected in 3 minutes of pump running. If the flow switch of unit module is off all the time for 5S successively, it shall be reported for flow switch protection. Execute this failure unit in the failure stop procedure; save the content of failure. Confirm this failure manually on touch screen as required after resetting the flow switch (detection will not be carried out in the period of stop, nor started until the pump runs for 3 minutes)
Freeze protection	Freeze alarm	Antifreeze Switch	When leaving water temperature in a unit modular unit is less than or equal to 3℃ and the mechanical antifreeze switch is switched off, report freeze protection, immediately stop this unit in the failure stop procedure, and save the content of failure. Save the content of failure. Do not switch on the unit modular unit (to be detected during both stop and running) in accordance with the conditions of temperature and time until this failure is confirmed manually on touch screen as required after failure is eliminated.
High-pressure alarm	High-pressure alarm	High-pressure switch	To be detected during both stop and running. Switch off the high-pressure switch when discharge pressure of the system is higher than 20Bar, report high-pressure protection, stop the module immediately in the failure stop procedure, and save the content of failure. Reset will not be allowed until system pressure is lower than the setting value after protection occurs. Do not switch on the units in accordance with the conditions of temperature and time until this failure is confirmed manually on touch screen as required after failure is eliminated.

Low-pressure alarm	Low-pressure alarm	Low-pressure switch	To be detected during both stop and running. Switch off the low-pressure switch when discharge pressure of the system is lower than 1Bar, report low-pressure protection, stop the module immediately in the failure stop procedure, and save the content of failure.
Compressor internal protection	Compressor internal protection	Motor protector	To be detected during both stop and running. Switch off the protection switch in compressor in the case of high temperature of compressor winding, or high compressor discharge temperature, or phase sequence error of compressor power, or phase lack. Stop the units immediately in the failure stop procedure and save the content of failure. Do not switch on the units in accordance with the conditions of temperature and time until this failure is confirmed manually on touch screen as required after failure is eliminated.
Oil level protection	Oil level protection	Oil level switch	To be continuously monitored prior to start, report oil level protection in case of continuous switch-off of oil level switch for 3S, and start of compressor is not allowed; to be detected in running, switch off the oil level switch in case of continuous switch-off of oil level switch of compressor for 60S during running of compressor. Then report oil level switch protection. Immediately stop the units in the failure stop procedure, and save the content of failure.
Oil differential pressure protection	Oil differential pressure protection	Oil differential pressure switch	To be detected in running, switch off the oil differential pressure switch when the difference between oil pressure and discharge pressure of compressor is higher than the setting value during running of compressor. The indicator of oil differential pressure switch in input interface will be out. Do not switch on the units in accordance with the conditions of temperature and time until this failure is confirmed manually on touch screen as required after switch resetting.
Contactor failure	Contactor failure	Contactor	To be detected after start of master, report the contactor failure in case of incorrect pull-in of contactor. Do not switch on the units in accordance with the conditions of temperature and time until this failure is confirmed manually on touch screen as required after switch resetting.
Compressor overload	Compressor overload	Compressor overload relay	Report compressor overload protection when the current value of unit compressor is greater than the setting value and energy accumulated to result in thermorelay trip. Stop the module immediately in the failure stop procedure, and save the content of failure. Do not switch on the units in accordance with the conditions of temperature and time until this failure is confirmed manually on touch screen as required after failure is eliminated.

Fans overload	Fans overload	Fans overload relay	Report fans motor overload protection when the current value of unit fans is greater than the setting value and energy accumulated to result in thermorelay trip. Stop the compressors and fans (simultaneously) immediately for this module, and save the content of failure. Do not switch on the units in accordance with the conditions of temperature and time until this failure is confirmed manually on touch screen as required after switch resetting.
Power Failure	Power Failure	Phase sequence protector	To be detected at any time, report power failure in cases of high / low voltage of power or phase unbalance and phase lack. Failure will be eliminated after power gets right. Notes: phase lack / phase stagger of power will be detected during both initial stage of power-on and unit running.
High Fin temp.	High Fin temp.	Fin temp. sensor	To be detected in running, the fin temperature of the system is higher than 65℃, and the failure record indicates that the fin temperature is too high.
High Discharge temp.	High Discharge temp.	Discharge temp. sensor	To be detected in running, the discharge temperature of the system is higher than 110℃, and the failure record indicates that the discharge temperature is too high.
Leaving water temp. sensor failure	Leaving water temp. sensor failure	Leaving water temp. sensor	Switch off compressors in case of failure of the sensor itself. Switch-off of pump and fans will be delayed. The failure indicator of display board will be on, and a corresponding alarm mark will be displayed in “Failure Query”. The compressors will not be restarted until the failure of sensor is eliminated, and the failure signal must be cleared manually, otherwise it cannot be cleared.
Entering water temp. sensor failure	Entering water temp. sensor failure	Entering water temp. sensor	
Fin temp. sensor failure	Fin temp. sensor failure	Fin temp. sensor	
Ambient temp. sensor failure	Ambient temp. sensor failure	Ambient temp. sensor	
Discharge temp. sensor failure	Discharge temp. sensor failure	Discharge temp. sensor	
Suction temp. sensor failure	Suction temp. sensor failure	Suction temp. sensor	
Low-pressure alarm	Low-pressure alarm	Low-pressure switch	Do not restart the units until confirming manually on touch screen as required when the suction pressure detected by the system is lower than the setting value for continuously 1s.
High-pressure alarm	High-pressure alarm	High-pressure switch	Do not restart the units until confirming manually on touch screen as required when the discharge pressure detected by the system is lower than the setting value for continuously 1s.
Differential pressure alarm	Differential pressure alarm	Differential pressure switch	To be detected in running. Currently, there are two modes, one is direct use of differential pressure switch, namely that when the

			difference between high pressure and low pressure of the system is smaller than the setting value of 4Bar, the differential pressure switch will be switched off, and the indicator of differential pressure switch of input interface will be out. The other is PLC calculation, namely that an alarm will be given if the differential pressure is smaller than 4Bar.
Low Suction Pressure	Low Suction Pressure	Low-pressure sensor	To be detected in running, report protection of too low suction pressure when the refrigeration suction pressure is lower than 1Bar, and the units will not be restarted until it is confirmed manually on touch screen as required.
High Discharge Pressure	High Discharge Pressure	High-pressure sensor	To be detected in running, report protection of high discharge pressure when the discharge pressure is higher than 20Bar, and the units will not be restarted until it is confirmed manually on touch screen as required.
Beyond the operation range	Beyond the operation range	Ambient temp. sensor, entering water temp. sensor	The system will be automatically stopped when the ambient temperature detected by the system exceeds that set by the system for continuously 5 minutes.
Mode water temp. protection	Mode water temp. protection	Entering / Leaving water temp. sensor	Detect water temperature in the refrigeration mode after start for 5 minutes, and report mode water temp. protection when leaving water temperature is not lower than entering water temperature for continuously 5s.
EXV module failure	EXV module failure	EXV Control Module	Start detection upon power-on of units, and report immediately failure of EXV module when the alarm output point of EXV control module is switched off.

✧ Description: Communication failure (displayed on main page for units)

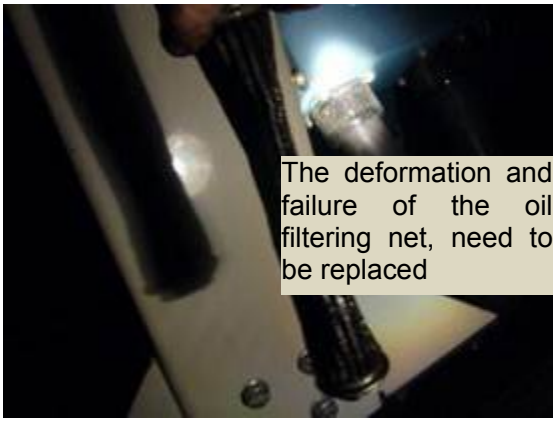
1） It is divided into internal communication failure and master-slave communication failure. A small box indicating “Communication Failure” will appear on touch screen in case of internal communication failure, and communication light “*com*” will flash at frequency varying from high to low! Possible cause: poor contact of communication line.

2） Master-slave communication failure: inspect for error of wiring between master and slave, and whether setting of station number is correct.

2.4 Installation/Removal and Service of Key Parts

1) Refrigerant Recycling and Adding

If transfer and recycling of refrigerant are required during the maintenance and service, the following items shall be carefully considered:


The deformation and failure of the oil filtering net, need to be replaced

(1) If oil differential pressure alarm occurs in the unit, the lubricating oil deteriorates and is emulsified, or the unit is used for too long, the compressor oil filter and tank shall be cleaned, and the unit lubricating oil shall be replaced. If the unit oil filter is deformed or damaged, it needs to be replaced.


Dirty block oil filtering net, need cleaning

Before replacing compressor oil filter, cleaning compressor oil tank, replacing unit lubricating oil, oil level switch, stop valve connected to the compressor, or other parts, close the pressure-equalizing pipe stop valve of discharge valve, suction valve and injection flow expansion valve of the compressor, and discharge refrigerant in the chamber of the compressor. After the replacement and cleaning are completed, pump vacuum in to the compressor via vacuum pump, and after that, negative pressure shall be kept. When the resumed vacuum in the unit meets the requirements, add part of refrigerant, generally 5~10 kg, depending on particular situations.

(2) Before replacing electronic expansion valve of the system, pressure sensor sampling stop valve, low pressure pipeline, etc. force the refrigerant in the liquid part of the system.

The particular steps are: (take careful consideration before continuing with the following steps)`

a Close the dry filter angle valve of the system.

b Start up the unit, and emergently stop the unit when the gas in the system is below 0.5bar.

c Close the liquid/air valve of the compressor.

d Discharge the residual refrigerant in the gas system.

e Carry on replacement of the parts of the system.

f After the replacement, extract vacuum in the gas part.

g After the vacuum extraction, keep the negative voltage until the resumed vacuum in the unit meets the requirements.

h Open the angle valve of liquid system and compressor liquid/air stop valve to ensure the loop of the entire system is unobstructed.

i Add proper amount of refrigerant, generally 5~10k.

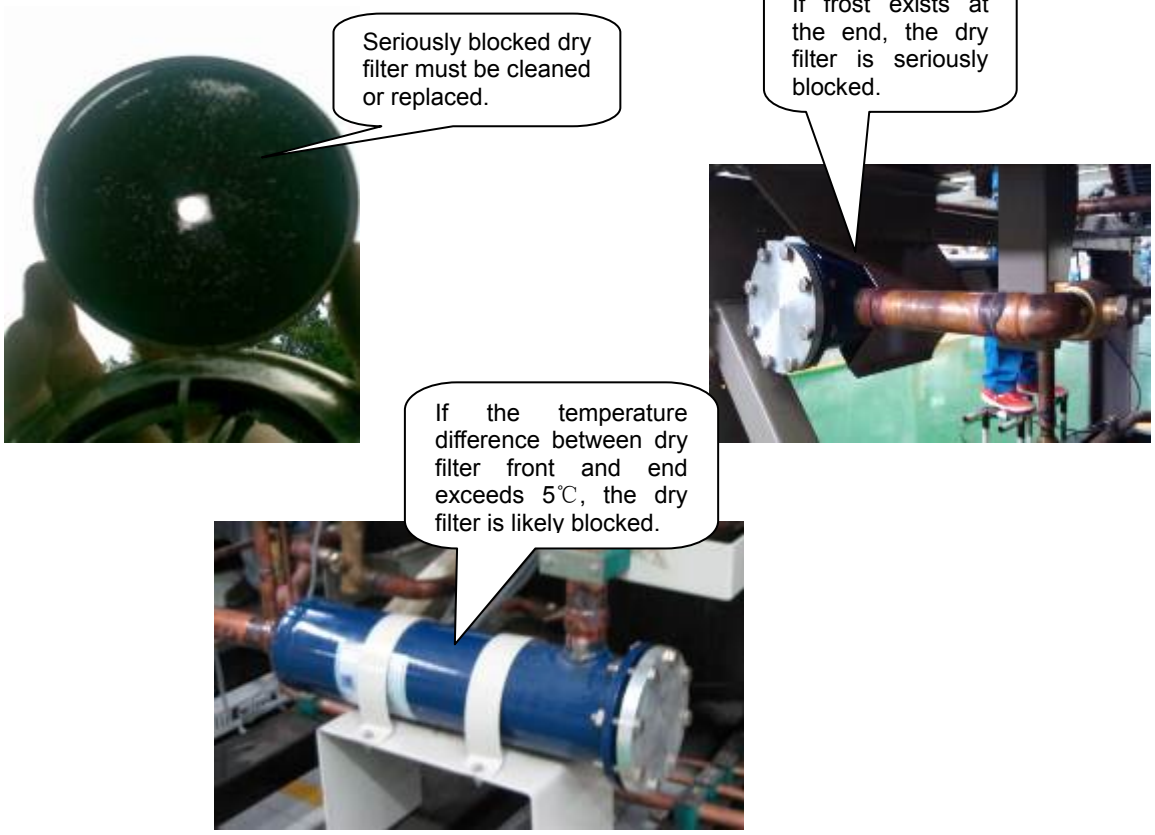
(3) Before replacing dry filter core filter, directly close the angle valves at both ends to discharge the residual refrigerant in the dry filter. After the replacement, fix the end cover tight, extract

vacuum, and then add 2~3kg refrigerant.

If only to clean the dry filter, but not to replace it, before removal of the filter, ensure that the refrigerant in the dry filter is completely discharged and the dry filter has remained not in use for a time (to ensure the temperature of the dry filter core is close to the ambient temperature) so that the removed dry filter core with low temperature would not cause the moisture in the air to immediately reach to the dew point to condense and absorb water. Protective measures shall be taken to the removed filter to prevent it from directly contacting with the air.

If the dry filter core is dirt or has absorbed too much moisture, it must be replaced with a dry one.

During the operation, inspect whether the dry filter is blocked and whether the temperatures at the dry filter inlet and outlet are close in normal conditions. If there is obvious temperature difference (above 5℃) between the front and end of the filter, or even that frost exists at the end of the filter, it is likely to block the dry filter.



(4) If refrigerant is desired to be extracted for the complete machine, the refrigerant in the system shall be transferred to particular refrigerant container via fluorine recycling machine.

2) Replacement of Compressor

(take careful consideration before continuing with the following steps)

(1) Inspect the refrigerant system and various lines to figure out the cause of burnout of the compressor as far as possible.

(2) Recycle the refrigerant, and before that, prepare relative equipment and tools, and especially keep good ventilation condition in the working environment.

(3) Remove the compressor from the system, and replace the dry filter.

(4) Inspect and clean the thermostatic expansion valve.

(5) Clean repeatedly the entire system with high pressure nitrogen.

(6) Extract vacuum in the system three times, and reduce the pressure of the system to an appropriate value.

(7) Fill refrigerant in the system. Pay attention not to start up the unit until the filling amount is at least 60% of the rated amount of the unit. This can be realized by lifting the refrigerant steel cylinder and fill it in backward direction.

(8) Continue filling refrigerant after the start-up till it reaches the rated filling amount. It can be filled in liquid if necessary. Ensure that the liquid filling point is before the vapor-liquid separator, better at the inlet of the evaporator.

(9) Leave the system running for 48 h, extract a small amount of compressor oil, inspect the taste and measure the acidity with PH paper. Replace the compressor oil if necessary.

(10) After step 9 is completed, leave the system running for another 48 h. If everything is normal, change the dry filter to the original model for the unit.

(11) After the above steps, inspect the system again in two weeks to ensure the working conditions and operation of the unit meet the requirements of the design.

3) Replacement of Shell and Tube Evaporator

(1) Inspect the water system and various lines for whether the evaporator is damaged.

(2) If it is damaged and needs replacement, disconnect the power supply of the unit and recycle the refrigerant.

(3) Loosen the water inlet and outlet joints, separate the pipeline connected to the evaporator through welding (different units have different heat exchange types; therefore, when welding the connective pipeline, all connection locations shall be recorded. Wrong connected pipelines will cause gas-cross in the system).

(4) Clean the system depending on particular situations.

(5) Loosen screws of fixing base of the evaporator, remove the shell and tube evaporator and replace the heat exchanger with one of the same model, and connect the pipeline through welding.

(6) Pay attention to nitrogen filled protection during welding.

(7) Keep the pressure of the system, extract vacuum, and refill refrigerant.

4) Replacement of Condenser

(1) Disconnect the power supply of the unit and recycle refrigerant.

(2) Remove the metal plate connected to the condenser and remove the guard of the condenser.

(3) Remove the parts of collector tube and gas-distributing subassemblies connected to the condenser through welding. Pay attention to the direction of the flame to prevent contact with condenser fin and metal plate of the unit.

(4) Clean the system depending on particular situations.

(5) Loosen the fixing bolts connecting the condenser and metal plate of the unit, remove and replace the condenser, and connecting corresponding pipelines through welding.

(6) Pay attention to nitrogen filled protection during welding.

(7) Keep the pressure of the system, extract vacuum, and refill refrigerant.

5) Replacement of Thermostatic Expansion Valve and Strainer

(1) Inspect the refrigerant system and various lines to figure out the cause of damage of the expansion valve or strainer.

(2) If the expansion valve or strainer is to be replaced, disconnect the power supply of the unit and recycle the refrigerant.

(3) Wrap the expansion valve body or strainer with wet cloth, remove the inlet and outlet tubes of the expansion valve through welding, and then remove the expansion valve or strainer.

(4) Replace the thermostatic expansion valve or strainer with the one of the same model, wrap the thermostatic expansion valve body or strainer with wet cloth again, and connect the inlet and outlet tubes of the expansion valve through welding.

(5) Pay attention to nitrogen filled protection during welding. Besides, pay attention that no water flows into the pipeline.

(6) Keep the pressure of the system, extract vacuum, and refill refrigerant.

2.5 Precautions for Maintenance and Service

1) When the angel valve cores at both ends of the dry filter are turned outward "left, two main pipelines 2 and 3 are connected and the needle valve connector 1 is closed; when the valve cores are turned inward "right, the needle valve connector 1 and the main pipeline 2 parallel to the angle valve connector are connected, and the main pipeline 3 vertical to the needle valve connector is closed; when the valve cores stop at the middle part, the

angle valve connector 1 and two main pipelines 2 and 3 are interconnected.

Ball Valve
When the ball valve core is turned outward, the two main pipelines are interconnected;
When the core is turned inward, the two pipelines are not interconnected

2) Each time when acing or cleaning the strainer, oil filter, stop valve, etc., inspect relative sealing faces for leakage after filling of refrigerant.
3) Recycling of refrigerant is not part of the normal running, therefore, the protection settings of the unit must be ensured valid, especially when the unit needs to operate. If the protection switch is short connected due to protection failure, start-up is in principle not recommended.
4) The system of air cooling screws unit is generally complicated, and the flow line is long, if replacement, cleaning and welding of parts at some area are required, close the valve as close to the engaged area as possible, and minimize the volume of vacuum extraction.
5) If vacuum extraction is required for the complete machine, because of the complicated system, it is better to divide the system into several parts for vacuum extraction, or extract vacuum at several points in the system, generally 3 points at least, in addition, it is better to choose the vacuum pump of larger model. If the vacuum pump is relatively small, sufficient time for vacuum extraction shall be guaranteed.
6) During filling of refrigerant, valid metering device is required for accuracy of filling amount. Empty the connective pipeline before filling refrigerant each time. Refrigerant pipe with reliable quality shall be chosen to prevent accident during transfer or filling of refrigerant.
7) It is better to use filling machine to fill the refrigerant. If no filling machine is available, refrigerant tank can be used to fill refrigerant directly. However, the pressure in the refrigerant tank is too limited to fill the refrigerant required completely to the system. It is suggested to heat the refrigerant tank in 40~50℃ water (heating temperature shall not be too high). When there is 60% of the rated amount of refrigerant in the system, start up the machine for filling. Fill refrigerant at the gas side of the system, and control the flow of the refrigerant. Gas of refrigerant is better. If it is liquid, it is better to be filled before the evaporator. If after the evaporator, it shall be filled slowly and in small flow.

2.6 Training User Operator

The commissioning process includes training user operators in the following aspects:

1) Stress the safety in shutdown and operation processes.
2) Require the users to carefully read the operation manual of the unit.

Explain to the users that operation of the unit shall be carried out strictly as per the steps and methods specified in the operation manual. If anyone has any problems about descriptions in the manual, he shall enquire after-sale personnel or professionals in the factory and carry out the operation only when he understands it. Any deviation in the installation of the unit from the requirements in the manual shall be pointed out to the part responsible for installation, and the after-sale personnel or professionals in the factory will determine whether change is necessary.

3) Short-connection is forbidden when all protection functions of the unit are normal. Ensure all protection functions are available and reliable.

   Various protection switches in the unit are for safety of the unit or user, and are not permitted to be short connected in principle. If short-connection is required for commissioning, the operation shall be done by the after-sale personnel or professionals in the factory on site. After the commissioning, connect the protection switches to the system before starting up the unit for long-time running.

4) Open the water pump and wait until the water flow is stable before starting up the master compressor. For shutdown, the water pump must be closed in a delayed time. It is not allowed to forcibly close the water pump when the master compressor is still running. If the water pump fails, and the flow switch does not jump, the unit must be emergently shut down.

5) The unit must be disconnected from the power supply during inspection or replacement of the lines of the unit.

   If it is required to tighten the line bank screw or replacing the wire and element in the electrical cabinet during commissioning and maintenance, it shall be down when the power supply is disconnected. Similar operations by the user in later maintenance and service shall also be done when the power supply is disconnected.

6) The non-user parameters in the touch screen of the unit and electronic expansion valve control module are forbidden to be changed.

   The non-user parameters in the touch screen of the unit and electronic expansion valve control module are directly related to the performance and reliability of the unit, and are not allowed to be changed in principle. Even if it is required to adjust some parameters due to special local climate, it shall be done by or under the instructions of after-sale personnel or professionals in the factory.

7) If any exceptional case occurs to the unit, it is forbidden to forcibly start up the unit unless under the instructions of professionals.

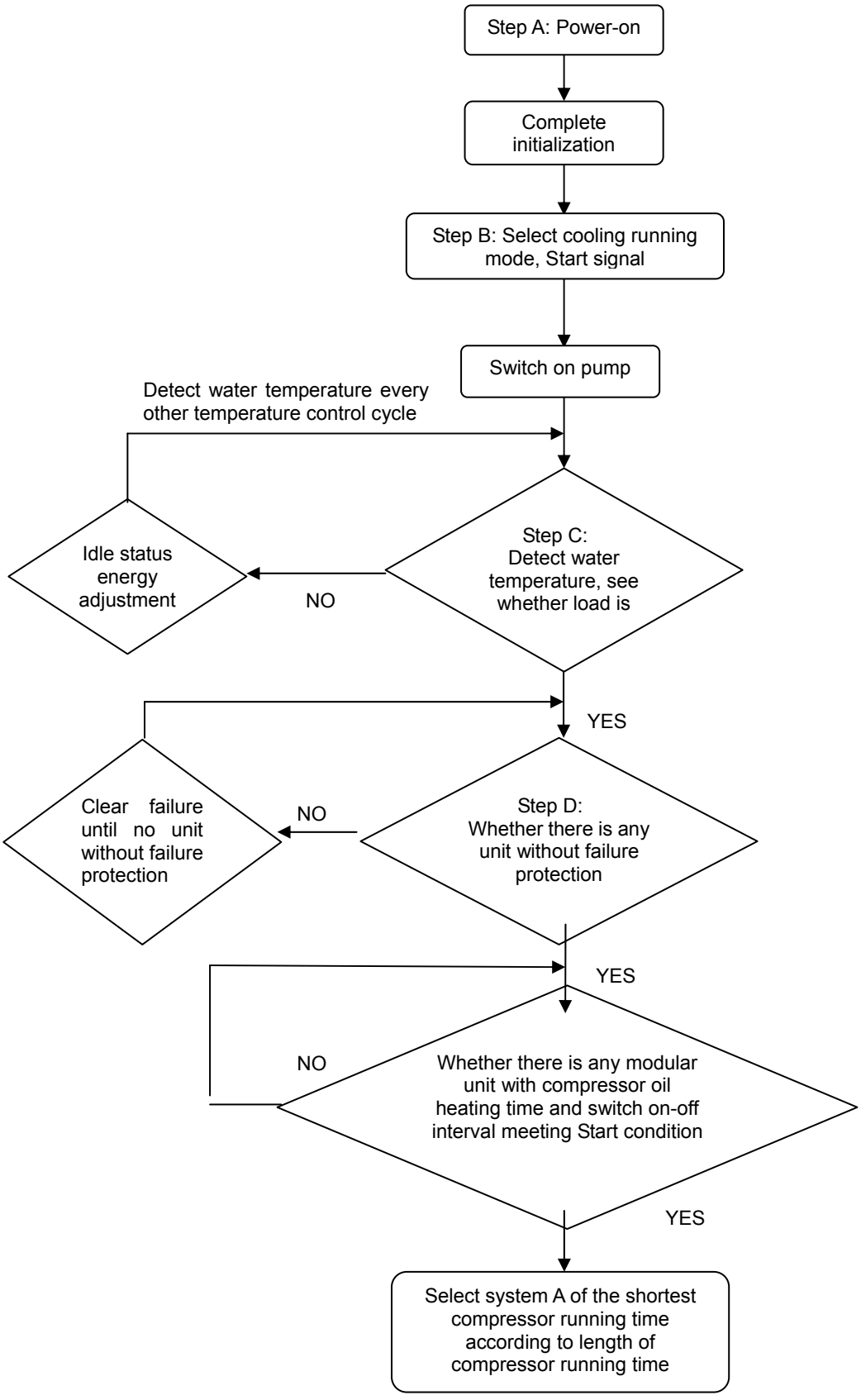
   Exceptional temperature, pressure, sound, or vibration, etc. of the unit during the running shall be clearly recorded in details, and reported to after-sale personnel or professionals in the factory. It is forbidden to forcibly start up the unit unless permitted.

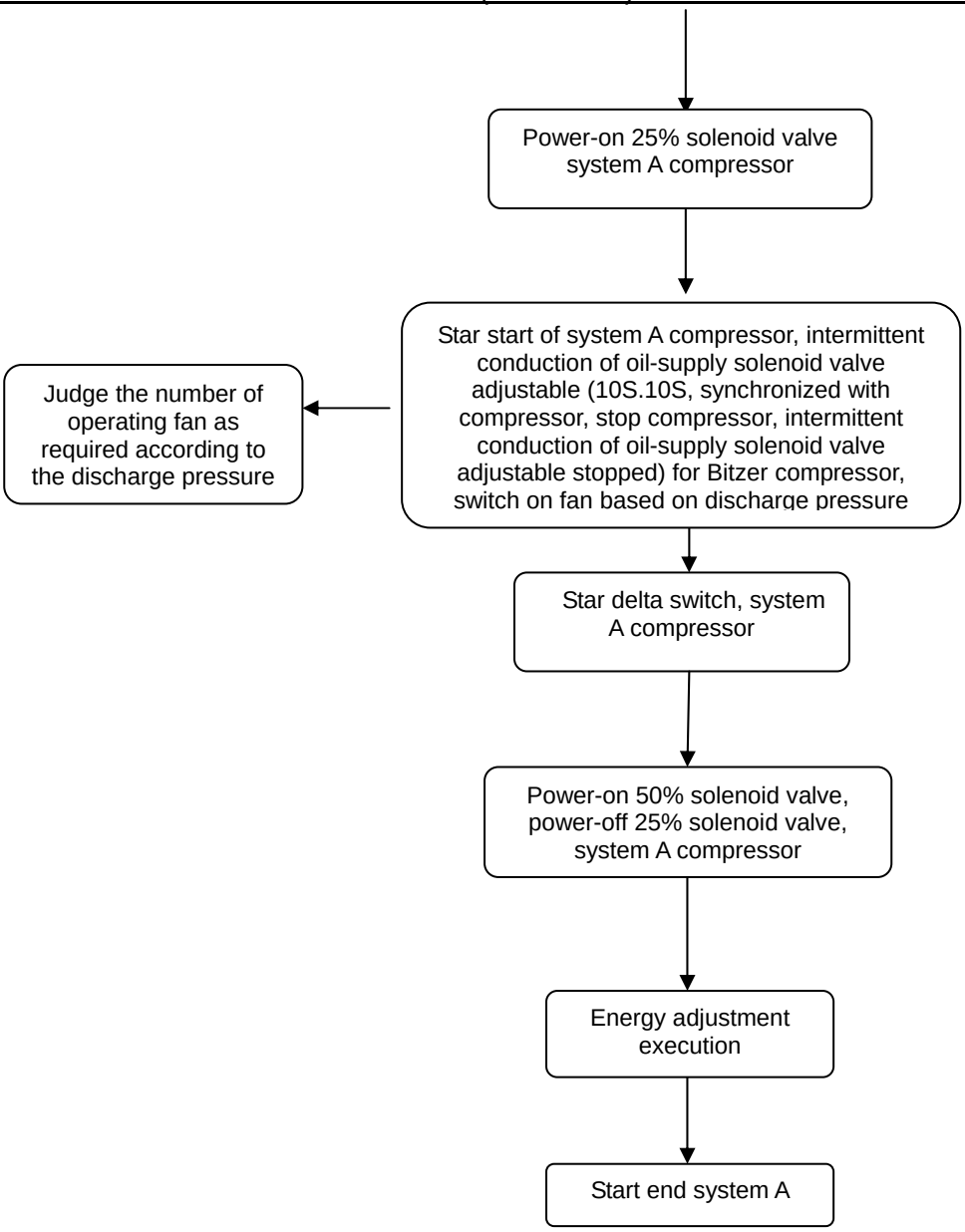
V. Control Logic

1. Start (Stop) Logic

1.1 Start Logic

1) Cooling Start:





Execute step B at the interval of 120 s for other modular units.

2) Start after cooling energy adjustment Stop:

When total entering water temperature is detected to be within the start reset temperature range after energy adjustment Stop of all modules, the first unit module meeting the Start condition will be executed from step B, and other modular units will be executed from step A to start up at the interval of 120 s.

Only some of modular units stopped adjustably, the units that have been stopped will be executed from step A, and each module will be started at the interval of 120S.

Description:

1. Double-head Start Mode:

According to the running time of compressors, the unit of shorter running time will be started prior to the other in the case that both compressors meet the starting condition, and No 1 head

If water temperature has been within loading area after the head started prior to the other, the other will be started in two minutes. If water temperature has been (or had been) immerged in loading area in two minutes, the other head will not be started until the head started prior to the other has been started and loaded to 100% in case that further loading is required for the unit according to the energy adjustment process.

2. Multi-Connected Start Mode:

Water pump starts to run upon point start of units, and the duration of switching on the water pump is from 3 to 5 minutes. The units will be converted into idle mode upon switching on the water pump, and then attempt will be made to switching on the compressor.

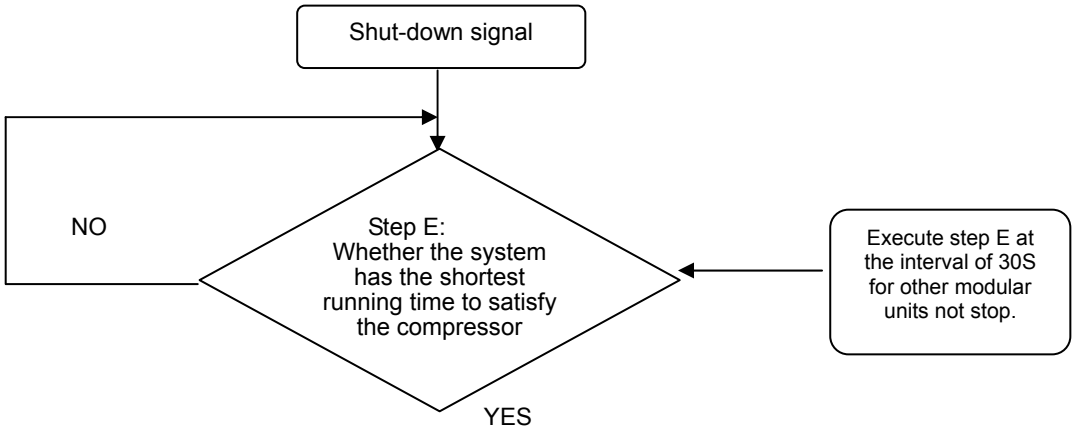
The running times of all jointly-controlled units will be sequenced in case of multi-connection provided that the condition for switching on the compressor is satisfied. The unit of shorter running time will be started prior to the other when both units meet the Start condition, and the unit of smaller station number will be switched on prior to the other in the case of identical running time.

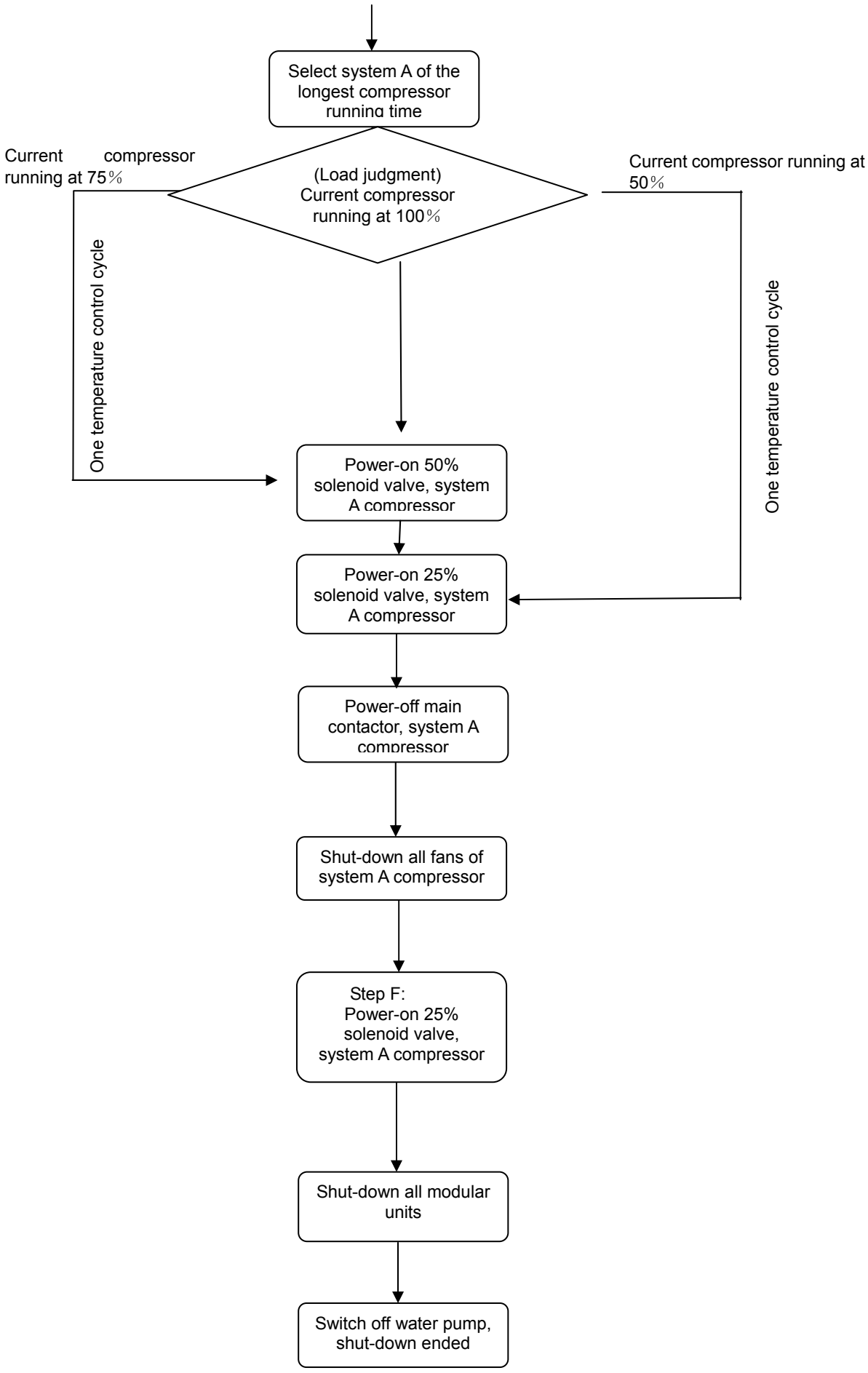
Double-Compressor running time: the running time of one head of shorter running time than that of the other will be taken as the reference during loading, and the running time of the other head will be directly taken as the reference if one head does not meet the starting condition; the running time of one head of longer running time than that of the other will be taken as the reference during unloading, and the running time of the other head will be directly taken as the reference if one head does not meet the unloading condition.

When no unit running has been started, the jointly-controlled units will be started at the interval of 2 minutes for each in the Start order with water temperature is in the loading area, (to be executed as per the above double-head single-unit mode, with double-head treated as one unit), and energy adjustment will be executed individually by the unit that has been started; when water temperature is not in the loading area, a single unit will no longer execute energy adjustment individually, nor the unit that has not been switched on will be switched on at the interval of two minutes, and the complete machine will start to run in accordance with the normal process of energy adjustment.

1.2 Stop Logic

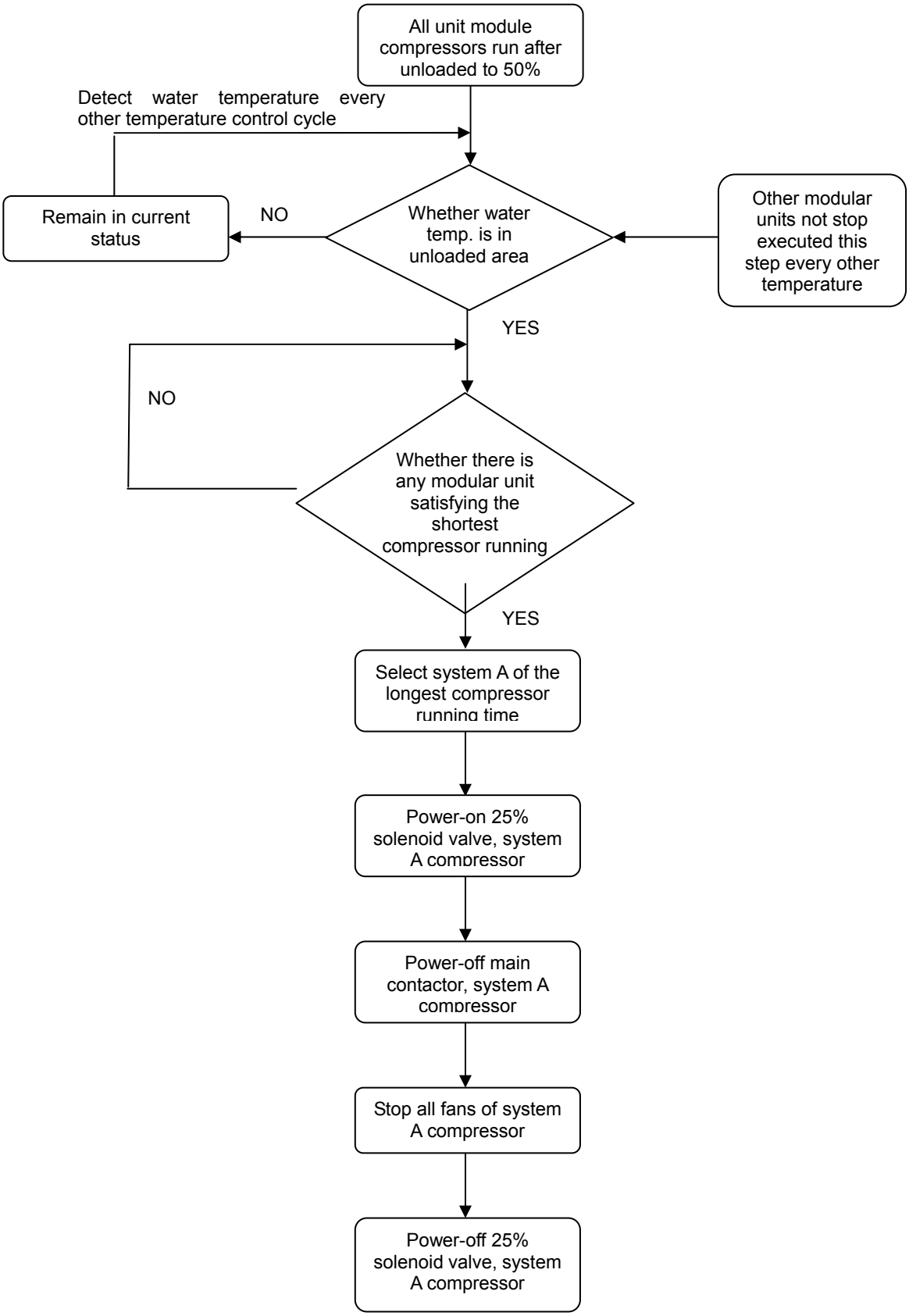
1) Normal Stop



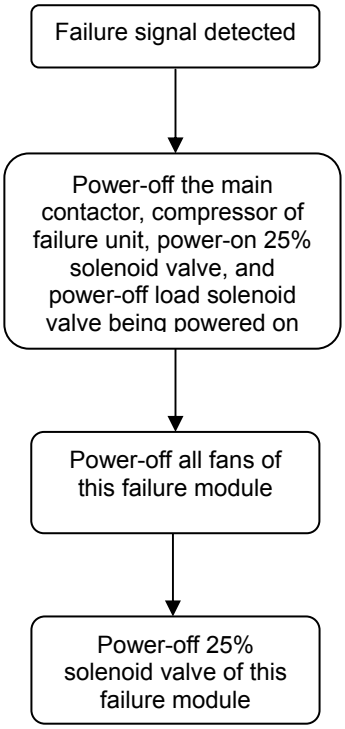

Select system A of the longest compressor running time
(Load judgment) Current compressor running at 100%
Current compressor running at 75%
Current compressor running at 50%
One temperature control cycle
One temperature control cycle
Power-on 50% solenoid valve, system A compressor
Power-on 25% solenoid valve, system A compressor
Power-off main contactor, system A compressor
Shut-down all fans of system A compressor
Step F: Power-on 25% solenoid valve, system A compressor
Shut-down all modular units
Switch off water pump, shut-down ended

When all modules are in the energy adjustment idle status, 3 minutes will be delayed to switch off water pump after Stop signal is received.

2) Energy adjustment Stop



3) Downtime



Water pump will stop running after Stop of the last failure module for 3 minutes when any non-resettable failure not resulting from flow switch occur in all modular units.

Description:

1. Double-Compressor Stop Mode:

   When the units meet the Stop condition after point Stop of units,

   When both compressors are running with regard to the double-head mode, the unit of longer running time will be stopped prior to the other, and the other stopped in 30S provided both units meet the Stop condition.

   The compressors will be unloaded and stopped in accordance with the step by step unloading mode. For example, with regard to the compressor running at 75%, when the condition for compressor Stop is satisfied after point Stop, the units will firstly be unloaded to 50% then unloaded to 25% to run for a period of time followed by Stop of compressors.

   25% solenoid valve will continue to be powered on for a period of time to facilitate resetting of the solenoid valve when both compressors are switched off.

   The whole process of Stop will be completed upon running of water pump for 3 to 5 minutes after the compressors are switched off.

2. Multi-Connected Stop Mode：

   The units will meet the Stop conditions after point Stop,

   The unit of longer running time will be stopped prior to others with regard to multi-connected

units sequenced in accordance with running time, and the unit of greater station number will be stopped prior to others when the units are of the same running time.

The compressors will be unloaded and stopped in accordance with the step by step unloading mode. For example, with regard to the compressor running at 75%, when the condition for compressor Stop is satisfied after point Stop, the units will firstly be unloaded to 50% then unloaded to 25% to run for a period of time followed by Stop of compressors.

25% solenoid valve will continue to be powered on for a period of time to facilitate resetting of the solenoid valve when both compressors are switched off.

The entire Stop process will be completed upon running of water pump for 3 to 5 minutes after the compressors are switched off.

Remarks:

① The units Stop command must be executed whenever there is a Stop signal in any case (except the defrosting process, the user must be prompted whenever there is a Stop signal in the process of unit defrosting, Stop will not be allowed until the defrosting process is completed followed by the Stop sequence of the last module) after the compressors meet the requirement of limitation of the shortest running time. Any controller which has not been output, independent of the Stop process, shall not be output once again.

② The Stop signal exists when some modules among interconnected modules do not meet the Stop condition. Unit modules which meet the Stop condition will be stopped as per the normal Stop procedure, and those which fail to meet the Stop condition will not be stopped in sequence after entering the normal Stop procedure until they meet the Stop condition. 3 minutes will be delayed to switch off water pump after Stop of compressors of all unit interconnected modules.

③ The Stop signal exists when all modules among interconnected modules fail to meet the Stop condition, with output displayed in the table of unit running status as required, and Stop will not be allowed until the Stop condition is satisfied.

④ The compressors will not be stopped with the variation of water temperature within the shortest running time once the modular unit is started, except for failure protection.

⑤ The compressors will not be started up with any Start command at the shortest Stop interval or between two Starts once the modular unit is stopped, and they will not be started up for operation until the shortest Stop interval and the interval between two Starts of compressors.

2. Energy Adjustment Logic

Energy adjustment may be controlled by either entering water temperature or leaving water temperature in case of operation of single-module unit, and it can only be controlled by entering water temperature in case of multi-module interconnection.

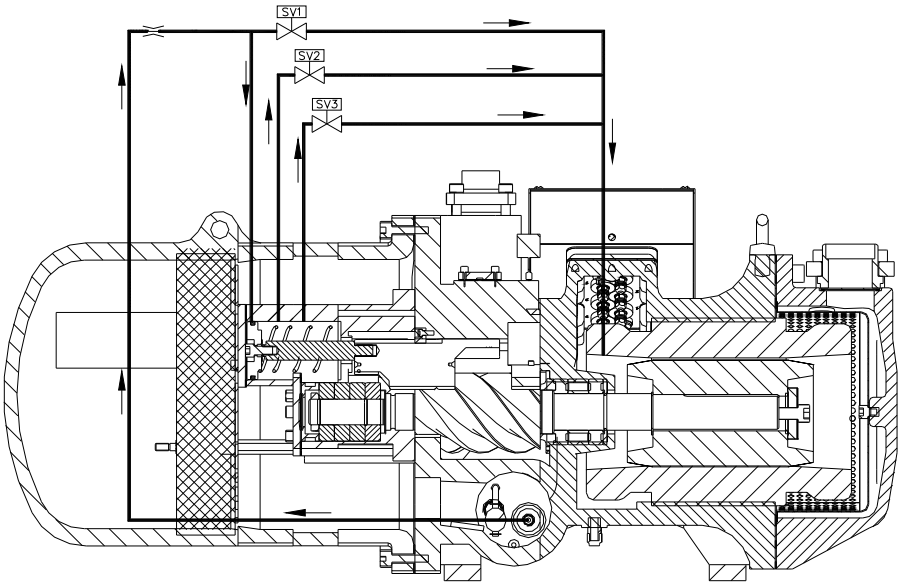
Compressor Capacity Adjustment

The capacity output of the unit is determined by the valid length of slide valve which is controlled by 3 solenoid valves. The control system cycles compressors, loaders, and minimum load control

valves to maintain the user configured leaving (or entering) chilled water temperature set point. Temperature sensors transfer temperature signals to PLC which will calculate the optimum time to add or subtract capacity stages. Special algorithm programmed in PLC will try to maintain the Control Point at the desired set point.

