



ICU CONDENSING UNITS

OPERATING MANUAL

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IBS ISITMA SOĞUTMA HAVALANDIRMA TAAHHÜT SAN.VE TİC.A.Ş



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1. DATA ABOUT THE DEVICE

Model / Type	
Supply	V
Phase	
Frequency	50 Hz
Total Power	kW
Refrigeration Capacity	kW(-10/+45 °C) (-25/+45 °C) kW(-10/+50 °C) (-25/+50 °C)
Refrigerant	
Length	mm
Width	mm
Height	mm

2. GENERAL OPERATING INSTRUCTION

This operating manual contains information necessary for installation, operation and maintenance of ICU Condensing Units manufactured by IBS Isıtma Soğutma Havalandırma Taahhüt San. ve Tic. A.Ş. This manual should be considered as an integral part of the unit and should be read by the technician who shall install and operate the cooling unit. This manual should be kept near the unit for application when needed.

Before installation and operation of the unit, please be sure to read the manual attentively. It is important for your safety to understand the concepts in this manual. Please, ask for technical support from a cooling technician. Conform to the instructions in this manual for safe and efficient use of your unit.

No cooling refrigerant and oil should be used other than those stated on label of the unit. The system should not be operated before completion of installation and gas charging stated on label of the device.

The manufacturer doesn't bear any responsibility due to losses and damages arising out of use, operation and applications not stated in this manual.

2.1- In Case of Danger

- Cut off mains voltage.
- Contact with the nearest service.
- Don't apply anything to the device except for emergency interventions until the authorized service directed by our service center comes.

2.2-Operations upon the Unit

- Installation, operation and maintenance should be performed by a qualified cooling technician.
- While making any operation upon the unit, the mains electrical feeding should be cut off and the unit should wait for 10-15 minutes for cooling.

2.3-Features of Place of the Unit

- No dust.
- The floor should be rigid, sound and safe taking weight of the unit into consideration.
- Should be protected against flood and being left under snow.
- Should be mounted in a place which doesn't prevent air induction and release and which is open to atmosphere.
- If installed in a closed area, it should absolutely have sufficient ventilation and

there shouldn't be overheating.

- Be sure all measures about human health and environmental safety are taken.

3. SAFETY WARNINGS

Pay attention to the warnings to prevent damages to you and your goods.

Try to understand safety warnings and take necessary precautions.

Even if you have sufficient experience and knowledge, if you are not authorized, and if you don't have sufficient experience and knowledge even if you are authorized, never attend to adjustments, controls, installations and repair works.

Control panel has fatal electrical voltage. Turn on the mains electrical feeding switches and label with a sign of work before maintaining or repairing the equipment.

High pressure line and compressor heads have a temperature of 120° -160° C, and interventions should be made after waiting for 15-20 minutes for cooling of these parts after the system is stopped.

- The units subject to high internal pressure during operation. The pipes and equipment containing pressurized gas are made of materials resistant to internal and external forces. Damages to the pipes and equipment during transport, installation and maintenance shall decrease safety of the unit. Don't allow any equipment to be damaged by external effects.
- All tests, adjustments and controls of the units have been performed. Don't change connections and adjustments of equipment during installation, maintenance and service.
- The units are not harmful to human health and environment.
- Electrical board and circuits are only for authorized personnel. Safety and protection precautions in these fields are valid as long as you don't change adjustments and connections. Direct or indirect contact with these fields may lead to danger. Don't touch any electrical cables, boards, tools and connections for any reason whatsoever. Keep away these fields and be sure that you are insulated.
- The units contain switches, thermics, contactors and similar mechanisms prepared to create a certain safety and precaution mechanism to allow for performance of functions in the units. Don't interfere with these mechanisms. Replace if they are damaged.

Mechanical risk parts are insulated from surrounding as they are constructed within a closed structure. Don't open the cap and protections while the machine is operating. If it is open, close the cap before starting the machine. Be careful while touching these fields even if the machine isn't operating.