- 4-stage control (50%~100%)

The 4-step capacity control system is made of one slider, three NC solenoid valves and one piston with adjustable range of 25%, 50%, 75% and 100%. The principle of capacity control is by moving the slider to allow partial refrigerant to bypass back to the intake and regulate the refrigerant flow.



Solenoid valve activating table of four-stage capacity control

SV Status	SV1 (NC)	SV2 (NC)	SV3 (NC)
100%	OFF	OFF	OFF
75%	OFF	OFF	ON
50%	OFF	ON	OFF
25%(startup)	ON	OFF	OFF

ON: energize, OFF: de-energize

Startup: 25% loading

For easier startup of compressor, the loading must be minimized. Therefore, SV1 is energized to bypass oil to the low-pressure side directly. The slider does not move and keep the maximum opening in suction end to bypass the refrigerant. After the completion of startup the compressor then can increase loading gradually by de-energizing the SV1 solenoid valve. It is recommended to run compressor at 25% loading for about 30 seconds before starting to increase loading.

Partial load: 50% Operation

With the same principle as stated in 25% loading, SV2 is energized and others are de-energized to achieve 50% loading.

Partial load：75% Operation

Receiving a feedback from system demanding for lower capacity, the SV3 is energized to allow oil to flow back to the low-pressure side through the valve channel. The piston returns to the outlet of SV3 oil passage and the slide block moves to let part refrigerant flow back to the low-pressure side through bypass opening. This action would reduce the discharge volume and make the compressor operating at 75% loading

Full load: 100% operation

After the completion of startup, SV1, SV2 and SV3 are de-energized and oil flows straight to cylinder and pushes piston forward, driving the slider to gradually reduce bypass opening. When the opening is closed completely, the compressor is running at 100% loading.

Control of Cooling Energy Adjustment

The total entering water temperature may be set as Ts (Ts settable) with the touch screen, the set total entering water temperature Ts＝12℃ as default (settable range varying from 12 to 15℃), and the total entering water temperature is Tin.

Start Reset Temperature	Tin≥ T△（T△≥ (Ts+1)
Loading Area	Tin≥Ts+1
Fuzzy Loading Area	Ts+0.5＜Tin＜Ts+1
Stable Area	Ts-1≤Tin≤Ts+0.5
Unloading Area	Ts-2＜Tin≤Ts-1
Stop Area	Tin≤Ts-2

The temperature control cycle for temperature judgment in the table is 60S (settable).

In the case of judgment of the temperature rise trend (compared with that of the previous temperature control cycle) of a temperature control cycle for the fuzzy loading area, if temperature rises, loading will be executed, otherwise no action is executed. When all units of interconnected modules having been put into operation are loaded to 100%, entering water temperature still remains in the fuzzy loading area without starting the module to be started, and the module to be started will not be put into operation until entering water temperature is positioned in the loading area.

Compressors and fans of modules will be stopped one by one in the energy adjustment Stop procedure after entering water temperature enters the Stop area and compressors of unit modules meet the requirement of the shortest running time. Then the units enter the energy adjustment idle status.

Loading will be executed when entering water temperature is positioned in the loading area or the fuzzy loading area, entering water temperature in a lower energy level will be firstly loaded, and for entering water temperatures in the same energy level, those of shorter running time will be firstly loaded. (Running times are compared in hours, the same hereinafter). When running times are identical, those of smaller address number will be firstly loaded.

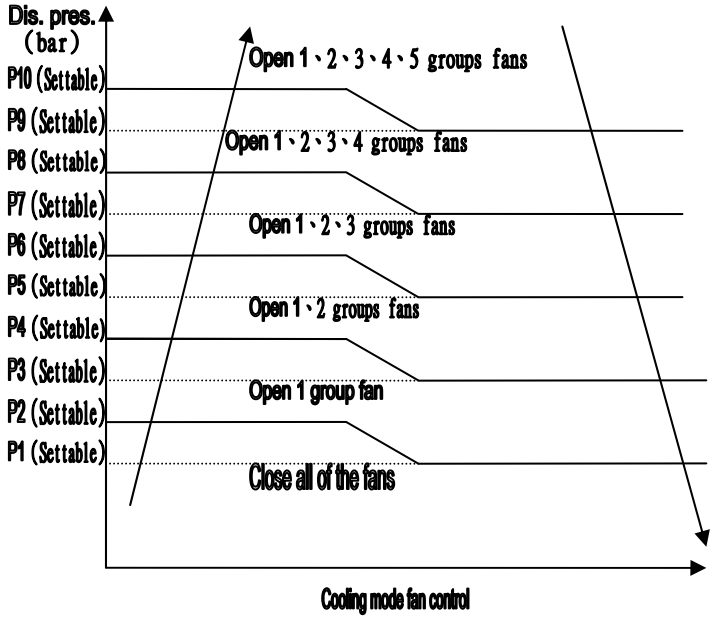
Unloading will be executed when entering water temperature is positioned in the unloading area, those in a higher energy level will be firstly unloaded, and those of longer running time will be firstly loaded when energy levels are identical.

The module will remain in the status after unloaded to 50% load, and the other module of longer running time will be unloaded if unloading is still required. All modules running in an interconnected mode will be unloaded to 50% load, and modules of longer running time will be firstly stopped if entering water temperature needs to be unloaded.

Compressors and fans will not be started once again to run when entering water temperature meet the reset Start condition while meeting the shortest Stop time of compressors.

3. Fan Control Logic

The number of operating fan as required is according to the discharge pressure. For example, for LSBLGW500/C, there are 8 fans, divided into 5 groups. Opening condition as follow:



4. Oil heater control Logic

In unit shutdown period, oil heater is energized to keep normal oil temperature. When unit starts, it is turned off.

Oil heating time limits:

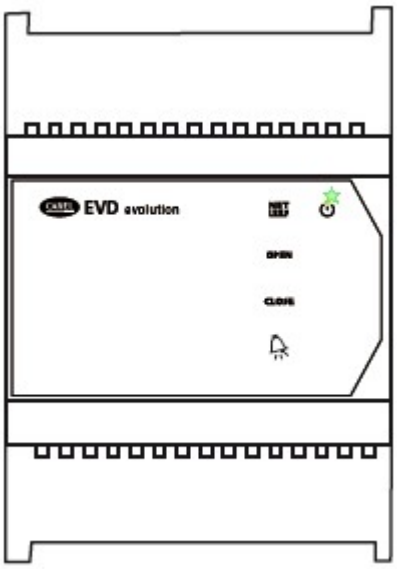
- When cooling water inlet temperature >= 35°C (real time value), oil heating time for first startup is 0.5h. If power down happens during operation and downtime is less than 8hrs, no heating time delay is needed when unit restarts. If it exceeds 8hrs, 0.5h heating time is need.
- When cooling water inlet temperature >= 30°C (real time value), oil heating time for first startup is 1h. If power down happens during operation and downtime is less than 5hrs, no heating time delay is needed when unit restarts. If it exceeds 5hrs, 1h heating time is need.
- When cooling water inlet temperature >= 25°C (real time value), oil heating time for first startup is 2hrs. If power down happens during operation and downtime is less than 3hrs, no heating time delay is needed when unit restarts. If it exceeds 3hrs, 0.5h heating time is need. If it exceeds 5hrs, 2hrs heating time is need.
- When cooling water inlet temperature >= 20°C (real time value), oil heating time for first startup

is 4hrs. If power down happens during operation and downtime is less than 1h, no heating time delay is needed when unit restarts. If it exceeds 1h, 2hrs heating time is need. If it exceeds 5hrs, 3hrs heating time is need. If it exceeds 8hrs, 4hrs heating time is need.

- When cooling water inlet temperature < 20°C (real time value), oil heating time for first startup is 8hrs. If power down happens during operation and downtime is less than 1h, no heating time delay is needed when unit restarts. If it exceeds 1h, 3hrs heating time is need. If it exceeds 5hrs, 5hrs heating time is need. If it exceeds 8hrs, 8hrs heating time is need.

5. EXV operation& wiring

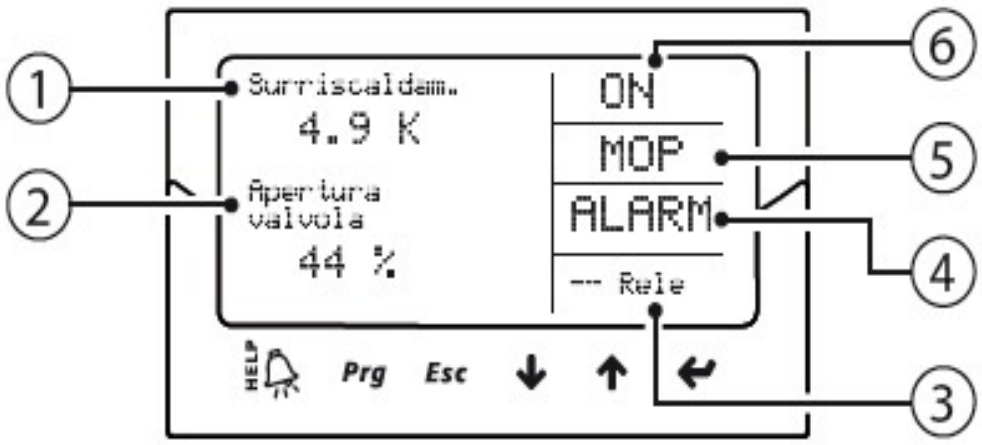
User interface consists of five components of the LED display operating status, the table below:



LED	Light	Extinguish	Flicker
NET	Can be connected to the network	Not connected	Communication failure
OPEN	Open the valve	-	Disable the drive
CLOSE	Close the valve	-	Disable the drive
	Activate the alarm	-	-
	Drive power	The drive is not connected to power supply	-

- **Display and keypad**

Graphical display with two kinds of system variables, the drive control of the state, protection function is activated, and the alarm and relay output status



Note:

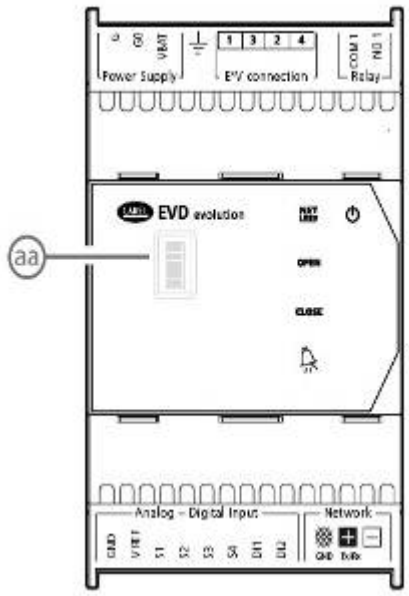
	Control state		Type of protection running
ON	Run	LowSH	Low superheat protection
OFF	Standby	LOP	Low evaporation temperature protection
POS	Locate	MOP	High evaporation temperature protection
WAIT	Wait	HiTcond	High condensing temperature protection
CLOSE	Close		

1	Display first kinds of variables
2	Display second kinds of variables
3	Relay output status
4	Alarm
5	Start of the protection
6	Control state

Keypad:

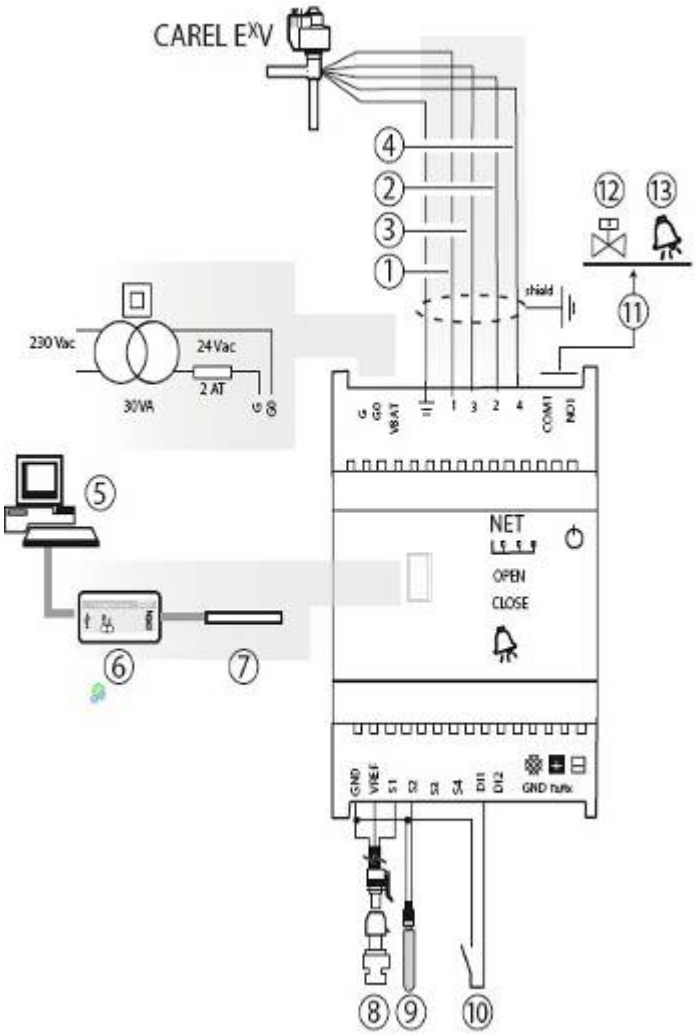
Button	Function
Prg	Open the display screen, enter the password to enter the programming mode
HELP	• In the alarm state, the display alerts the queue; • When the "producer" level under the rolling parameters, the display shows the interface
Esc	• To exit the programming (maintenance / producer) and display mode; • set a parameter, the exit without saving changes
↓ / ↑ UP/DOWN	• Display screen navigation; • Increase / decrease the value
↵ Enter	• from the parameter setting mode, the display switches to • Confirm the list of parameters and return the value

- **General wiring diagram**



Terminal	E**xplanation**
G\G0	Power supply
VABT	Emergency Power Supply
⏚	Functional ground
1,2,3,4	Stepper motor power supply
COM1,NO1	Alarm Relay
GND	Signal Ground
VREF	Sensor power supply
S1	Sensor 1 (pressure) or an external signal 4 to 20mA
S2	Sensor 2 (temperature) or 0 to 10V external signal
S3	Sensor 3 (pressure)
S4	Sensor 4 (temperature)

Terminal	**Explanation**	**Terminal**	**Explanation**
DI1	Digital input 1	⊞	Connection tLAN, pLAN, RS485, Modbus ® terminal
DI2	Digital input 2	⊟	Connection pLAN, RS485, Modbus ® terminal
▩	Connection tLAN, pLAN, RS485, Modbus ® terminal	aa	Service port, after removal of the cover need to be connected LED



1	Green
2	yellow
3	Brown
4	white
5	sets of personal computers
6	USB / tLAN converter
7	Adapter
8	ratio of pressure sensor - evaporation pressure
9	NTC suction temperature
10	start-controlled digital input 1
11	free contacts (up to 230Vac)
12	solenoid valve
13	warning signs

Appendix 1: R134a saturation temperature - pressure corresponding tables

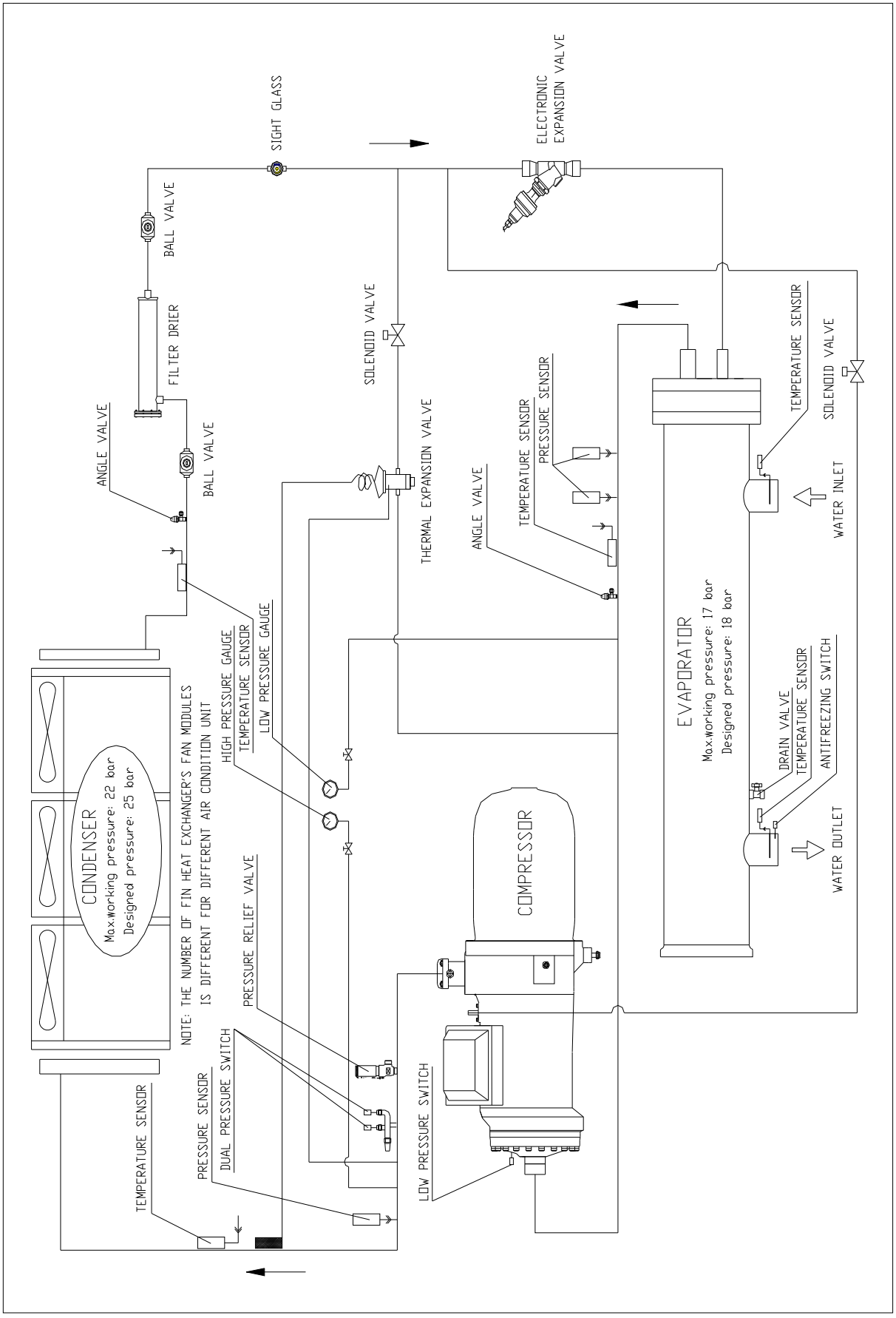
R134a saturation temperature - pressure corresponding tables							
˚C	KPa	˚C	KPa	˚C	KPa	˚C	KPa
−15	164	7	375	29	748	51	1351
−14	171	8	388	30	770	52	1385
−13	178	9	401	31	793	53	1420
−12	185	10	415	32	815	54	1455
−11	193	11	429	33	839	55	1492
−10	201	12	443	34	863	56	1528
−9	209	13	458	35	887	57	1566
−8	217	14	473	36	912	58	1604
−7	225	15	488	37	937	59	1642
−6	234	16	504	38	963	60	1682
−5	243	17	521	39	990	61	1722
−4	253	18	537	40	1017	62	1763
−3	262	19	554	41	1044	63	1804
−2	272	20	572	42	1072	64	1847
−1	282	21	590	43	1101	65	1890
0	293	22	608	44	1130	66	1934
1	304	23	627	45	1160	67	1978
2	315	24	646	46	1190	68	2024
3	326	25	665	47	1221	69	2070
4	338	26	685	48	1253	70	2117
5	350	27	706	49	1285	71	2165
6	362	28	727	50	1318	72	2213

Note: this table of pressure values for absolute pressure value, the pressure value (unit touch screen display value) for the vast pressure value and the local atmospheric pressure difference.

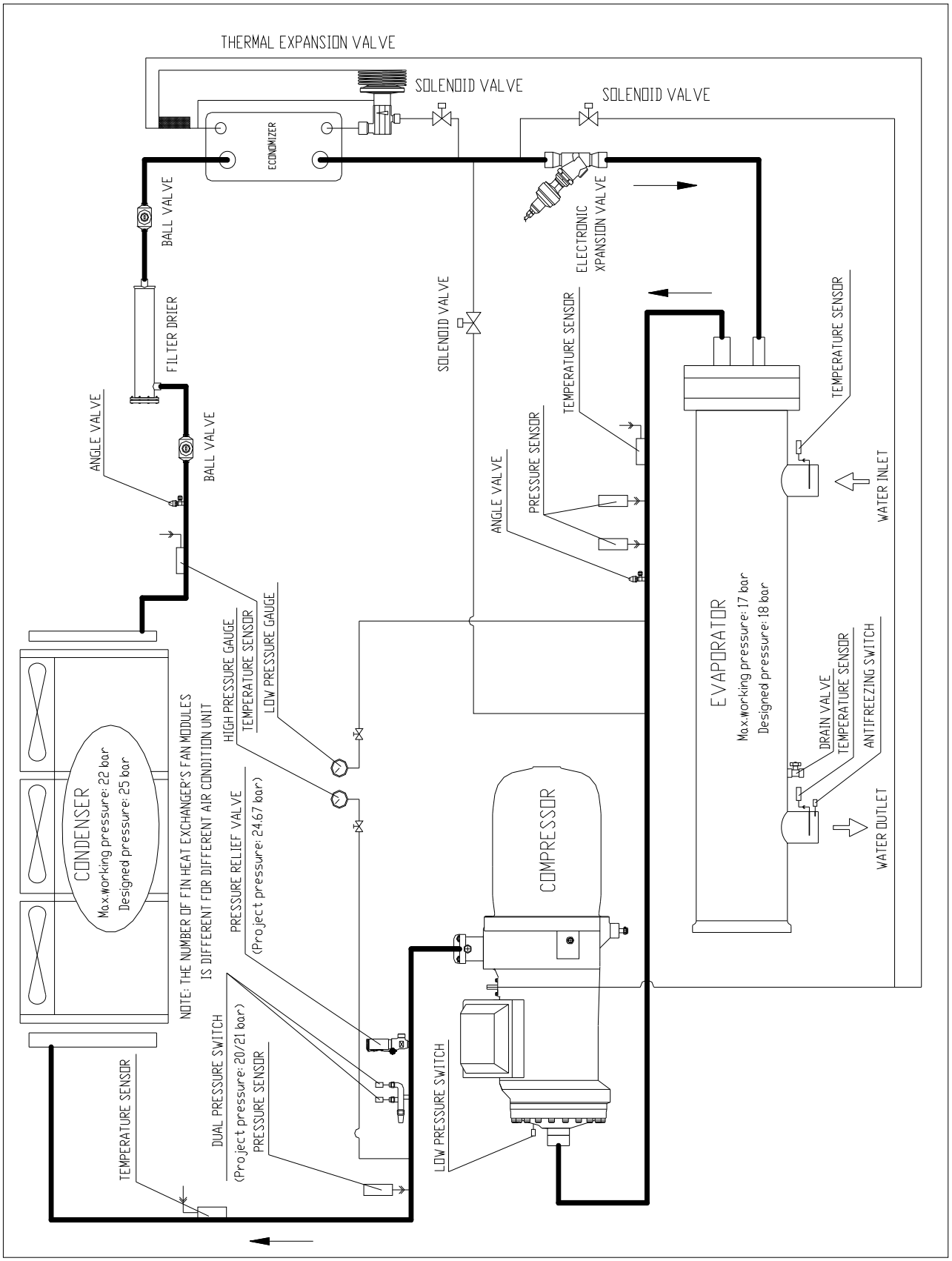
Appendix 2: the flow chart of the system

Appendix 2: system working principle map:

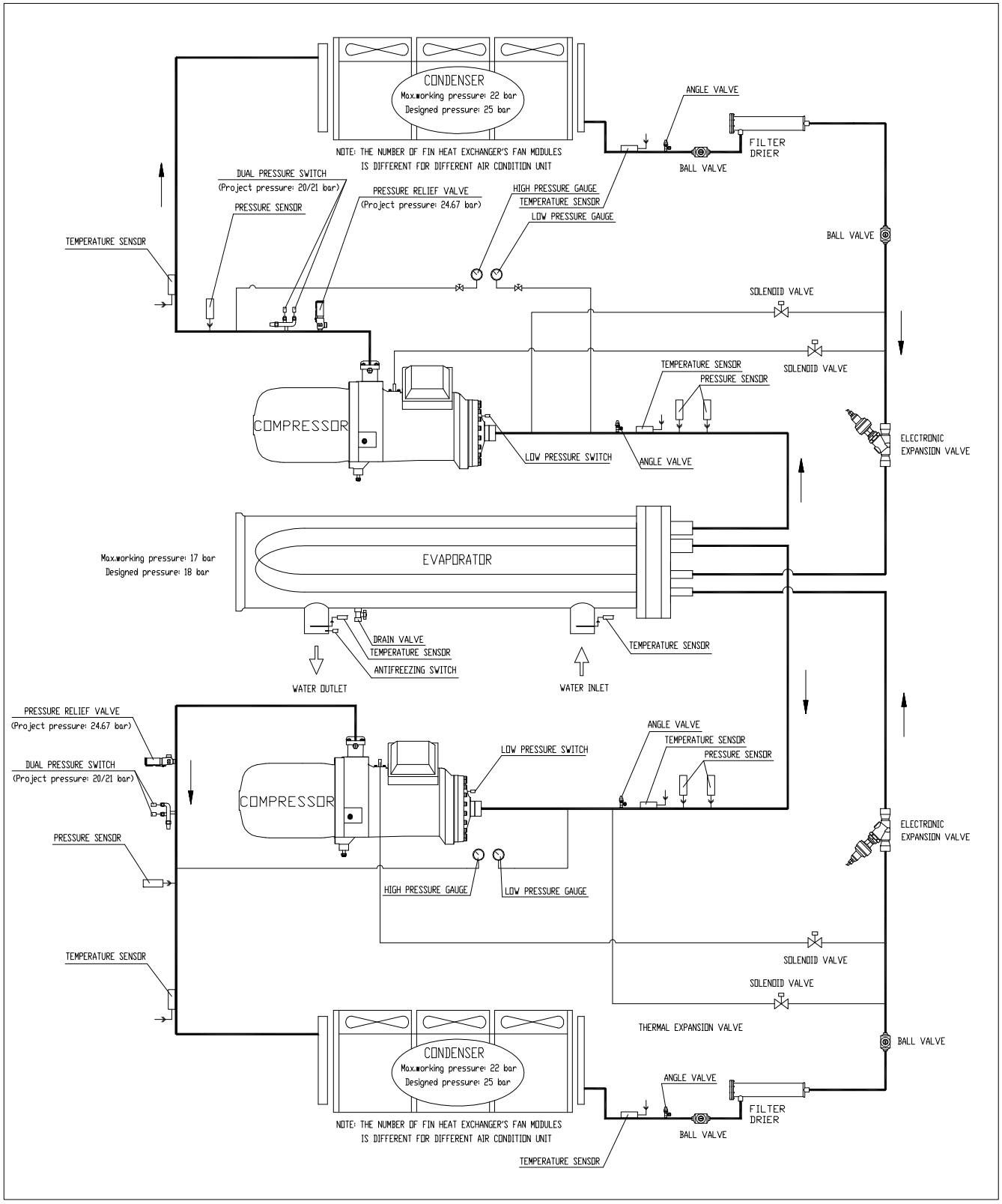
LSBLGW380/C，LSBLGW500/C



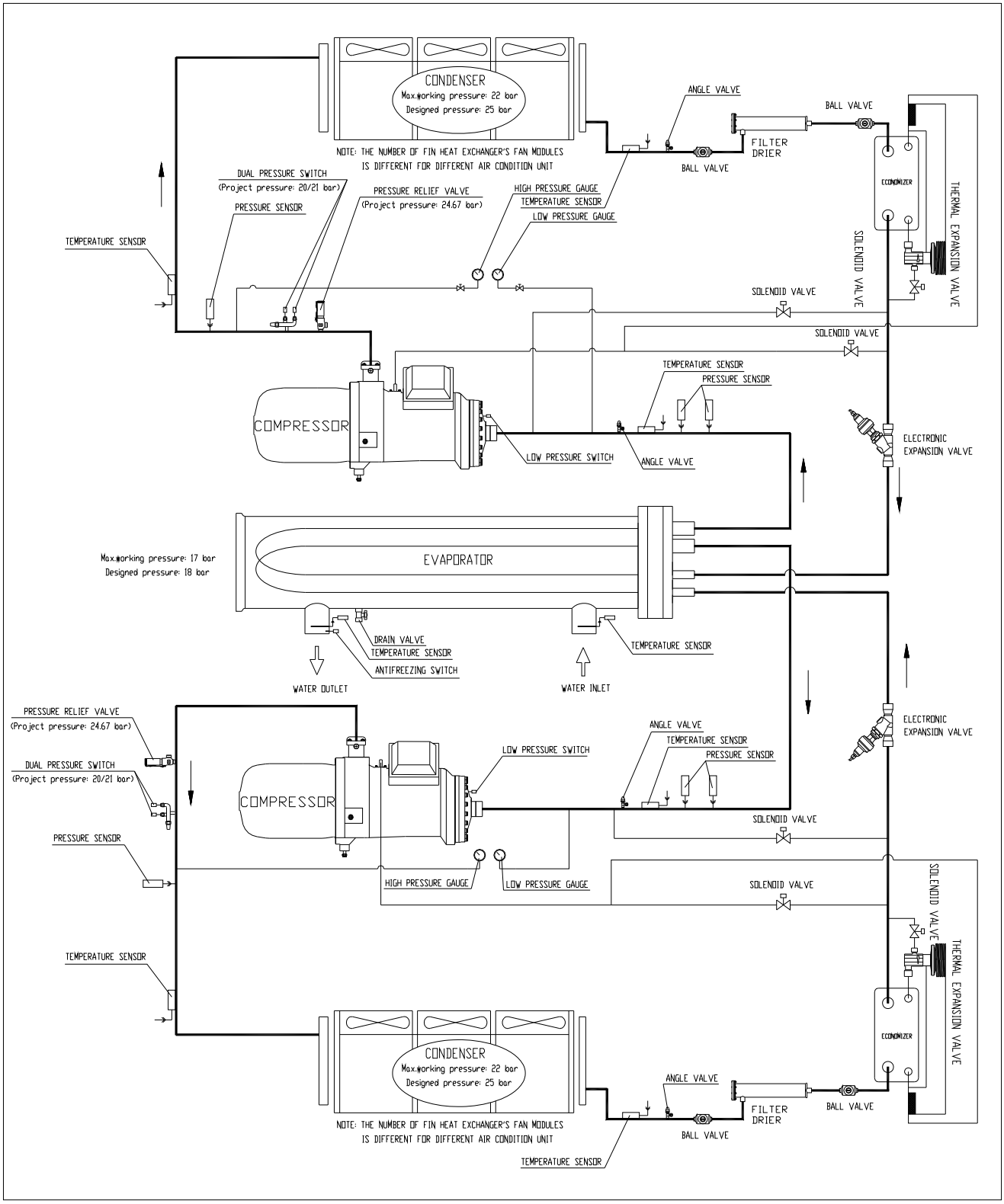
LSBLGW600/C，LSBLGW720/C



LSBLGW880/C，LSBLGW1000/C



LSBLGW1200/C，LSBLGW1420/C



Appendix 3: capacity table

Model	Outlet Temp.	Ambient temperature													
		15		20		25		30		35		40		43	
		Cooling Capacity /kw	Power Input /kw	Cooling Capacity /kw	Power Input /kw	Cooling Capacity /kw	Power Input /kw	Cooling Capacity /kw	Power Input /kw	Cooling Capacity /kw	Power Input /kw	Cooling Capacity /kw	Power Input /kw	Cooling Capacity /kw	Power Input /kw
380	5	418.0	93.0	397.3	101.4	380.6	108.1	362.3	115.7	349.8	120.8	324.3	130.8	310.1	137.1
	6	436.0	94.5	414.3	103.0	396.6	109.7	376.9	117.3	362.5	122.4	337.5	132.6	322.0	138.8
	7	453.9	96.0	431.3	104.5	412.6	111.3	392.0	119.0	376.0	124.0	350.6	134.3	334.5	140.6
	8	471.9	97.5	448.3	106.1	428.6	112.9	407.0	120.6	390.7	125.8	363.8	136.1	347.1	142.4
	9	489.8	99.0	465.3	107.6	444.7	114.5	422.1	122.3	404.8	127.5	376.9	137.8	359.7	144.2
	10	507.8	100.4	482.3	109.2	460.7	116.1	437.2	123.9	417.2	129.0	390.1	139.6	370.7	145.7
	11	525.8	101.9	499.3	110.7	476.7	117.7	452.2	125.6	433.1	131.0	403.2	141.4	384.9	147.7
	12	543.7	103.4	516.3	112.2	492.8	119.3	467.3	127.2	447.2	132.7	416.3	143.1	397.5	149.5
	13	561.7	104.9	533.3	113.8	508.8	120.9	482.3	128.9	461.3	134.4	429.5	144.9	410.0	151.3
	14	579.6	106.4	550.3	115.3	524.8	122.5	497.4	130.6	475.4	136.1	442.6	146.7	422.6	153.1
	15	597.6	107.9	567.3	116.9	540.8	124.1	512.5	132.2	490.5	138.0	455.8	148.4	436.0	155.0
500	5	527.4	120.7	504.5	131.3	489.1	139.4	470.0	148.9	461.8	154.7	431.7	167.6	413.1	175.3
	6	552.2	122.1	527.8	132.8	510.5	141.2	489.6	150.7	478.4	156.8	447.9	169.8	428.7	177.8
	7	576.9	123.4	551.1	134.3	532.3	143.0	509.9	152.7	496.0	159.0	465.3	172.3	445.4	180.3
	8	601.6	124.7	574.5	135.8	554.0	144.7	530.3	154.7	515.6	161.5	482.7	174.7	462.2	182.8
	9	626.3	126.0	597.8	137.3	575.8	146.5	550.6	156.7	534.3	163.8	500.1	177.2	478.9	185.3
	10	651.0	127.3	621.2	138.8	597.6	148.3	570.9	158.7	550.5	165.8	517.5	179.6	493.2	187.5
	11	675.7	128.7	644.5	140.3	619.4	150.0	591.2	160.7	571.5	168.5	535.0	182.1	512.4	190.4
	12	700.4	130.0	667.8	141.8	641.2	151.8	611.6	162.7	590.2	170.8	552.4	184.5	529.2	192.9
	13	725.0	131.3	691.2	143.3	663.0	153.6	631.9	164.7	608.8	173.2	569.8	187.0	545.9	195.4
	14	749.7	132.6	714.5	144.8	684.7	155.3	652.2	166.7	627.4	175.5	587.2	189.4	562.6	197.9
	15	774.3	133.9	737.9	146.4	706.9	157.1	673.3	168.8	647.5	178.0	605.9	192.1	580.6	200.6

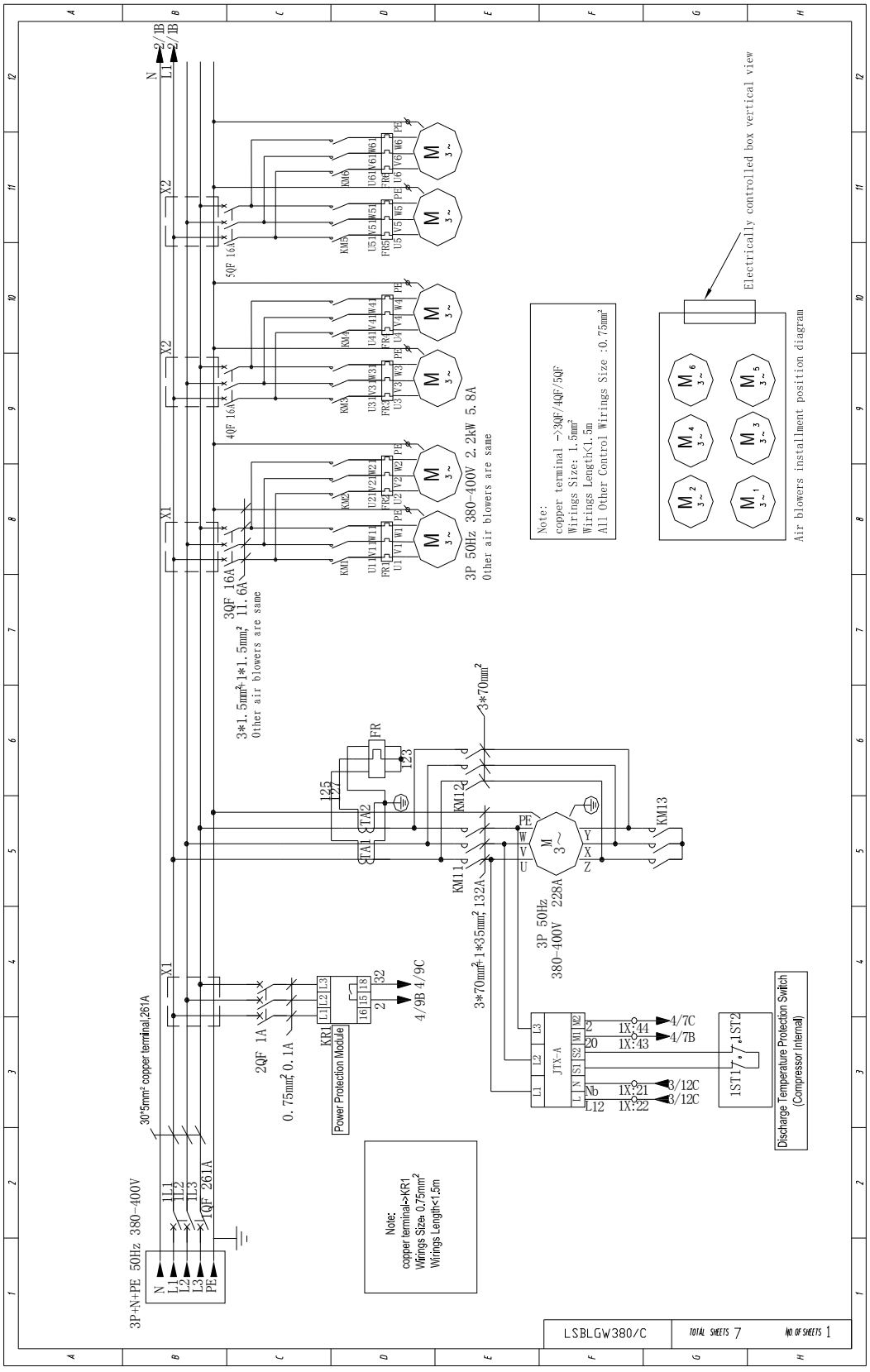
Model	Outlet Temp.	Ambient temperature													
		15		20		25		30		35		40		43	
		Cooling Capacity /kw	Power Input /kw	Cooling Capacity /kw	Power Input /kw	Cooling Capacity /kw	Power Input /kw	Cooling Capacity /kw	Power Input /kw	Cooling Capacity /kw	Power Input /kw	Cooling Capacity /kw	Power Input /kw	Cooling Capacity /kw	Power Input /kw
600	5	634.0	133.6	609.2	147.7	591.0	159.7	569.4	172.7	557.4	182.6	526.4	198.7	507.2	208.6
	6	653.3	135.9	627.9	150.1	609.5	162.0	587.5	175.1	575.2	184.8	543.7	201.2	524.0	211.1
	7	674.0	138.5	647.9	152.8	629.3	164.6	606.9	177.6	594.0	187.0	562.2	203.7	541.8	213.8
	8	694.6	141.2	667.9	155.5	649.1	167.2	626.3	180.2	614.5	189.5	580.7	206.3	559.7	216.5
	9	715.3	143.8	687.9	158.2	668.9	169.8	645.7	182.8	634.1	191.9	599.3	208.8	577.5	219.2
	10	735.9	146.4	705.4	160.2	688.7	172.4	665.1	185.4	651.3	194.0	617.8	211.4	593.2	221.6
	11	756.6	149.1	727.9	163.5	708.5	175.0	684.4	188.0	673.4	196.6	636.3	213.9	613.2	224.5
	12	777.2	151.7	747.9	166.2	728.3	177.6	703.8	190.6	693.1	199.0	654.9	216.5	631.1	227.2
	13	797.9	154.3	767.9	168.9	748.1	180.2	723.2	193.1	712.8	201.3	673.4	219.0	648.9	229.9
	14	818.5	157.0	787.9	171.6	767.9	182.8	742.6	195.7	732.4	203.7	691.9	221.6	666.8	232.6
	15	840.6	159.9	809.2	174.6	789.0	185.4	763.2	198.5	753.5	206.2	711.7	224.3	685.7	235.4
720	5	767.1	177.6	744.1	189.9	717.3	204.2	690.5	218.7	676.9	227.9	636.8	247.1	611.2	259.2
	6	790.8	180.9	767.3	193.6	739.5	207.8	711.8	222.1	697.9	230.8	657.0	250.3	630.8	262.6
	7	815.4	184.8	791.4	197.4	763.2	211.5	735.1	225.6	720.0	234.0	678.5	253.9	650.9	266.3
	8	840.0	188.6	815.5	201.1	787.0	215.1	758.4	229.1	744.1	237.6	699.9	257.5	671.1	269.9
	9	864.6	192.4	839.6	204.9	810.7	218.7	781.8	232.6	767.3	241.0	721.3	261.2	691.2	273.5
	10	887.3	195.2	863.7	208.6	834.4	222.3	805.1	236.1	787.8	243.7	742.8	264.8	709.9	276.7
	11	913.7	200.1	887.8	212.4	858.1	226.0	828.5	239.6	813.5	247.8	764.2	268.4	731.4	280.8
	12	938.3	203.9	911.9	216.1	881.8	229.6	851.8	243.1	836.6	251.3	785.7	272.1	751.5	284.5
	13	962.9	207.7	936.0	219.9	905.6	233.2	875.1	246.6	859.7	254.7	807.1	275.7	772.5	288.4
	14	987.5	211.6	960.1	223.6	929.3	236.8	898.5	250.1	882.8	258.1	828.5	279.4	751.7	268.9
	15	1013.0	215.9	985.2	227.3	954.5	240.5	923.8	253.7	907.4	261.9	851.2	283.4	773.6	272.9

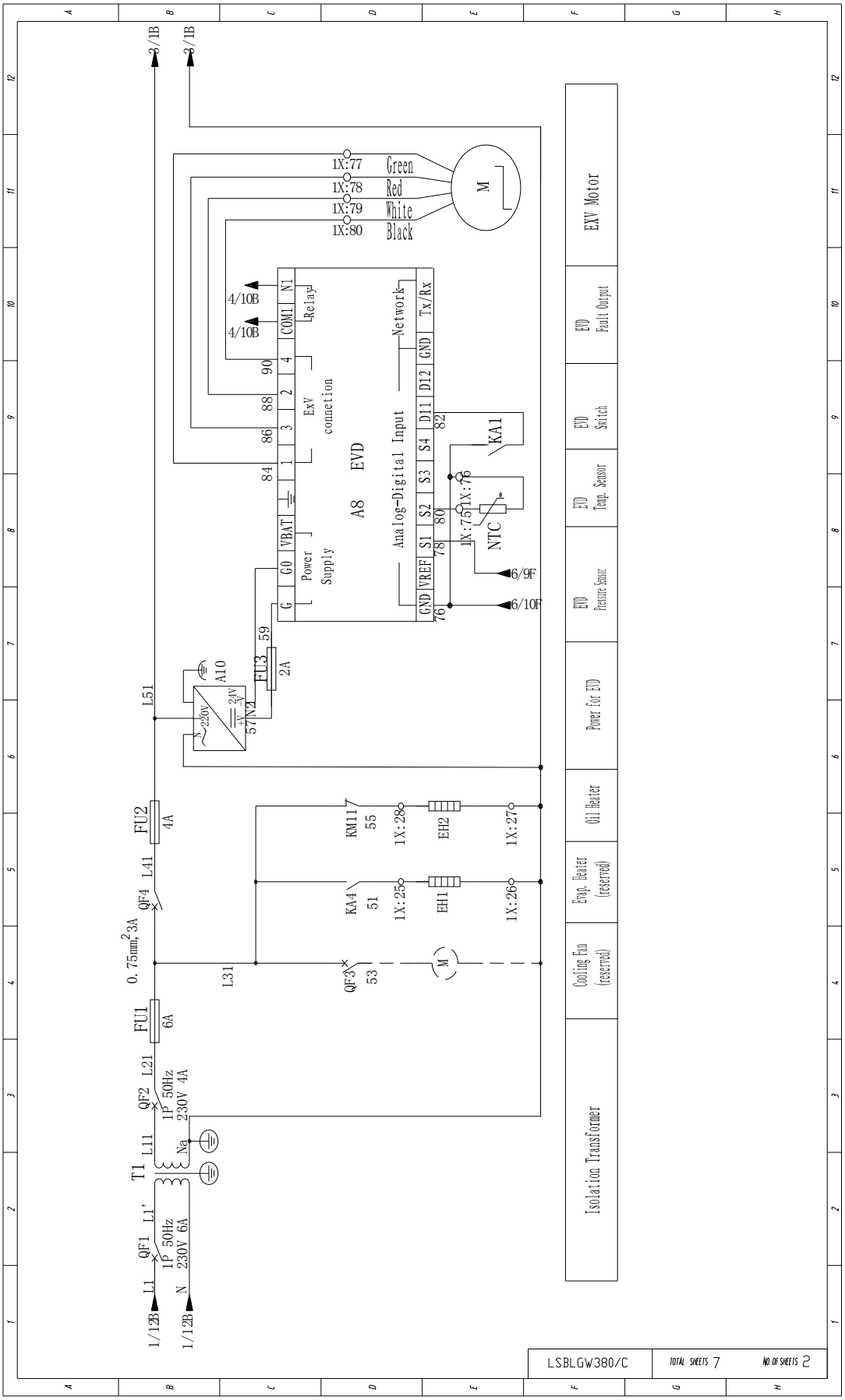
Model	Outlet Temp.	Ambient temperature													
		15		20		25		30		35		40		43	
		Cooling Capacity /kw	Power Input /kw	Cooling Capacity /kw	Power Input /kw	Cooling Capacity /kw	Power Input /kw	Cooling Capacity /kw	Power Input /kw	Cooling Capacity /kw	Power Input /kw	Cooling Capacity /kw	Power Input /kw	Cooling Capacity /kw	Power Input /kw
880	5	953.4	216.6	910.2	235.5	878.1	249.9	840.4	267.1	818.7	277.7	765.1	300.7	732.2	314.9
	6	995.4	218.4	949.8	236.9	914.9	252.9	874.6	270.2	848.6	281.2	794.1	304.7	758.6	318.8
	7	1037.3	220.8	989.4	239.5	951.9	256.0	909.2	273.6	880.0	285.0	823.8	308.8	787.0	323.0
	8	1079.1	223.2	1028.9	242.2	988.8	259.1	943.7	277.0	912.1	289.1	853.4	313.0	815.4	327.2
	9	1121.0	225.5	1068.4	244.8	1025.8	262.2	978.2	280.5	943.9	293.1	883.0	317.1	843.7	331.4
	10	1162.9	227.9	1107.9	247.5	1062.8	265.2	1012.7	283.9	975.7	297.1	912.7	321.2	872.1	335.6
	11	1204.7	230.3	1147.5	250.2	1099.7	268.3	1047.3	287.3	1007.4	301.0	942.3	325.3	900.5	339.8
	12	1246.6	232.7	1187.0	252.8	1136.7	271.4	1081.8	290.7	1039.2	305.0	971.9	329.4	928.8	344.0
	13	1288.4	235.0	1226.5	255.5	1173.7	274.4	1116.3	294.1	1071.0	308.9	1001.5	333.6	957.2	348.2
	14	1330.3	237.4	1266.1	258.1	1210.7	277.5	1150.8	297.6	1102.7	312.9	1031.2	337.7	985.6	352.4
	15	1372.0	240.3	1305.5	262.1	1247.8	280.6	1185.7	301.3	1136.3	317.2	1061.4	341.9	1015.9	357.0
1000	5	1047.0	244.0	1002.7	264.9	975.8	280.5	940.2	298.8	929.6	309.6	869.0	335.4	831.3	351.3
	6	1107.1	246.2	1058.0	267.4	1024.5	283.6	983.2	302.4	961.8	313.7	900.6	339.9	861.2	355.8
	7	1156.0	248.3	1104.1	269.9	1067.2	286.8	1022.8	306.1	996.0	318.0	934.0	344.6	893.4	360.7
	8	1204.9	250.3	1150.3	272.4	1110.0	290.0	1062.5	309.8	1033.4	322.8	967.5	349.4	925.5	365.5
	9	1253.8	252.4	1196.4	274.9	1152.7	293.1	1102.1	313.5	1069.2	327.3	1001.0	354.2	957.7	370.4
	10	1302.8	254.5	1260.9	277.5	1195.5	296.3	1141.8	317.2	1105.0	331.9	1034.4	358.9	985.3	374.5
	11	1351.7	256.6	1288.6	280.0	1238.2	299.5	1181.4	320.9	1140.9	336.4	1067.9	363.7	1022.0	380.2
	12	1400.6	258.7	1334.8	282.5	1280.9	302.6	1221.1	324.6	1176.7	341.0	1101.4	368.4	1054.1	385.0
	13	1449.6	260.8	1380.9	285.0	1323.7	305.8	1260.7	328.3	1212.5	345.5	1134.8	373.2	1086.3	389.9
	14	1498.5	262.9	1427.0	287.5	1366.4	308.9	1300.4	331.9	1248.3	350.1	1168.3	378.0	1118.4	394.8
	15	1536.3	264.9	1464.0	290.1	1403.2	312.1	1336.7	335.8	1286.7	355.0	1203.6	383.0	1152.8	400.1

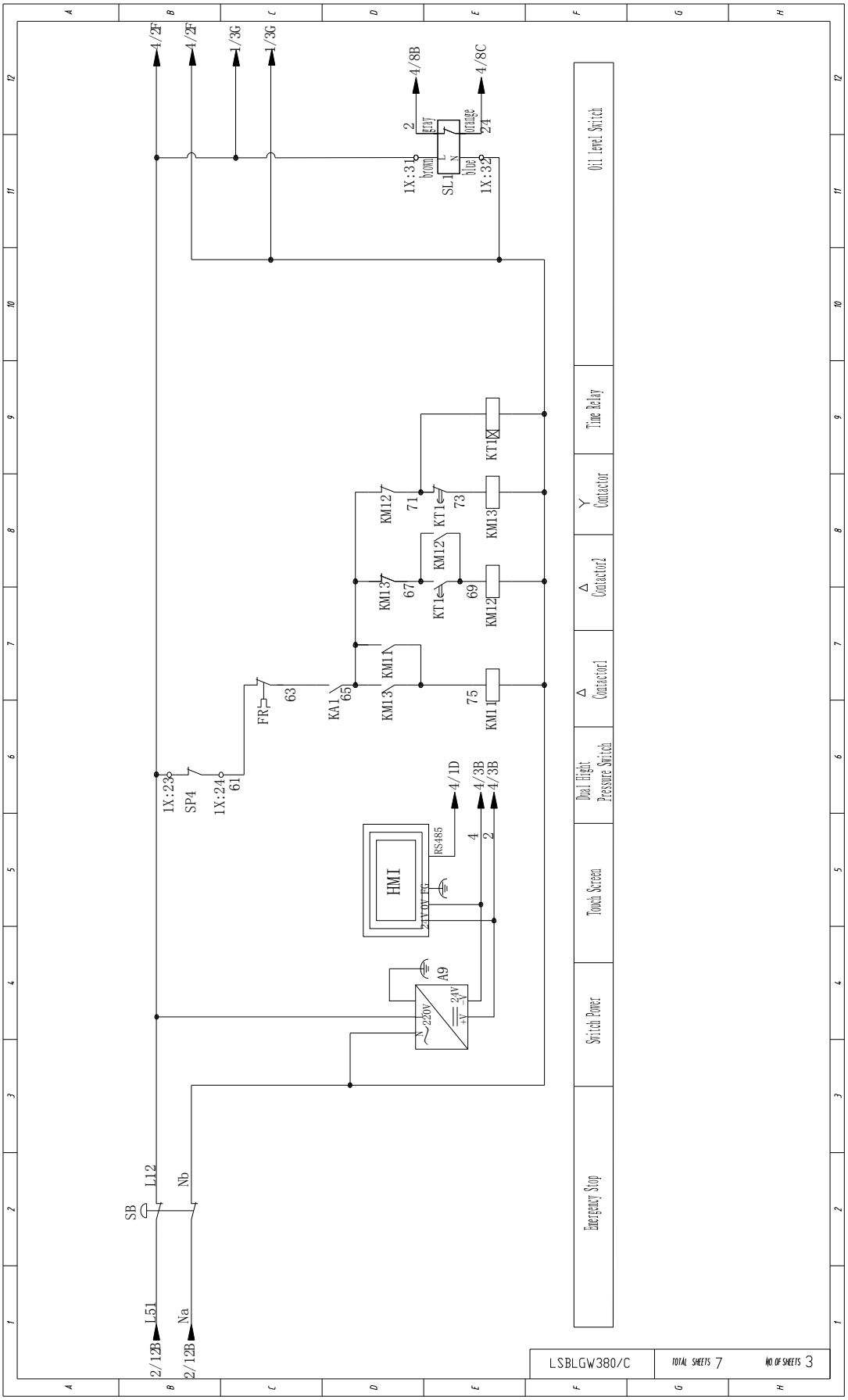
Model	Outlet Temp.	Ambient temperature													
		15		20		25		30		35		40		43	
		Cooling Capacity /kw	Power Input /kw	Cooling Capacity /kw	Power Input /kw	Cooling Capacity /kw	Power Input /kw	Cooling Capacity /kw	Power Input /kw	Cooling Capacity /kw	Power Input /kw	Cooling Capacity /kw	Power Input /kw	Cooling Capacity /kw	Power Input /kw
1200	5	1316.6	271.8	1260.9	299.9	1216.0	323.3	1165.7	350.3	1131.1	370.7	1065.1	402.6	1024.8	422.0
	6	1367.3	274.4	1308.5	303.0	1259.8	327.2	1206.0	354.6	1166.1	375.7	1098.5	408.1	1056.8	427.7
	7	1417.8	276.9	1356.1	306.1	1304.3	331.0	1247.5	359.1	1203.0	381.0	1134.0	413.9	1090.7	433.7
	8	1468.3	279.4	1403.7	309.2	1348.8	334.9	1289.0	363.6	1242.7	386.8	1169.5	419.7	1124.5	439.7
	9	1518.8	282.0	1451.3	312.3	1393.3	338.7	1330.5	368.1	1281.0	392.3	1205.0	425.6	1158.4	445.8
	10	1569.3	284.5	1498.9	315.4	1437.8	342.6	1372.0	372.7	1315.1	397.1	1240.5	431.4	1188.5	451.1
	11	1619.8	287.0	1546.5	318.4	1482.3	346.5	1413.5	377.2	1357.6	403.3	1276.0	437.3	1226.2	457.8
	12	1670.3	289.6	1594.1	321.5	1526.8	350.3	1455.0	381.7	1395.8	408.9	1311.5	443.1	1260.0	463.8
	13	1720.8	292.1	1641.7	324.6	1571.3	354.2	1496.5	386.2	1434.1	414.4	1347.0	449.0	1293.9	469.9
	14	1771.3	294.7	1689.3	327.7	1615.8	358.0	1538.0	390.8	1472.4	419.9	1382.5	454.8	1327.8	475.9
	15	1821.6	297.1	1736.9	330.8	1661.0	361.9	1580.7	395.5	1513.1	425.8	1420.0	461.0	1363.6	482.3
1420	5	1516.8	353.6	1469.6	378.0	1416.0	406.7	1362.3	435.6	1331.3	453.7	1255.0	492.3	1206.7	516.6
	6	1562.6	360.0	1515.5	385.4	1460.4	413.8	1405.3	442.3	1375.8	459.7	1296.5	498.7	1245.4	523.4
	7	1610.9	367.5	1563.1	392.7	1507.4	421.0	1451.6	449.2	1419.0	466.0	1339.2	505.9	1285.2	530.6
	8	1659.2	375.0	1610.7	400.1	1554.3	428.1	1497.9	456.1	1468.8	473.3	1381.8	513.1	1325.0	537.8
	9	1707.6	382.5	1658.3	407.5	1601.3	435.3	1544.2	463.0	1515.3	480.2	1424.4	520.3	1364.7	545.0
	10	1755.9	390.0	1705.9	414.9	1648.2	442.4	1590.5	469.9	1561.8	487.0	1467.1	527.5	1404.5	552.1
	11	1804.2	397.5	1753.5	422.2	1695.2	449.6	1636.7	476.9	1608.3	493.8	1509.7	534.7	1444.2	559.3
	12	1852.6	405.0	1801.1	429.6	1742.1	456.7	1683.0	483.8	1654.8	500.7	1552.3	541.9	1484.0	566.5
	13	1900.9	412.5	1848.7	437.0	1789.1	463.8	1729.3	490.7	1701.3	507.5	1595.0	549.1	1525.4	574.3
	14	1949.2	420.0	1896.3	444.3	1836.0	471.0	1775.6	497.6	1747.8	514.3	1637.6	556.3	1491.7	535.5
	15	2000.1	428.5	1945.7	451.7	1885.5	478.1	1825.3	504.8	1794.5	521.6	1681.4	564.3	1538.1	543.9

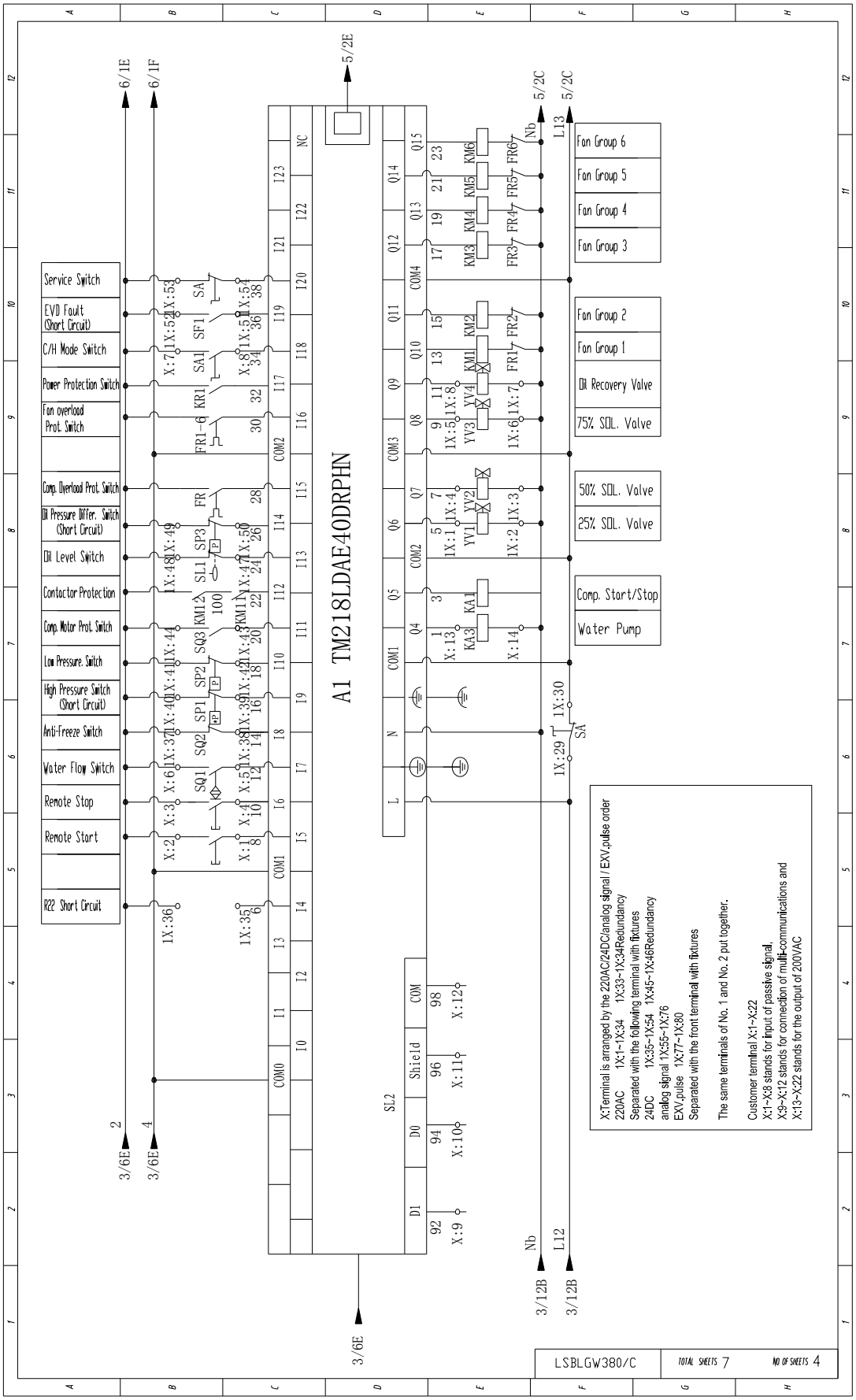
Appendix 4: circuit principle reference map

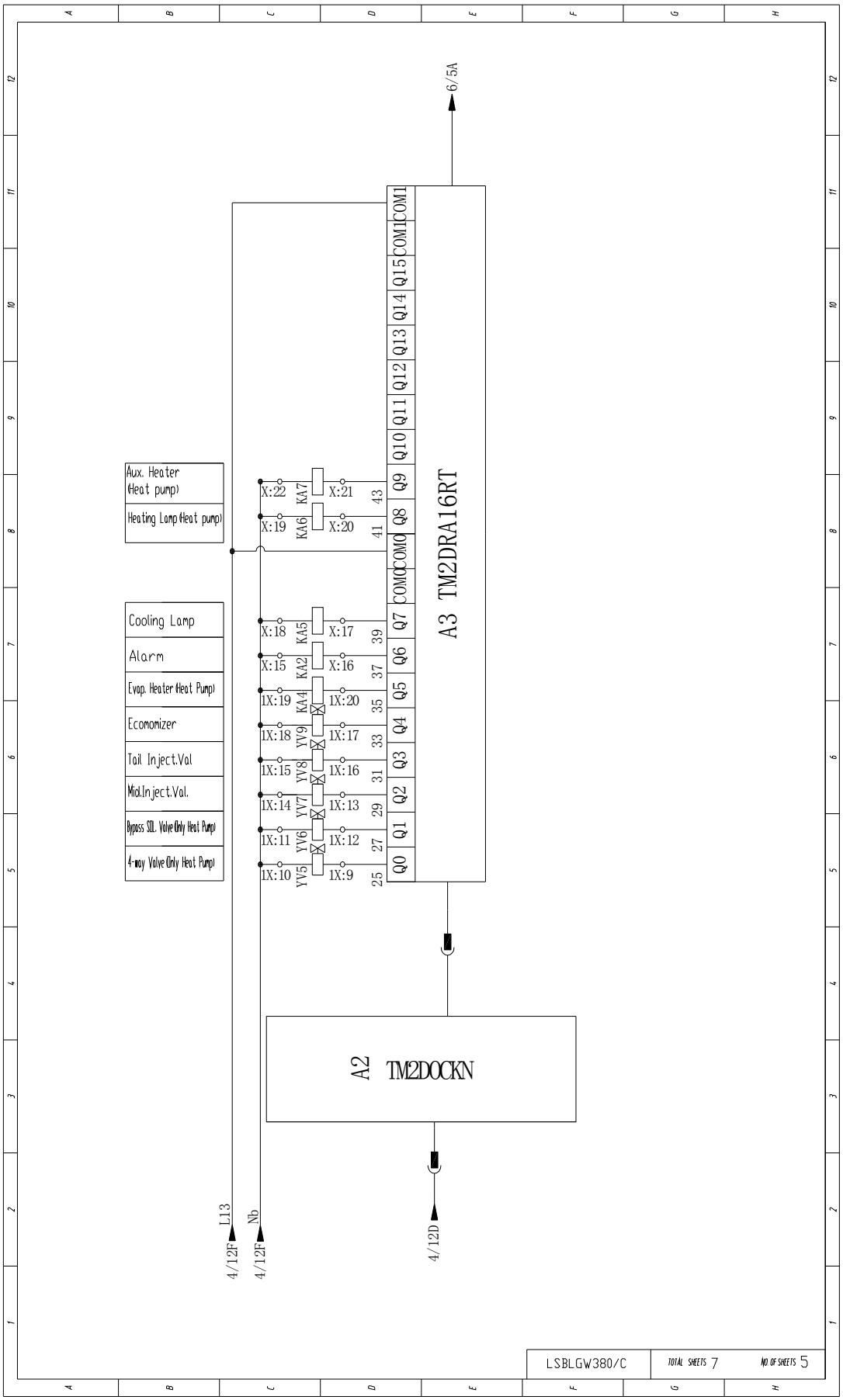
LSBLGW380/C WIRING DIAGRAM

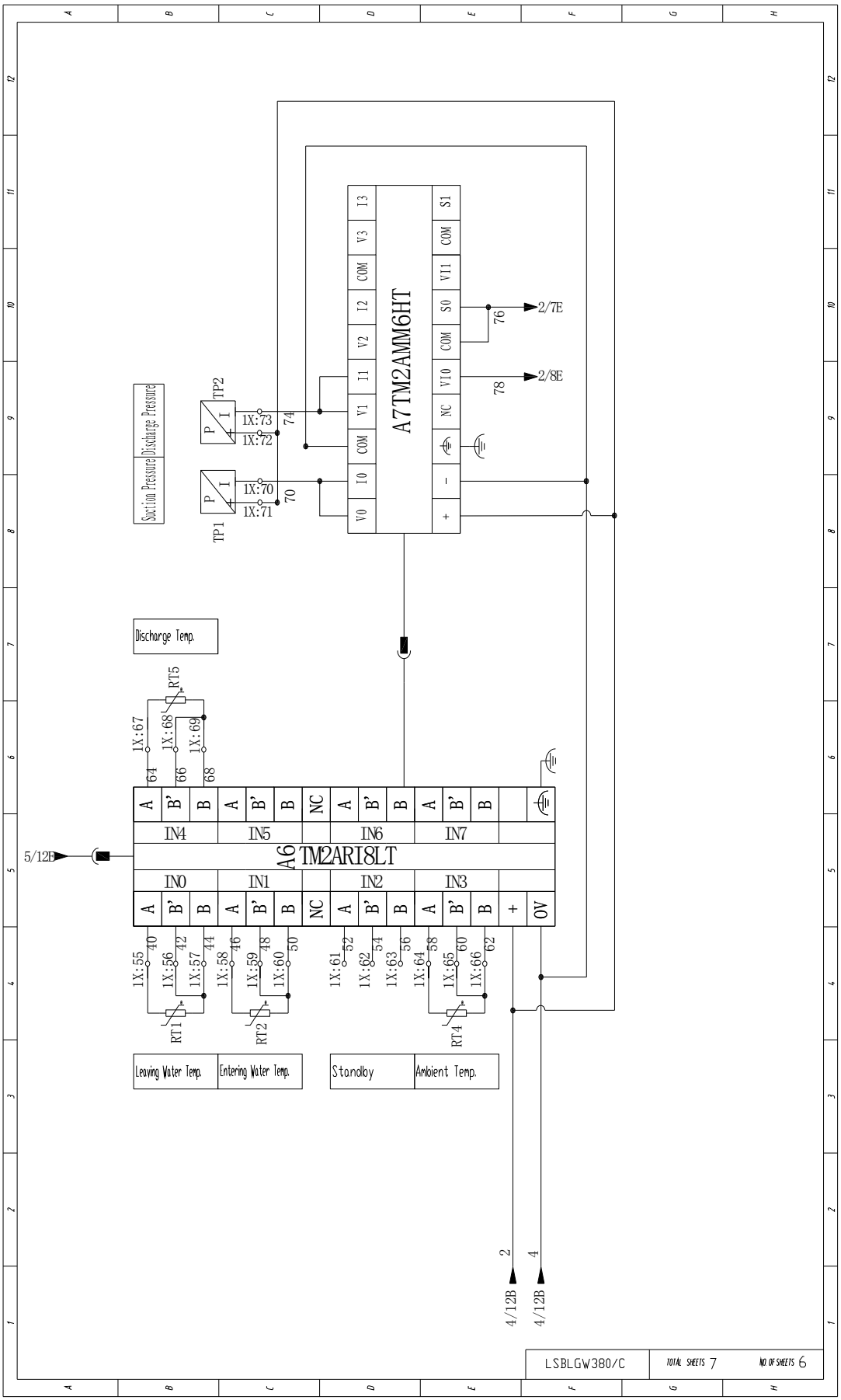


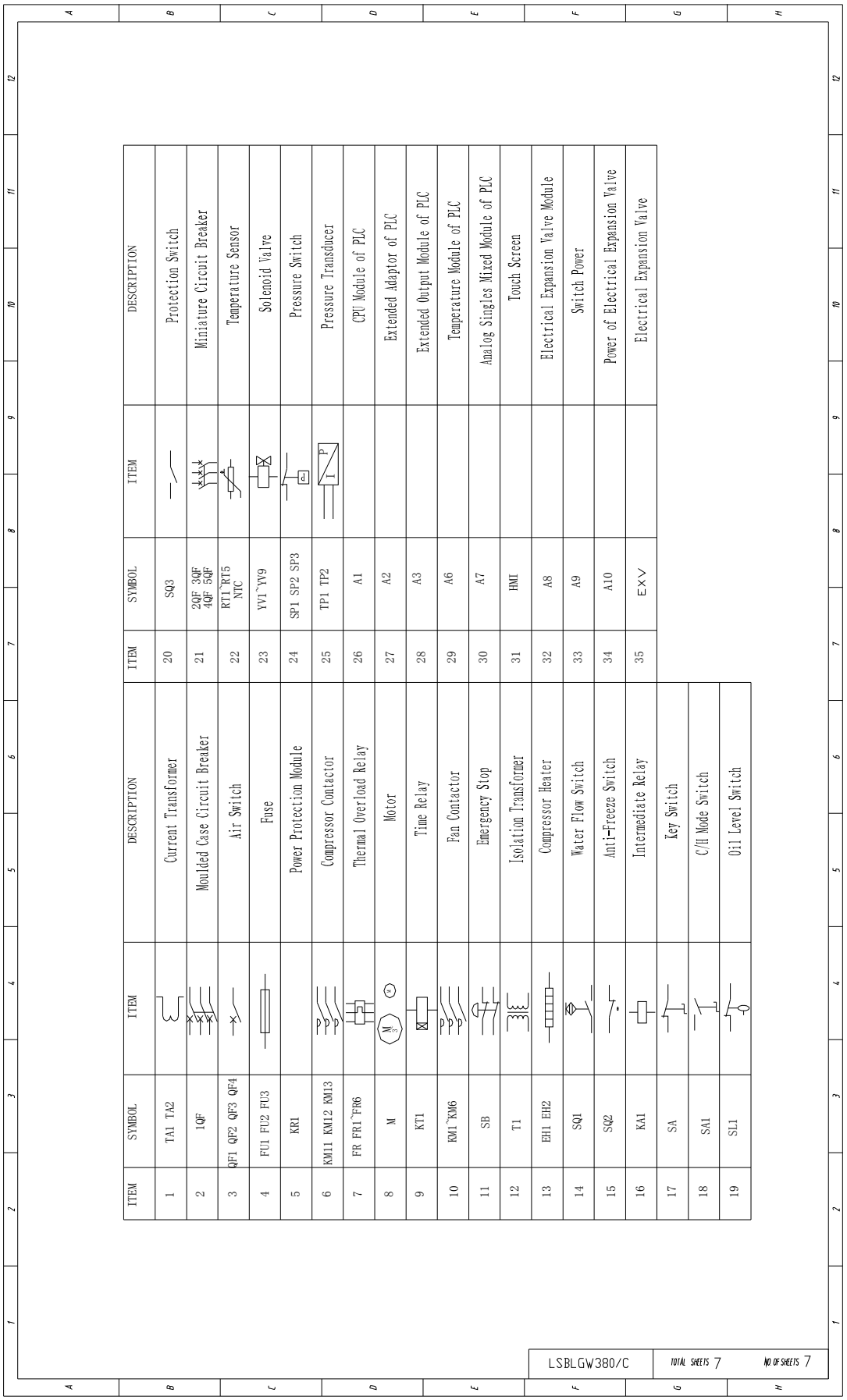

3/1B
3/1B
1X:77 Green
1X:78 Red
1X:79 White
1X:80 Black
M
EXV Motor
4/10B
4/10B
COM1 N1 Relay
Network Tx/Rx GND D12 D11 S4 S3 S2 S1 VREF GND
Analog-Digital Input
ExV connection
A8 EVD
Power Supply
G G0 VBAT
84 86 88 90
1 3 2 4
82 80 78 76
KA1
1X:75
1X:76
NTC
6/9F
6/10F
EVD Fault Output
EVD Switch
EVD Temp. Sensor
EVD Pressure Sensor
A10
FU3 2A
59
57 N2
L51
220V
24V
FU2 4A
L41
QF4
0.75mm2,3A
KM11 55
KA4 51
QF3 53
1X:28
1X:25
1X:27
1X:26
EH2
EH1
M
Power for EVD
Oil Heater
Evap. Heater (reserved)
Cooling Fan (reserved)
L31
FU1 6A
L21
QF2 1P 50Hz 230V 4A
L11
Na
T1
L1'
QF1 1P 50Hz 230V 6A
L1
N
1/12B
1/12B
Isolation Transformer
LSBLGW380/C
TOTAL SHEETS 7
NO. OF SHEETS 2


Oil Level Switch
Time Relay
Y Contactor
△ Contactor2
△ Contactor1
Dual Hight Pressure Switch
Touch Screen
Switch Power
Emergency Stop
LSBLGW380/C
TOTAL SHEETS 7
NO OF SHEETS 3
HMI
SB
SP4
FR
SL1
KA1
KM11
KM12
KM13
KT1
L12
Nb
L51
Na
RS485
A9
1X:23
1X:24
1X:31
1X:32
4/1D
4/3B
4/8B
4/8C
2/12B
4/2F
1/3G


A1 TM218LDAE40DRPHN
Service Switch
EVD Fault (Short Circuit)
C/H Mode Switch
Power Protection Switch
Fan overload Prot. Switch
Comp. Overload Prot. Switch
Oil Pressure Differ. Switch (Short Circuit)
Oil Level Switch
Contactor Protection
Comp. Motor Prot. Switch
Low Pressure. Switch
High Pressure Switch (Short Circuit)
Anti-freeze Switch
Water Flow Switch
Remote Stop
Remote Start
R22 Short Circuit
Fan Group 6
Fan Group 5
Fan Group 4
Fan Group 3
Fan Group 2
Fan Group 1
Oil Recovery Valve
75% SOL. Valve
50% SOL. Valve
25% SOL. Valve
Comp. Start/Stop
Water Pump
X:Terminal is arranged by the 220AC/24DC/analog signal / EXV.pulse order
220AC 1X:1~1X:34 1X:33~1X:34Redundancy
Separated with the following terminal with fixtures
24DC 1X:35~1X:54 1X:45~1X:46Redundancy
analog signal 1X:55~1X:76
EXV.pulse 1X:77~1X:80
Separated with the front terminal with fixtures
The same terminals of No. 1 and No. 2 put together.
Customer terminal X:1~X:22
X:1~X:8 stands for input of passive signal.
X:9~X:12 stands for connection of multi-communications and
X:13~X:22 stands for the output of 200VAC
LSBLGW380/C
TOTAL SHEETS 7
NO OF SHEETS 4


6/5A
A3 TM2DRA16RT
COM1 COM1 Q15 Q14 Q13 Q12 Q11 Q10 Q9 Q8 COM0 COM0 Q7 Q6 Q5 Q4 Q3 Q2 Q1 Q0
Aux. Heater (Heat pump)
Heating Lamp (Heat pump)
Cooling Lamp
Alarm
Evap. Heater (Heat Pump)
Economizer
Tail Inject.Val
Mid.Inject.Val.
Bypass SOL. Valve (Only Heat Pump)
4-way Valve (Only Heat Pump)
X:22 KA7 X:21 43
X:19 KA6 X:20 41
X:18 KA5 X:17 39
X:15 KA2 X:16 37
1X:19 KA4 1X:20 35
1X:18 YV9 1X:17 33
1X:15 YV8 1X:16 31
1X:14 YV7 1X:13 29
1X:11 YV6 1X:12 27
1X:10 YV5 1X:9 25
A2 TM2DOCKN
L13
Nb
4/12F
4/12F
4/12D
LSBLGW380/C
TOTAL SHEETS 7
NO OF SHEETS 5


A7TM2AMM6HT
V0
I0
COM
V1
I1
V2
I2
COM
V3
I3
+
-
NC
V10
COM
S0
V11
COM
S1
TP1
TP2
P
I
1X:70
1X:71
1X:73
1X:72
70
74
76
78
2/7E
2/8E
Suction Pressure
Discharge Pressure
Discharge Temp.
RT5
1X:67
1X:68
1X:69
64
66
68
A6TM2ARI8LT
IN0
IN1
IN2
IN3
IN4
IN5
IN6
IN7
A
B'
B
NC
+
0V
5/12B
1X:55
1X:56
1X:57
1X:58
1X:59
1X:60
1X:61
1X:62
1X:63
1X:64
1X:65
1X:66
40
42
44
46
48
50
52
54
56
58
60
62
RT1
RT2
RT4
Leaving Water Temp.
Entering Water Temp.
Standby
Ambient Temp.
2
4
4/12B
4/12B
LSBLGW380/C
TOTAL SHEETS 7
NO OF SHEETS 6

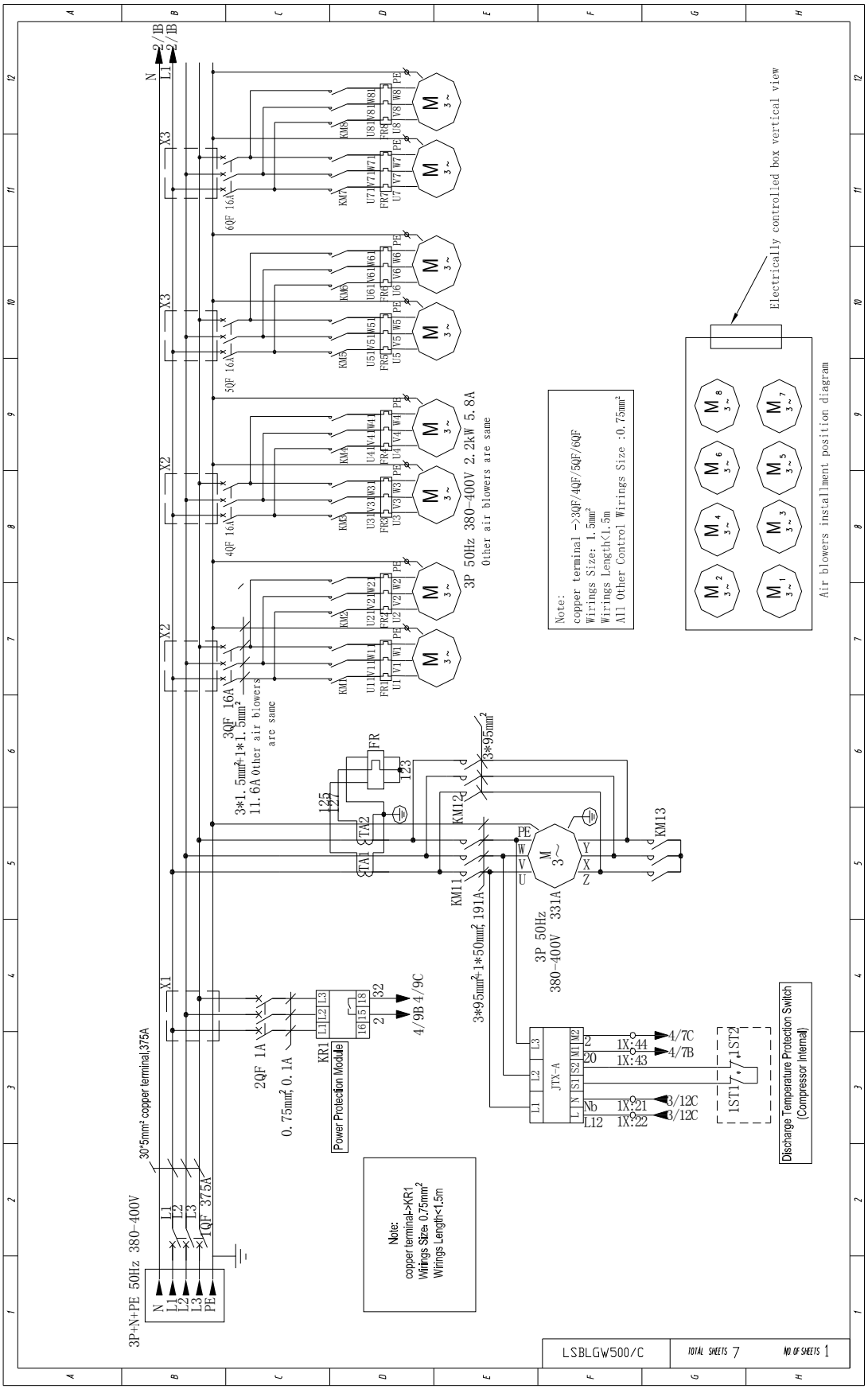


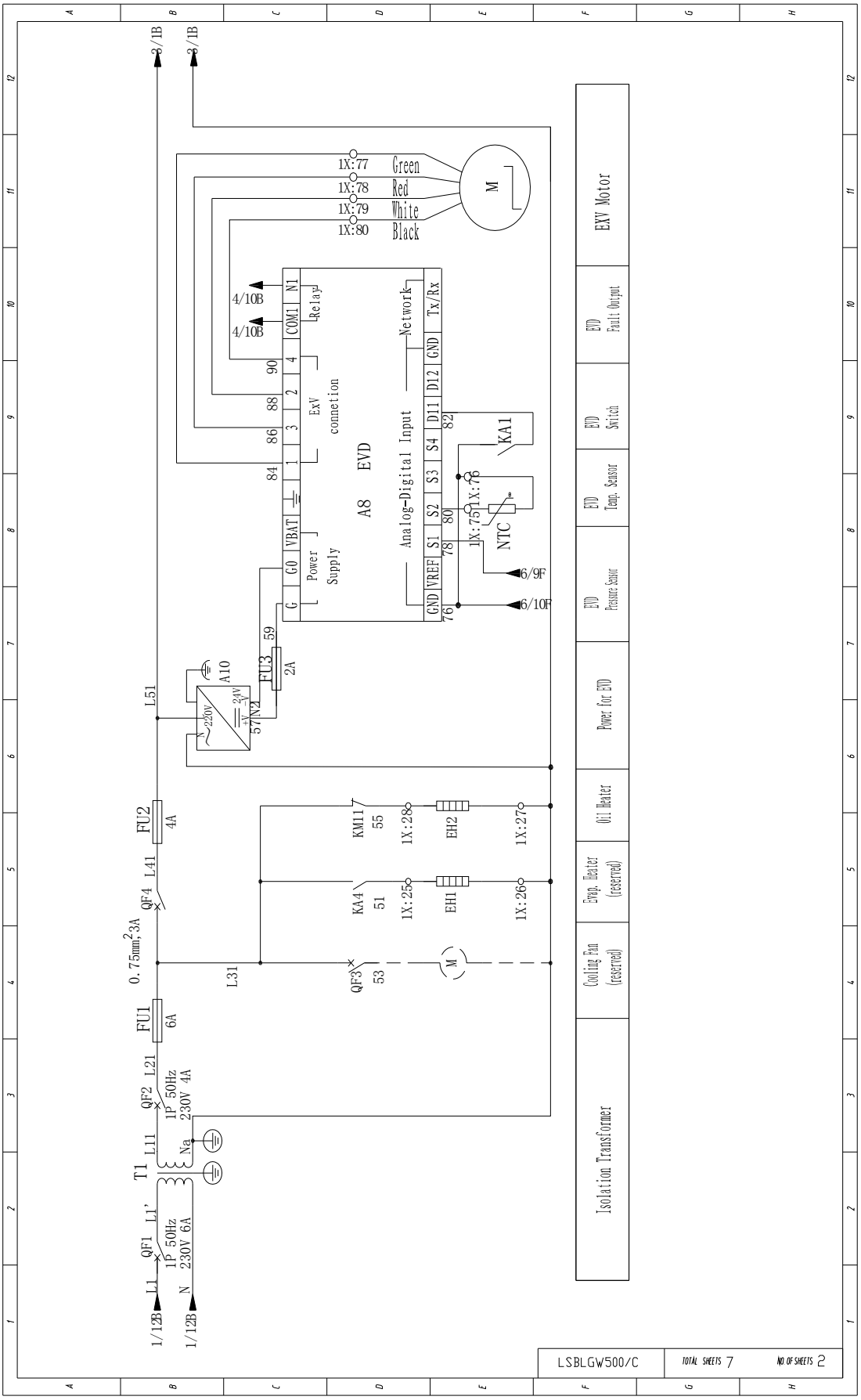
ITEM	SYMBOL	ITEM	DESCRIPTION
1	TA1 TA2		Current Transformer
2	1QF		Moulded Case Circuit Breaker
3	QF1 QF2 QF3 QF4		Air Switch
4	FU1 FU2 FU3		Fuse
5	KR1		Power Protection Module
6	KM11 KM12 KM13		Compressor Contactor
7	FR FR1~FR6		Thermal Overload Relay
8	M		Motor
9	KT1		Time Relay
10	KM1~KM6		Fan Contactor
11	SB		Emergency Stop
12	T1		Isolation Transformer
13	EH1 EH2		Compressor Heater
14	SQ1		Water Flow Switch
15	SQ2		Anti-Freeze Switch
16	KA1		Intermediate Relay
17	SA		Key Switch
18	SA1		C/H Mode Switch
19	SL1		Oil Level Switch

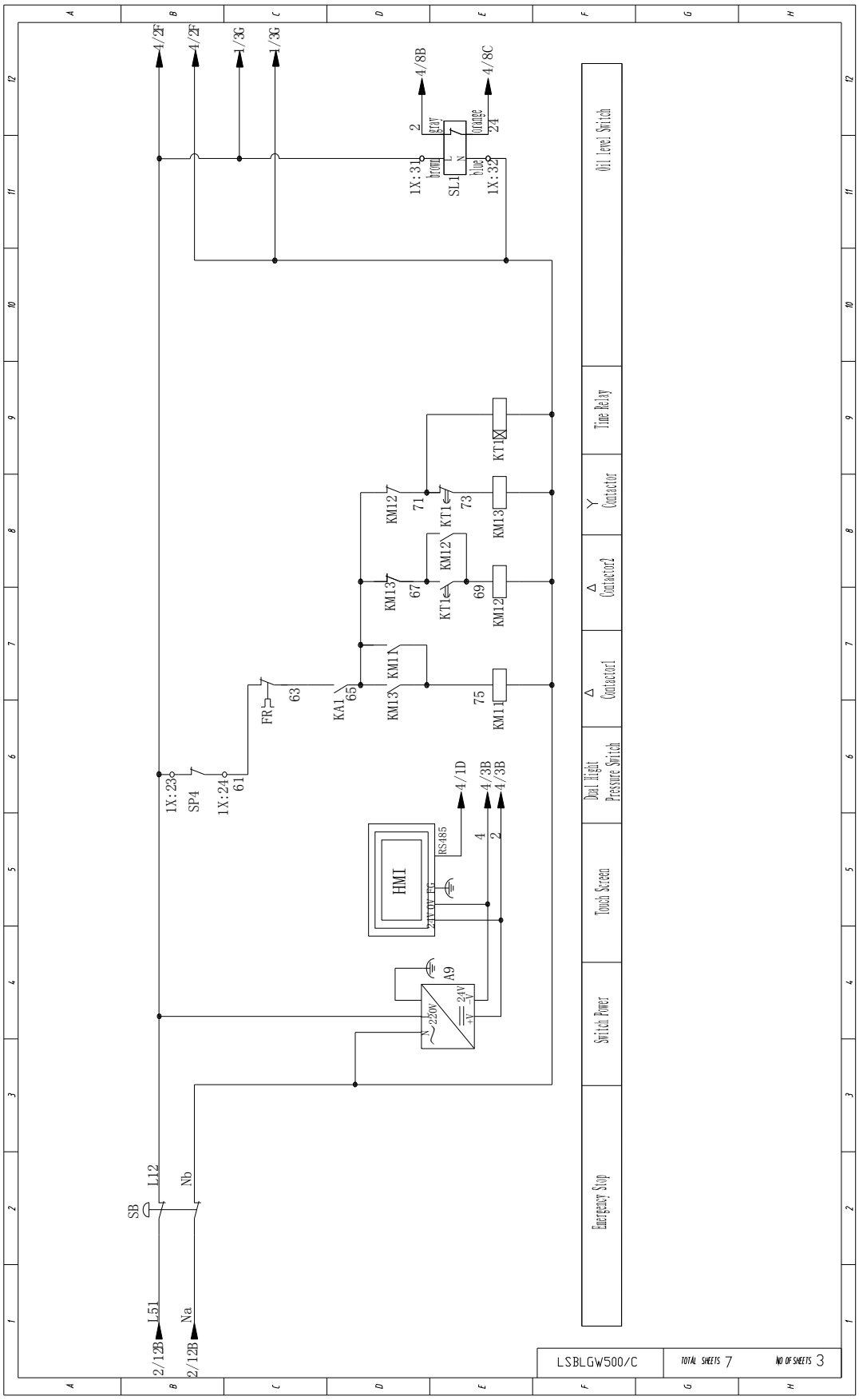
ITEM	DESCRIPTION	ITEM	SYMBOL	ITEM	DESCRIPTION
20	SQ3		Protection Switch		
21	2QF 3QF 4QF 5QF		Miniature Circuit Breaker		
22	RT1~RT5 NTC		Temperature Sensor		
23	YV1~YV9		Solenoid Valve		
24	SP1 SP2 SP3		Pressure Switch		
25	TP1 TP2		Pressure Transducer		
26	A1		CPU Module of PLC		
27	A2		Extended Adaptor of PLC		
28	A3		Extended Output Module of PLC		
29	A6		Temperature Module of PLC		
30	A7		Analog Singles Mixed Module of PLC		
31	HMI		Touch Screen		
32	A8		Electrical Expansion Valve Module		
33	A9		Switch Power		
34	A10		Power of Electrical Expansion Valve		
35	EXV		Electrical Expansion Valve		

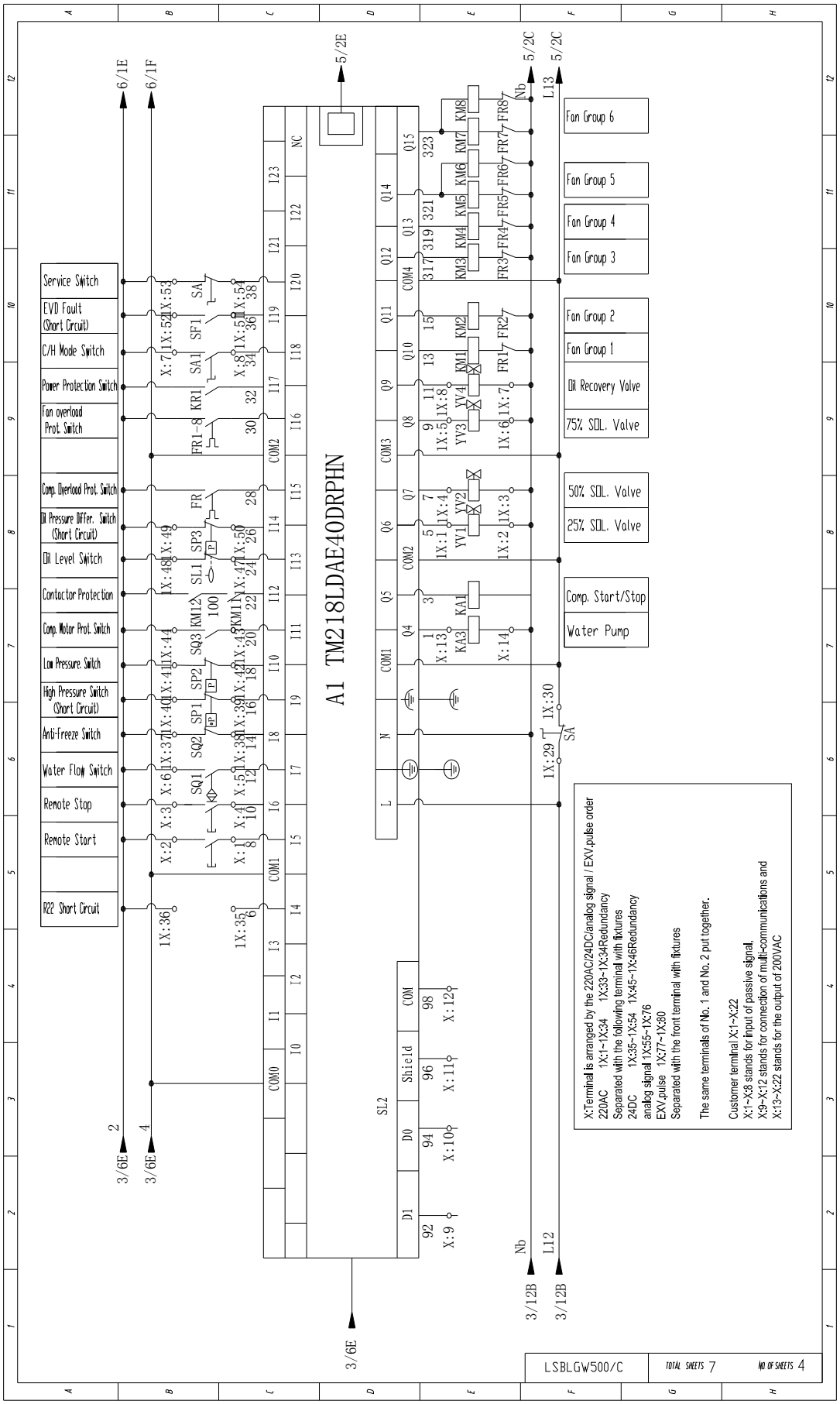
LSBLGW380/C TOTAL SHEETS 7 NO OF SHEETS 7