Keep away from hot fields and surfaces of the machine. Don't remain close to these fields and don't contact directly or indirectly. Even if the machine isn't operating, wait for their cooling before touching these fields.

There are warning labels on the units against the situations (stated or not stated in this manual). Don't touch or keep away the places with warning labels. Conform to the instructions on the labels.

If the labels become illegible, replace them. You can find meanings of labels and which instructions shall be applied in the section titled "Meanings of Safety Labels" of this manual.

3.1 Meanings of Safety Labels



This "ATTENTION" sign is an important safety warning.



High voltage. Fatal Electrical Voltage.

It is used to protect the user or maintenance personnel from touching the parts or fields bearing risk of electricity when the machine is operated or a break is given. This label means that there is an electrical risk here. Don't touch these places without an insulation protector or turning off power source. Don't apply water, oil or similar substances even for cleaning purposes. Be sure that these fields are always insulated. Don't give damage to the cap, protection and insulation equipment.



Risk of Burning

It is used to protect the user or maintenance personnel from the risk of touching anywhere. This label means that there is electrical, mechanical or burning risk at these fields. Don't touch the fields with this label or take all necessary precautions.



Protective Gloves Should Be Worn

It is a warning sign used to remind the personnel to wear protective gloves when the machine is operated or a break is given. Wear your gloves if you are working in the places with this label.

4. DEFINITION AND OPERATING PRINCIPLE OF THE MACHINE

The machine presented in this manual is a condensing unit. Condensing units are designed and manufactured to provide stable temperature under certain conditions. It has to be used together with an evaporator which is an internal unit. It isn't possible to use alone. The device shall be ready to operate when it is installed in a proper place, copper pipe connections to the evaporator are made, and the cooling refrigerant is charged. Model fan is divided into eight series according to the type of compressor and fields of use.

Model	Description	Applied Temperature
HM	Split Type Hermetic Condensering Unit	Cool
HL	Split Type Hermetic Condensering Unit	Freezing
CM	Split Scroll Hermetic Condensering Unit	Cool
CL	Split Scroll Hermetic Condensering Unit	Freezing
SM	Split Type Semi-Hermetic Condensering Unit	Cool
SL	Split Type Semi-Hermetic Condensering Unit	Freezing
SMI	Industrial Type Semi-Hermetic Condensering Unit	Cool
SLI	Industrial Type Semi-Hermetic Condensering Unit	Freezing
TS	Split Type Semi-Hermetic Condensering Unit	Quickfreezing
TSI	Industrial Type Semi-Hermetic Condensering Unit	Quickfreezing

Installation and operation of Condensering Unit should be performed by a qualified cooling technician in accordance with general safety rules. Information such as model, typical functions and serial number is available on the label upon the device. If you need help or further information, please state model and serial number.