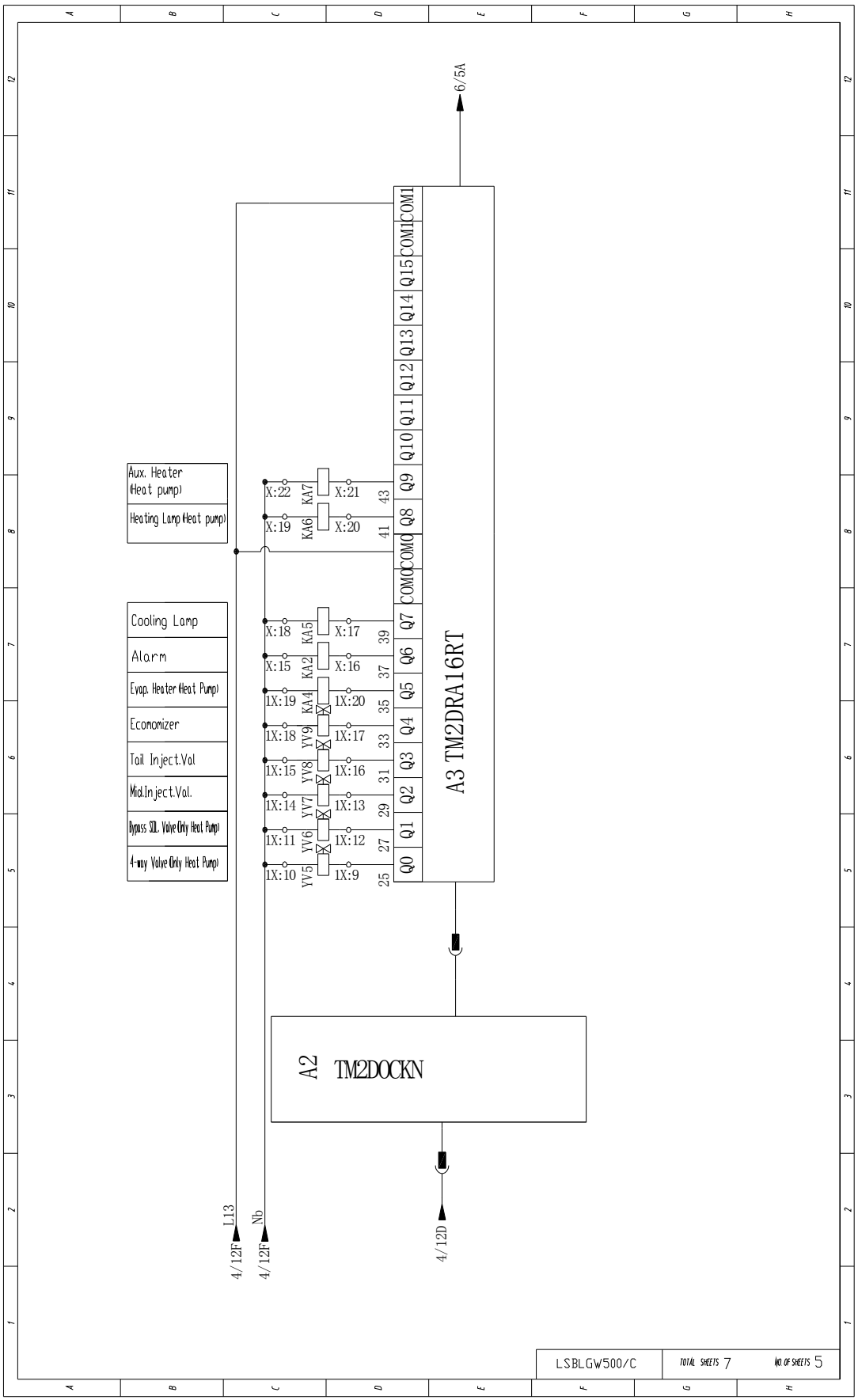
LSBLGW500/C WIRING DIAGRAM

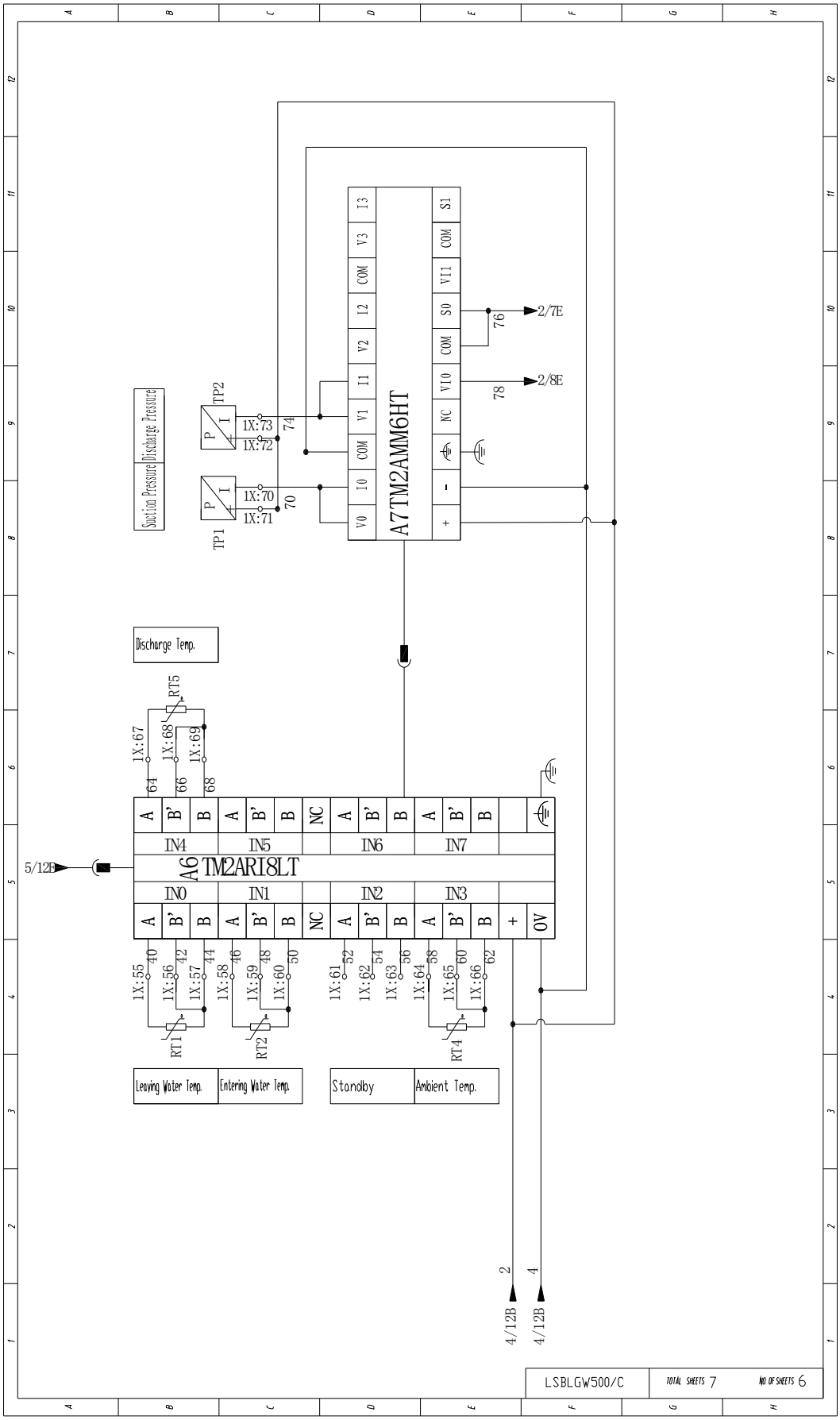


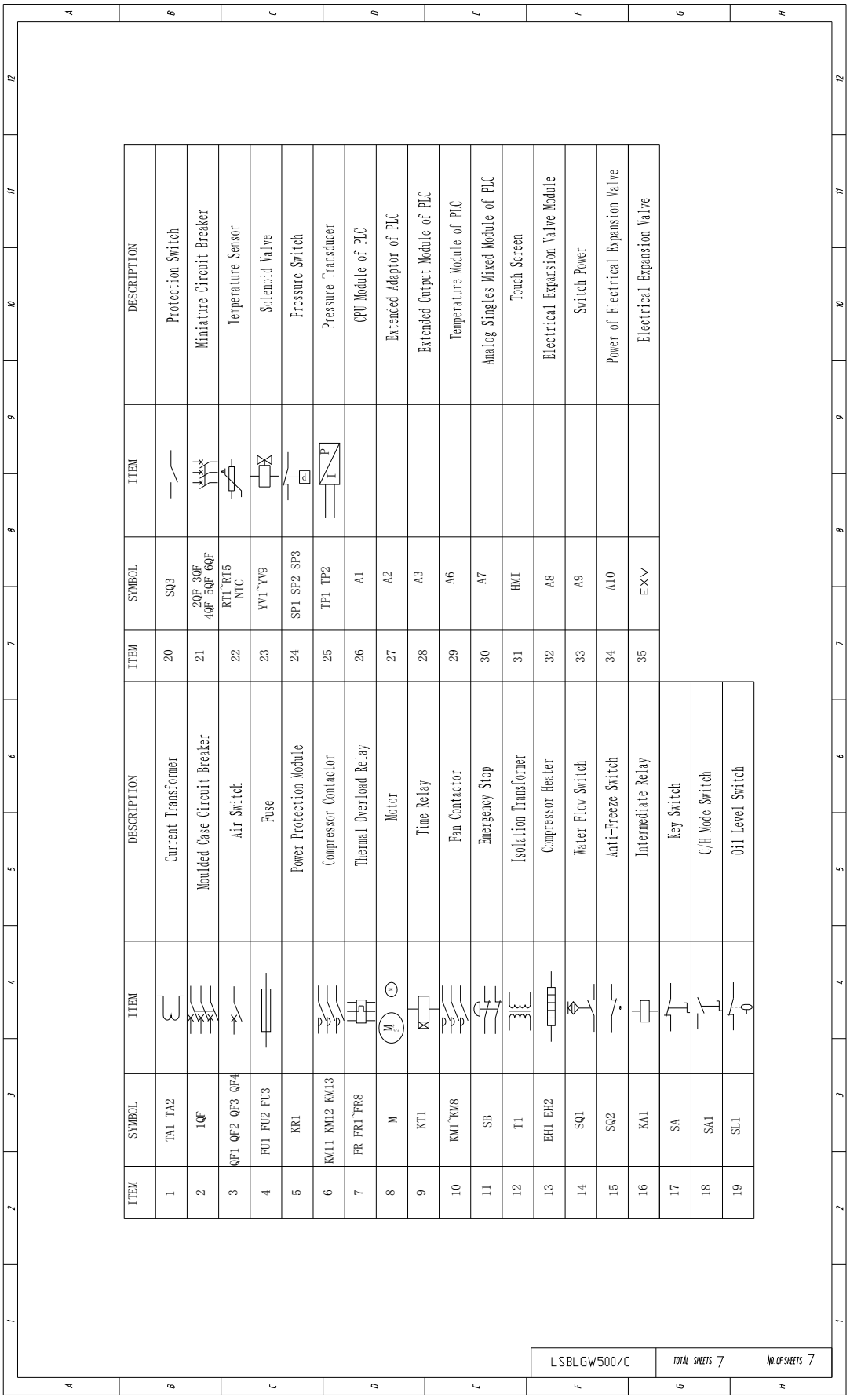

Isolation Transformer
Cooling Fan (reserved)
Evap. Heater (reserved)
Oil Heater
Power for EVD
EVD Pressure Sensor
EVD Temp. Sensor
EVD Switch
EVD Fault Output
EXV Motor
A8 EVD
Analog-Digital Input
Network
Power Supply
Relay
EXV connetion
1X:77 Green
1X:78 Red
1X:79 White
1X:80 Black
NTC
KA1
EH1
EH2
KM11
KA4
QF1
QF2
QF3
QF4
FU1
FU2
FU3
T1
A10
LSBLGW500/C
TOTAL SHEETS 7
NO.OF SHEETS 2


Oil Level Switch
Time Relay
Y Contactor
△ Contactor2
△ Contactor1
Dual Hight Pressure Switch
Touch Screen
Switch Power
Emergency Stop
LSBLGW500/C
TOTAL SHEETS 7
NO OF SHEETS 3
HMI
SP4
SB
FR
SL1
KA1
KM11
KM12
KM13
KT1
L12
Nb
L51
Na
RS485
220V
24V


A1 TM218LDAE40DRPHN
Service Switch
EVD Fault (Short Circuit)
C/H Mode Switch
Power Protection Switch
Fan overload Prot. Switch
Comp. Overload Prot. Switch
Oil Pressure Differ. Switch (Short Circuit)
Oil Level Switch
Contactor Protection
Comp. Motor Prot. Switch
Low Pressure Switch
High Pressure Switch (Short Circuit)
Anti-Freeze Switch
Water Flow Switch
Remote Stop
Remote Start
R22 Short Circuit
Fan Group 6
Fan Group 5
Fan Group 4
Fan Group 3
Fan Group 2
Fan Group 1
Oil Recovery Valve
75% SOL. Valve
50% SOL. Valve
25% SOL. Valve
Comp. Start/Stop
Water Pump
X:Terminal is arranged by the 220AC/24DC/analog signal / EXV.pulse order
220AC 1X:1~1X:34 Separated with the following terminal with fixtures
24DC 1X:35~1X:54 1X:45~1X:46Redundancy
analog signal 1X:55~1X:76
EXV.pulse 1X:77~1X:80
Separated with the front terminal with fixtures
The same terminals of No. 1 and No. 2 put together.
Customer terminal X:1~X:22
X:1~X:8 stands for input of passive signal.
X:9~X:12 stands for connection of multi-communications and
X:13~X:22 stands for the output of 200VAC
LSBLGW500/C
TOTAL SHEETS 7
NO OF SHEETS 4


6/5A
COM1
COM1
Q15
Q14
Q13
Q12
Q11
Q10
Q9
Q8
COM0
COM0
Q7
Q6
Q5
Q4
Q3
Q2
Q1
Q0
A3 TM2DRA16RT
Aux. Heater (Heat pump)
Heating Lamp (Heat pump)
Cooling Lamp
Alarm
Evap. Heater (Heat Pump)
Economizer
Tail Inject.Val
Mid.Inject.Val.
Bypass SOL. Valve (Only Heat Pump)
4-way Valve (Only Heat Pump)
X:22
KA7
X:21
43
X:19
KA6
X:20
41
X:18
KA5
X:17
39
X:15
KA2
X:16
37
1X:19
KA4
1X:20
35
1X:18
YV9
1X:17
33
1X:15
YV8
1X:16
31
1X:14
YV7
1X:13
29
1X:11
YV6
1X:12
27
1X:10
YV5
1X:9
25
A2 TM2DOCKN
L13
Nb
4/12F
4/12F
4/12D
LSBLGW500/C
TOTAL SHEETS 7
NO OF SHEETS 5


A7TM2AMM6HT
I3
V3
COM
I2
V2
I1
V1
COM
I0
V0
S1
COM
VI1
S0
COM
VI0
NC
-
+
2/7E
2/8E
76
78
74
70
TP2
TP1
P
I
1X:73
1X:72
1X:70
1X:71
Suction Pressure
Discharge Pressure
Discharge Temp.
RT5
1X:67
1X:68
1X:69
64
66
68
A6TM2ART8LT
IN4
IN5
IN6
IN7
IN0
IN1
IN2
IN3
5/12B
A
B'
B
NC
+
0V
1X:55
1X:56
1X:57
1X:58
1X:59
1X:60
1X:61
1X:62
1X:63
1X:64
1X:65
1X:66
40
42
44
46
48
50
52
54
56
58
60
62
RT1
RT2
RT4
Leaving Water Temp.
Entering Water Temp.
Standby
Ambient Temp.
2
4
4/12B
4/12B
LSBLGW500/C
TOTAL SHEETS 7
NO OF SHEETS 6

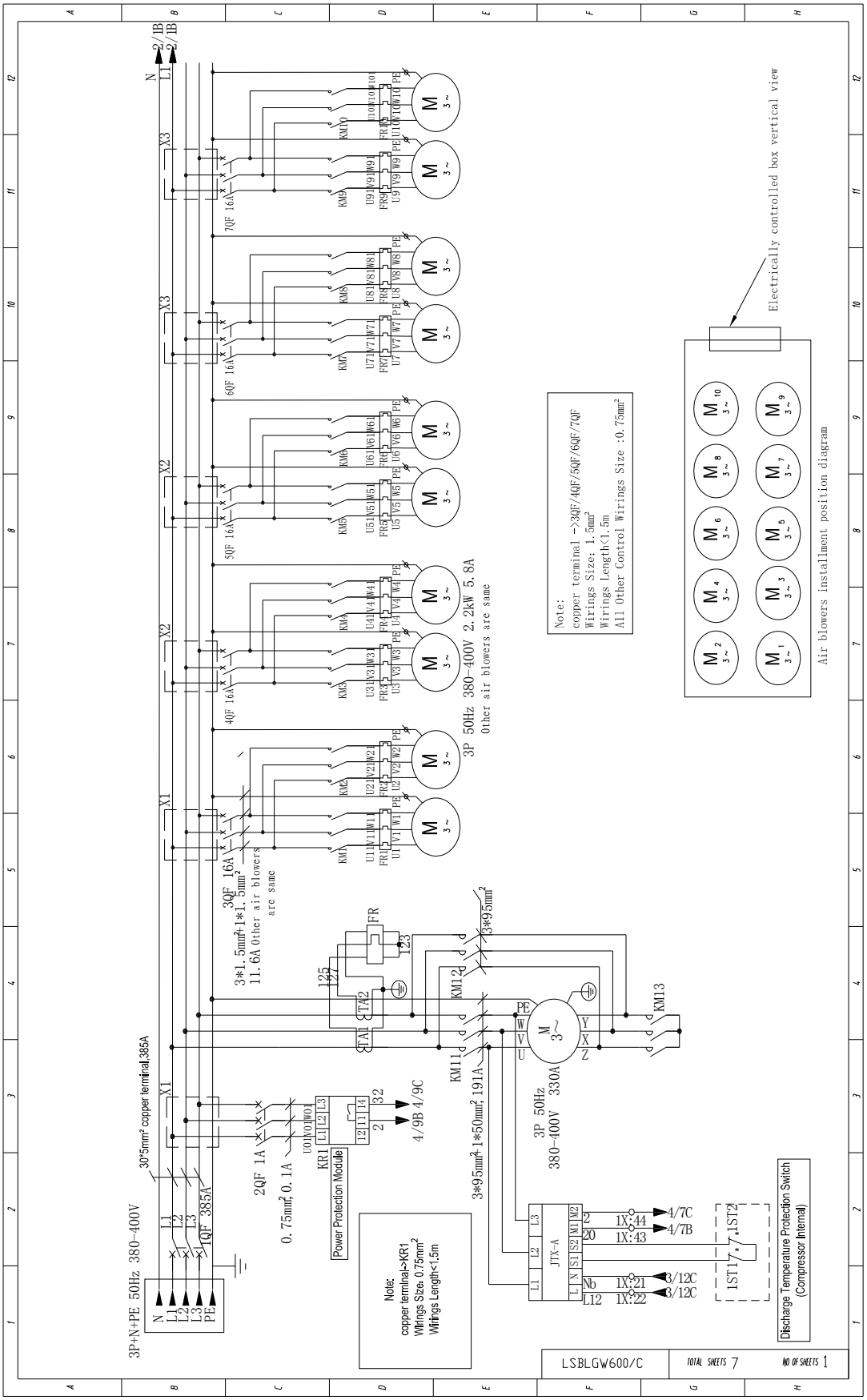


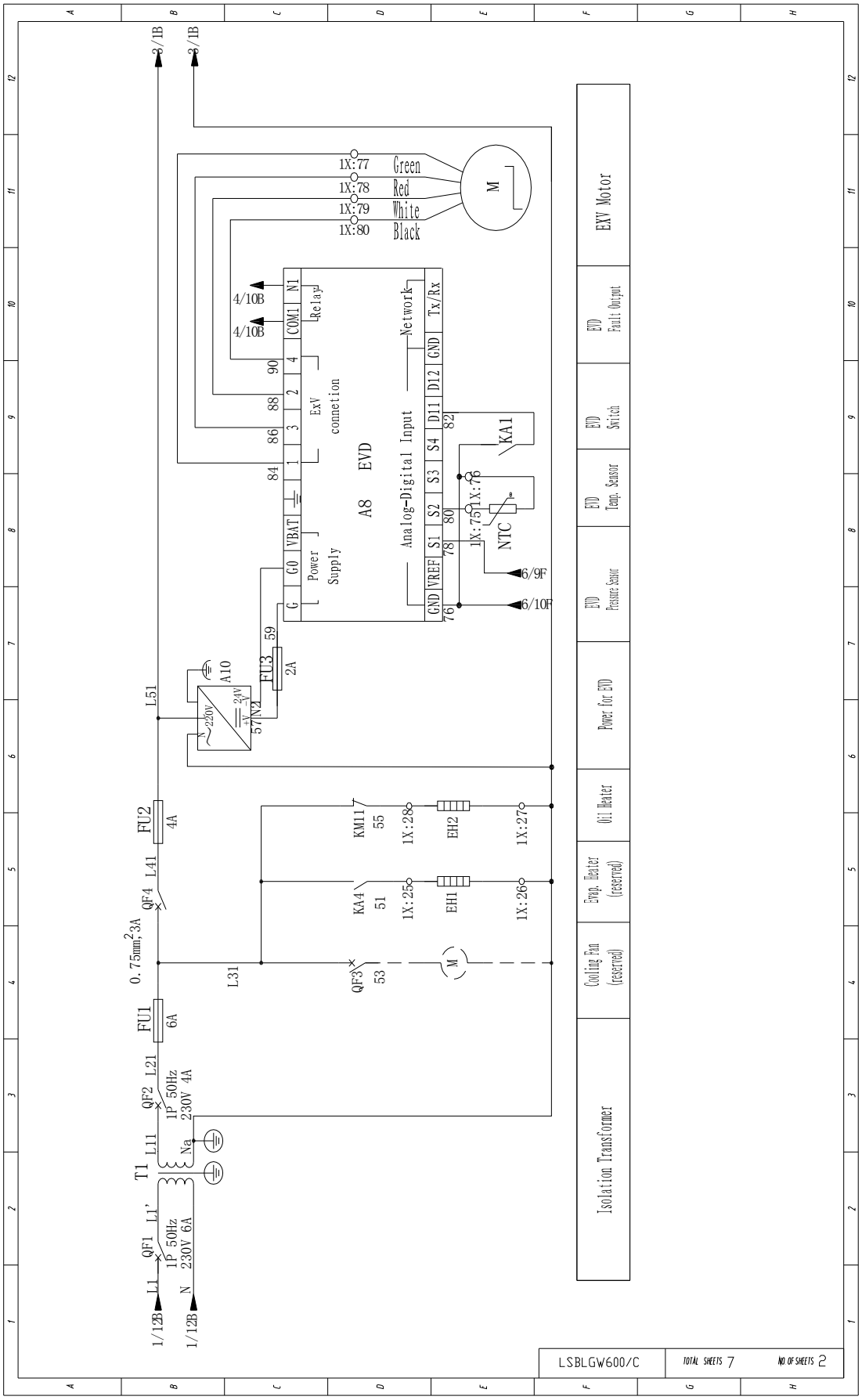
ITEM	SYMBOL	ITEM	DESCRIPTION
1	TA1 TA2		Current Transformer
2	1QF		Moulded Case Circuit Breaker
3	QF1 QF2 QF3 QF4		Air Switch
4	FU1 FU2 FU3		Fuse
5	KR1		Power Protection Module
6	KM11 KM12 KM13		Compressor Contactor
7	FR FR1~FR8		Thermal Overload Relay
8	M	M 3~	Motor
9	KT1		Time Relay
10	KM1~KM8		Fan Contactor
11	SB		Emergency Stop
12	T1		Isolation Transformer
13	EH1 EH2		Compressor Heater
14	SQ1		Water Flow Switch
15	SQ2		Anti-Freeze Switch
16	KA1		Intermediate Relay
17	SA		Key Switch
18	SA1		C/H Mode Switch
19	SL1		Oil Level Switch

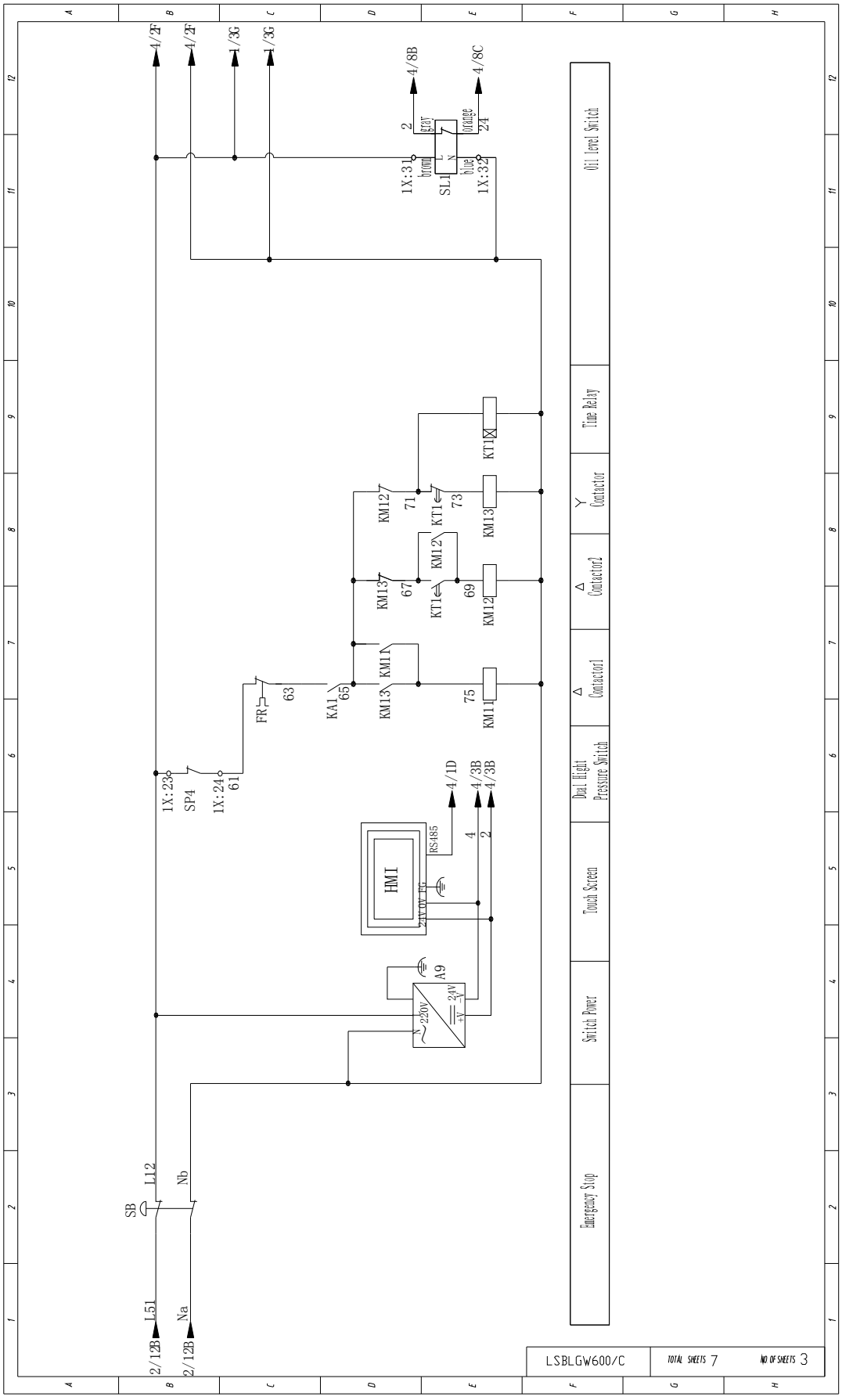
ITEM	SYMBOL	ITEM	DESCRIPTION
20	SQ3		Protection Switch
21	2QF 3QF 4QF 5QF 6QF		Miniature Circuit Breaker
22	RT1~RT5 NTC		Temperature Sensor
23	YV1~YV9		Solenoid Valve
24	SP1 SP2 SP3		Pressure Switch
25	TP1 TP2	P I	Pressure Transducer
26	A1		CPU Module of PLC
27	A2		Extended Adaptor of PLC
28	A3		Extended Output Module of PLC
29	A6		Temperature Module of PLC
30	A7		Analog Singles Mixed Module of PLC
31	HMI		Touch Screen
32	A8		Electrical Expansion Valve Module
33	A9		Switch Power
34	A10		Power of Electrical Expansion Valve
35	EXV		Electrical Expansion Valve

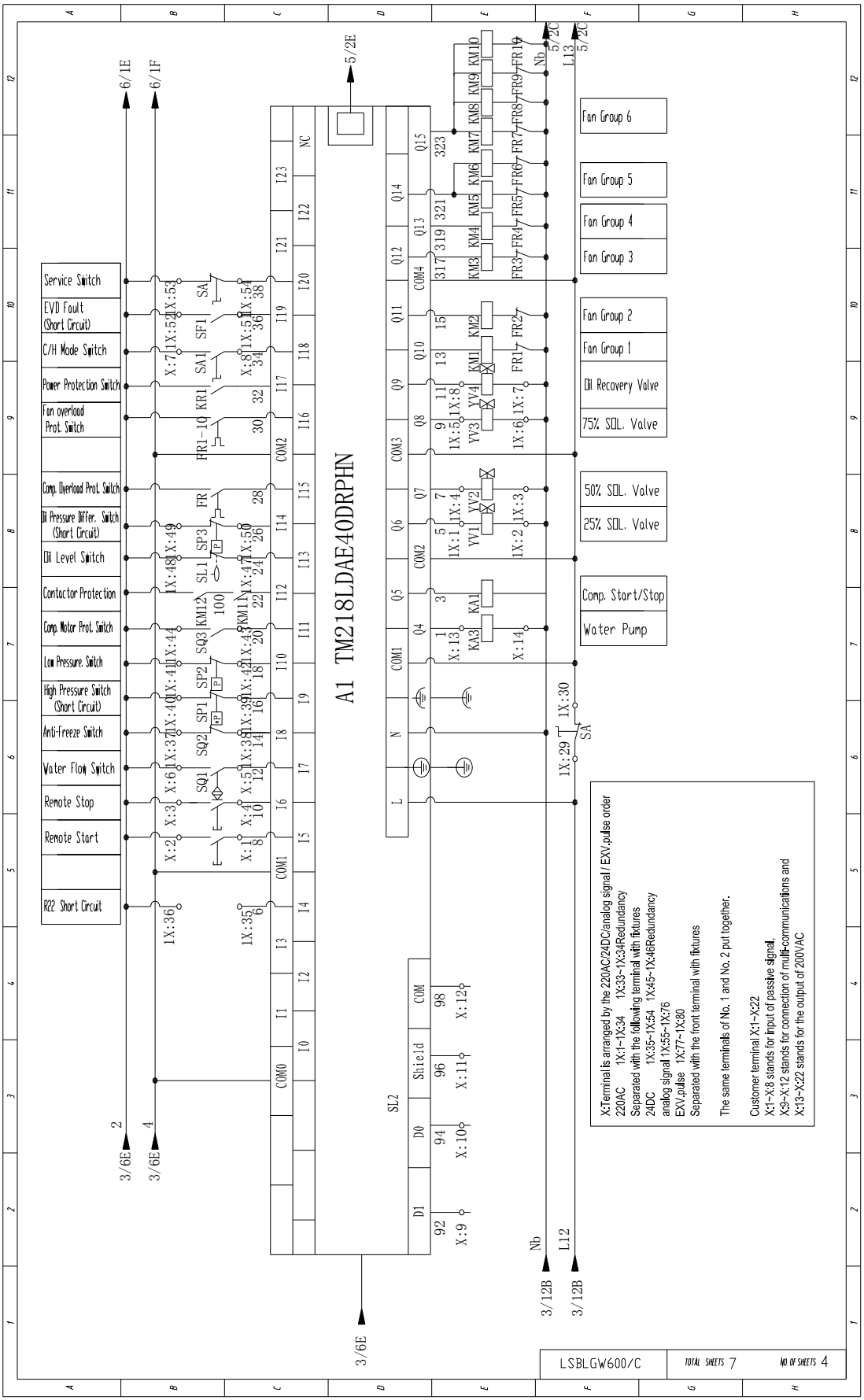
LSBLGW500/C | TOTAL SHEETS 7 | NO.OF SHEETS 7

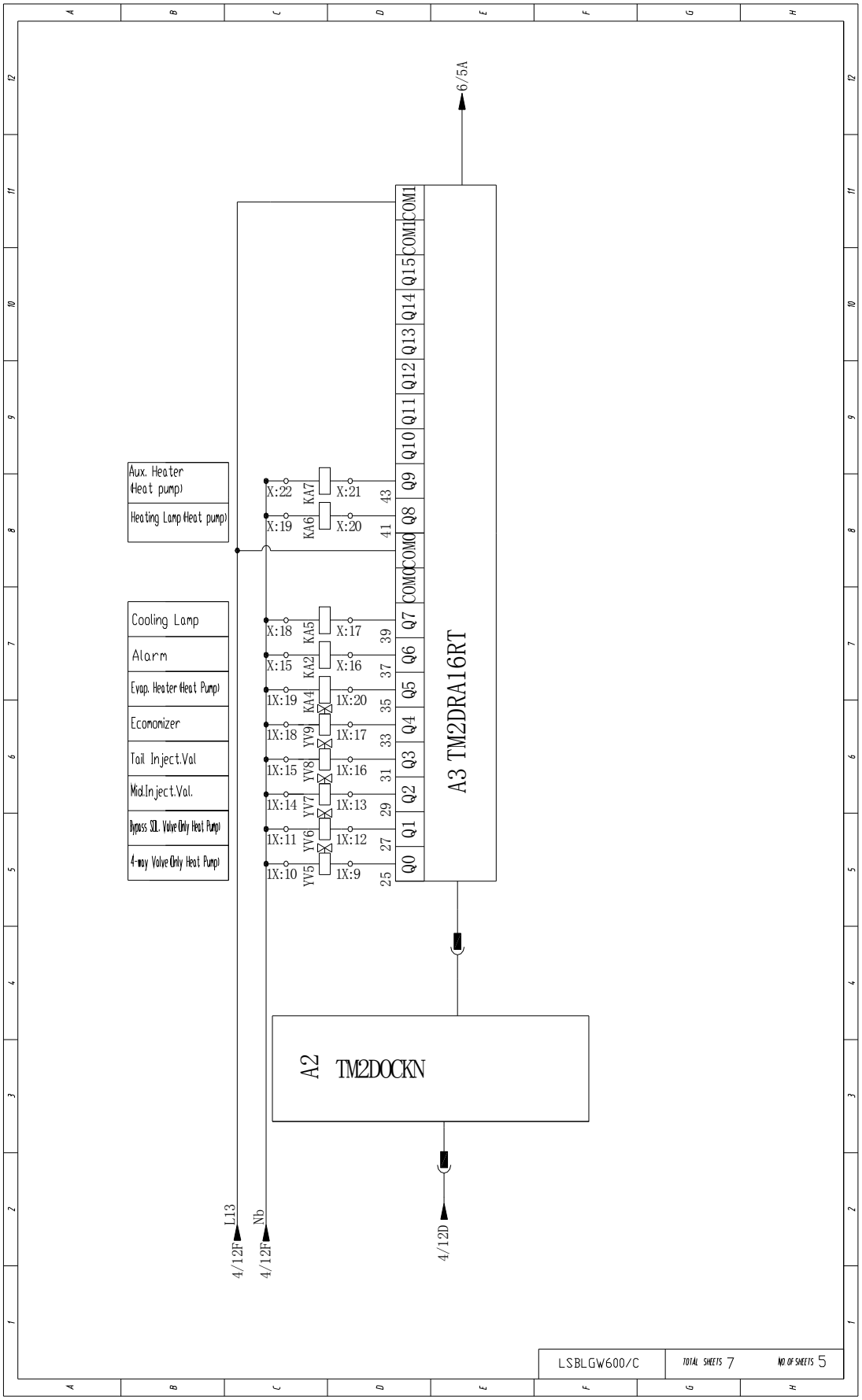
LSBLGW600/C WIRING DIAGRAM

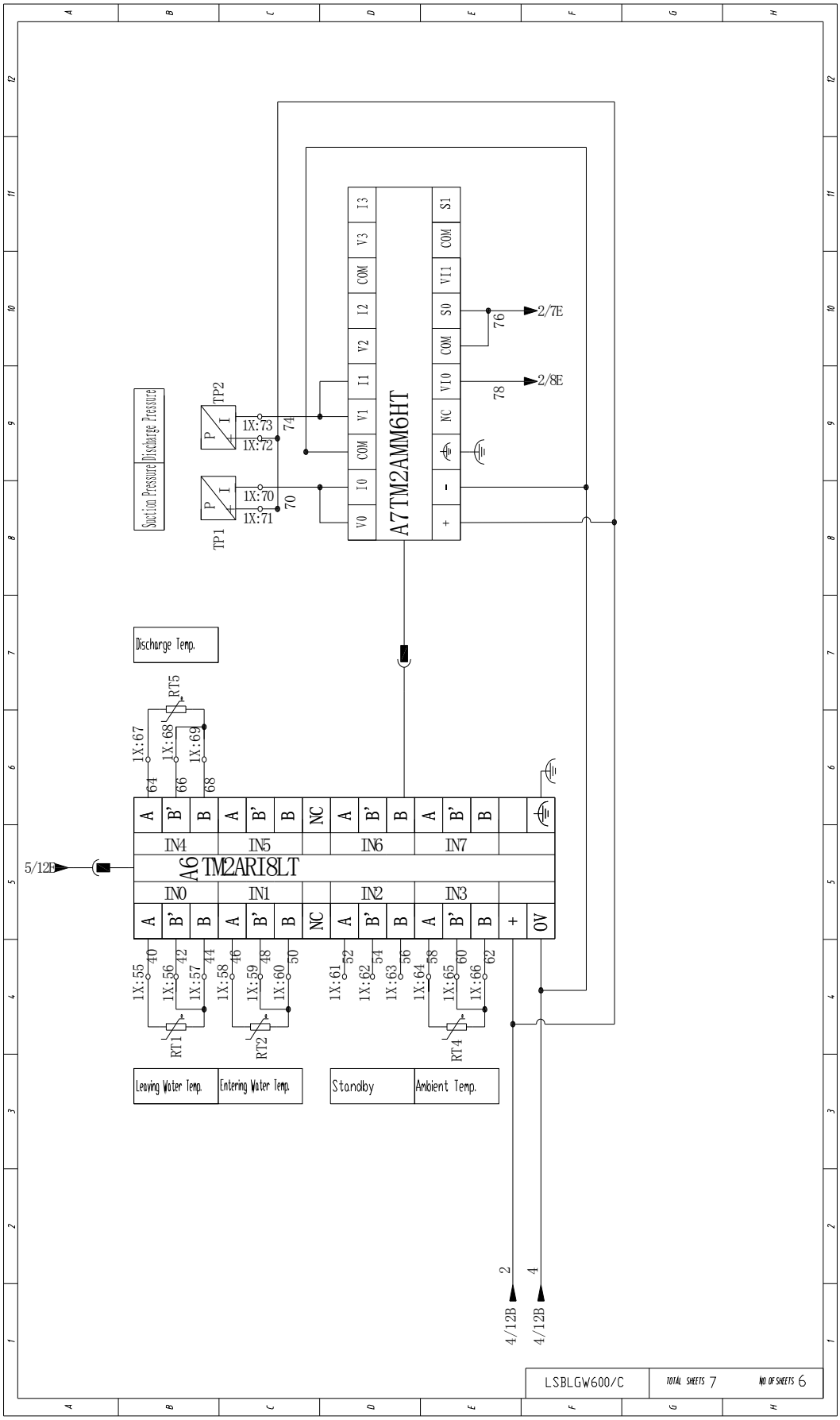


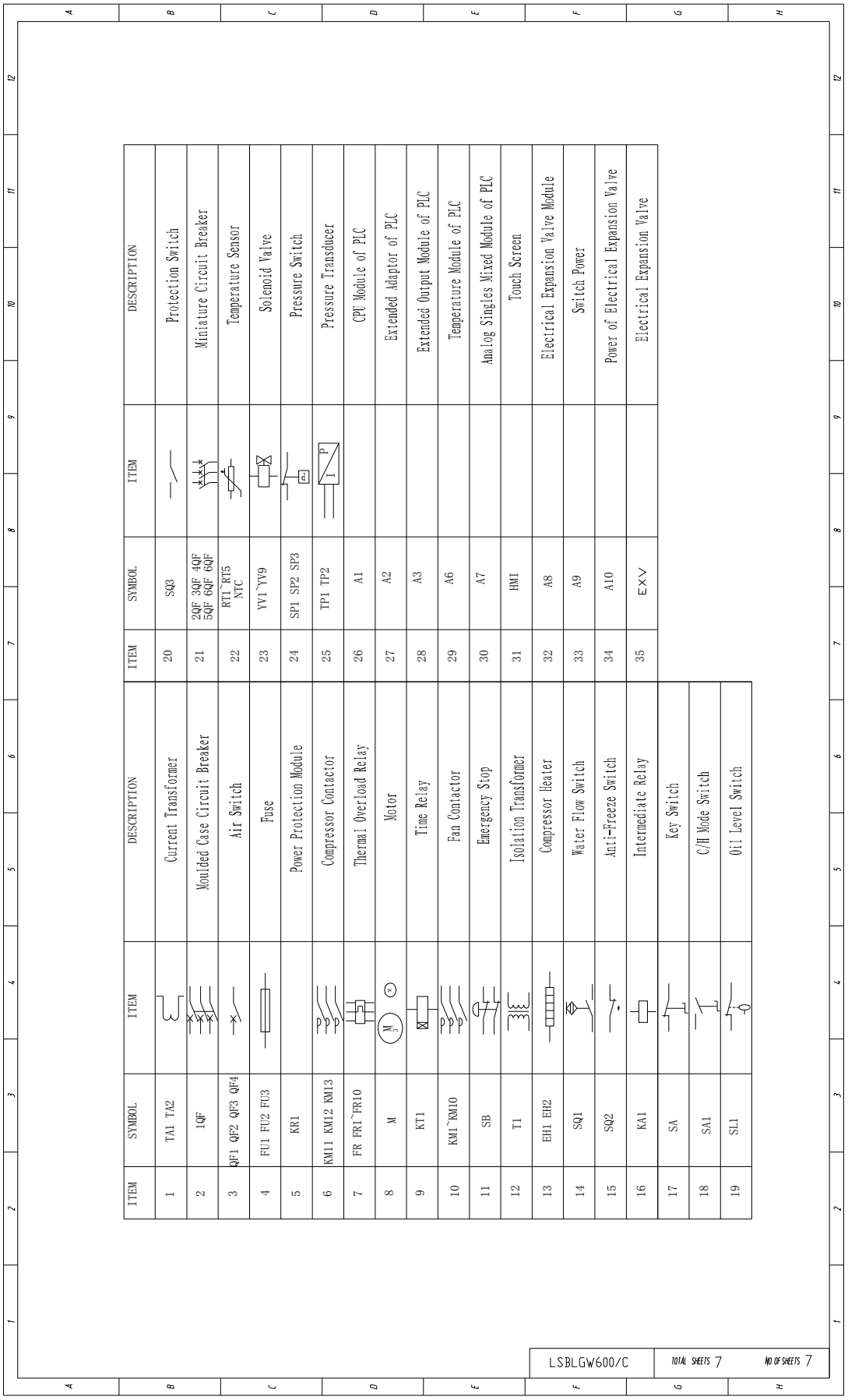

Isolation Transformer
Cooling Fan (reserved)
Evap. Heater (reserved)
Oil Heater
Power for EVD
EVD Pressure Sensor
EVD Temp. Sensor
EVD Switch
EVD Fault Output
EXV Motor
T1
FU1 6A
FU2 4A
FU3 2A
QF1 1P 50Hz N 230V 6A
QF2 1P 50Hz 230V 4A
QF3
QF4
KM11
KA1
KA4
EH1
EH2
A8 EVD
Analog-Digital Input
Power Supply
ExV connetion
Relay
Network
NTC
A10
1X:77 Green
1X:78 Red
1X:79 White
1X:80 Black
LSBLGW600/C
TOTAL SHEETS 7
NO.OF SHEETS 2


4/2F
4/2F
1/3G
1/3G
4/8B
4/8C
2
24
1X:31
1X:32
SL1
blue
orange
brown
KT1
KM12
KM13
KM11
KA1
FR
SP4
1X:23
1X:24
61
63
65
67
69
71
73
75
4/1D
4/3B
4/3B
HMI
RS485
A9
220V
24V
Oil level Switch
Time Relay
Y Contactor
△ Contactor2
△ Contactor1
Dual Light Pressure Switch
Touch Screen
Switch Power
Emergency Stop
SB
L12
Nb
L51
Na
2/12B
2/12B
LSBLGW600/C
TOTAL SHEETS 7
NO OF SHEETS 3


A1 TM218LDAE40DRPHN
Service Switch
EVD Fault (Short Circuit)
C/H Mode Switch
Power Protection Switch
Fan overload Prot. Switch
Comp. Overload Prot. Switch
Oil Pressure Differ. Switch (Short Circuit)
Oil Level Switch
Contactor Protection
Comp. Motor Prot. Switch
Low Pressure Switch
High Pressure Switch (Short Circuit)
Anti-freeze Switch
Water Flow Switch
Remote Stop
Remote Start
R22 Short Circuit
Fan Group 6
Fan Group 5
Fan Group 4
Fan Group 3
Fan Group 2
Fan Group 1
Oil Recovery Valve
75% SOL. Valve
50% SOL. Valve
25% SOL. Valve
Comp. Start/Stop
Water Pump
X:Terminal is arranged by the 220AC/24DC/analog signal / EXV.pulse order
220AC 1X:1~1X:34 1X:33~1X:34Redundancy
Separated with the following terminal with fixtures
24DC 1X:35~1X:54 1X:45~1X:46Redundancy
analog signal 1X:55~1X:76
EXV.pulse 1X:77~1X:80
Separated with the front terminal with fixtures
The same terminals of No. 1 and No. 2 put together.
Customer terminal X:1~X:22
X:1~X:8 stands for input of passive signal.
X:9~X:12 stands for connection of multi-communications and
X:13~X:22 stands for the output of 200VAC
LSBLGW600/C
TOTAL SHEETS 7
NO. OF SHEETS 4


6/5A
A3 TM2DRA16RT
COM1
COM1
Q15
Q14
Q13
Q12
Q11
Q10
Q9
Q8
COM0
COM0
Q7
Q6
Q5
Q4
Q3
Q2
Q1
Q0
Aux. Heater (Heat pump)
Heating Lamp (Heat pump)
Cooling Lamp
Alarm
Evap. Heater (Heat Pump)
Economizer
Tail Inject.Val
Mid.Inject.Val.
Bypass SOL. Valve (Only Heat Pump)
4-way Valve (Only Heat Pump)
X:22
KA7
X:21
43
X:19
KA6
X:20
41
X:18
KA5
X:17
39
X:15
KA2
X:16
37
1X:19
KA4
1X:20
35
1X:18
YV9
1X:17
33
1X:15
YV8
1X:16
31
1X:14
YV7
1X:13
29
1X:11
YV6
1X:12
27
1X:10
YV5
1X:9
25
A2 TM2DOCKN
L13
Nb
4/12F
4/12F
4/12D
LSBLGW600/C
TOTAL SHEETS 7
NO.OF SHEETS 5


A7TM2AMM6HT
I3
V3
COM
I2
V2
I1
V1
COM
I0
V0
S1
COM
VI1
S0
COM
VI0
NC
-
+
2/7E
2/8E
76
78
74
70
TP2
TP1
1X:73
1X:72
1X:70
1X:71
Suction Pressure
Discharge Pressure
Discharge Temp.
RT5
1X:67
1X:68
1X:69
64
66
68
A6TM2ART8LT
IN4
IN5
IN6
IN7
IN0
IN1
IN2
IN3
5/12B
A
B'
B
NC
+
0V
1X:55
1X:56
1X:57
1X:58
1X:59
1X:60
1X:61
1X:62
1X:63
1X:64
1X:65
1X:66
40
42
44
46
48
50
52
54
56
58
60
62
RT1
RT2
RT4
Leaving Water Temp.
Entering Water Temp.
Standby
Ambient Temp.
2
4
4/12B
4/12B
LSBLGW600/C
TOTAL SHEETS 7
NO OF SHEETS 6

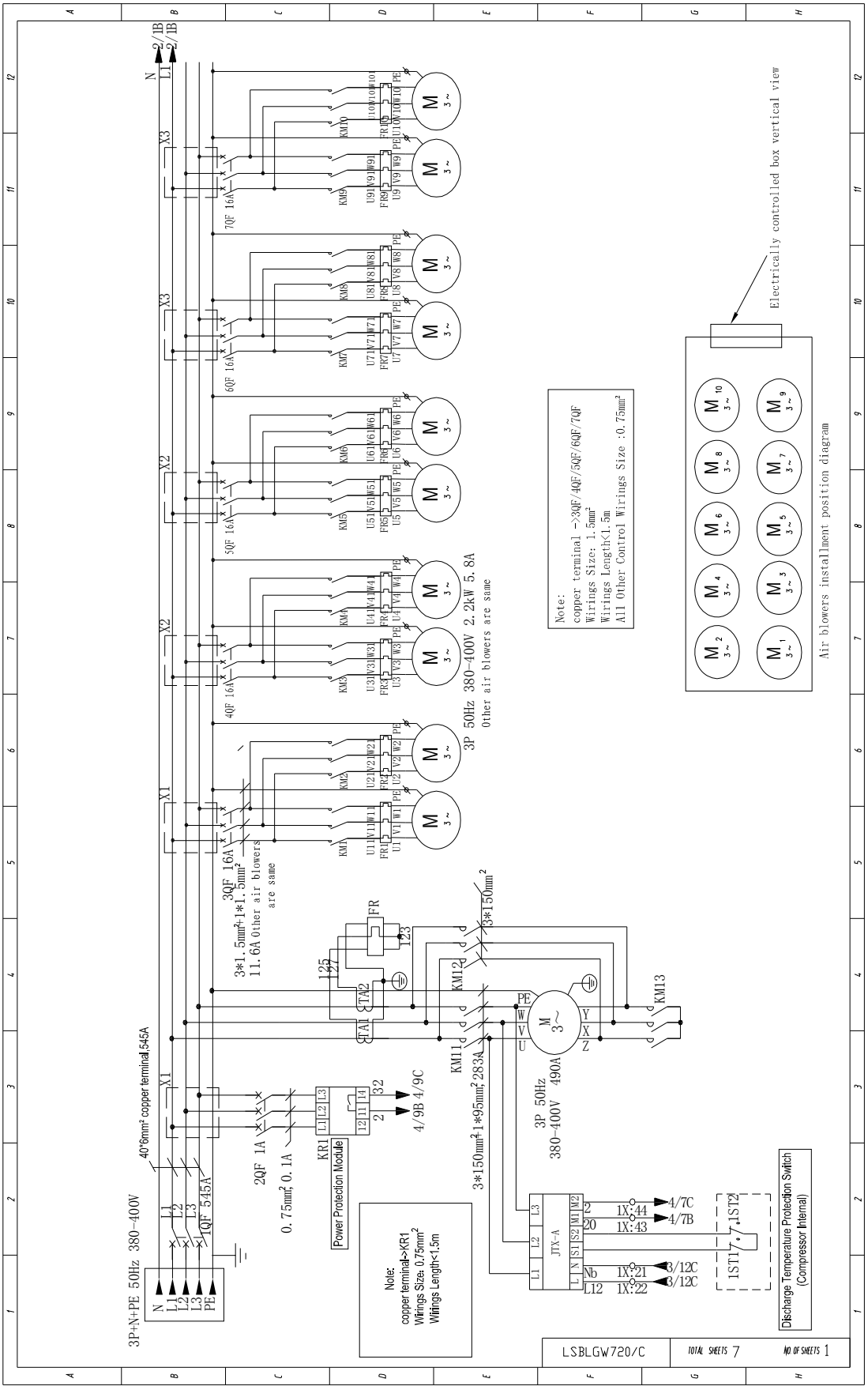


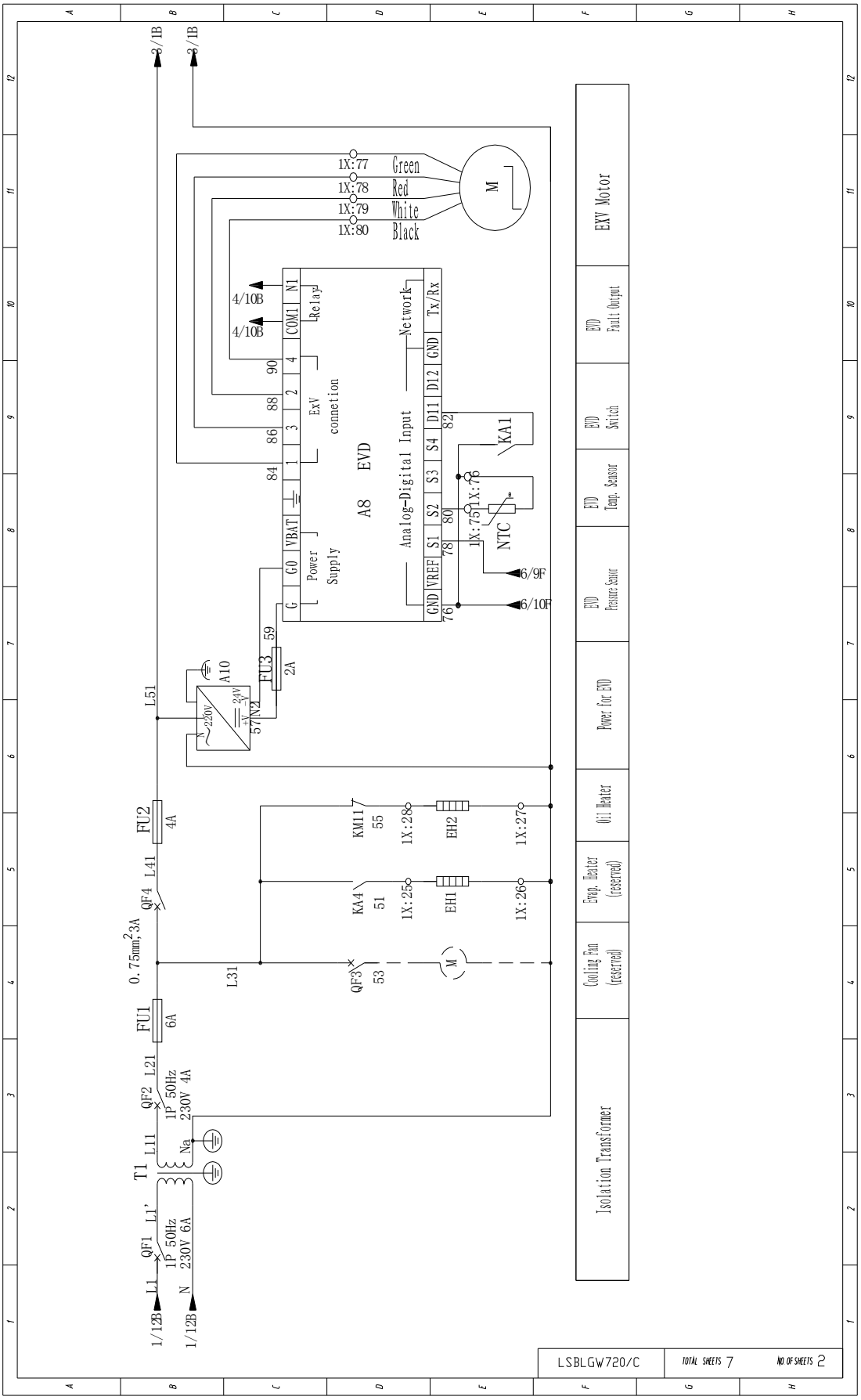
ITEM	SYMBOL	ITEM	DESCRIPTION
1	TA1 TA2		Current Transformer
2	1QF		Moulded Case Circuit Breaker
3	QF1 QF2 QF3 QF4		Air Switch
4	FU1 FU2 FU3		Fuse
5	KR1		Power Protection Module
6	KM11 KM12 KM13		Compressor Contactor
7	FR FR1~FR10		Thermal Overload Relay
8	M		Motor
9	KT1		Time Relay
10	KM1~KM10		Fan Contactor
11	SB		Emergency Stop
12	T1		Isolation Transformer
13	EH1 EH2		Compressor Heater
14	SQ1		Water Flow Switch
15	SQ2		Anti-Freeze Switch
16	KA1		Intermediate Relay
17	SA		Key Switch
18	SA1		C/H Mode Switch
19	SL1		Oil Level Switch

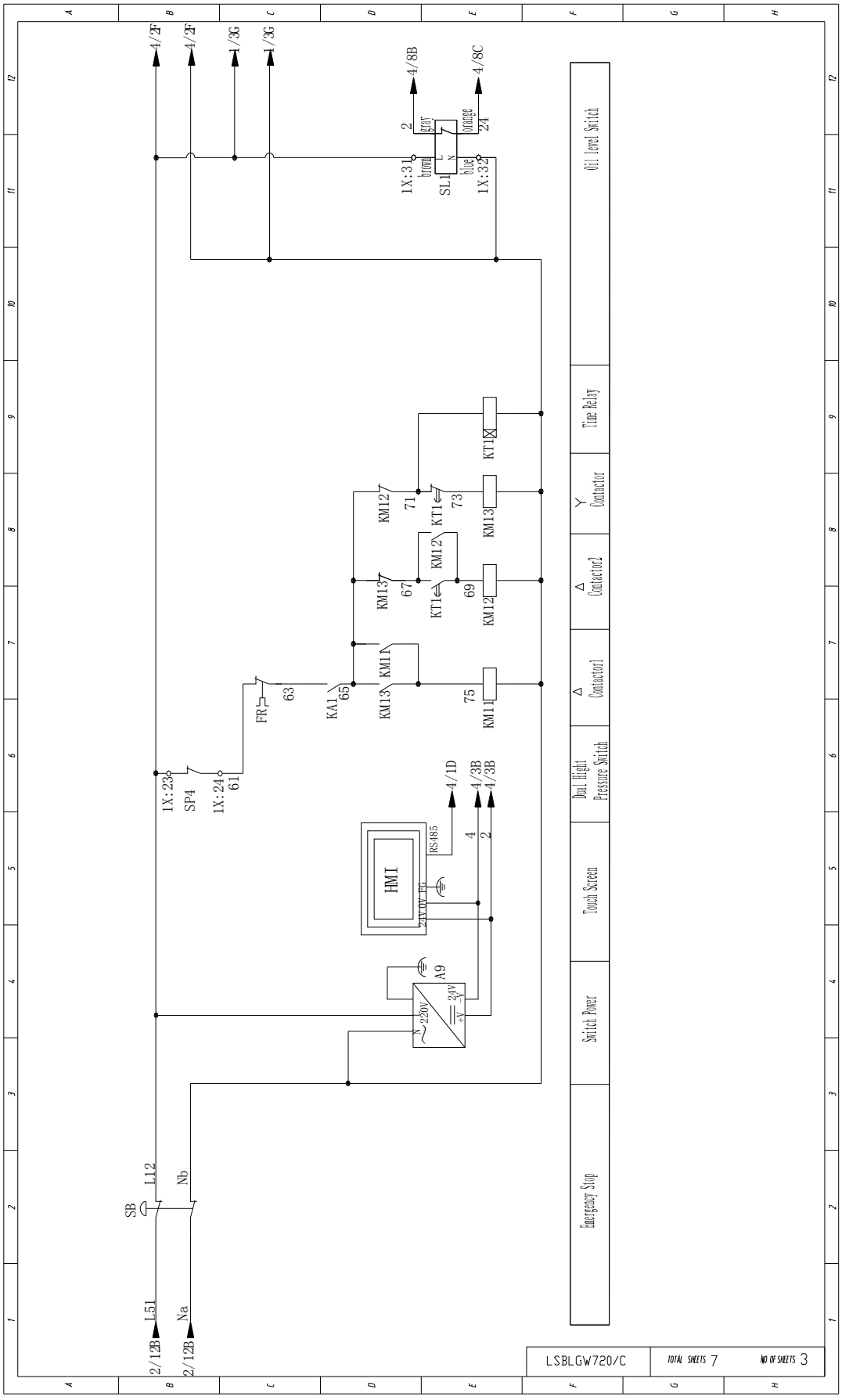
ITEM	SYMBOL	ITEM	DESCRIPTION
20	SQ3		Protection Switch
21	2QF 3QF 4QF 5QF 6QF 6QF		Miniature Circuit Breaker
22	RT1~RT5 NTC		Temperature Sensor
23	YV1~YV9		Solenoid Valve
24	SP1 SP2 SP3		Pressure Switch
25	TP1 TP2		Pressure Transducer
26	A1		CPU Module of PLC
27	A2		Extended Adaptor of PLC
28	A3		Extended Output Module of PLC
29	A6		Temperature Module of PLC
30	A7		Analog Singles Mixed Module of PLC
31	HMI		Touch Screen
32	A8		Electrical Expansion Valve Module
33	A9		Switch Power
34	A10		Power of Electrical Expansion Valve
35	EXV		Electrical Expansion Valve

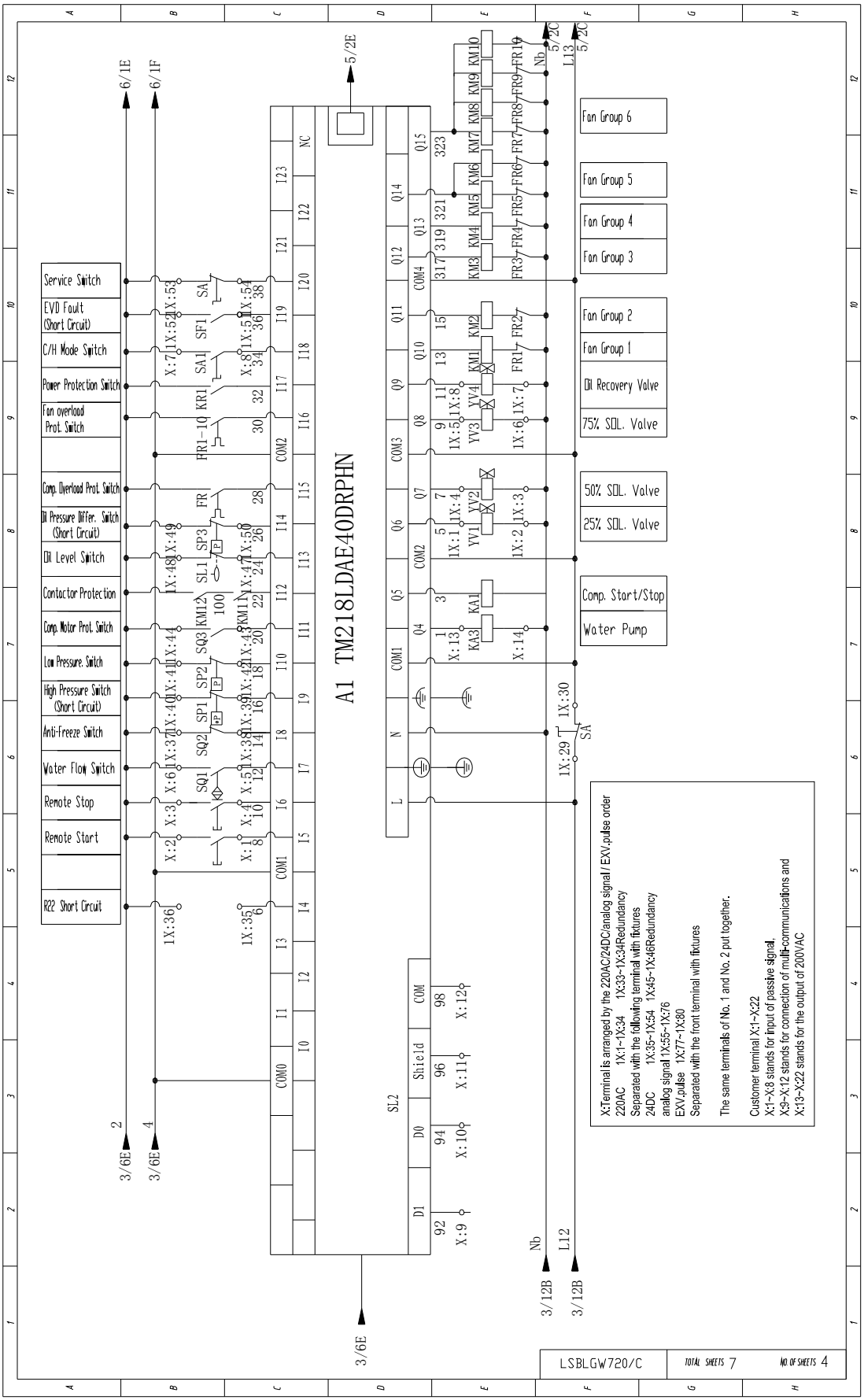
LSBLGW600/C | TOTAL SHEETS 7 | NO OF SHEETS 7

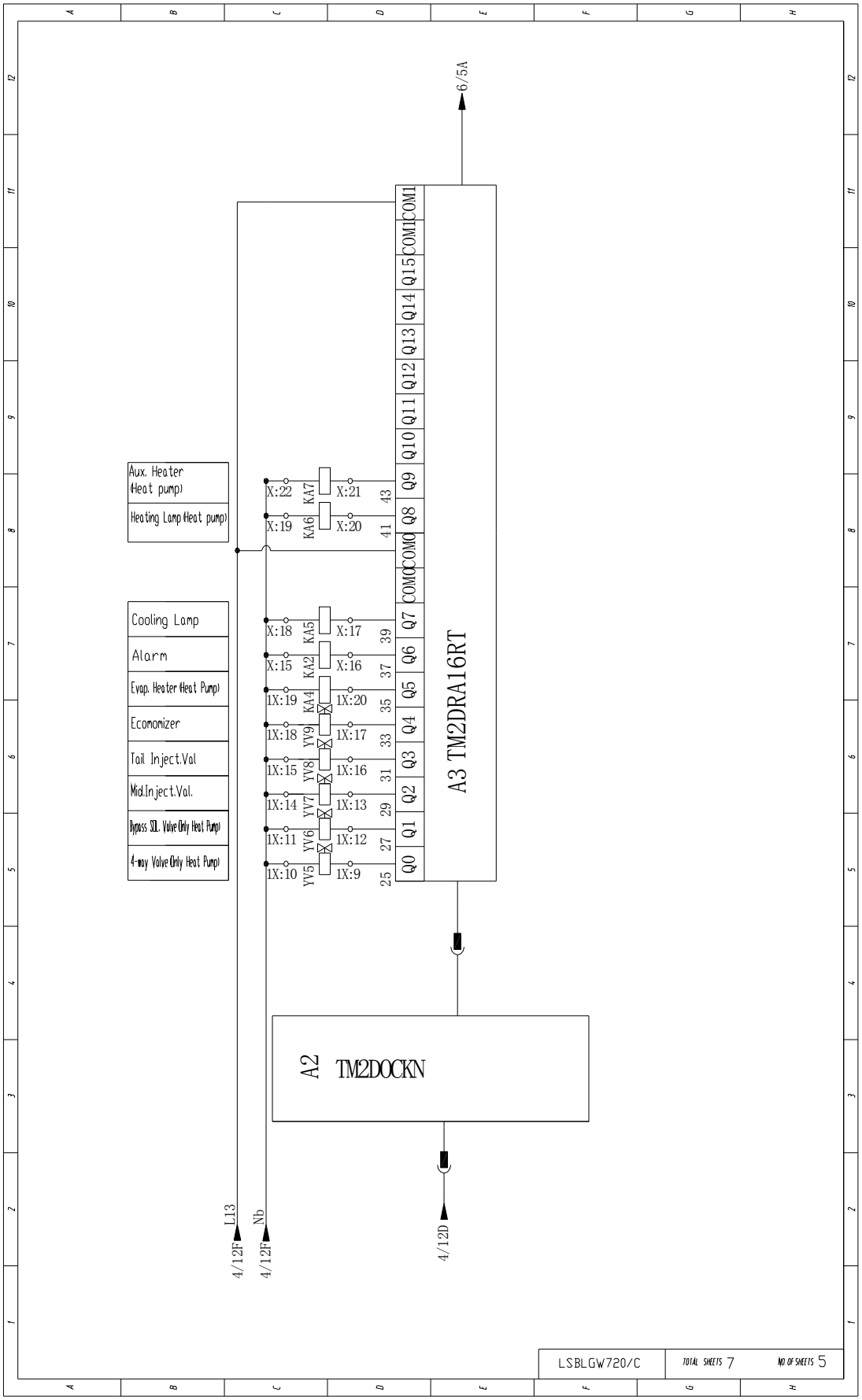
LSBLGW720/C WIRING DIAGRAM

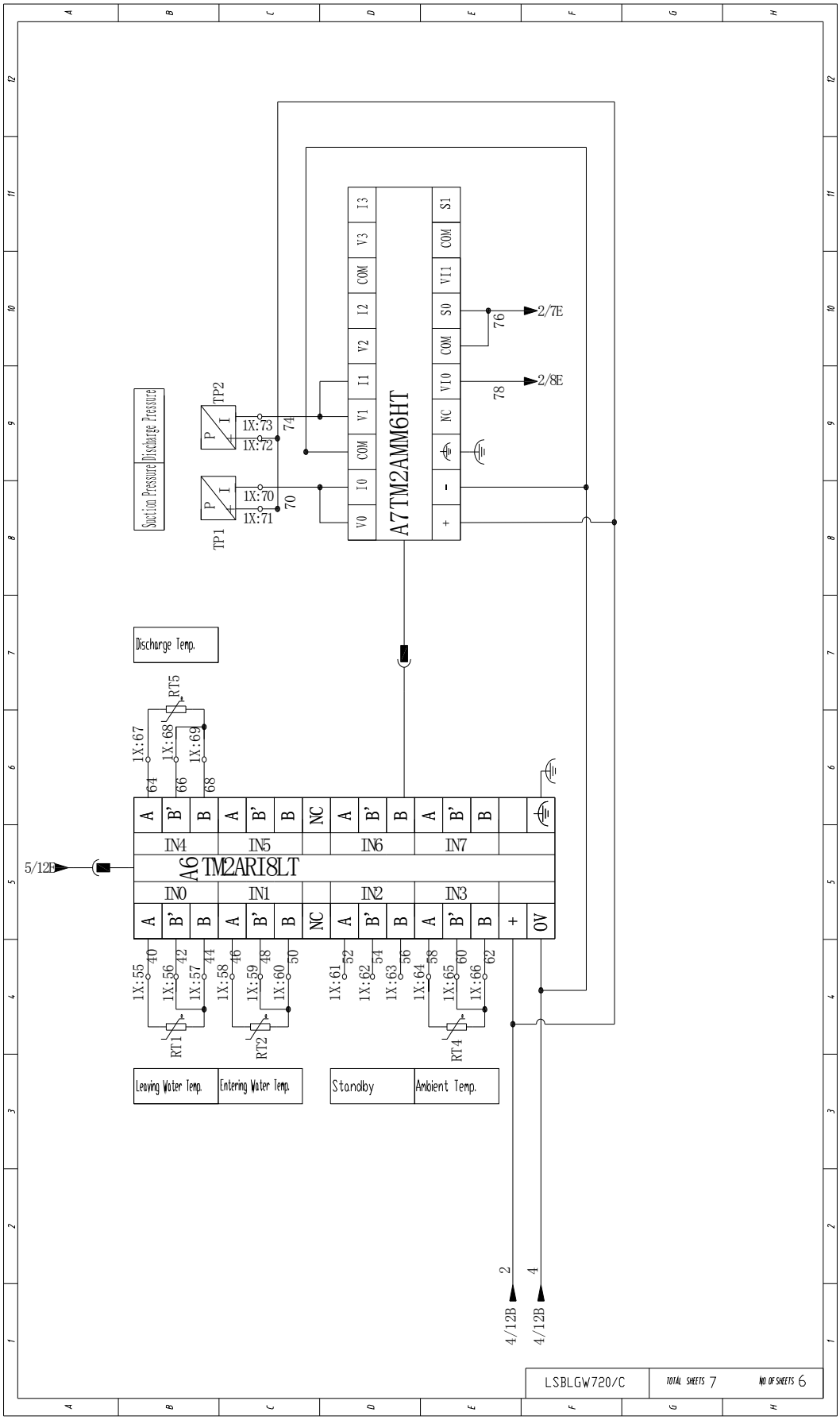


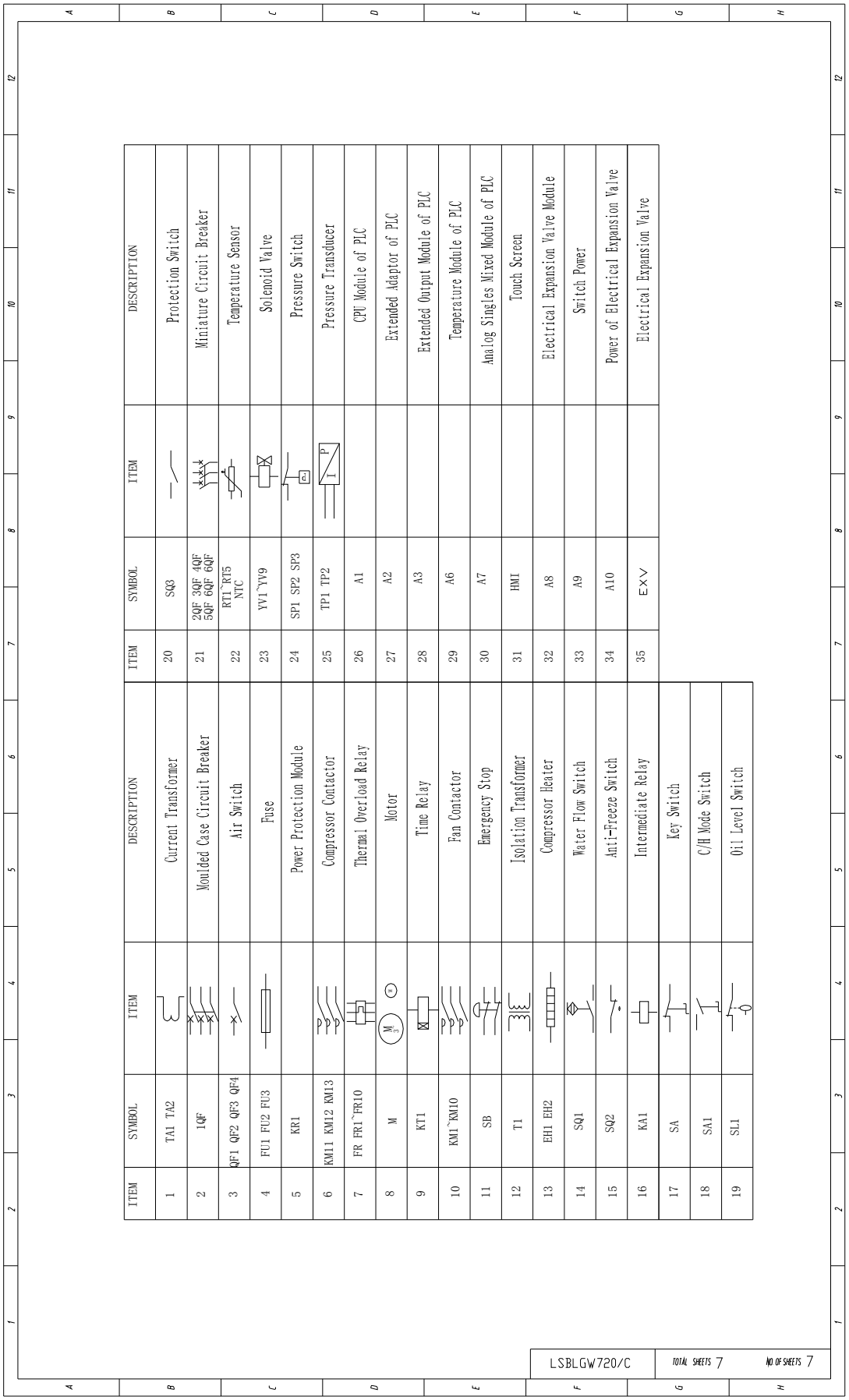

1X:77 Green
1X:78 Red
1X:79 White
1X:80 Black
M
EXV Motor
EVD Fault Output
EVD Switch
EVD Temp. Sensor
EVD Pressure Sensor
Power for EVD
Oil Heater
Evap. Heater (reserved)
Cooling Fan (reserved)
Isolation Transformer
A8 EVD
Analog-Digital Input
Network
Tx/Rx
Relay
ExV connetion
Power Supply
KA1
NTC
FU1 6A
FU2 4A
FU3 2A
QF1 1P 50Hz 6A
QF2 1P 50Hz 230V 4A
QF3
QF4
KM11
KA4
EH1
EH2
T1
A10
L1
L1'
L11
L21
L31
L41
L51
N
Na
0.75mm²-3A
1/12B
2/1B
4/10B
6/9F
6/10F
LSBLGW720/C
TOTAL SHEETS 7
NO.OF SHEETS 2


4/2F
4/2F
1/3G
1/3G
4/8B
4/8C
2
24
1X:31
1X:32
SL1
blue
brown
orange
Oil level Switch
Time Relay
Y Contactor
△ Contactor2
△ Contactor1
Dual Light Pressure Switch
Touch Screen
Switch Power
Emergency Stop
KT1
KM12
KT1
KM13
KM13
KM12
KT1
KM11
KM12
KM13
KM11
71
73
67
69
75
63
65
FR
KA1
1X:23
SP4
1X:24
61
4/1D
4/3B
4/3B
4
2
RS485
HMI
A9
220v
24V
+V
SB
L12
Nb
L51
Na
2/12B
2/12B
LSBLGW720/C
TOTAL SHEETS 7
NO OF SHEETS 3


A1 TM218LDAE40DRPHN
Service Switch
EVD Fault (Short Circuit)
C/H Mode Switch
Power Protection Switch
Fan overload Prot. Switch
Comp. Overload Prot. Switch
Oil Pressure Differ. Switch (Short Circuit)
Oil Level Switch
Contactor Protection
Comp. Motor Prot. Switch
Low Pressure Switch
High Pressure Switch (Short Circuit)
Anti-freeze Switch
Water Flow Switch
Remote Stop
Remote Start
R22 Short Circuit
Fan Group 6
Fan Group 5
Fan Group 4
Fan Group 3
Fan Group 2
Fan Group 1
Oil Recovery Valve
75% SOL. Valve
50% SOL. Valve
25% SOL. Valve
Comp. Start/Stop
Water Pump
X:Terminal is arranged by the 220AC/24DC/analog signal / EXV.pulse order
220AC 1X:1~1X:34 1X:33~1X:34Redundancy
Separated with the following terminal with fixtures
24DC 1X:35~1X:54 1X:45~1X:46Redundancy
analog signal 1X:55~1X:76
EXV.pulse 1X:77~1X:80
Separated with the front terminal with fixtures
The same terminals of No. 1 and No. 2 put together.
Customer terminal X:1~X:22
X:1~X:8 stands for input of passive signal.
X:9~X:12 stands for connection of multi-communications and
X:13~X:22 stands for the output of 200VAC
LSBLGW720/C
TOTAL SHEETS 7
NO. OF SHEETS 4


6/5A
A3 TM2DRA16RT
COM1
COM1
Q15
Q14
Q13
Q12
Q11
Q10
Q9
Q8
COM0
COM0
Q7
Q6
Q5
Q4
Q3
Q2
Q1
Q0
Aux. Heater (Heat pump)
Heating Lamp (Heat pump)
Cooling Lamp
Alarm
Evap. Heater (Heat Pump)
Economizer
Tail Inject.Val
Mid.Inject.Val.
Bypass SOL. Valve (Only Heat Pump)
4-way Valve (Only Heat Pump)
X:22
KA7
X:21
43
X:19
KA6
X:20
41
X:18
KA5
X:17
39
X:15
KA2
X:16
37
1X:19
KA4
1X:20
35
1X:18
YV9
1X:17
33
1X:15
YV8
1X:16
31
1X:14
YV7
1X:13
29
1X:11
YV6
1X:12
27
1X:10
YV5
1X:9
25
A2 TM2DOCKN
L13
Nb
4/12F
4/12F
4/12D
LSBLGW720/C
TOTAL SHEETS 7
NO.OF SHEETS 5


A7TM2AMM6HT
I3
V3
COM
I2
V2
I1
V1
COM
I0
V0
S1
COM
VI1
S0
COM
VI0
NC
-
+
2/7E
2/8E
76
78
74
70
TP2
TP1
P
I
1X:73
1X:72
1X:70
1X:71
Discharge Pressure
Suction Pressure
Discharge Temp.
RT5
1X:67
1X:68
1X:69
64
66
68
A6TM2ART8LT
IN4
IN5
IN6
IN7
IN0
IN1
IN2
IN3
5/12B
A
B'
B
NC
+
0V
1X:55
1X:56
1X:57
1X:58
1X:59
1X:60
1X:61
1X:62
1X:63
1X:64
1X:65
1X:66
40
42
44
46
48
50
52
54
56
58
60
62
RT1
RT2
RT4
Leaving Water Temp.
Entering Water Temp.
Standby
Ambient Temp.
2
4
4/12B
4/12B
LSBLGW720/C
TOTAL SHEETS 7
NO OF SHEETS 6

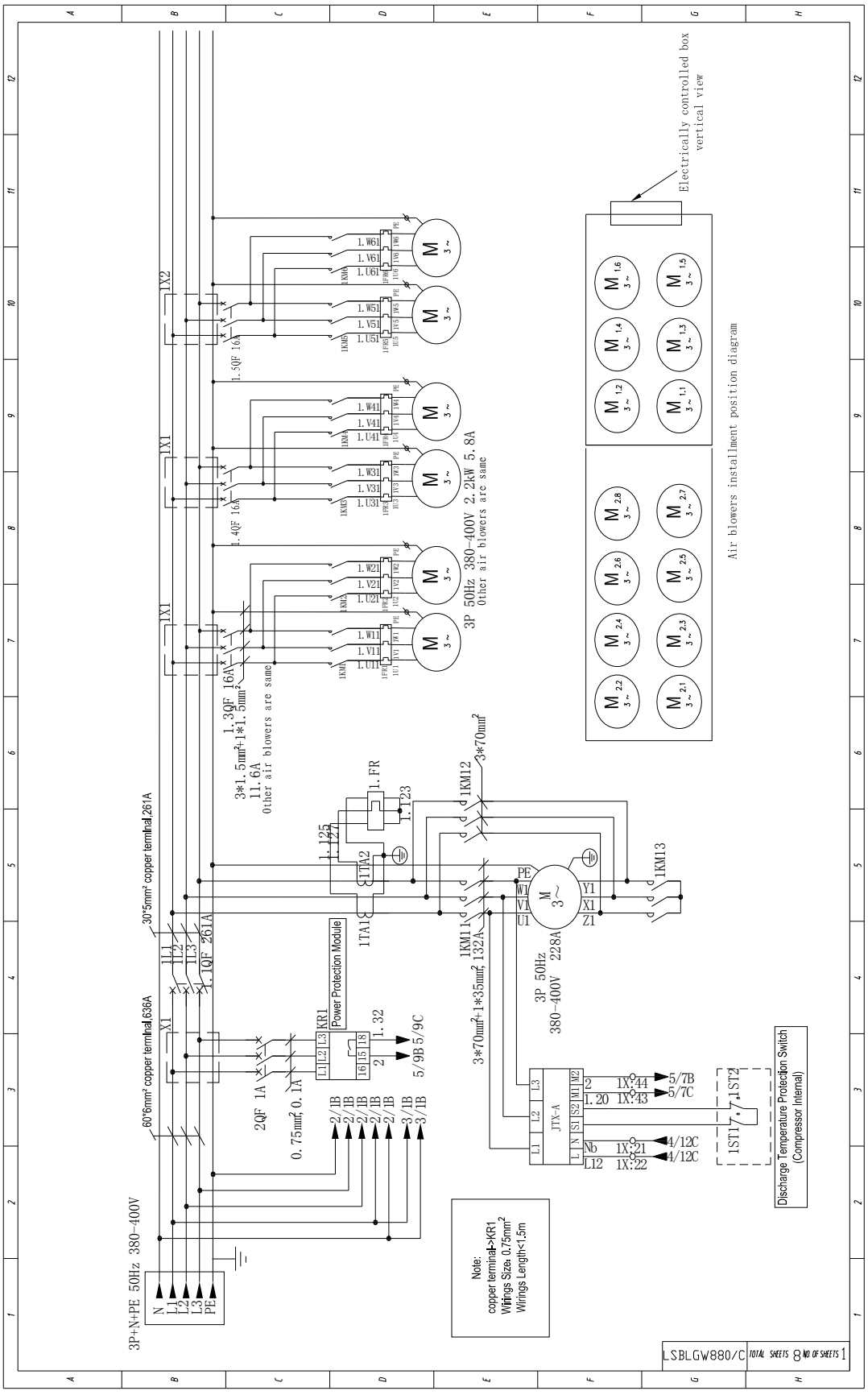


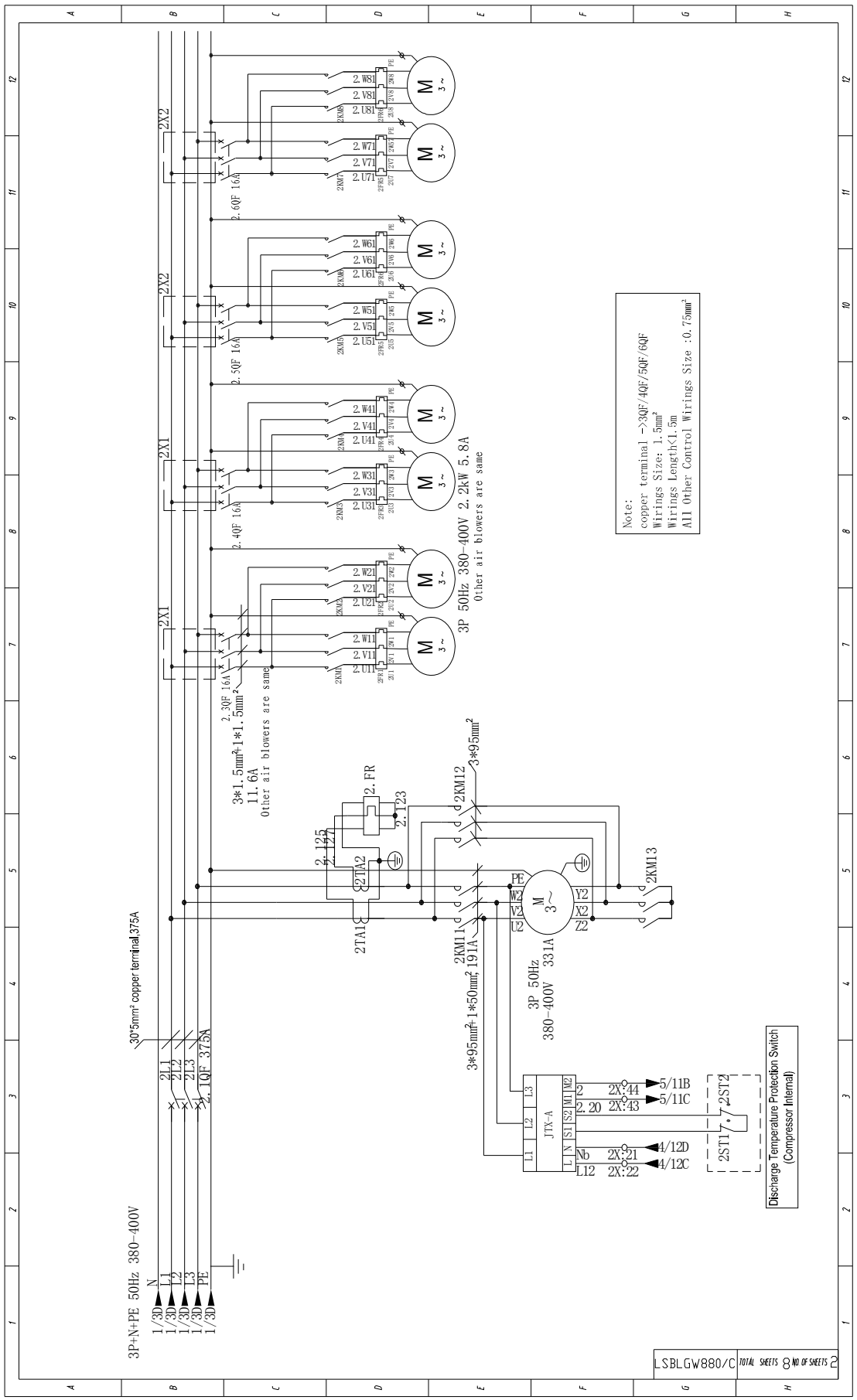
ITEM	SYMBOL	ITEM	DESCRIPTION
1	TA1 TA2		Current Transformer
2	1QF		Moulded Case Circuit Breaker
3	QF1 QF2 QF3 QF4		Air Switch
4	FU1 FU2 FU3		Fuse
5	KR1		Power Protection Module
6	KM11 KM12 KM13		Compressor Contactor
7	FR FR1~FR10		Thermal Overload Relay
8	M	M 3~	Motor
9	KT1		Time Relay
10	KM1~KM10		Fan Contactor
11	SB		Emergency Stop
12	T1		Isolation Transformer
13	EH1 EH2		Compressor Heater
14	SQ1		Water Flow Switch
15	SQ2		Anti-Freeze Switch
16	KA1		Intermediate Relay
17	SA		Key Switch
18	SA1		C/H Mode Switch
19	SL1		Oil Level Switch

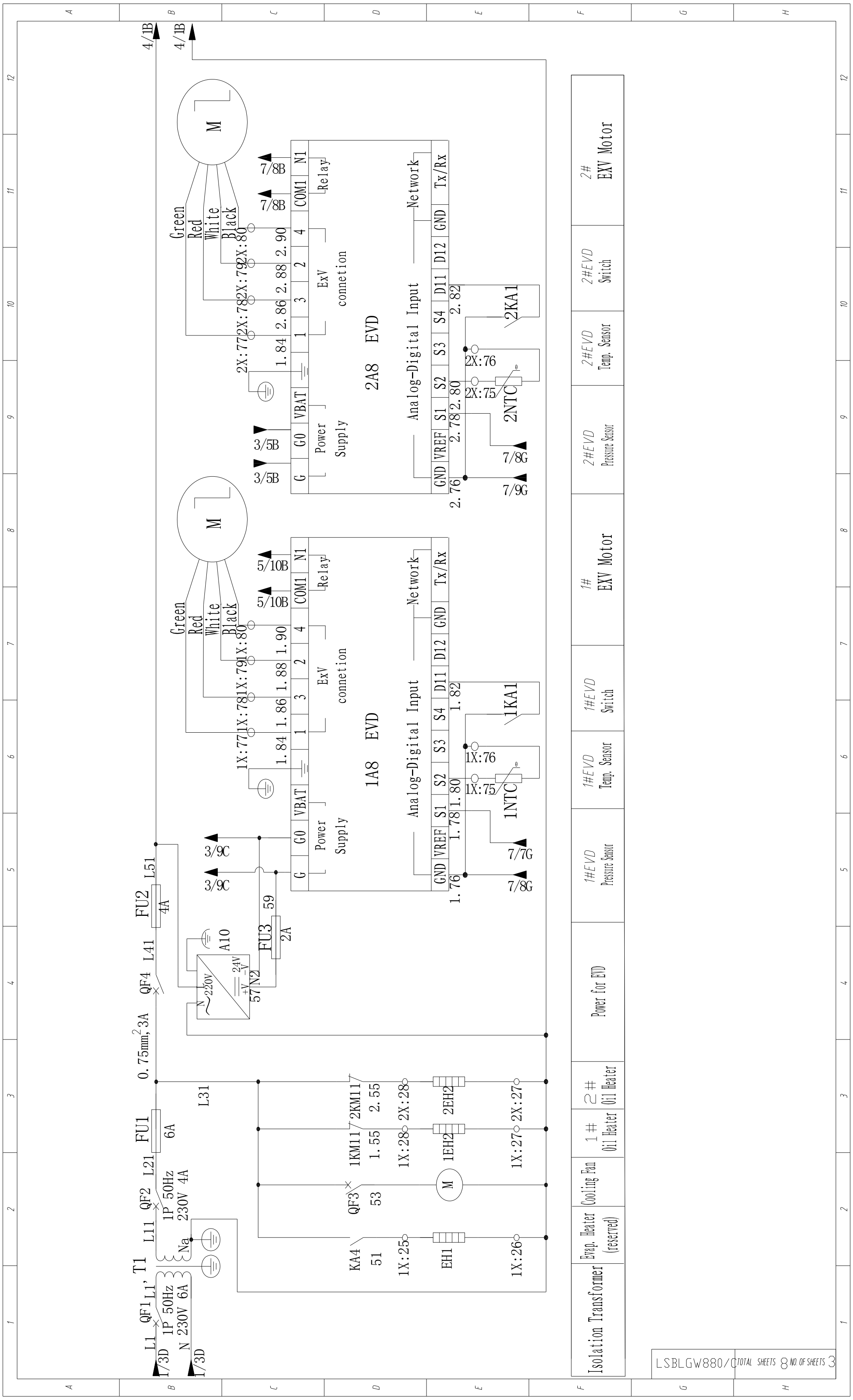
ITEM	SYMBOL	ITEM	DESCRIPTION
20	SQ3		Protection Switch
21	2QF 3QF 4QF 5QF 6QF 7QF		Miniature Circuit Breaker
22	RT1~RT5 NTC		Temperature Sensor
23	YV1~YV9		Solenoid Valve
24	SP1 SP2 SP3		Pressure Switch
25	TP1 TP2	P I	Pressure Transducer
26	A1		CPU Module of PLC
27	A2		Extended Adaptor of PLC
28	A3		Extended Output Module of PLC
29	A6		Temperature Module of PLC
30	A7		Analog Singles Mixed Module of PLC
31	HMI		Touch Screen
32	A8		Electrical Expansion Valve Module
33	A9		Switch Power
34	A10		Power of Electrical Expansion Valve
35	EXV		Electrical Expansion Valve