5. CYCLE DIAGRAM AND EQUIPMENT

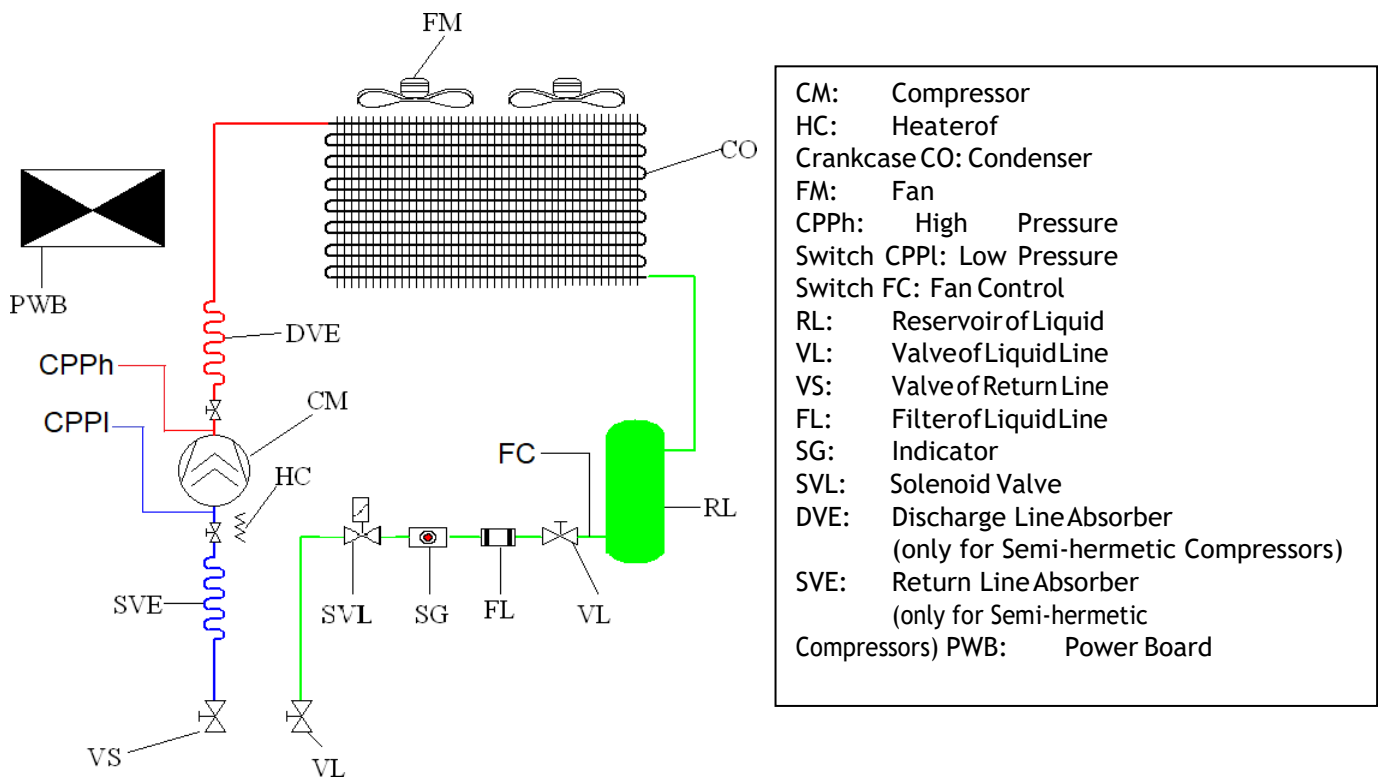


Diagram 1

Cycle Diagram of ICU Condensing Unit

6. FIELD OF USE and INTENDED USE

ICU condensing units manufactured by IBS Isıtma Soğutma Havalandırma Taahhüt San. ve Tic. A.Ş are designed and manufactured to be used in all commercial and industrial cooling applications such as window type refrigerators, coldrooms, ice machines, ice-cream machines and etc. The units should not be used except for intended use. The manufacturing firm cannot be held responsible for the damages and losses resulting from use of the product for other purposes without obtaining approval of the manufacturer.

7. PACKAGING, CARRYING and STORAGE

ICU condensing units are packaged by wrapping with nylon to prevent scratching of the paint on device cabinet due to small crashes. Unless otherwise stated, the units are delivered in exporting boxes.

The units should absolutely be carried and transported vertically and should never be canted and overlapped during transport. ICU condensering units are transported after all copper pipe soldering works and electrical connections of all operating equipment within the unit are completed and all controls and tests are performed. The unit becomes ready for operation after evaporator and copper pipe soldering works are completed, the electrical connections are made and the cooling refrigerant is charged in the place of installation. Necessary care should be taken for not damaging the units. The units should be stored in a way that they shall stand up on a flat floor and in the places where there isn't excessive corrosion-radiation and the temperature is lower than -25°C and higher than $+60^{\circ}\text{C}$. The unit should be protected against floods as it contains electrical shaft materials. The units should never be canted and overlapped for storing purposes. The manufacturing firm bears no responsibility for the damages resulting from carrying, transport and storage.