LSBLGW720/C TOTAL SHEETS 7 NO OF SHEETS 7

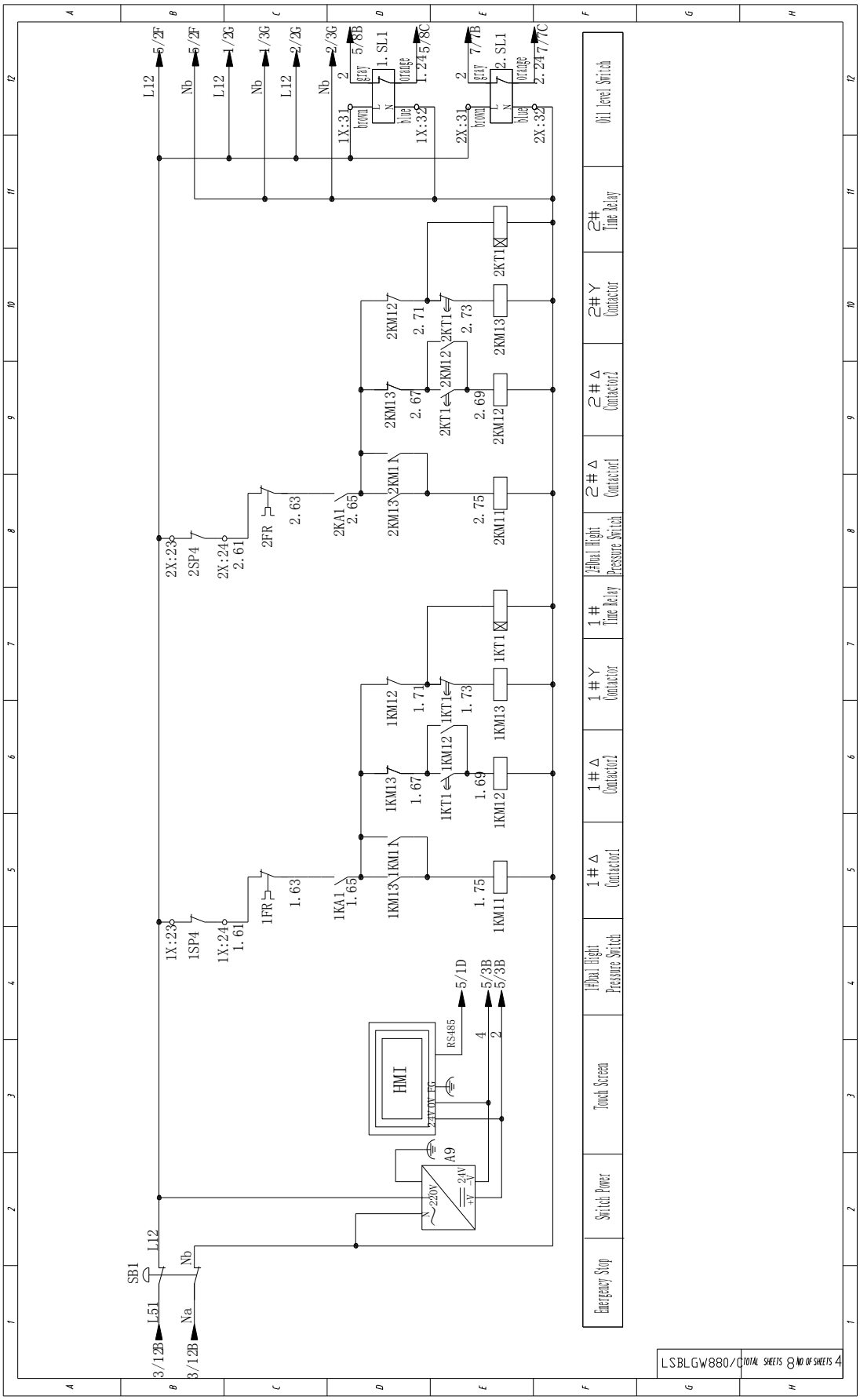
LSBLGW880/C WIRING DIAGRAM

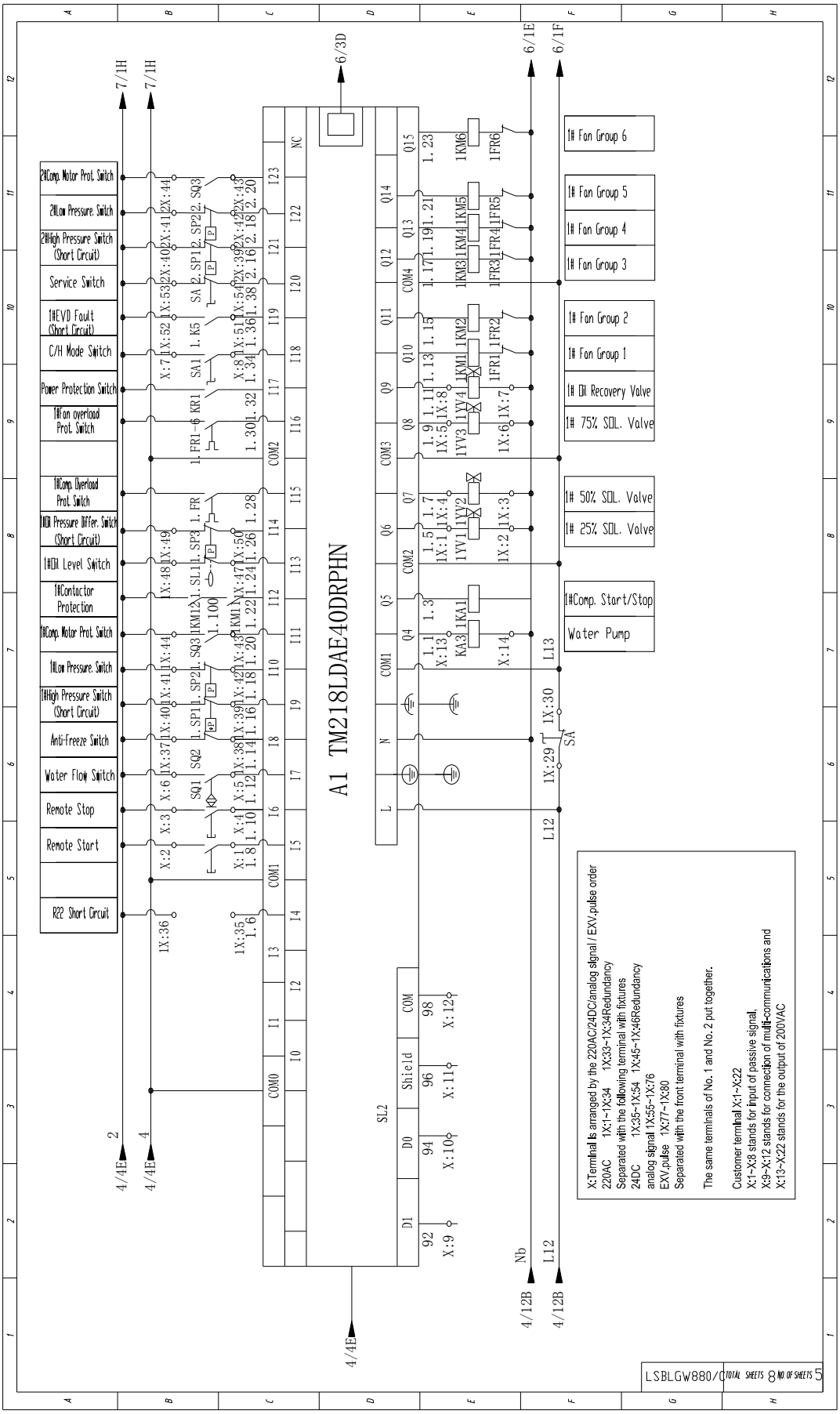


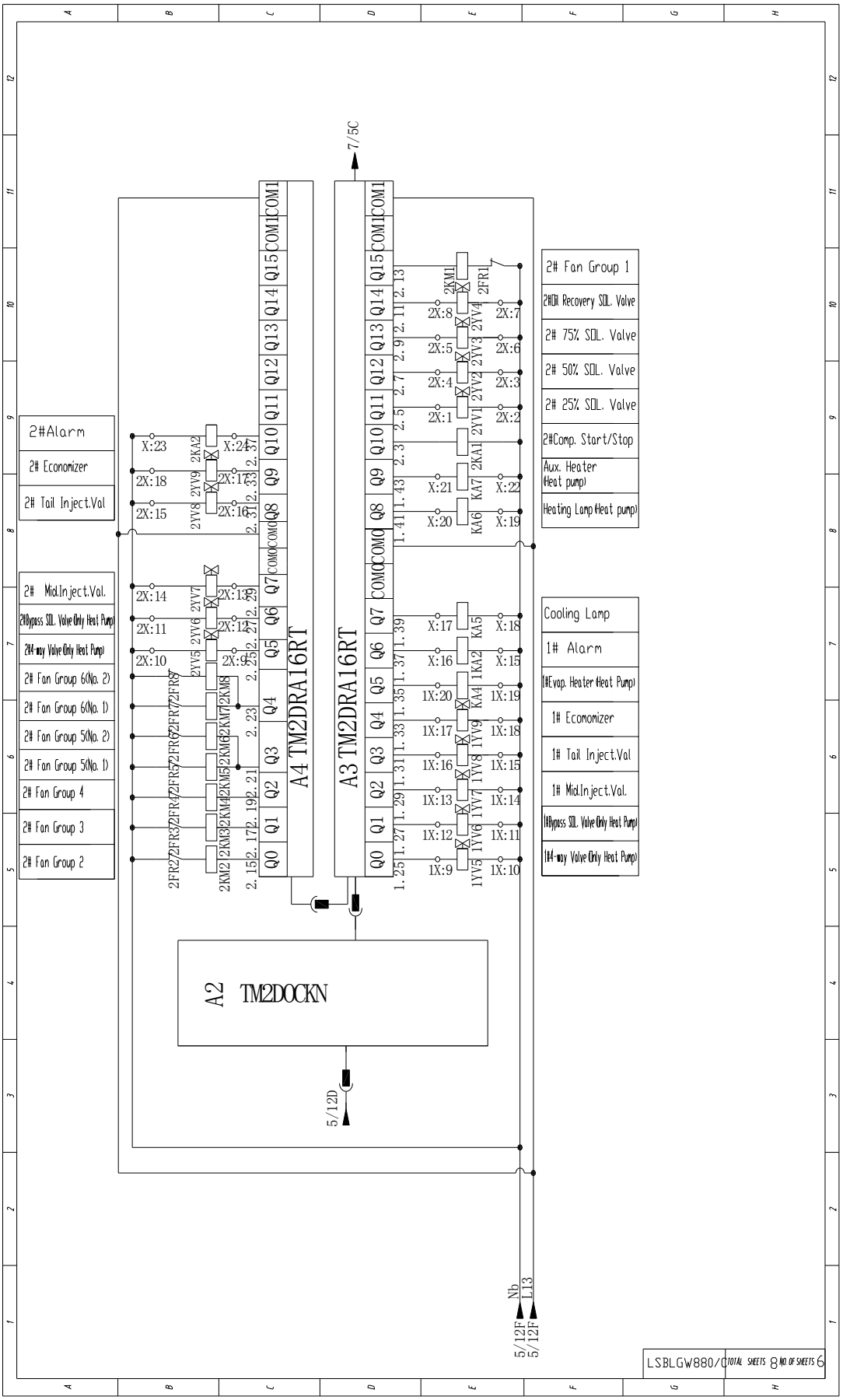

3P+N+PE 50Hz 380-400V
N
L1
L2
L3
PE
2.10F 375A
30*5mm² copper terminal,375A
2.30F 16A
3*1.5mm²+1*1.5mm²
11.6A
Other air blowers are same
2.40F 16A
2.50F 16A
2.60F 16A
2X1
2X2
2.W11
2.V11
2.U11
2.W21
2.V21
2.U21
2.W31
2.V31
2.U31
2.W41
2.V41
2.U41
2.W51
2.V51
2.U51
2.W61
2.V61
2.U61
2.W71
2.V71
2.U71
2.W81
2.V81
2.U81
3P 50Hz 380-400V 2.2kW 5.8A
Other air blowers are same
Note:
copper terminal ->3QF/4QF/5QF/6QF
Wirings Size: 1.5mm²
Wirings Length<1.5m
All Other Control Wirings Size :0.75mm²
2.FR
2.T23
2.T25
2TA2
2TA1
2KM12
3*95mm²
2KM11
3*95mm² 191A
2KM13
3P 50Hz
380-400V 331A
JTX-A
2.20
2X:44
2X:43
2X:21
2X:22
5/11B
5/11C
4/12D
4/12C
2ST2
2ST1
Discharge Temperature Protection Switch
(Compressor Internal)
LSBLGW880/C
TOTAL SHEETS 8 NO OF SHEETS 2

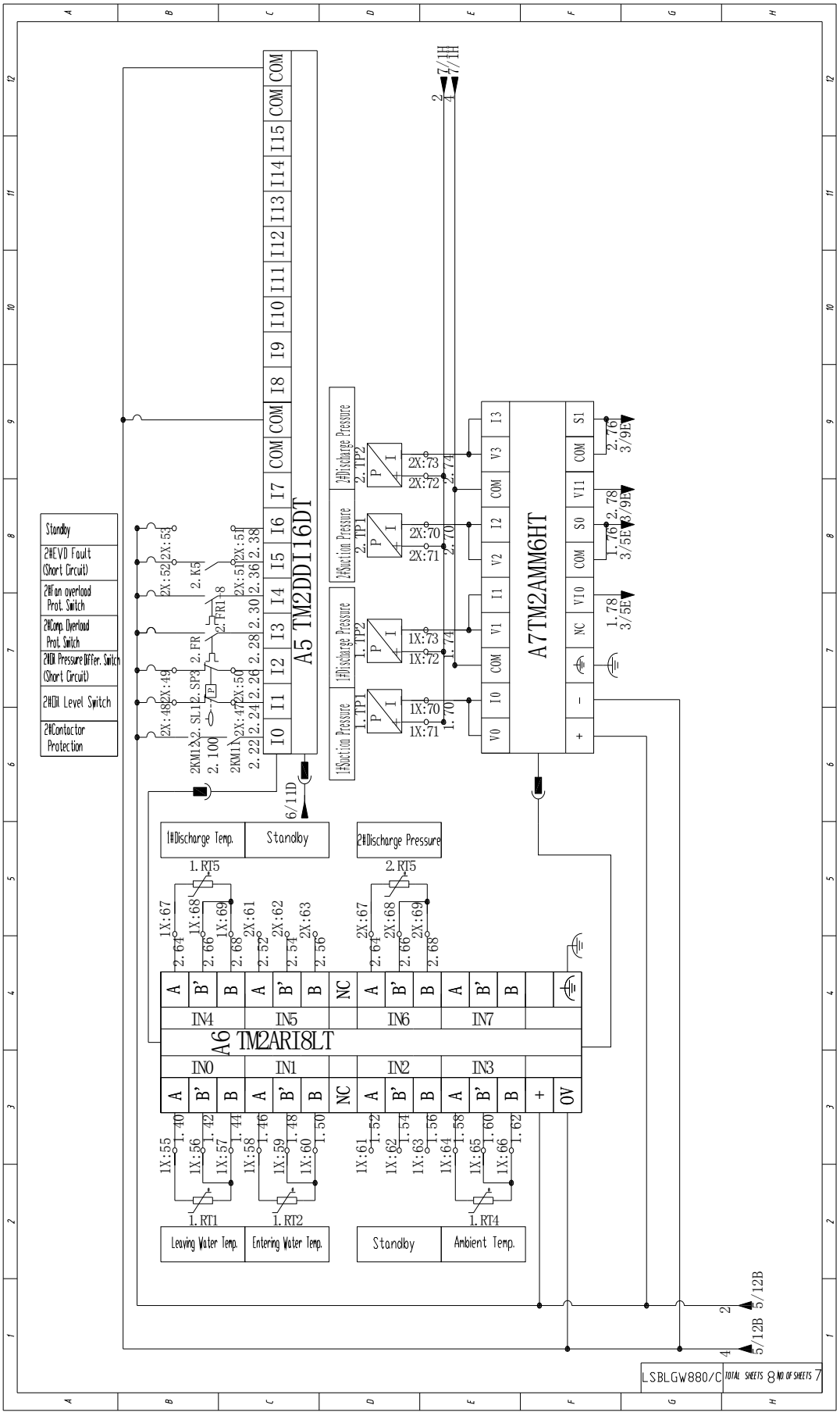


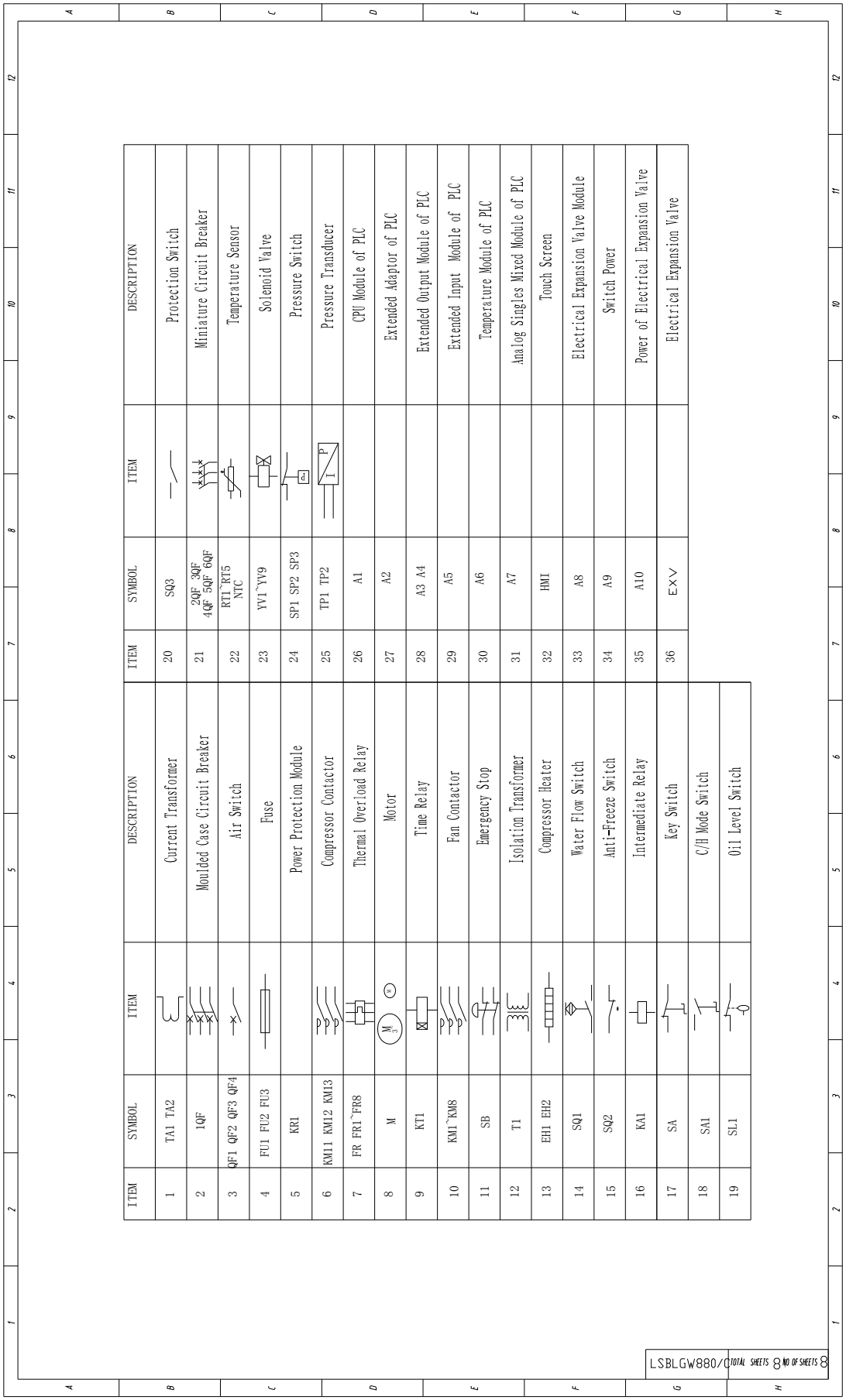
2# EXV Motor
2#EVD Switch
2#EVD Temp. Sensor
2#EVD Pressure Sensor
1# EXV Motor
1#EVD Switch
1#EVD Temp. Sensor
1#EVD Pressure Sensor
Power for EVD
2# Oil Heater
1# Oil Heater
Cooling Fan
Evap. Heater (reserved)
Isolation Transformer
2A8 EVD
1A8 EVD
Power Supply
ExV connetion
Analog-Digital Input
Relay
Network
2KA1
1KA1
2NTC
1NTC
Green
Red
White
Black
FU1 6A
FU2 4A
FU3 2A
QF1 1P 50Hz 230V 6A
QF2 1P 50Hz 230V 4A
QF3
QF4 3A
T1
2EH2
1EH2
EH1
KA4
1KM11
2KM11
LSBLGW880/C
TOTAL SHEETS 8
NO.OF SHEETS 3


Emergency Stop
Switch Power
Touch Screen
1#Dual Right Pressure Switch
1# Δ Contactor1
1# Δ Contactor2
1# Y Contactor
1# Time Relay
2#Dual Right Pressure Switch
2# Δ Contactor1
2# Δ Contactor2
2# Y Contactor
2# Time Relay
Oil Level Switch
HMI
RS485
220V
24V
A9
SB1
L51
Na
Nb
L12
1KM11
1KM12
1KM13
1KA1
1FR
1SP4
1KT1
2KM11
2KM12
2KM13
2KA1
2FR
2SP4
2KT1
1. SL1
2. SL1
TOTAL SHEETS 8 NO OF SHEETS 4


A1 TM218LDAE40DRPHN
2#Comp. Motor Prot. Switch
2#Low Pressure Switch
2#High Pressure Switch (Short Circuit)
Service Switch
1#EVD Fault (Short Circuit)
C/H Mode Switch
Power Protection Switch
1#Fan overload Prot. Switch
1#Comp. Overload Prot. Switch
1#Oil Pressure Differ. Switch (Short Circuit)
1#Oil Level Switch
1#Contactor Protection
1#Comp. Motor Prot. Switch
1#Low Pressure Switch
1#High Pressure Switch (Short Circuit)
Anti-freeze Switch
Water Flow Switch
Remote Stop
Remote Start
R22 Short Circuit
1# Fan Group 6
1# Fan Group 5
1# Fan Group 4
1# Fan Group 3
1# Fan Group 2
1# Fan Group 1
1# CH Recovery Valve
1# 75% SOL. Valve
1# 50% SOL. Valve
1# 25% SOL. Valve
1#Comp. Start/Stop
Water Pump
X:Terminal is arranged by the 220AC/24DC/analog signal / EXV.pulse order
220AC 1X:1~1X:34 1X:33~1X:34Redundancy
Separated with the following terminal with fixtures
24DC 1X:35~1X:54 1X:45~1X:46Redundancy
analog signal 1X:55~1X:76
EXV.pulse 1X:77~1X:80
Separated with the front terminal with fixtures
The same terminals of No. 1 and No. 2 put together.
Customer terminal X:1~X:22
X:1~X:8 stands for input of passive signal.
X:9~X:12 stands for connection of multi-communications and
X:13~X:22 stands for the output of 200VAC
LSBLGW880/C TOTAL SHEETS 8 NO. OF SHEETS 5


A4 TM2DRA16RT
A3 TM2DRA16RT
A2 TM2DOCKN
2#Alarm
2# Economizer
2# Tail Inject.Val
2# Mid.Inject.Val.
2#Bypass SOL. Valve(Only Heat Pump)
2#4-way Valve(Only Heat Pump)
2# Fan Group 6(No. 2)
2# Fan Group 6(No. 1)
2# Fan Group 5(No. 2)
2# Fan Group 5(No. 1)
2# Fan Group 4
2# Fan Group 3
2# Fan Group 2
2# Fan Group 1
2#Oil Recovery SOL. Valve
2# 75% SOL. Valve
2# 50% SOL. Valve
2# 25% SOL. Valve
2#Comp. Start/Stop
Aux. Heater (Heat pump)
Heating Lamp(Heat pump)
Cooling Lamp
1# Alarm
1#Evap. Heater(Heat Pump)
1# Economizer
1# Tail Inject.Val
1# Mid.Inject.Val.
1#Bypass SOL. Valve(Only Heat Pump)
1#4-way Valve(Only Heat Pump)
7/5C
5/12D
5/12F
5/12F
Nb
L13
LSBLGW880/C
TOTAL SHEETS 8 NO. OF SHEETS 6


A5 TM2DDI16DT
A7TM2AMM6HT
A6 TM2ARI8LT
Standby
2#EVD Fault (Short Circuit)
2#Fan overload Prot. Switch
2#Comp. Overload Prot. Switch
2#Oil Pressure Differ. Switch (Short Circuit)
2#Oil Level Switch
2#Contactor Protection
1#Discharge Temp.
Standby
2#Discharge Pressure
Leaving Water Temp.
Entering Water Temp.
Standby
Ambient Temp.
LSBLGW880/C

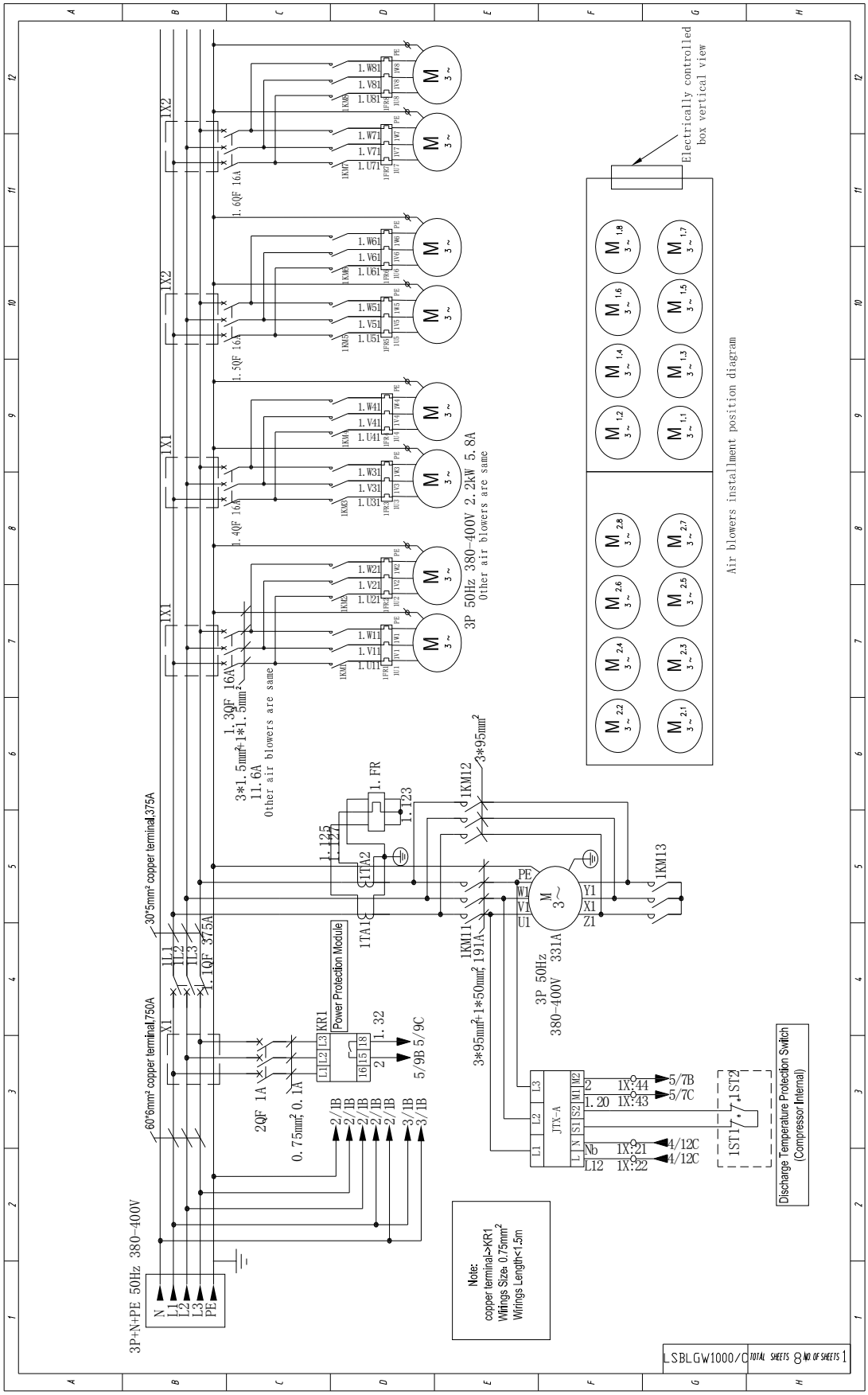


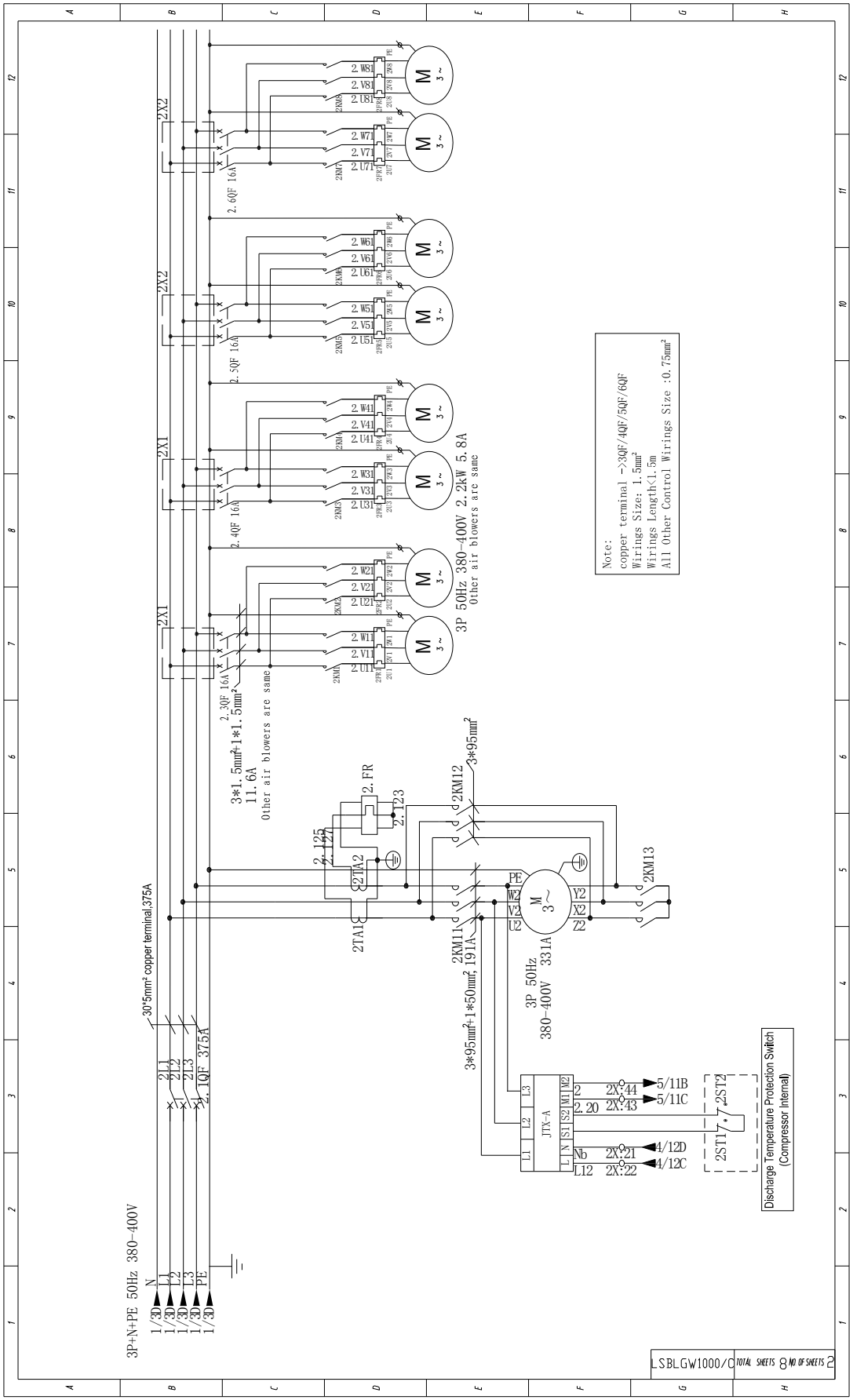
ITEM	SYMBOL	ITEM	DESCRIPTION
1	TA1 TA2		Current Transformer
2	1QF		Moulded Case Circuit Breaker
3	QF1 QF2 QF3 QF4		Air Switch
4	FU1 FU2 FU3		Fuse
5	KR1		Power Protection Module
6	KM11 KM12 KM13		Compressor Contactor
7	FR FR1~FR8		Thermal Overload Relay
8	M		Motor
9	KT1		Time Relay
10	KM1~KM8		Fan Contactor
11	SB		Emergency Stop
12	T1		Isolation Transformer
13	EH1 EH2		Compressor Heater
14	SQ1		Water Flow Switch
15	SQ2		Anti-Freeze Switch
16	KA1		Intermediate Relay
17	SA		Key Switch
18	SA1		C/H Mode Switch
19	SL1		Oil Level Switch

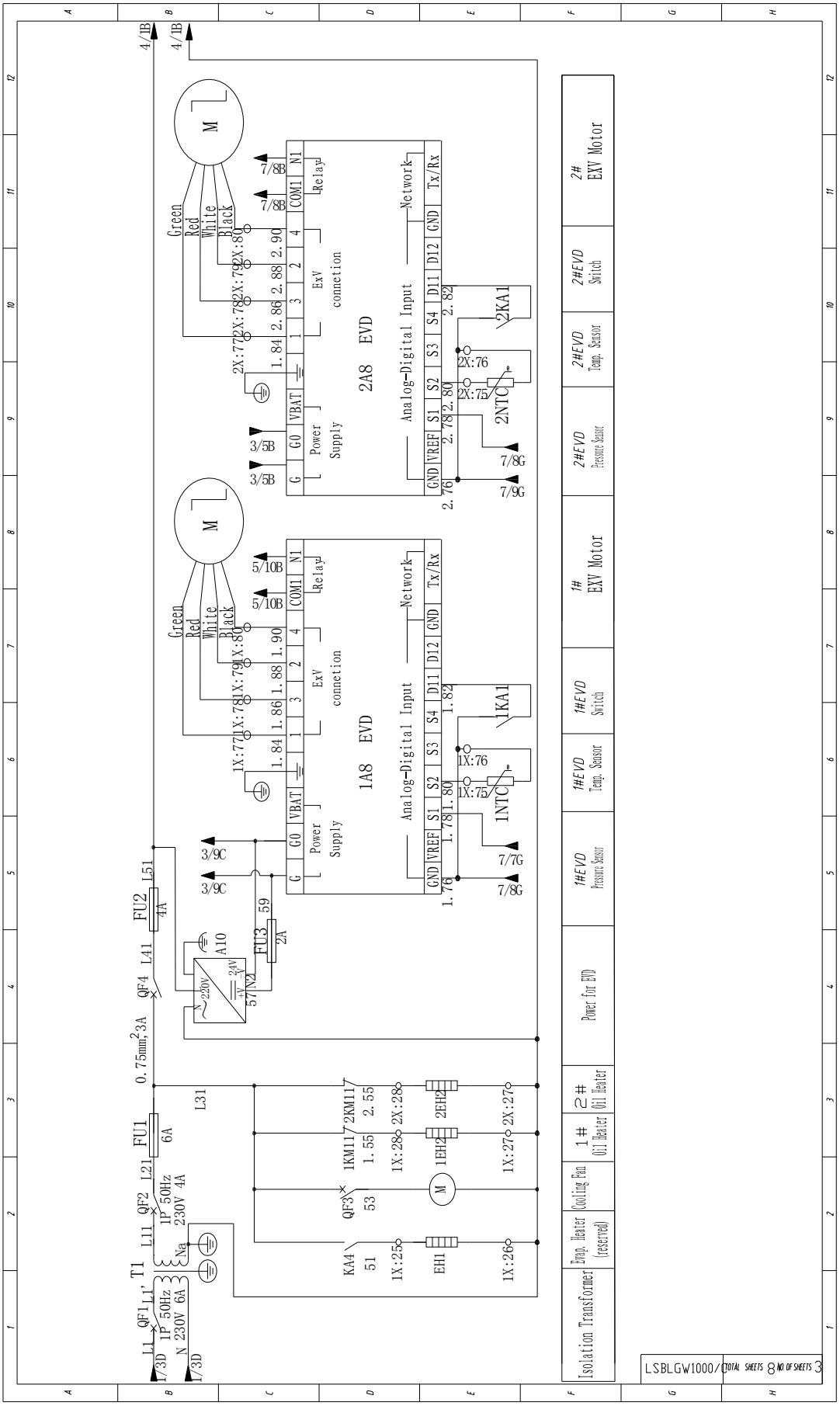
ITEM	SYMBOL	ITEM	DESCRIPTION
20	SQ3		Protection Switch
21	2QF 3QF 4QF 5QF 6QF		Miniature Circuit Breaker
22	RT1~RT5 NTC		Temperature Seansor
23	YV1~YV9		Solenoid Valve
24	SP1 SP2 SP3		Pressure Switch
25	TP1 TP2		Pressure Transducer
26	A1		CPU Module of PLC
27	A2		Extended Adaptor of PLC
28	A3 A4		Extended Output Module of PLC
29	A5		Extended Input Module of PLC
30	A6		Temperature Module of PLC
31	A7		Analog Singles Mixed Module of PLC
32	HMI		Touch Screen
33	A8		Electrical Expansion Valve Module
34	A9		Switch Power
35	A10		Power of Electrical Expansion Valve
36	EXV		Electrical Expansion Valve

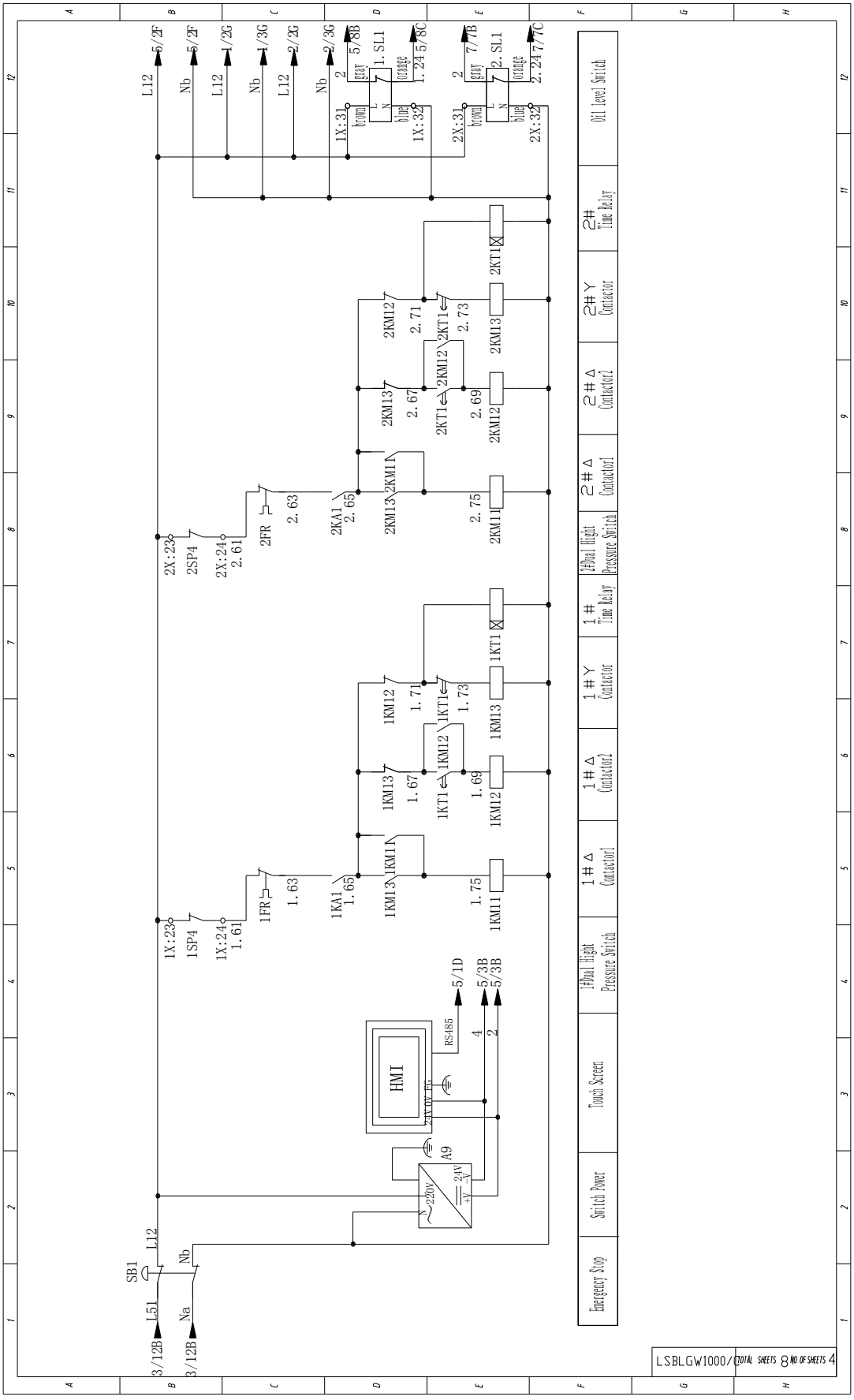
LSBLGW880/C TOTAL SHEETS 8 NO OF SHEETS 8

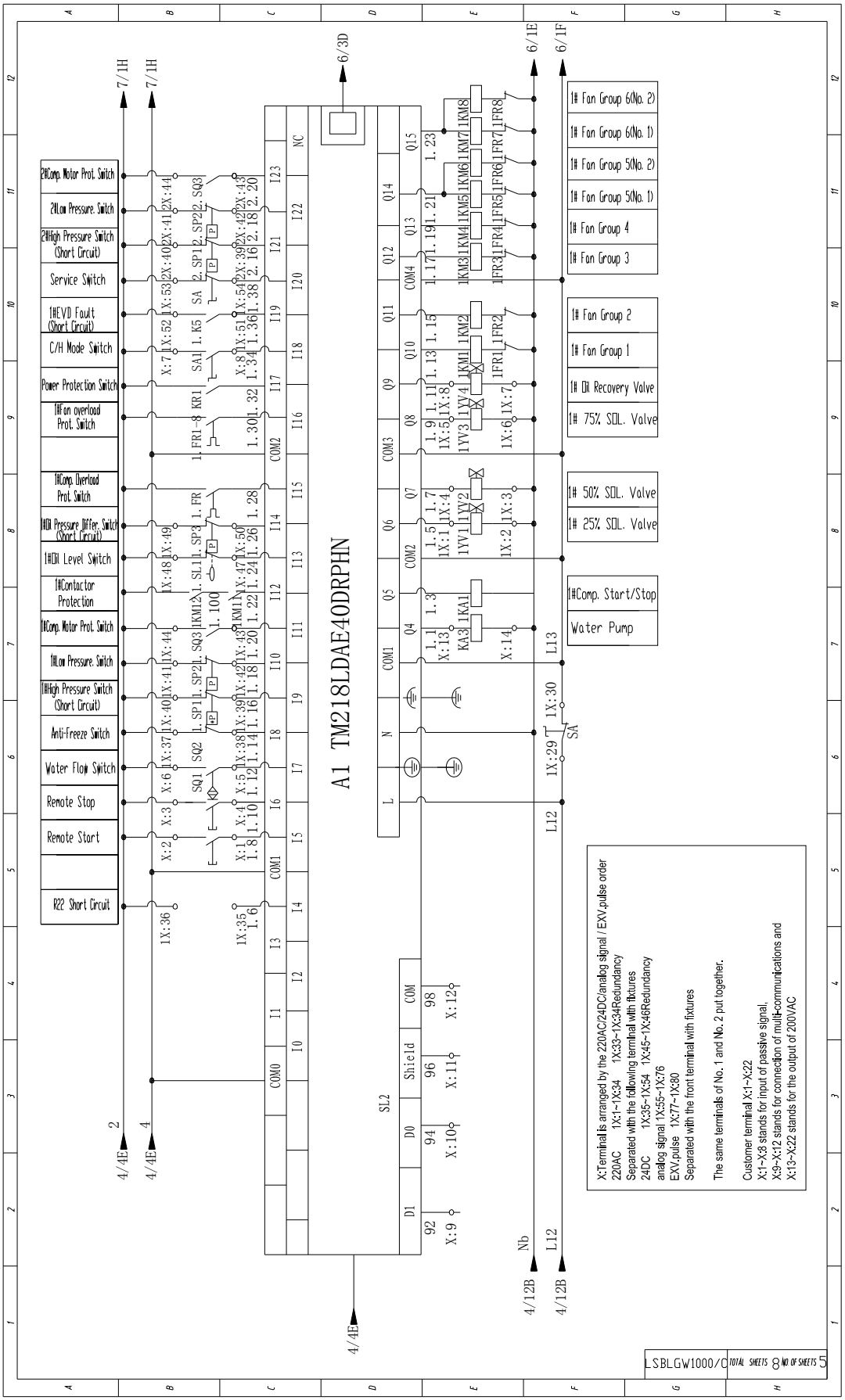
LSBLGW1000/C WIRING DIAGRAM

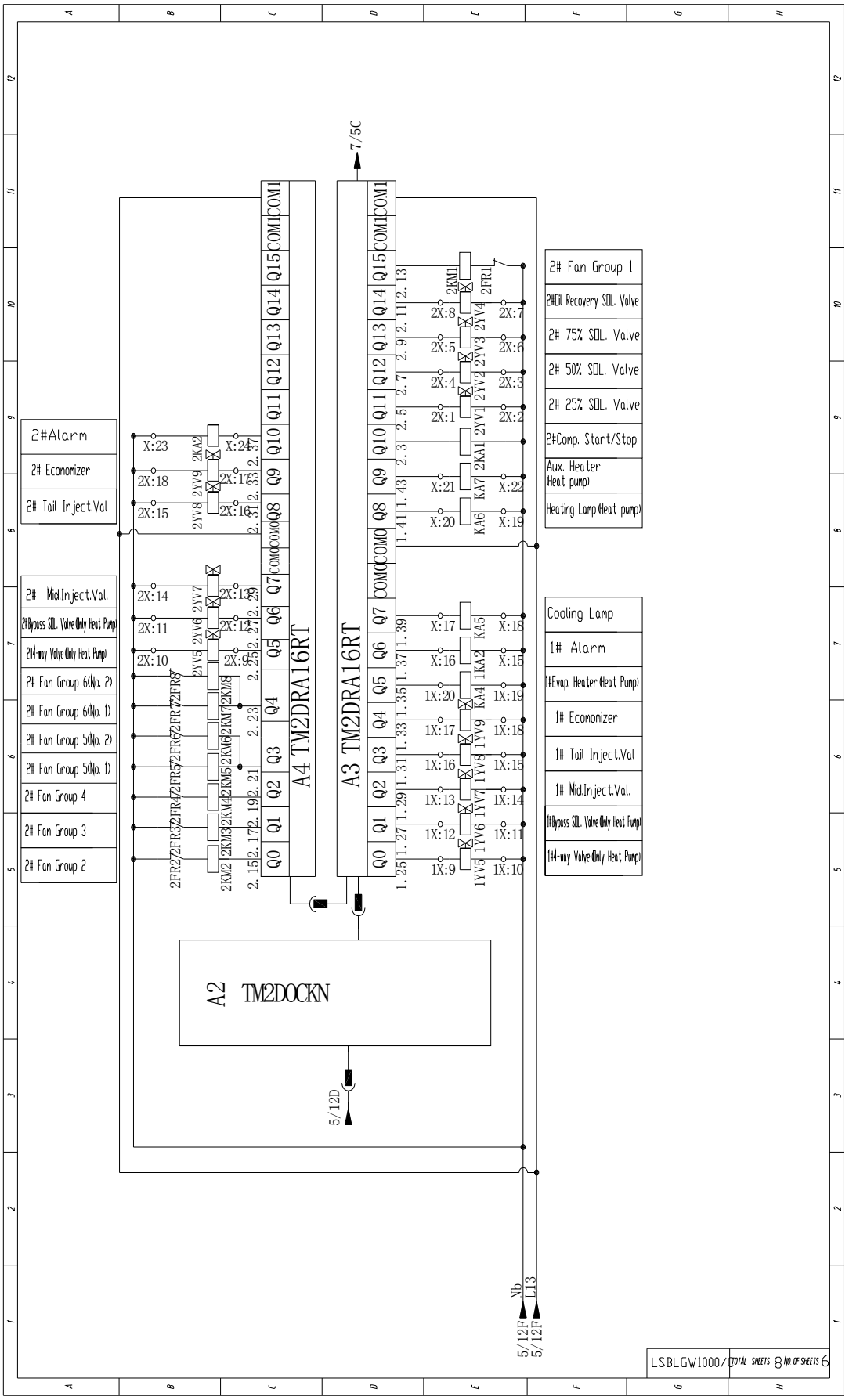


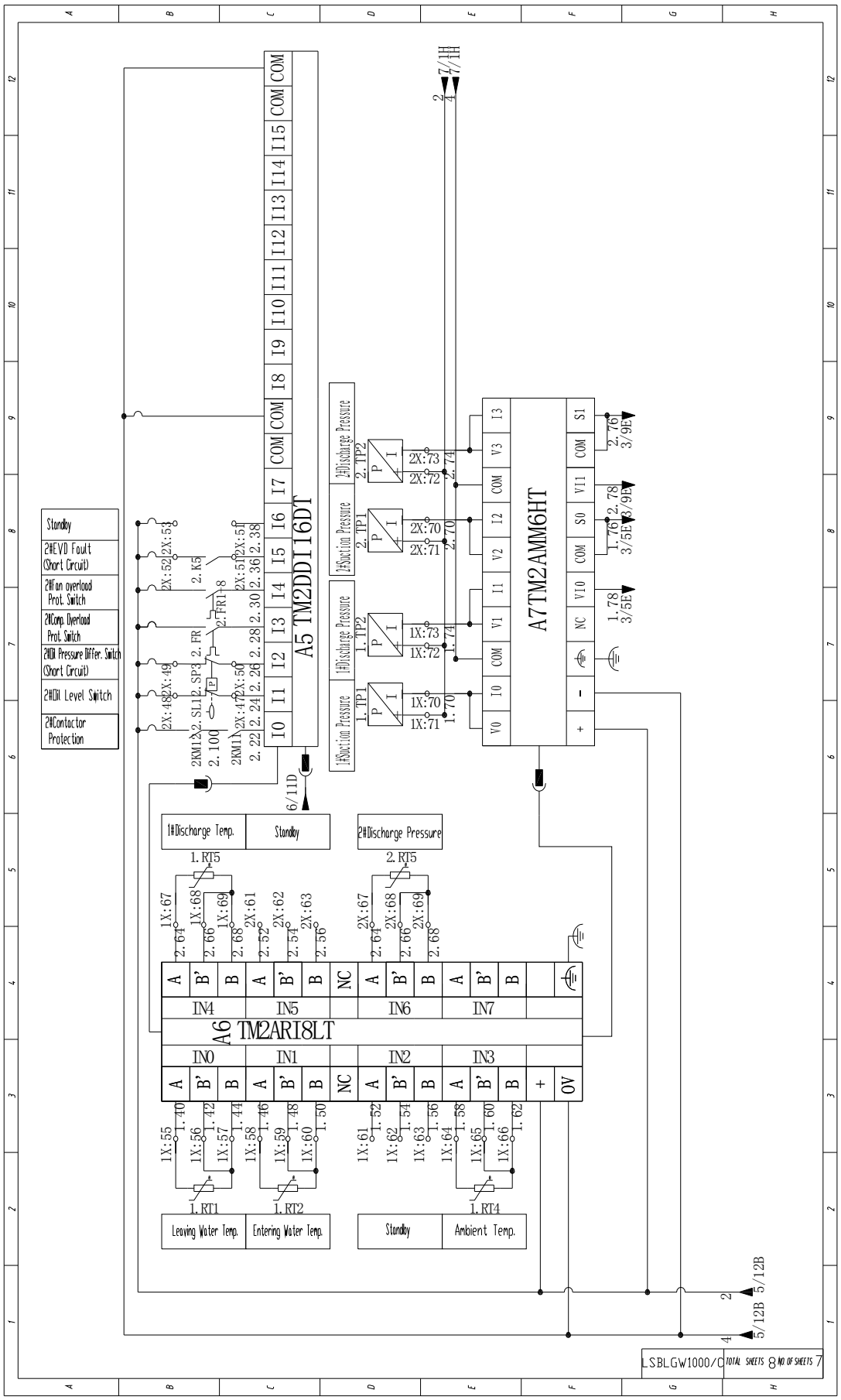

3P+N+PE 50Hz 380-400V
N
PE
1.1QF 375A
30*5mm² copper terminal;375A
3*1.5mm²+1*1.5mm²
11.6A
Other air blowers are same
2.3QF 16A
2.4QF 16A
2.5QF 16A
2.6QF 16A
3P 50Hz 380-400V 2.2kW 5.8A
Other air blowers are same
2.FR
2.123
2.125
2TA1
2TA2
2KM11
2KM12
2KM13
3*95mm²
3*95mm²+1*50mm²;191A
3P 50Hz
380-400V 331A
JTX-A
2X:44
2X:43
2X:21
2X:22
5/11B
5/11C
4/12D
4/12C
2ST1
2ST2
Discharge Temperature Protection Switch
(Compressor Internal)
Note:
copper terminal ->30QF/40QF/50QF/60QF
Wirings Size: 1.5mm²
Wirings Length<1.5m
All Other Control Wirings Size :0.75mm²
LSBLGW1000/C
TOTAL SHEETS 8 NO OF SHEETS 2

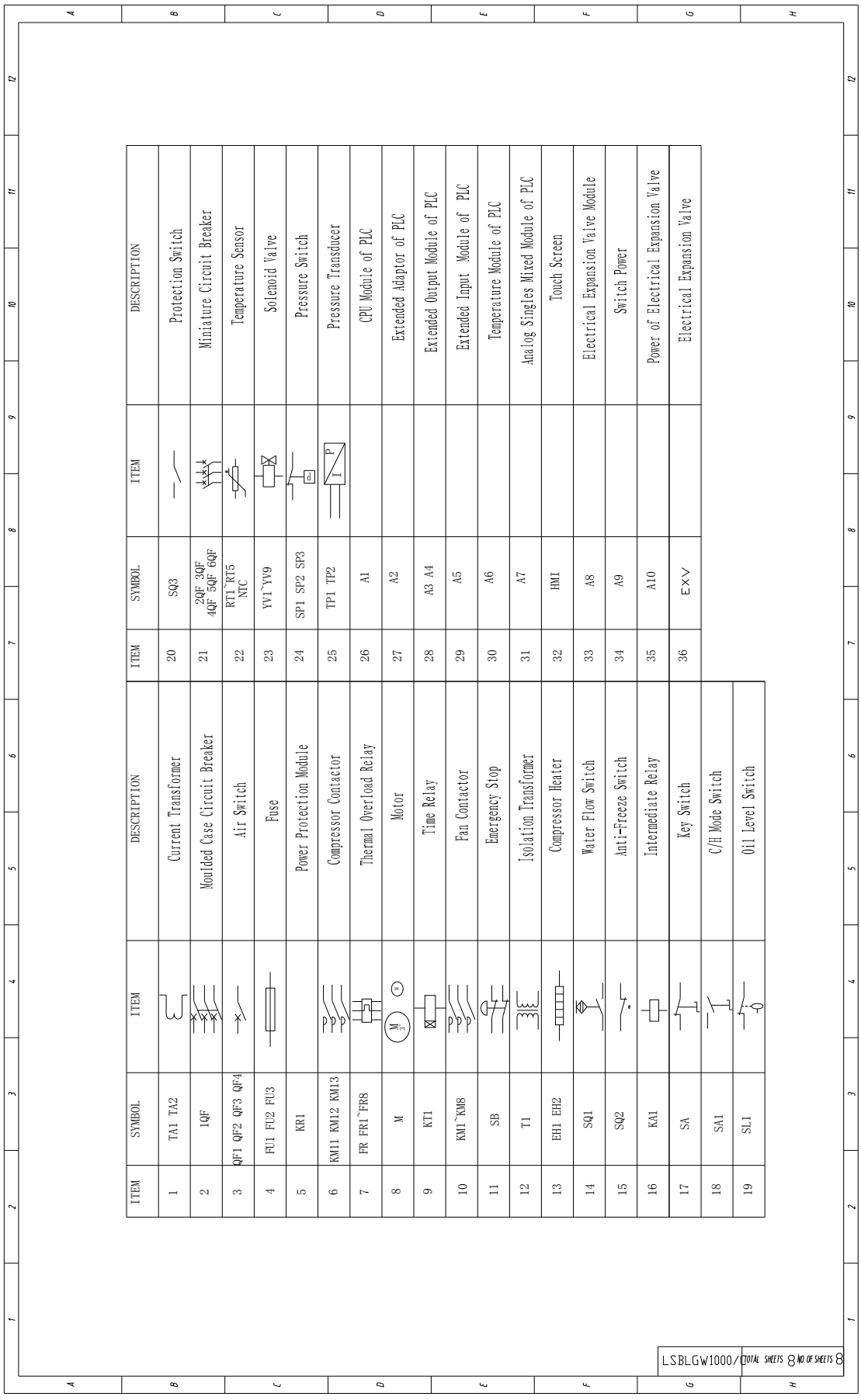

Isolation Transformer
Drop. Heater (reserved)
Cooling Fan
1# Oil Heater
2# Oil Heater
Power for EVD
1#EVD Pressure Sensor
1#EVD Temp. Sensor
1#EVD Switch
1# EXV Motor
2#EVD Pressure Sensor
2#EVD Temp. Sensor
2#EVD Switch
2# EXV Motor
1A8 EVD
2A8 EVD
Analog-Digital Input
Power Supply
ExV connetion
Network
Relay
1NTC
2NTC
1KA1
2KA1
1EH2
2EH2
EH1
KA4
QF1
QF2
QF3
QF4
FU1
FU2
FU3
T1
LSBLGW1000/C
TOTAL SHEETS 8 NO OF SHEETS 3


Emergency Stop
Switch Power
Touch Screen
1#Dual Right Pressure Switch
1# Δ Contactor1
1# Δ Contactor2
1# Y Contactor
1# Time Relay
2#Dual Right Pressure Switch
2# Δ Contactor1
2# Δ Contactor2
2# Y Contactor
2# Time Relay
Oil Level Switch
HMI
SB1
1SP4
2SP4
1FR
2FR
1KA1
2KA1
1KM11
2KM11
1KM12
2KM12
1KM13
2KM13
1KT1
2KT1
1. SL1
2. SL1
A9
220V
24V
RS485
L12
Nb
Na
L51
LSBLGW1000/
TOTAL SHEETS 8 NO OF SHEETS 4


A1 TM218LDAE40DRPHN
2#Comp. Motor Prot. Switch
2#Low Pressure Switch
2#High Pressure Switch (Short Circuit)
Service Switch
1#EVD Fault (Short Circuit)
C/H Mode Switch
Power Protection Switch
1#Fan overload Prot. Switch
1#Comp. Overload Prot. Switch
1#Oil Pressure Differ. Switch (Short Circuit)
1#Oil Level Switch
1#Contactor Protection
1#Comp. Motor Prot. Switch
1#Low Pressure Switch
1#High Pressure Switch (Short Circuit)
Anti-Freeze Switch
Water Flow Switch
Remote Stop
Remote Start
R22 Short Circuit
1# Fan Group 6(No. 2)
1# Fan Group 6(No. 1)
1# Fan Group 5(No. 2)
1# Fan Group 5(No. 1)
1# Fan Group 4
1# Fan Group 3
1# Fan Group 2
1# Fan Group 1
1# Oil Recovery Valve
1# 75% SOL. Valve
1# 50% SOL. Valve
1# 25% SOL. Valve
1#Comp. Start/Stop
Water Pump
X:Terminal is arranged by the 220AC/24DC/analog signal / EXV.pulse order
220AC 1X:1~1X:34 1X:33~1X:34Redundancy
Separated with the following terminal with fixtures
24DC 1X:35~1X:54 1X:45~1X:46Redundancy
analog signal 1X:55~1X:76
EXV.pulse 1X:77~1X:80
Separated with the front terminal with fixtures
The same terminals of No. 1 and No. 2 put together.
Customer terminal X:1~X:22
X:1~X:8 stands for input of passive signal.
X:9~X:12 stands for connection of multi-communications and
X:13~X:22 stands for the output of 200VAC
LSBLGW1000/C
TOTAL SHEETS 8 NO OF SHEETS 5


A3 TM2DRA16RT
A4 TM2DRA16RT
A2 TM2DOCKN
7/5C
5/12D
5/12F
5/12F
Nb
L13
2#Alarm
2# Economizer
2# Tail Inject.Val
2# Mid.Inject.Val.
2#Bypass SOL. Valve(Only Heat Pump)
2#4-way Valve(Only Heat Pump)
2# Fan Group 6(No. 2)
2# Fan Group 6(No. 1)
2# Fan Group 5(No. 2)
2# Fan Group 5(No. 1)
2# Fan Group 4
2# Fan Group 3
2# Fan Group 2
2# Fan Group 1
2#Oil Recovery SOL. Valve
2# 75% SOL. Valve
2# 50% SOL. Valve
2# 25% SOL. Valve
2#Comp. Start/Stop
Aux. Heater (Heat pump)
Heating Lamp (Heat pump)
Cooling Lamp
1# Alarm
1#Evap. Heater (Heat Pump)
1# Economizer
1# Tail Inject.Val
1# Mid.Inject.Val.
1#Bypass SOL. Valve(Only Heat Pump)
1#4-way Valve(Only Heat Pump)
LSBLGW1000/
TOTAL SHEETS 8 NO OF SHEETS 6


A5 TM2DDI16DT
A6 TM2ARI8LT
A7TM2AMM6HT
Standby
2#EVD Fault (Short Circuit)
2#Fan overload Prot. Switch
2#Comp. Overload Prot. Switch
2#Oil Pressure Differ. Switch (Short Circuit)
2#Oil Level Switch
2#Contactor Protection
1#Discharge Temp.
Standby
2#Discharge Pressure
Leaving Water Temp.
Entering Water Temp.
Standby
Ambient Temp.
1#Discharge Pressure
1#Suction Pressure
2#Discharge Pressure
2#Suction Pressure
LSBLGW1000/C
TOTAL SHEETS 8 NO OF SHEETS 7

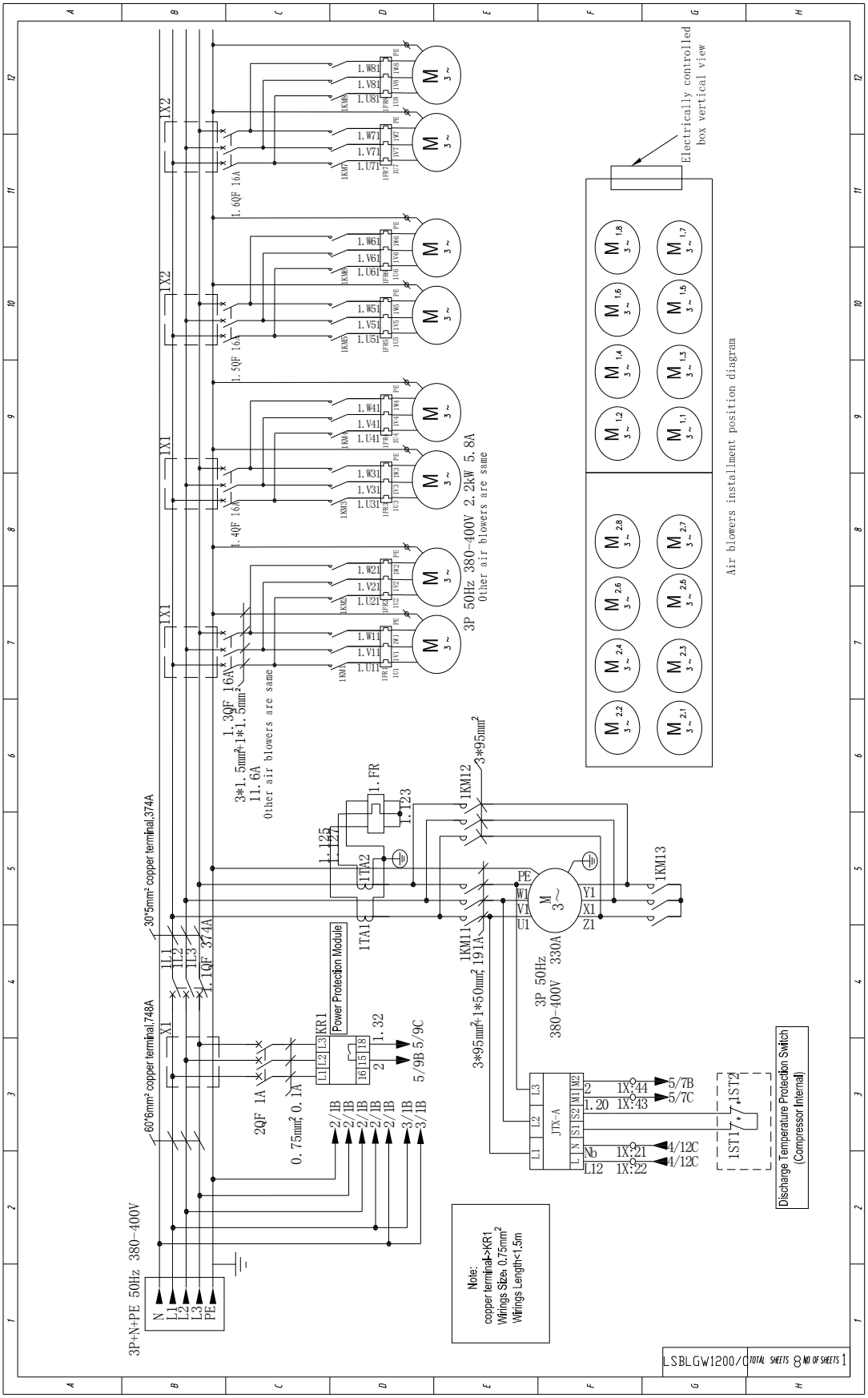


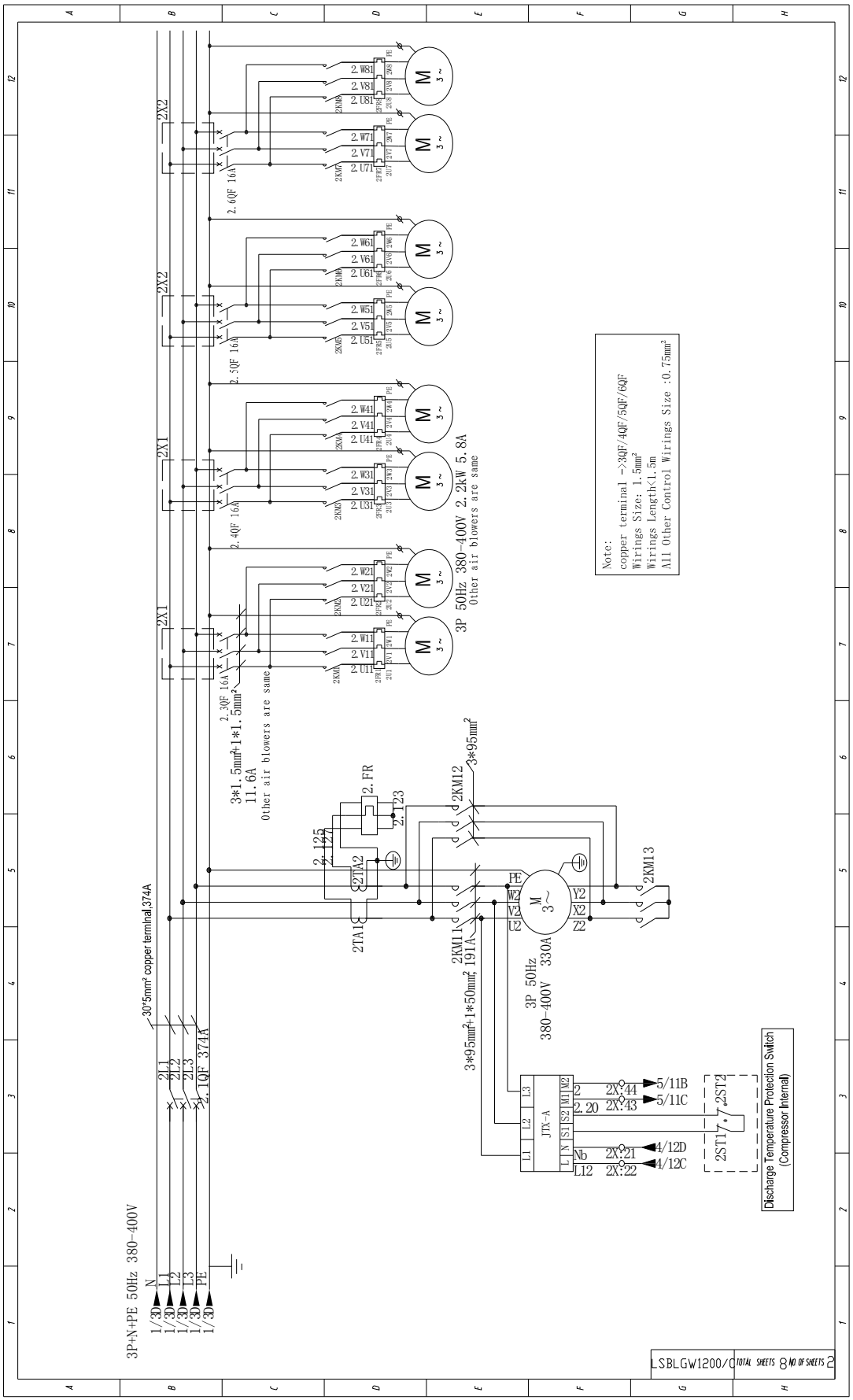
ITEM	SYMBOL	ITEM	DESCRIPTION
1	TA1 TA2		Current Transformer
2	1QF		Moulded Case Circuit Breaker
3	QF1 QF2 QF3 QF4		Air Switch
4	FU1 FU2 FU3		Fuse
5	KR1		Power Protection Module
6	KM11 KM12 KM13		Compressor Contactor
7	FR FR1~FR8		Thermal Overload Relay
8	M		Motor
9	KT1		Time Relay
10	KM1~KM8		Fan Contactor
11	SB		Emergency Stop
12	T1		Isolation Transformer
13	EH1 EH2		Compressor Heater
14	SQ1		Water Flow Switch
15	SQ2		Anti-Freeze Switch
16	KA1		Intermediate Relay
17	SA		Key Switch
18	SA1		C/H Mode Switch
19	SL1		Oil Level Switch

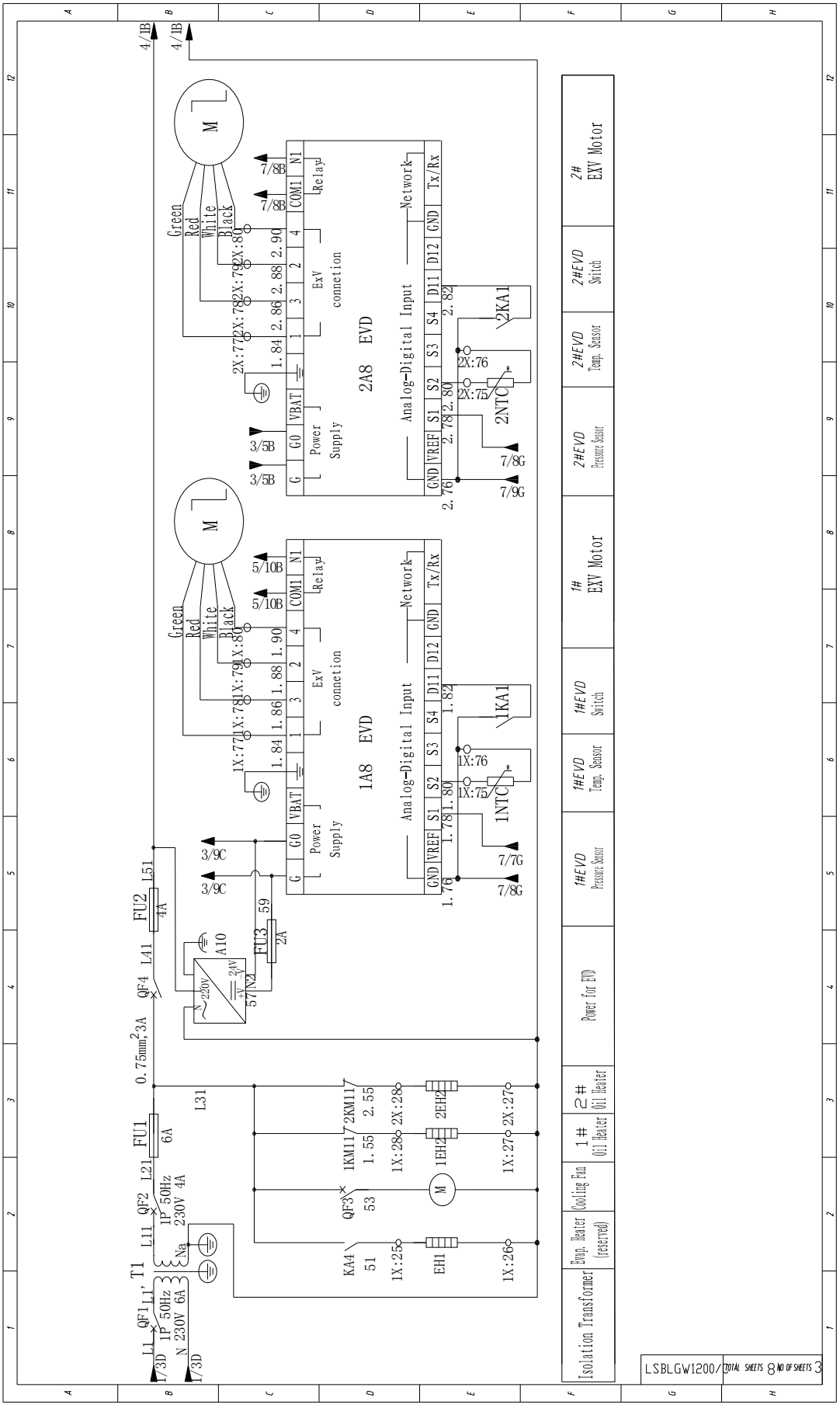
ITEM	SYMBOL	ITEM	DESCRIPTION
20	SQ3		Protection Switch
21	2QF 3QF 4QF 5QF 6QF		Miniature Circuit Breaker
22	RT1~RT5 NTC		Temperature Sensor
23	YV1~YV9		Solenoid Valve
24	SP1 SP2 SP3		Pressure Switch
25	TP1 TP2		Pressure Transducer
26	A1		CPU Module of PLC
27	A2		Extended Adaptor of PLC
28	A3 A4		Extended Output Module of PLC
29	A5		Extended Input Module of PLC
30	A6		Temperature Module of PLC
31	A7		Analog Singles Mixed Module of PLC
32	HMI		Touch Screen
33	A8		Electrical Expansion Valve Module
34	A9		Switch Power
35	A10		Power of Electrical Expansion Valve
36	E×V		Electrical Expansion Valve

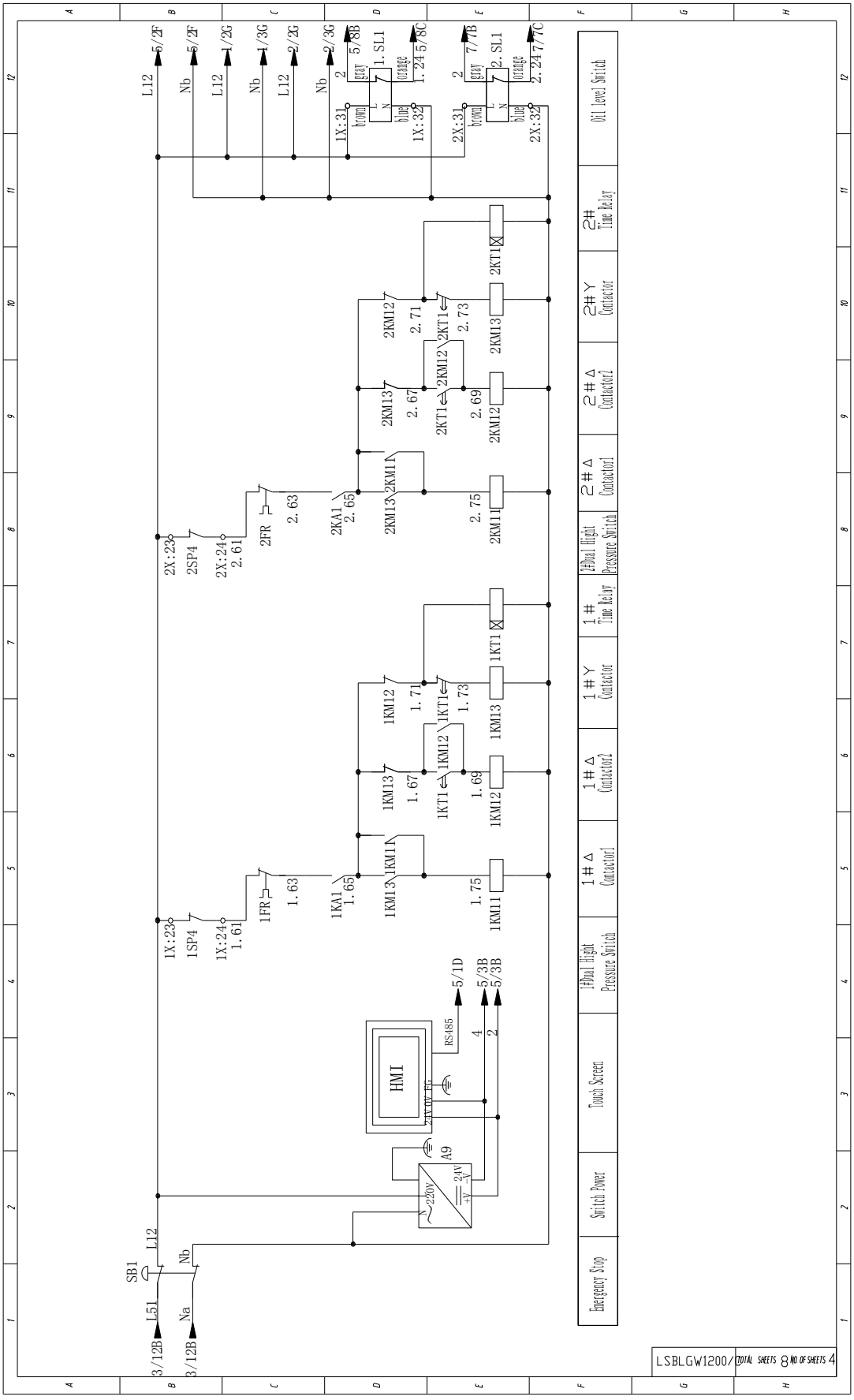
LSBLGW1000/C TOTAL SHEETS 8 NO.OF SHEETS 8

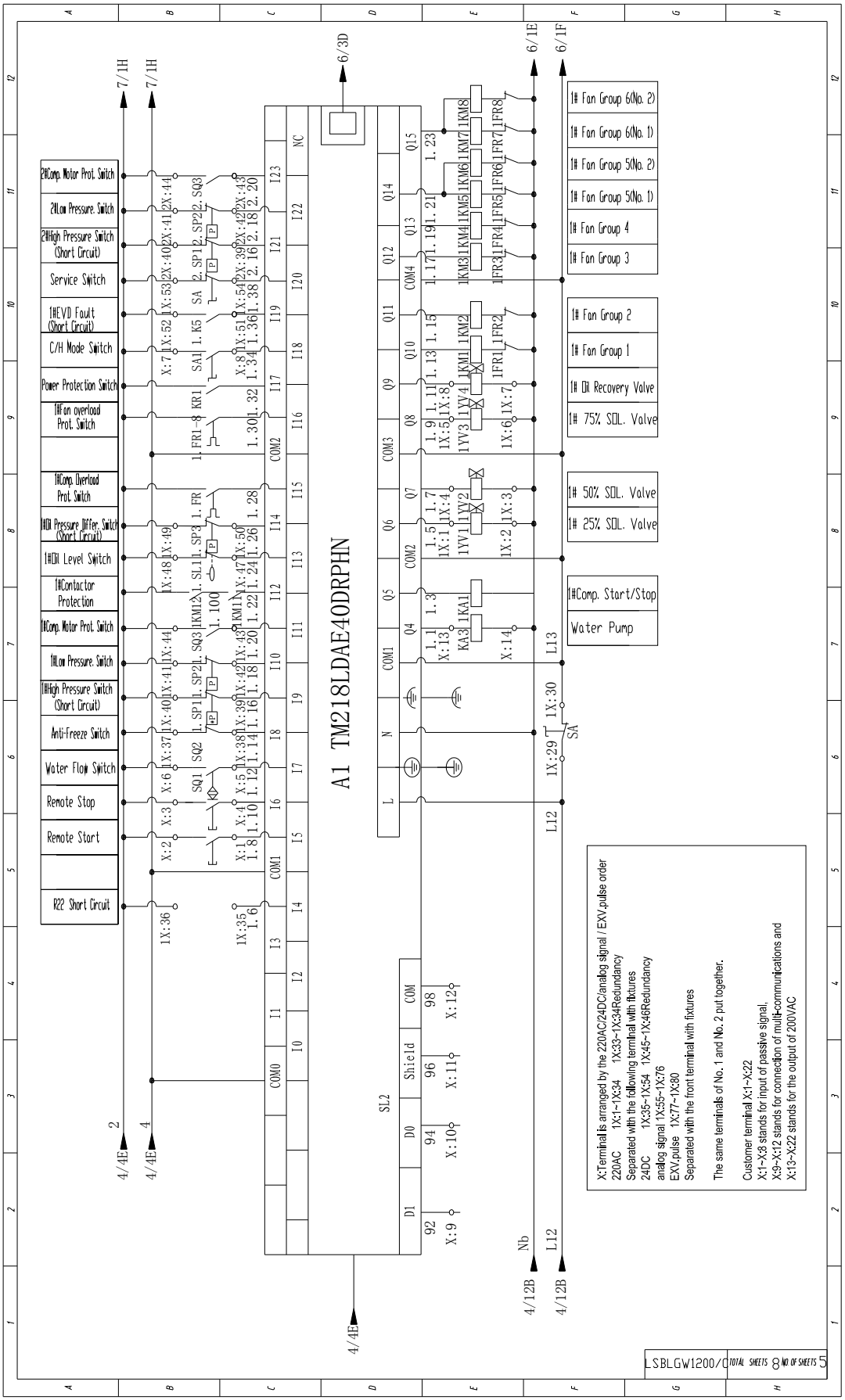
LSBLGW1200/C WIRING DIAGRAM

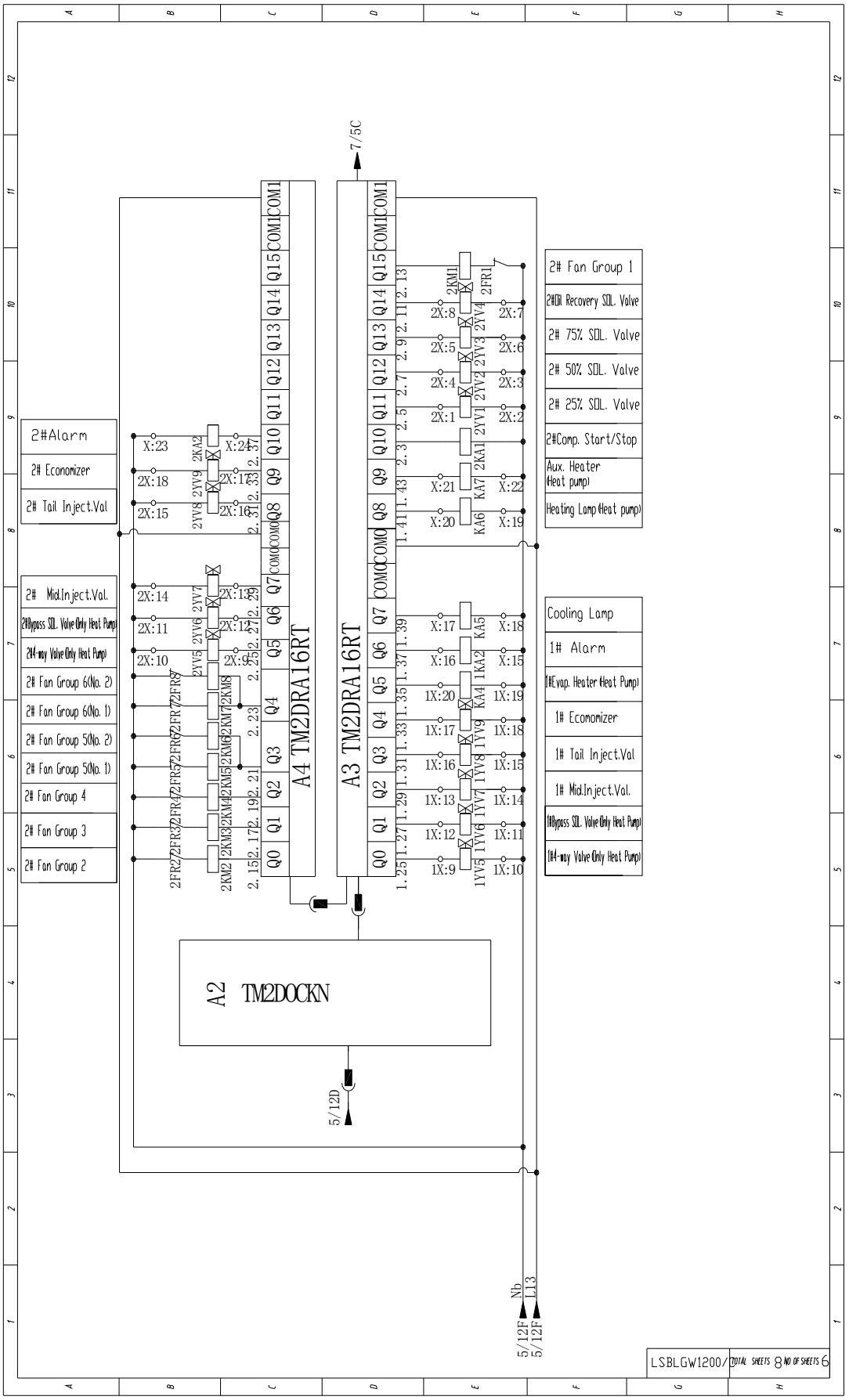


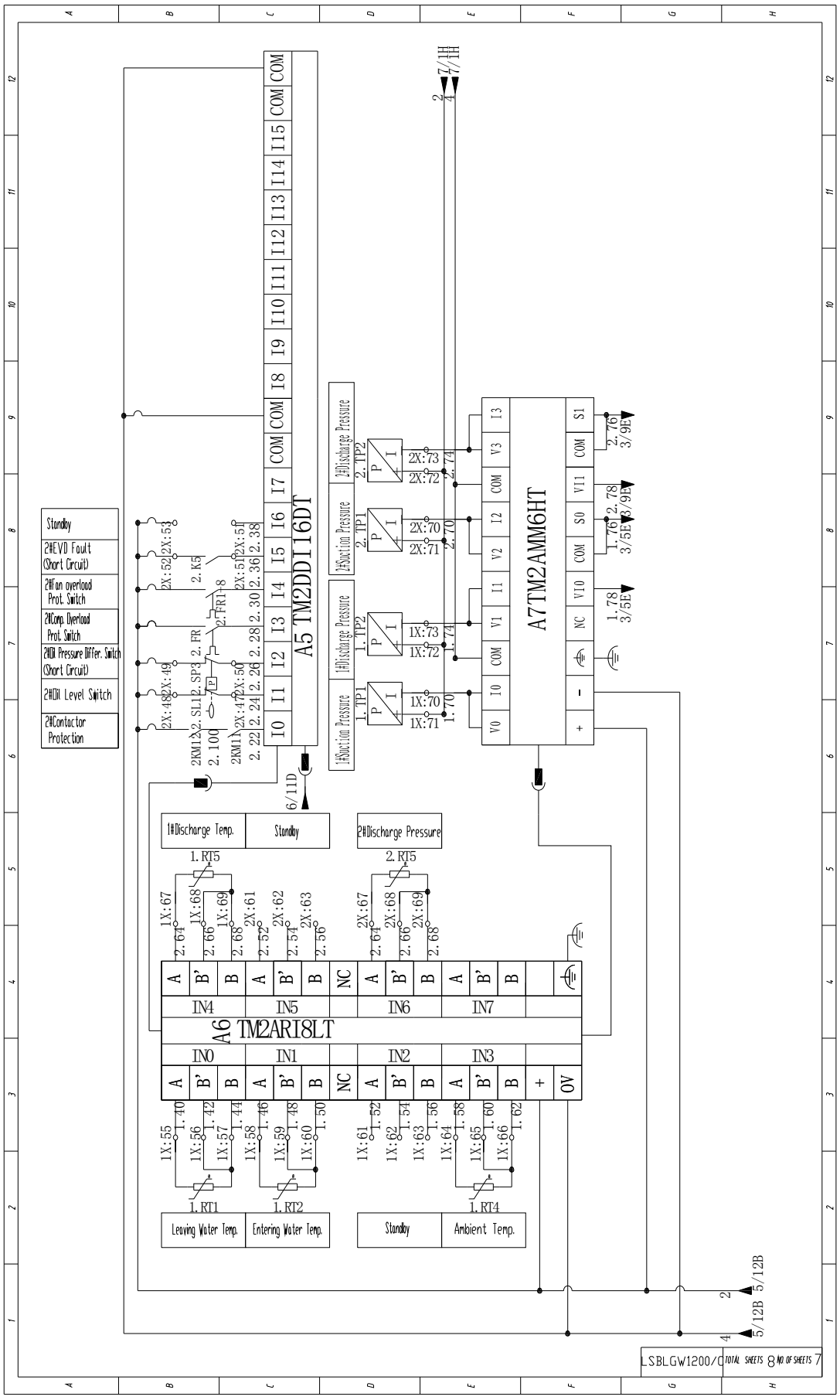

3P+N+PE 50Hz 380-400V
N
PE
2.1QF 374A
30*5mm² copper terminal 374A
3*1.5mm²+1*1.5mm²
11.6A
Other air blowers are same
2.30F 16A
2.40F 16A
2.50F 16A
2.60F 16A
3P 50Hz 380-400V 2.2kW 5.8A
Other air blowers are same
2.FR
2TA
2KM12
3*95mm²
2KM13
3*95mm²+1*50mm² 191A
2KM11
3P 50Hz
380-400V 330A
JTX-A
5/11B
5/11C
4/12D
4/12C
2ST1
2ST2
Discharge Temperature Protection Switch
(Compressor Internal)
Note:
copper terminal ->3QF/4QF/5QF/6QF
Wirings Size: 1.5mm²
Wirings Length<1.5m
All Other Control Wirings Size :0.75mm²
LSBLGW1200/C
TOTAL SHEETS 8 NO OF SHEETS 2