8. COMMISSIONING

In order to continue warranty cover, ICU condensering units should be assembled and operated by an experienced, trained and qualified cooling technician, and regular maintenances and controls should be performed. During installation, all norms should be conformed, and especially electrical cable installation, pressure safety switch adjustments and the relevant set values should not be changed.

The devices should not be operated without taking necessary precautions (consult the manufacturer about precautions) at ambient temperatures under -30°C and above $+48^{\circ}\text{C}$. Relative humidity rate of the air is not important for operation of the devices; however, as the devices include electrical equipment, they should be installed in the places protected against floods.

Conform to the instructions on installation, operation and maintenance. Please, examine the information given in the manual. Consult the manufacturing firm for more information.

For desired efficiency and operation of ICU condensering units, the following criteria should absolutely be observed while determining locations of the devices.

Before the installation;

The unit should be controlled for possible damages during carrying. Quality workmanship and materials should be used in selection of pipe fittings, design of installation and assembly.

8.1 Place of Installation

The unit shouldn't be installed in the areas where the sound during normal operation may disturb such as the places near windows, spaces between buildings and etc. The installation shouldn't block transits, doors, shutters or transit of the personnel. It is recommended to abstain from direct connection to the floor to prevent transmission of noise and vibrations of the units, and to use proper plastic absorber wedges taking weight of the device into consideration. If the units shall be installed on a floor higher than one that can be reached by normal service personnel, a walking scaffold should absolutely be mounted around the unit. This walking scaffold should be in capacity of carrying service personnel, equipment carried by the personnel and compressors.

Condensering units should be kept away heat sources and the place of installation should be ventilated well.

The place of installation should not prevent air circulation and should allow discharge of the heat produced by the unit.

Input and output surfaces of air should be kept away the objects which may prevent air circulation.

The unit should be installed in a place that can be reached easily when service and maintenance easiness and distances are taken into consideration.

Access to the unit should be prevented in a way that nobody can access to the unit except for the authorized service personnel.

The place of installation should be protected against floods, excessive corrosions and radiations.

The device's place of installation should be determined in a way that the distance between evaporator and ICU condensering unit shall not be higher than 10m vertically and total distance of horizontal and vertical pipelines shall not exceed 25m.

8.2 Assembly

Taking weight of the device into consideration, the floor upon which the device will be placed should be in capacity of carrying weight of the device and the device should be fixed to the floor vertically and flatly.

ICU condensing units are designed especially to operate silently. There should be no vibration while installing the unit.

The unit should be installed on a sound and fixed support safely. It is recommended to separate the unit from its support using anti-vibration pads or blocks. The pipes should be as flexible as not to transfer vibration.

8.3 Copper Pipe Connections

After installation and connection of the unit has been completed, pipe connections should be made. The system pipes should be compatible with ASHARE guidelines in order to reach maximum operating efficiency. For accurate and efficient operation of the system, all necessary ***pipe designs and installations are the responsibility of the user.***

In pipe installation, the following issues should be attended during selection of pipe diameters.

- Pressure decreases in suction, discharge and liquid lines due to friction loss.
- Speeds of fluids in suction, discharge and liquid lines for oil return.
- Pressure decreases in liquid line at vertical rises.
- All vertical suction pipes should incline 2% in the direction of flow to facilitate return of oil to the compressor.
- An oil trap should be used at the top and bottom parts of all suction pipes in every vertical rises of 1 m or higher.
- An oil trap should be used at every 5 m in the suction lines of 7,5 m or higher.

For high quality of our products, ICU condensing unit is delivered dry and filled with nitrogen. For quality and smooth operation of the units:

- Soldering should be performed under dry nitrogen.
- Friction of copper pipes to each other and contact of external metals with the copper pipes should be prevented. In such case, the copper pipe can be protected by covering with plastic pipes or insulation.

- The copper pipes may get damaged as a result of vibration which occurs when they contact with hard surfaces and sharp edges. They should be protected as mentioned above.