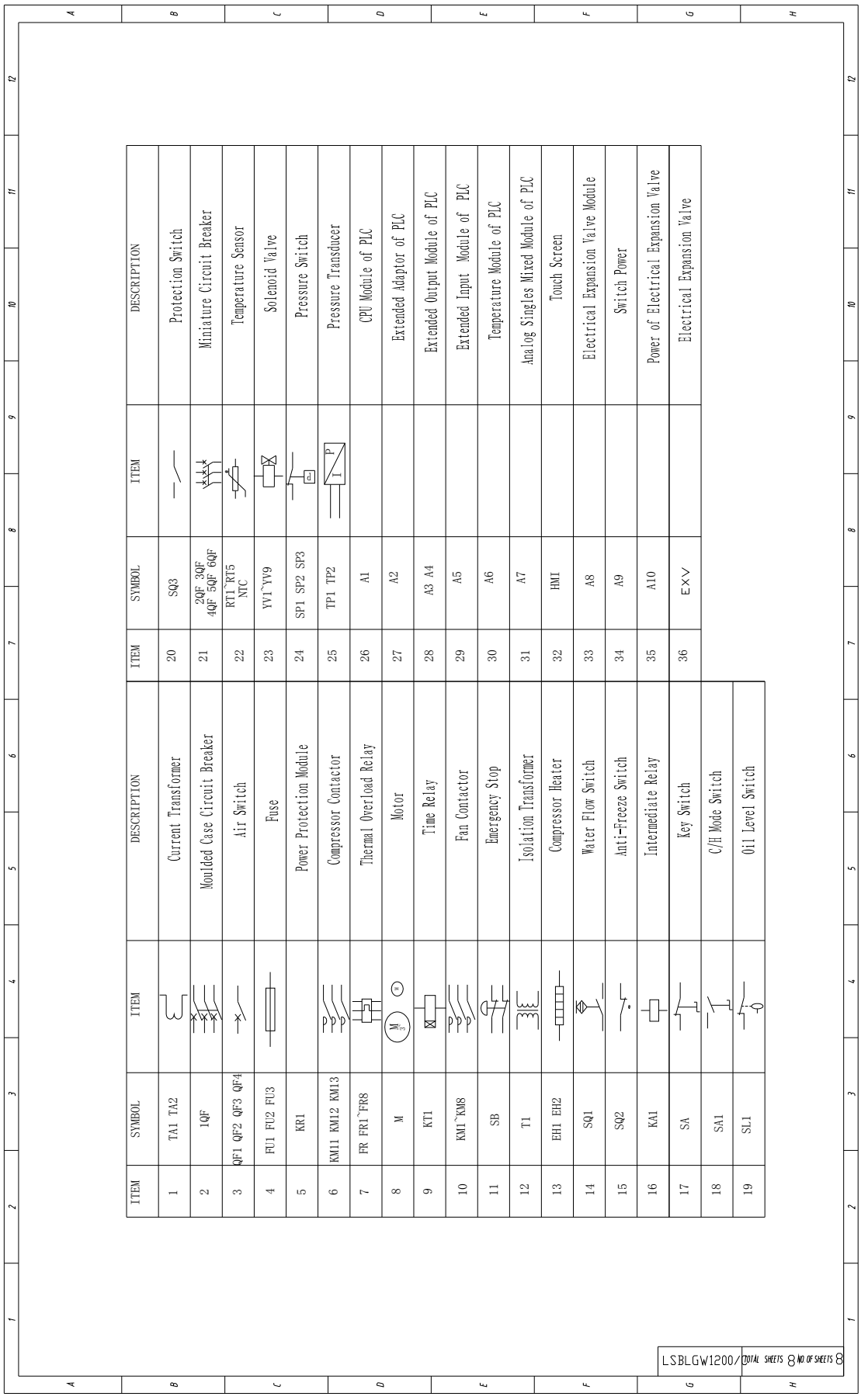

L1 QF1 L1' 1P 50Hz 6A N 230V
T1
L11 QF2 L21 1P 50Hz 230V 4A
Na
FU1 6A
0.75mm² 3A
L31
QF4 L41
FU2 L51 4A
FU3 59 2A
220V
24V
57 N2
A10
3/9C
3/5B
7/8G
7/9G
7/7G
7/8B
5/10B
4/1B
1A8 EVD
2A8 EVD
Power Supply
Analog-Digital Input
Network
ExV connetion
Relay
Green
Red
White
Black
1NTC
2NTC
1KA1
2KA1
1X:75
1X:76
2X:75
2X:76
1X:77
1X:78
1X:79
1X:80
2X:77
2X:78
2X:79
2X:80
KA4 51 1X:25
EH1
1X:26
QF3 53
1KM11 1.55 1X:28
2KM11 2.55 2X:28
1EH2
2EH2
1X:27
2X:27
Isolation Transformer
Drop. Heater (reserved)
Cooling Fan
1# Oil Heater
2# Oil Heater
Power for EVD
1#EVD Pressure Sensor
1#EVD Temp. Sensor
1#EVD Switch
1# EXV Motor
2#EVD Pressure Sensor
2#EVD Temp. Sensor
2#EVD Switch
2# EXV Motor
LSBLGW1200/
TOTAL SHEETS 8 NO OF SHEETS 3


Emergency Stop
Switch Power
Touch Screen
1#Dual Right Pressure Switch
1# Δ Contactor1
1# Δ Contactor2
1# Y Contactor
1# Time Relay
2#Dual Right Pressure Switch
2# Δ Contactor1
2# Δ Contactor2
2# Y Contactor
2# Time Relay
Oil Level Switch
HMI
RS485
220V
24V
1SP4
2SP4
1FR
2FR
1KA1
2KA1
1KM11
1KM12
1KM13
2KM11
2KM12
2KM13
1KT1
2KT1
1. SL1
2. SL1
SB1
L12
Nb
Na
L51
LSBLGW1200/


A1 TM218LDAE40DRPHN
2#Comp. Motor Prot. Switch
2#Low Pressure Switch
2#High Pressure Switch (Short Circuit)
Service Switch
1#EVD Fault (Short Circuit)
C/H Mode Switch
Power Protection Switch
1#Fan overload Prot. Switch
1#Comp. Overload Prot. Switch
1#Oil Pressure Differ. Switch (Short Circuit)
1#Oil Level Switch
1#Contactor Protection
1#Comp. Motor Prot. Switch
1#Low Pressure Switch
1#High Pressure Switch (Short Circuit)
Anti-Freeze Switch
Water Flow Switch
Remote Stop
Remote Start
R22 Short Circuit
1# Fan Group 6(No. 2)
1# Fan Group 6(No. 1)
1# Fan Group 5(No. 2)
1# Fan Group 5(No. 1)
1# Fan Group 4
1# Fan Group 3
1# Fan Group 2
1# Fan Group 1
1# Oil Recovery Valve
1# 75% SOL. Valve
1# 50% SOL. Valve
1# 25% SOL. Valve
1#Comp. Start/Stop
Water Pump
X:Terminal is arranged by the 220AC/24DC/analog signal / EXV.pulse order
220AC 1X:1~1X:34 1X:33~1X:34Redundancy
Separated with the following terminal with fixtures
24DC 1X:35~1X:54 1X:45~1X:46Redundancy
analog signal 1X:55~1X:76
EXV.pulse 1X:77~1X:80
Separated with the front terminal with fixtures
The same terminals of No. 1 and No. 2 put together.
Customer terminal X:1~X:22
X:1~X:8 stands for input of passive signal.
X:9~X:12 stands for connection of multi-communications and
X:13~X:22 stands for the output of 200VAC
LSBLGW1200/C
TOTAL SHEETS 8 NO OF SHEETS 5


A3 TM2DRA16RT
A4 TM2DRA16RT
A2 TM2DOCKN
7/5C
5/12D
5/12F
5/12F
Nb
L13
2#Alarm
2# Economizer
2# Tail Inject.Val
2# Mid.Inject.Val.
2#Bypass SOL. Valve(Only Heat Pump)
2#4-way Valve(Only Heat Pump)
2# Fan Group 6(No. 2)
2# Fan Group 6(No. 1)
2# Fan Group 5(No. 2)
2# Fan Group 5(No. 1)
2# Fan Group 4
2# Fan Group 3
2# Fan Group 2
2# Fan Group 1
2#Oil Recovery SOL. Valve
2# 75% SOL. Valve
2# 50% SOL. Valve
2# 25% SOL. Valve
2#Comp. Start/Stop
Aux. Heater (Heat pump)
Heating Lamp (Heat pump)
Cooling Lamp
1# Alarm
1#Evap. Heater (Heat Pump)
1# Economizer
1# Tail Inject.Val
1# Mid.Inject.Val.
1#Bypass SOL. Valve(Only Heat Pump)
1#4-way Valve(Only Heat Pump)
LSBLGW1200/
TOTAL SHEETS 8 NO OF SHEETS 6


A5 TM2DDI16DT
A7TM2AMM6HT
A6 TM2ARI8LT
Standby
2#EVD Fault (Short Circuit)
2#Fan overload Prot. Switch
2#Comp. Overload Prot. Switch
2#Oil Pressure Differ. Switch (Short Circuit)
2#Oil Level Switch
2#Contactor Protection
1#Discharge Temp.
Standby
2#Discharge Pressure
Leaving Water Temp.
Entering Water Temp.
Standby
Ambient Temp.
1#Discharge Pressure
1#Suction Pressure
2#Discharge Pressure
2#Suction Pressure
LSBLGW1200/C
TOTAL SHEETS 8 NO OF SHEETS 7

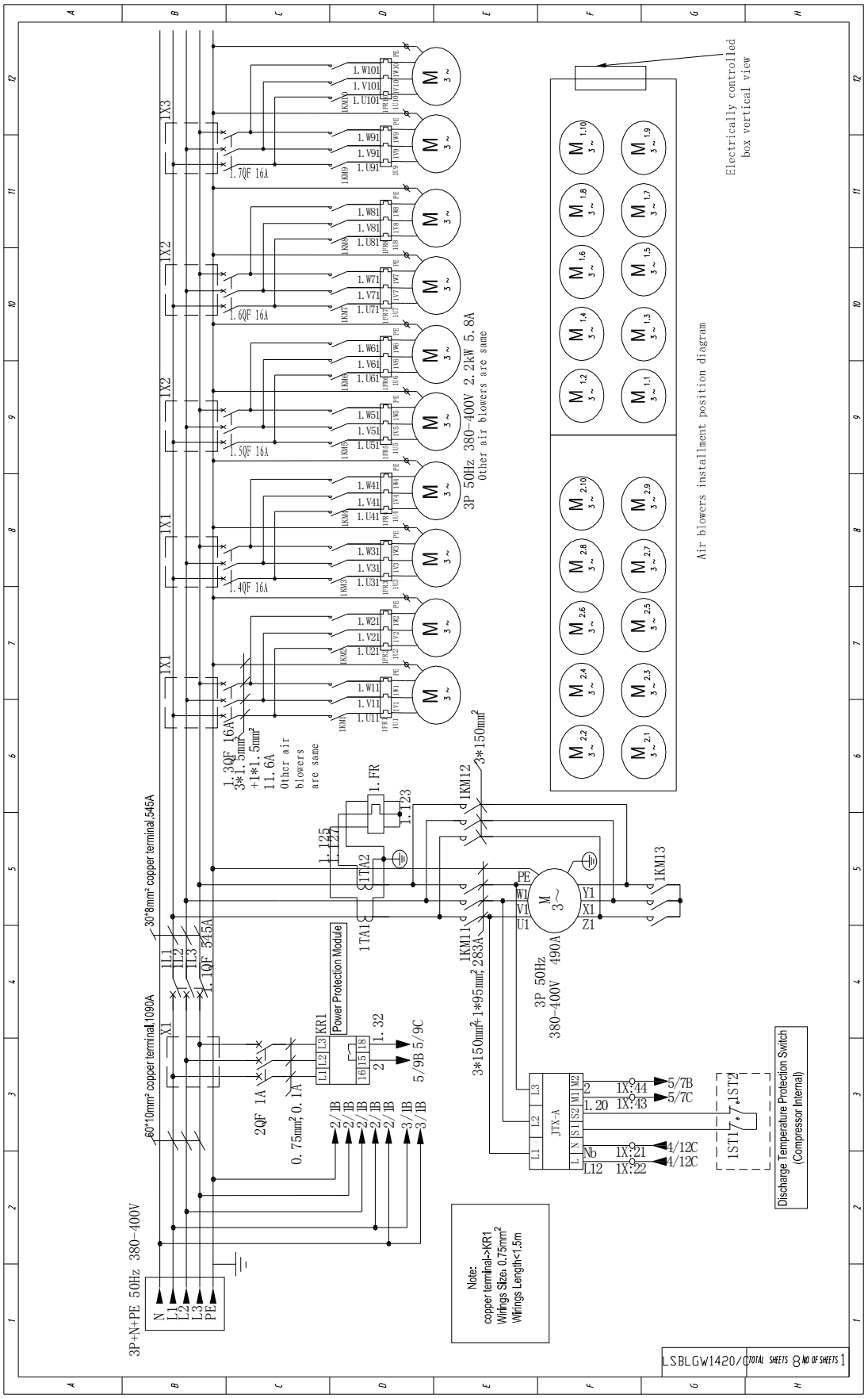


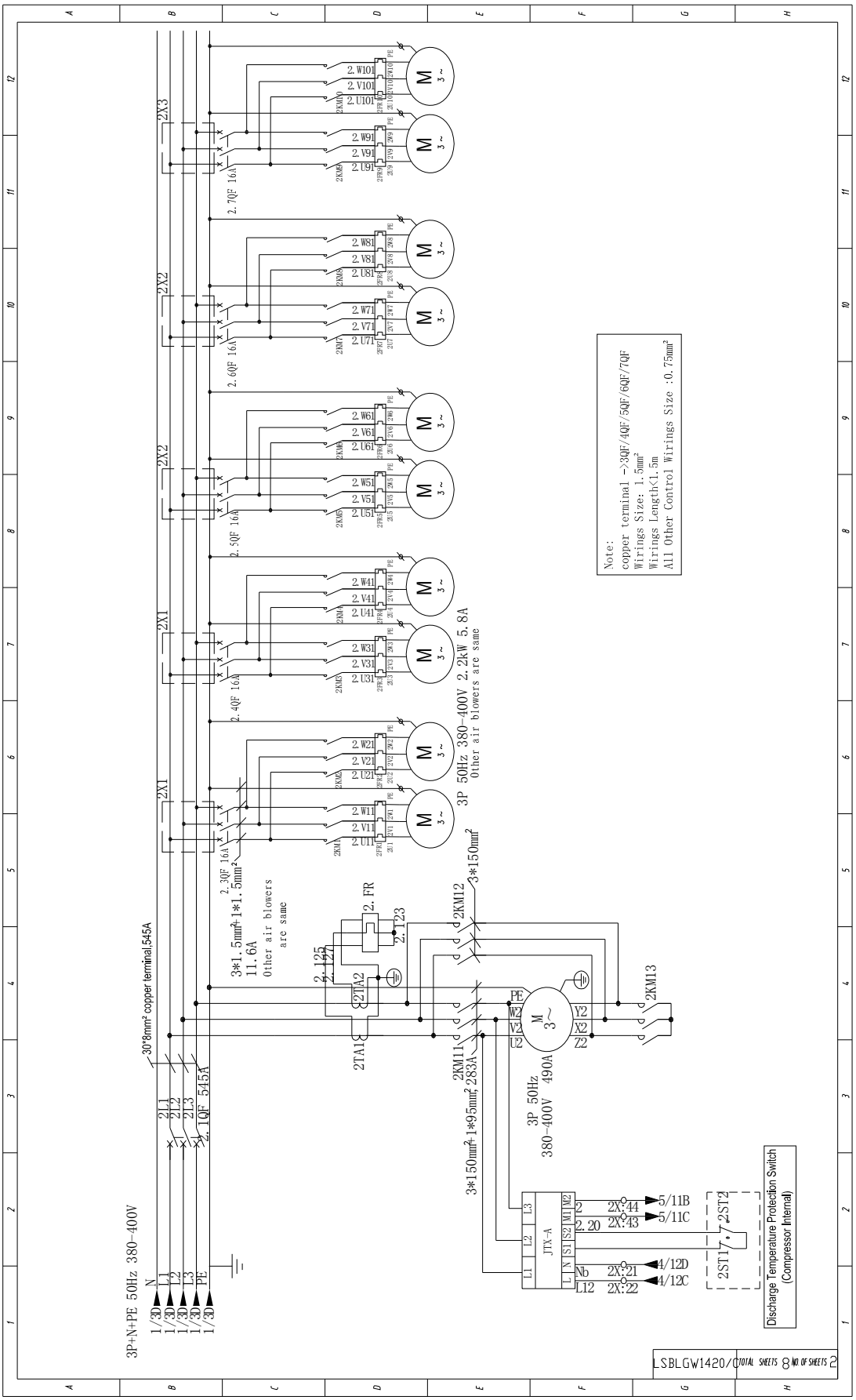
ITEM	SYMBOL	ITEM	DESCRIPTION
1	TA1 TA2		Current Transformer
2	1QF		Moulded Case Circuit Breaker
3	QF1 QF2 QF3 QF4		Air Switch
4	FU1 FU2 FU3		Fuse
5	KR1		Power Protection Module
6	KM11 KM12 KM13		Compressor Contactor
7	FR FR1~FR8		Thermal Overload Relay
8	M		Motor
9	KT1		Time Relay
10	KM1~KM8		Fan Contactor
11	SB		Emergency Stop
12	T1		Isolation Transformer
13	EH1 EH2		Compressor Heater
14	SQ1		Water Flow Switch
15	SQ2		Anti-Freeze Switch
16	KA1		Intermediate Relay
17	SA		Key Switch
18	SA1		C/H Mode Switch
19	SL1		Oil Level Switch

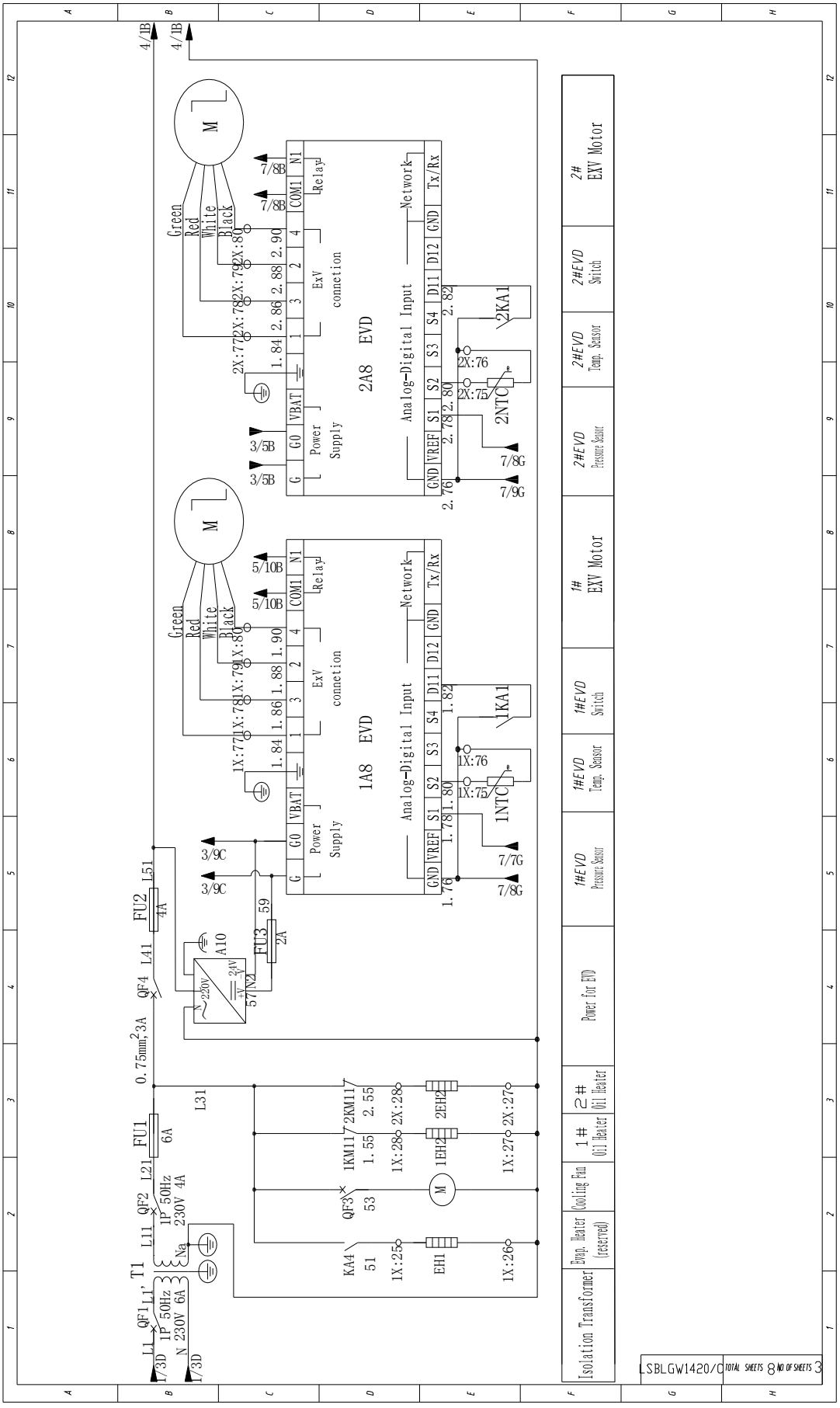
ITEM	SYMBOL	ITEM	DESCRIPTION
20	SQ3		Protection Switch
21	2QF 3QF 4QF 5QF 6QF		Miniature Circuit Breaker
22	RT1~RT5 NTC		Temperature Sensor
23	YV1~YV9		Solenoid Valve
24	SP1 SP2 SP3		Pressure Switch
25	TP1 TP2		Pressure Transducer
26	A1		CPU Module of PLC
27	A2		Extended Adaptor of PLC
28	A3 A4		Extended Output Module of PLC
29	A5		Extended Input Module of PLC
30	A6		Temperature Module of PLC
31	A7		Analog Singles Mixed Module of PLC
32	HMI		Touch Screen
33	A8		Electrical Expansion Valve Module
34	A9		Switch Power
35	A10		Power of Electrical Expansion Valve
36	EXV		Electrical Expansion Valve

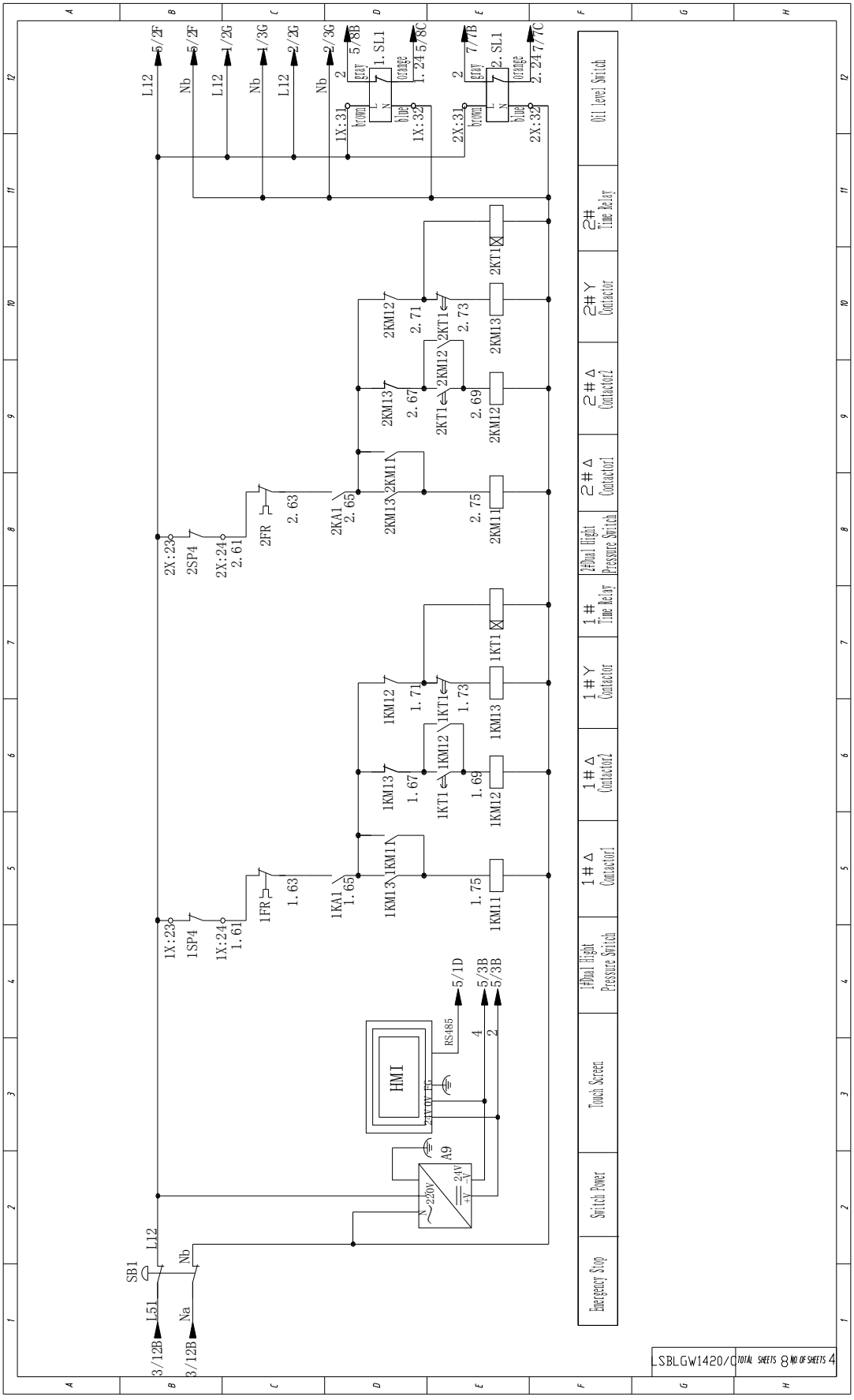
LSBLGW1200/ TOTAL SHEETS 8 NO. OF SHEETS 8

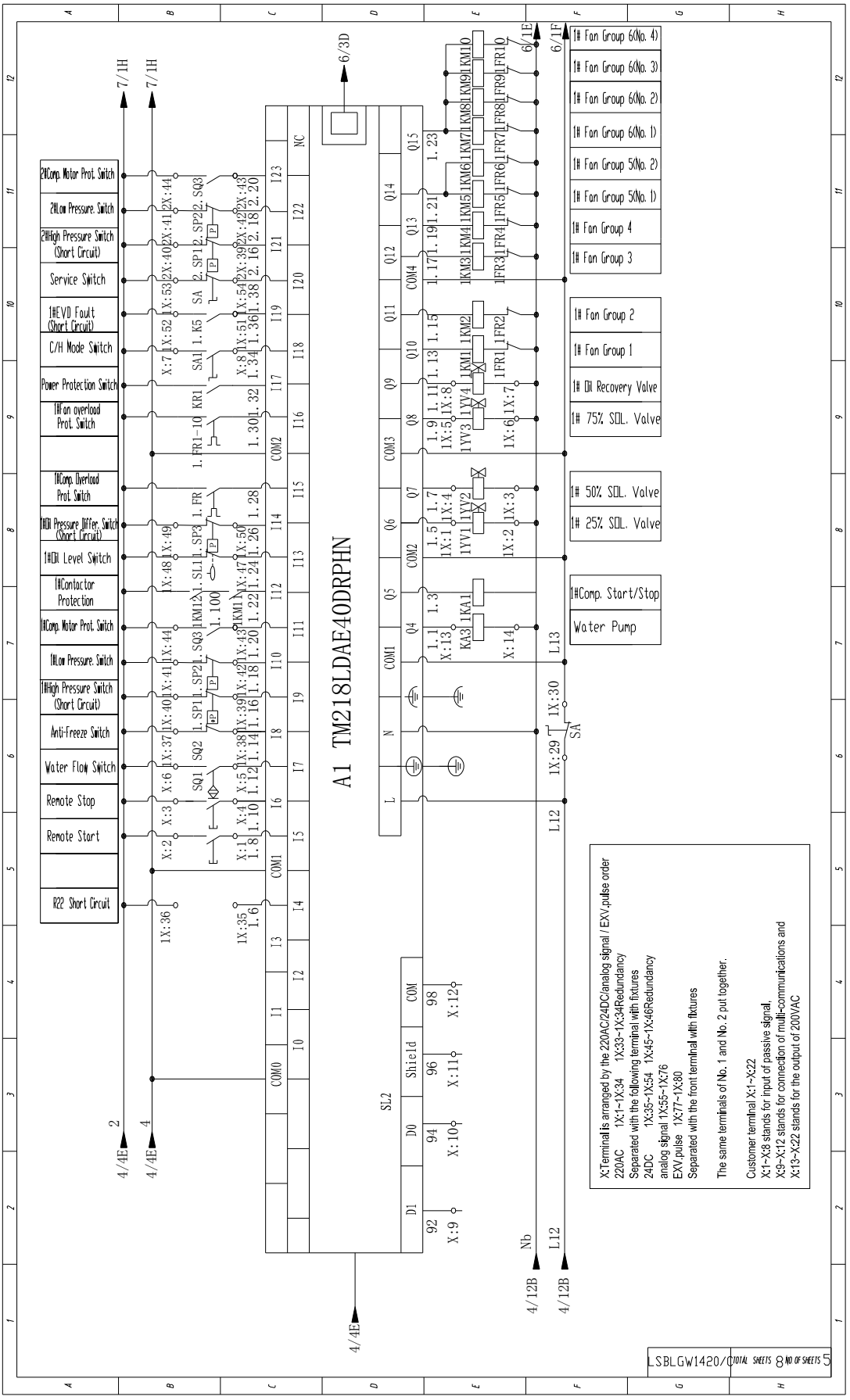
LSBLGW1420/C WIRING DIAGRAM

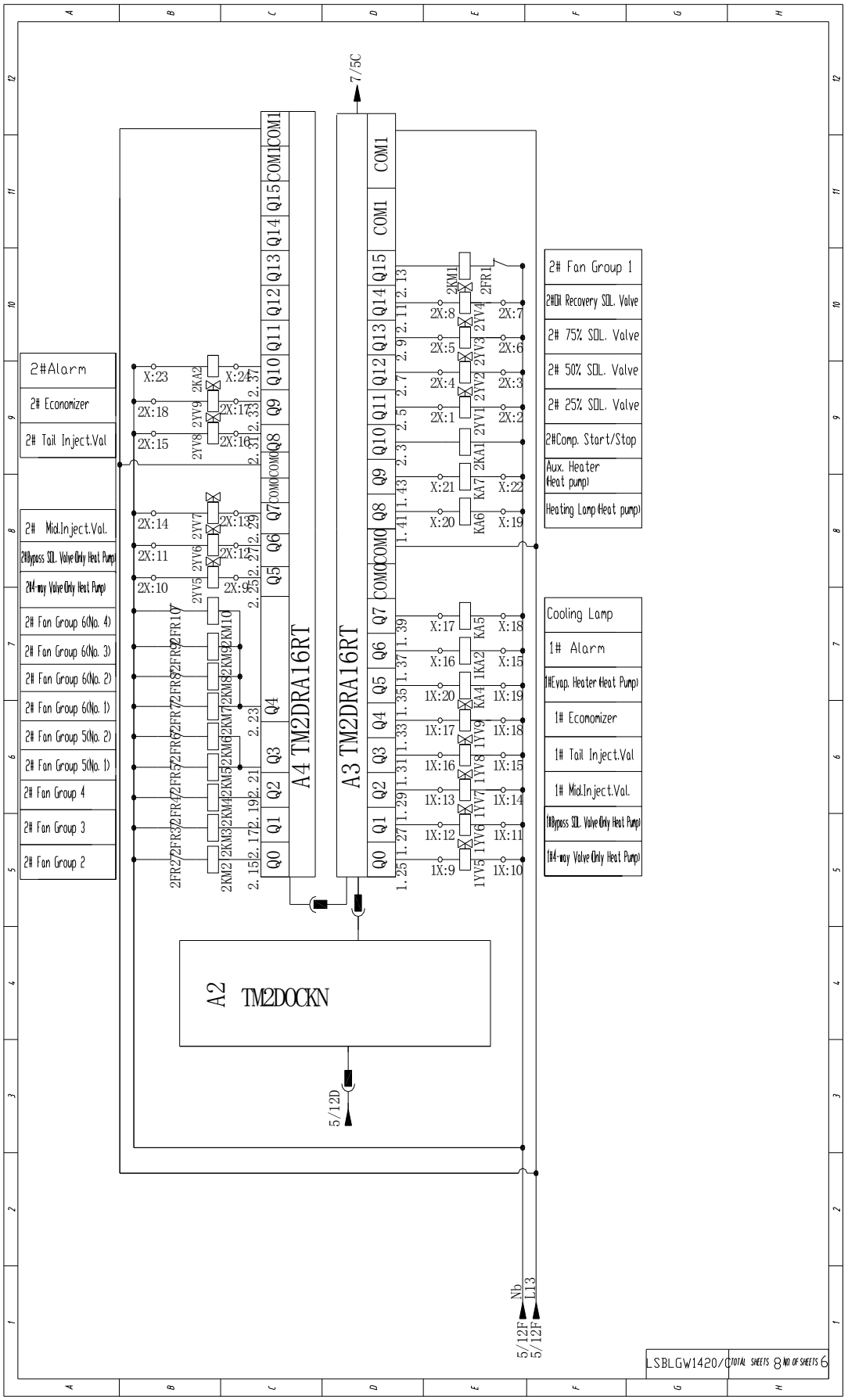


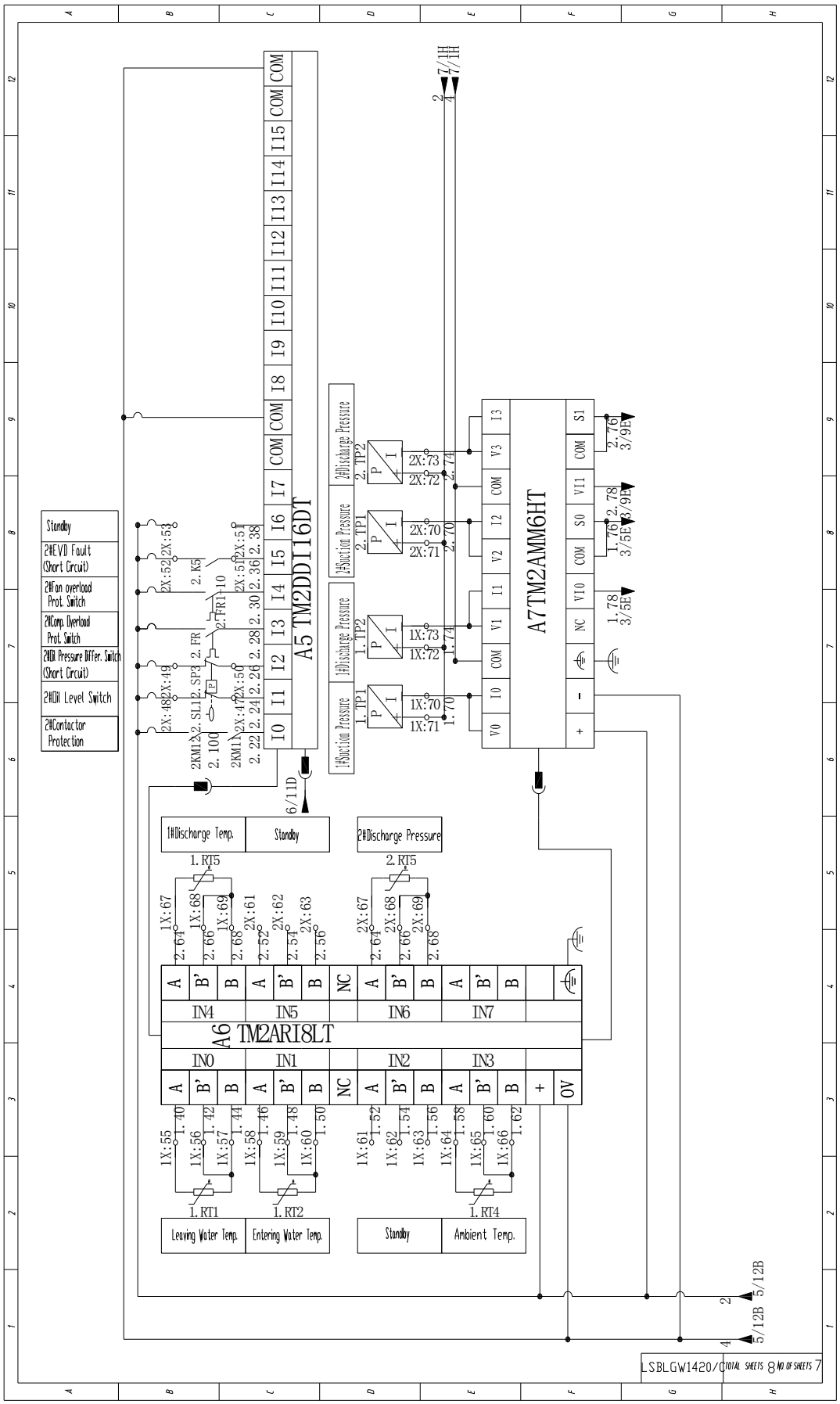

3P+N+PE 50Hz 380-400V
N
L1
L2
L3
PE
2. 1QF 545A
30*8mm² copper terminal,545A
2L1
2L2
2L3
2X1
2X2
2X3
2. 2QF 16A
3*1.5mm² 1*1.5mm²
11.6A
Other air blowers are same
2. 3QF 16A
2. 4QF 16A
2. 5QF 16A
2. 6QF 16A
2. 7QF 16A
2. FR
2. 123
2. 125
2. 127
2TA2
2TA1
2KM12
3*150mm²
2KM13
2KM11
3*150mm² 1*95mm² 283A
3P 50Hz 380-400V 490A
3P 50Hz 380-400V 2.2kW 5.8A
Other air blowers are same
Note:
copper terminal ->3QF/4QF/5QF/6QF/7QF
Wirings Size: 1.5mm²
Wirings Length<1.5m
All Other Control Wirings Size :0.75mm²
JTX-A
2X:44
2X:43
2X:21
2X:22
5/11B
5/11C
4/12D
4/12C
2. 20
2ST1, 2ST2
Discharge Temperature Protection Switch (Compressor Internal)
LSBLGW1420/C
TOTAL SHEETS 8 NO OF SHEETS 2

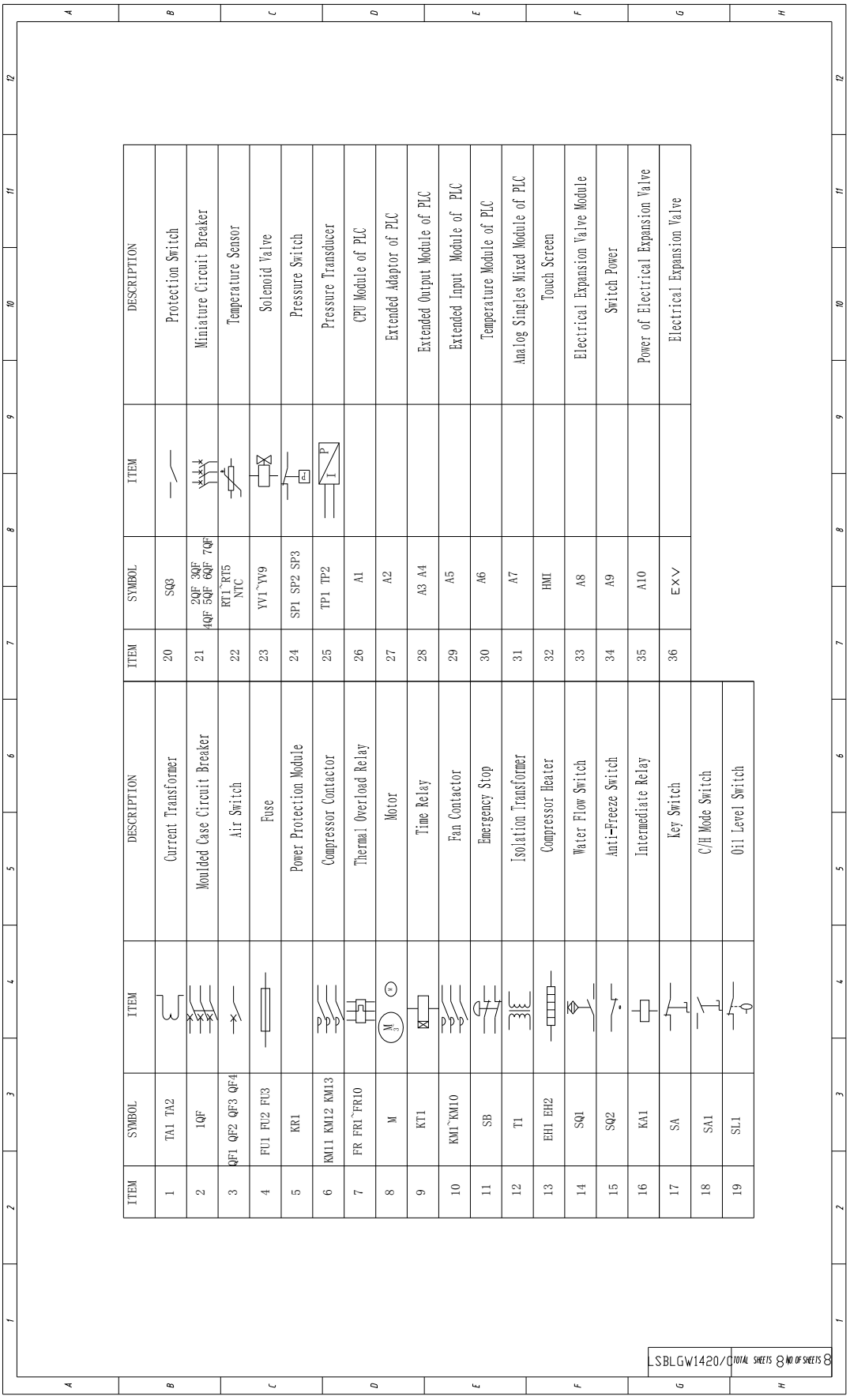

Isolation Transformer
Drain Heater (reserved)
Cooling Fan
1# Oil Heater
2# Oil Heater
Power for EVD
1#EVD Pressure Sensor
1#EVD Temp. Sensor
1#EVD Switch
1# EXV Motor
2#EVD Pressure Sensor
2#EVD Temp. Sensor
2#EVD Switch
2# EXV Motor
1A8 EVD
2A8 EVD
Power Supply
Analog-Digital Input
Network
ExV connetion
Relay
Green
Red
White
Black
1NTC
2NTC
1KA1
2KA1
1EH2
2EH2
EH1
KA4
QF1
QF2
QF3
QF4
FU1
FU2
FU3
T1
LSBLGW1420/C
TOTAL SHEETS 8 NO OF SHEETS 3


Emergency Stop
Switch Power
Touch Screen
1#Dual Right Pressure Switch
1# △ Contactor1
1# △ Contactor2
1# Y Contactor
1# Time Relay
2#Dual Right Pressure Switch
2# △ Contactor1
2# △ Contactor2
2# Y Contactor
2# Time Relay
Oil Level Switch
SB1
L51
Na
Nb
L12
3/12B
HMI
RS485
A9
220V
24V
1KA1
1FR
1KM11
1KM12
1KM13
1KT1
2KA1
2FR
2KM11
2KM12
2KM13
2KT1
1SP4
2SP4
1X:23
1X:24
2X:23
2X:24
1. SL1
2. SL1
LSBLGW1420/C
TOTAL SHEETS 8 NO OF SHEETS 4


A1 TM218LDAE40DRPHN
2#Comp. Motor Prot. Switch
2#Low Pressure Switch
2#High Pressure Switch (Short Circuit)
Service Switch
1#EVD Fault (Short Circuit)
C/H Mode Switch
Power Protection Switch
1#Fan overload Prot. Switch
1#Comp. Overload Prot. Switch
1#Oil Pressure Differ. Switch (Short Circuit)
1#Oil Level Switch
1#Contactor Protection
1#Comp. Motor Prot. Switch
1#Low Pressure Switch
1#High Pressure Switch (Short Circuit)
Anti-freeze Switch
Water Flow Switch
Remote Stop
Remote Start
R22 Short Circuit
1# Fan Group 6(No. 4)
1# Fan Group 6(No. 3)
1# Fan Group 6(No. 2)
1# Fan Group 6(No. 1)
1# Fan Group 5(No. 2)
1# Fan Group 5(No. 1)
1# Fan Group 4
1# Fan Group 3
1# Fan Group 2
1# Fan Group 1
1# Oil Recovery Valve
1# 75% SOL. Valve
1# 50% SOL. Valve
1# 25% SOL. Valve
1#Comp. Start/Stop
Water Pump
X:Terminal is arranged by the 220AC/24DC/analog signal / EXV.pulse order
220AC 1X:1~1X:34 1X:33~1X:34Redundancy
Separated with the following terminal with fixtures
24DC 1X:35~1X:54 1X:45~1X:46Redundancy
analog signal 1X:55~1X:76
EXV.pulse 1X:77~1X:80
Separated with the front terminal with fixtures
The same terminals of No. 1 and No. 2 put together.
Customer terminal X:1~X:22
X:1~X:8 stands for input of passive signal.
X:9~X:12 stands for connection of multi-communications and
X:13~X:22 stands for the output of 200VAC
LSBLGW1420/C TOTAL SHEETS 8 NO OF SHEETS 5


A3 TM2DRA16RT
A4 TM2DRA16RT
A2 TM2DOCKN
7/5C
5/12D
5/12F
5/12F
Nb
L13
2#Alarm
2# Economizer
2# Tail Inject.Val
2# Mid.Inject.Val.
2#Bypass SOL. Valve Only Heat Pump
2#4-way Valve Only Heat Pump
2# Fan Group 6(No. 4)
2# Fan Group 6(No. 3)
2# Fan Group 6(No. 2)
2# Fan Group 6(No. 1)
2# Fan Group 5(No. 2)
2# Fan Group 5(No. 1)
2# Fan Group 4
2# Fan Group 3
2# Fan Group 2
2# Fan Group 1
2#Oil Recovery SOL. Valve
2# 75% SOL. Valve
2# 50% SOL. Valve
2# 25% SOL. Valve
2#Comp. Start/Stop
Aux. Heater (Heat pump)
Heating Lamp (Heat pump)
Cooling Lamp
1# Alarm
1#Evap. Heater (Heat Pump)
1# Economizer
1# Tail Inject.Val
1# Mid.Inject.Val.
1#Bypass SOL. Valve Only Heat Pump)
1#4-way Valve Only Heat Pump)
LSBLGW1420/C TOTAL SHEETS 8 NO OF SHEETS 6


A5 TM2DDI16DT
A6 TM2ARI8LT
A7 TM2AMM6HT
Standby
2#EVD Fault (Short Circuit)
2#Fan overload Prot. Switch
2#Comp. Overload Prot. Switch
2#Oil Pressure Differ. Switch (Short Circuit)
2#Oil Level Switch
2#Contactor Protection
1#Discharge Temp.
Standby
2#Discharge Pressure
Leaving Water Temp.
Entering Water Temp.
Standby
Ambient Temp.
1#Discharge Pressure
1#Suction Pressure
2#Discharge Pressure
2#Suction Pressure
LSBLGW1420/C TOTAL SHEETS 8 NO. OF SHEETS 7



ITEM	SYMBOL	ITEM	DESCRIPTION
1	TA1 TA2		Current Transformer
2	1QF		Moulded Case Circuit Breaker
3	QF1 QF2 QF3 QF4		Air Switch
4	FU1 FU2 FU3		Fuse
5	KR1		Power Protection Module
6	KM11 KM12 KM13		Compressor Contactor
7	FR FR1~FR10		Thermal Overload Relay
8	M	M 3~	Motor
9	KT1		Time Relay
10	KM1~KM10		Fan Contactor
11	SB		Emergency Stop
12	T1		Isolation Transformer
13	EH1 EH2		Compressor Heater
14	SQ1		Water Flow Switch
15	SQ2		Anti-Freeze Switch
16	KA1		Intermediate Relay
17	SA		Key Switch
18	SA1		C/H Mode Switch
19	SL1		Oil Level Switch

ITEM	SYMBOL	ITEM	DESCRIPTION
20	SQ3		Protection Switch
21	2QF 3QF 4QF 5QF 6QF 7QF		Miniature Circuit Breaker
22	RT1~RT5 NTC		Temperature Sensor
23	YV1~YV9		Solenoid Valve
24	SP1 SP2 SP3		Pressure Switch
25	TP1 TP2	P I	Pressure Transducer
26	A1		CPU Module of PLC
27	A2		Extended Adaptor of PLC
28	A3 A4		Extended Output Module of PLC
29	A5		Extended Input Module of PLC
30	A6		Temperature Module of PLC
31	A7		Analog Singles Mixed Module of PLC
32	HMI		Touch Screen
33	A8		Electrical Expansion Valve Module
34	A9		Switch Power
35	A10		Power of Electrical Expansion Valve
36	EXV		Electrical Expansion Valve

LSBLGW1420/C TOTAL SHEETS 8 NO OF SHEETS 8

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