8.4 Electrical connections

Electrical connections of the devices should conform to EN60204-1 standards.

The appropriate power source for ICU condensing units is stated on the label upon the device and the voltage is 208-220-240 or 400V50Hz. Grounding should be performed.

The main cable connections should be made soundly to the terminal connectors on the power board and their screws should be tightened.

Voltage of the power source should remain within the limits of ± 10 of the value shown on the label of machine. The machine is protected against voltage fluctuations out of these limits. The ampere value of main switch feeding ICU condensing units should be bigger than the ampere value stated on the label of device.

Necessary cable sections should be determined taking the distance between main feeding cable, electrical distribution panel and the unit into consideration and calculating voltage decreases. No feeding should be made using a cable with a section smaller than $4 \times 2.5 \text{ mm}^2$. A cable with a section of $3 \times 1,5 \text{ mm}^2$ should be used between control panel of evaporation unit and condensing unit. Make connections using the connectors stated in circuit schema given with the unit.

You can find electrical connections on the following pages.

8.5 Leakage (NITROGEN) test

After all copper and electrical connections are made; a leakage control test should absolutely be done before operating the system. Before charging gas to the system, you should be sure that there is no leakage in the system.

*Use Nitrogen or Carbon dioxide gas for applying pressure to the system.
Never use Oxygen or Acetylene gas for pressure application.
These gases lead to great and dangerous explosions.*

During the test, all necessary precautions relating to safety and control elements that may be affected from pressure should be taken. All solenoid valves of the system should be on. Maximum pressure of 15 Bar should be applied in suction line and 25 Bar in discharge and liquid line. All conical and soldered connections should be controlled against leakage.

Nitrogen should be left in the system as pressurized for 12 hours. If no pressure decrease is detected, this means that there is no leakage. Therefore, nitrogen can be discharged from the system. After nitrogen test, the system should be connected to a vacuum pump. Vacuum all system with the vacuum pump until 755 mm HgS vacuum is obtained. Turn off vacuum pump when 755 mm HgS vacuum is obtained. After waiting for at least 4 hours, it means that there is no leakage if no increase is observed in vacuum manometer. After vacuum process, gas can be applied to the system through liquid line (control machine label in order to determine the correct cooling gas).



NEVER OPERATE THE COMPRESSORS WHEN THE SYSTEM IS UNDER VACUUMING.

8.6 Gas charging

Fill the facility only with the cooling gas it uses (see the label). If the cooling refrigerant is a mixture, the gas should be filled only in liquid form in order to prevent changes in compound rates of the mixture.

When the fluid is R448A, R449A, R452A, R507A, R404A, fill the cooling circuit slowly up to the level of 4-5 bar, or up to 2 bar when the fluid is R-134a.

The remaining gas shall be filled while the unit is operating until the system reaches nominal operating conditions. Before powering the system, please see the part titled "Control before Starting".

8.7 Control before Starting

Control whether the voltage of power unit is same with the voltage of condensing unit.

Control calibration of electrical protection devices.

Control whether service valves are completely on or not.

Control whether heater of crankcase operates or not.

Control whether the fans on the unit rotate freely or not.
Control whether condenser fins are clean and there is nothing preventing air circulation.
Control the facility against possible failures.

8.8 Operation of the System

Turn on main switch on the electrical mains feeder through main distribution board.

Bring On/Off switch on control panel of the evaporator to “on” position. The system shall start to operate automatically.

Control adjusted degree value on control panel of the evaporator.

Control high and low pressure values of the system with a manometer.

Control whether the cooling compressors within the condensing unit are overheated or not.

Make sealing control.

Make an overall control of the facility, and make sure the facility operates properly.

8.9 Turning off the system

If you don't need cooling process for a while, you can turn off the system using On/Off switch on evaporation control panel.

9. INSTRUCTIONS FOR OPERATION AND MAINTENANCE

Clean condenser fins within the structure of ICU condensing unit once a month.

If the condensing unit is in a dusty, dirty environment, make this cleaning more frequently. This period can be once a week. If you cannot clean the fins by yourself, contact the authorized service immediately.

Don't use chemical substances to clean Condenser Fins. These substances may give chemical harms to your condenser.

Extraordinary sounds and noises during operation of the system may be indicator for future problems. Continuing to operate the machine in such case may lead to irreparable damages to the machine.

If your condensing unit stops at short intervals and then starts again and the desired cooling is not achieved, contact an authorized service. This situation results from lack of cooling gas.

The leaking part should be found and insulated, and additional gas should be supplied.

Perform sealing tests and controls once a year or in accordance with regulations of your country.

Regularly, control;

- Adjustments of safety and control tools,
- State of electrical and cooling connections (safety, corrosion...),
- Operating conditions,
- Fixation of the unit upon its supports,
- Operation of the heater of crankcase.

10. REASONS and SOLUTIONS FOR SYSTEM PROBLEMS

A table about problems-reasons-solutions is given below. It should be taken into consideration that many problems require solutions beyond capacity of the user. Such problems can be solved by authorized service personnel with good equipment. Try to solve the problems in accordance with the following instructions. Don't forget that continuing to operate the unit without solving the problems may lead to permanent damages in the future. If you cannot solve the problems by yourself, please contact with the nearest service provider.

PROBLEM	REASON	SOLUTION
The unit isn't working	There is no mains electricity	Operate spare Power Source if any
	Voltage of power source is out of limits.	Don't operate the unit in case of voltage fluctuations
	Main switch cuts the circuit.	Control ampere values of your switch, replace if necessary
	On/Off switch is at "off" position.	Turn on the switch
	High thermostat adjustments	Control adjustments of thermostat
	Thermic is blowing out	1-Control temperature of the compressor. If overheated, leave for cooling. 2-Control electrical connections. 3-Control operation of the fans upon the unit.
HBP and LBP switches are cutting the circuit	1-Control adjusted values of the switch. 2-Control operation of the fans upon the unit.	

The compressor is stopping and operating with short intervals	LBP pressure switch adjustment is lower than the required.	Adjust cutting value to 1 bar and difference value to 0,7bar
	Evaporating fans are not operating.	Operate the fans
	Ice has accumulated in evaporator fins.	Control defrost periods and times through control panel of evaporator. Clean the ice in the fins.
	Difference value of temperature adjustment is lower than required.	Adjust difference value to 2
The compressor is operating continuously.	Thermostat is adjusted to a very low level.	Adjust thermostat temperature to an appropriate value
	The cooling refrigerant is insufficient.	Inform the nearest service
	Evaporator is subject to overload.	Control loading
	Compressor's electrical contactors are adhered	Replace failed contactors, control and follow voltage values

11. ELECTRICAL CIRCUIT SCHEMAS

You can find electrical circuit schemas of the units in the product. These schemas were drawn to include all cooling devices. These drawings are provided by IBS but if you lose these drawings, follow the explanations below to see electrical circuit schemas of the relevant unit.

In order to determine drawing code of the relevant device;

- Determine whether the compressor is monophase or triphase and from the drawing code; find letter M if it is Monophase: (ICUMRB1DC2EV1F), and letter T if it is Triphase: (ICUT2DC2EV2F).
- Learn number of defrost contactors used in the unit and from the drawing code according to the number;
Find number 1 in front of "DC" for 1 Contactor (ICUMRB1DC2EV1F), and number 2 in front of "DC" for 2 Contactors (ICUT2DC2EV2F).
- Learn number of Evaporator contactor used in the unit and from the drawing code according to the number;
Find number 1 in front of "EV" for 2 Contactors (ICUMRB1DC2EV1F), and number 2 in front of "EV" for 4 Contactors (ICUT2DC4EV4F).
- Determine number of fans on the unit and from the drawing code according to the number of fan;

Find number 1 in front of "F" for 1 Fan (ICUMRB1DC2EV1F);
number 2 in front of "F" for 2 Fans (ICUMRB1DC2EV2F); and
number 4 in front of "F" for 4 Fans (ICUT2DC4EV4F).

For example: the drawing code of a device:

1. with Monophase compressor,
2. with 1 Defrost contactor,
3. with 2 Evaporator contactor;
4. with 2 fans upon the group,

For Monophase compressor: ICUMRB1DC2EV2F

For 1 Defrost Contactor: ICUMRB1DC 2EV2F

For 2 Evaporator Contactor: ICUMRB1DC 2EV2F

For 2 fans upon the group: ICUMRB1DC 2EV2F is determined and the code is ICUMRB1DC 2EV.

In order to determine the drawing after drawing code of the relevant device;

After determining the drawing code, the drawing can be displayed by marking the boxes under other optional equipment used upon the relevant drawing code (Fan Switch or Fan Speed Control, Combine, Thermistor, Oil Auto, Thermostat, External Load, Defrost Contactor-1, Defrost Contactor-2, Evap Fan 1, Evap Fan 2). Be sure that the connections have not been made for the boxes not marked upon the device.

12. AUTHORIZED SERVICES AND SPARE PARTS

For your problems about cooling systems and needs for spare parts, contact with the following authorized services.

Service	Country/City	Tel.	Fax.
<i>IBS Heating, Cooling, Ventilation and Contracting Inc.</i>	Turkey/Istanbul	+90(216)4660405	+90(216)4660570

13. CONDENSERING UNIT INCLUSION DECLARATION

Only qualified personnel are authorized to work on the unit.

This product is a defined part to be included in the facilities in accordance with European directive 98/37/EC. ICU condensering unit shall not be operated unless the facility in which the devices are installed is detected or declared to be conformable to the laws in force. For this reason, this product isn't subject to 98/37/EC.

14. WARNINGS

IBS ISITMA SOĞUTMA HAVALANDIRMA TAAHHÜT SAN. VE TİC. A.Ş saves the right to amend these instructions without any early notification in order to develop its products continuously.

It should exactly be controlled whether safety automatics cut the circuit and there is any leakage in the system or not by operating the products used at maximum operating pressure once a year.

IBS Isıtma Soğutma Havalandırma Taahhüt San. ve Tic. A.Ş bears no responsibility for the risks that may be encountered after intervention of non-authorized personnel to the failures.

IBS Isıtma Soğutma Havalandırma Taahhüt San. ve Tic. A.Ş bears no responsibility for failures and damages arising out of non-conformance to the terms stated in this operating manual.

CERTIFICATE OF WARRANTY

Serial No :

Date of Invoice-No:...../...../20..... -

Warranty period starts as per the date of invoice. Warranty period is 1 (one) year.

The entire product including all parts is under the warranty of our firm.

In case of failure of the product within warranty period, the duration of repair is added to the warranty period. Duration of repair of the product is maximum thirty business days. This period starts when the failure of device is informed to the service station, if no service station is available, to the manufacturer of the product.

Within warranty period of the product, in case of failure due to material and manufacturing defects, no fees shall be claimed under the name of workmanship expenses, cost of replaced part or any other name.

The terms out of the scope of warranty:

Failures due to usage errors.

Failures due to lack of maintenance.

If the devices are serviced and maintained by non-authorized personnel.

Failures due to improper electrical feeding (voltage, frequency changes, harmonic current, etc.).

Operation of faulty devices

Change of device adjustments and safety values (of automatic control elements, thermostats, microprocessor adjustments, set values) without consulting to IBS Isıtma Soğutma Havalandırma Taahhüt San. ve Tic. A.Ş or authorized services.

Operation of devices in very hot and/or dirty, dusty, very damp and closed places without taking any precaution.

Failures due to the abovementioned reasons are regarded as out of the scope of warranty.

Title of Seller :

Address :

Tel / Fax :

E-mail :

Seal/Signature :