EKİN ENDÜSTRİYEL

Chiller
User Guide

MIT

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EKİN ENDÜSTRİYEL
Isıtma-Soğutma San. Tic. Ltd. Şti.

The first condition of innovation is to question. And the first condition of sustainable innovation is to question constantly.

The journey of innovation has started with a question for us too: “How can we develop value-added technologies in Turkey?”. First turning point in this long journey was the birth of MIT (Made in Turkey) brand. MIT made us the first plate heat exchanger producer of Turkey and it’s founding vision was not to become a local alternative, it was to build a high-quality brand that can compete on a global level.

While we are working towards this goal in the past 15 years, our products and processes deemed worthy for documentation by many national and international quality assessment institutions such as ISO, TSE, CE, GOST and many more. This was the natural outcome of our constant questioning of the status-quo and our desire to outperform ourselves.

New Generation Engineering

With our engineering approach that focuses on the process, not the problem, we do not just specialize in a product, we consider the entire ecosystem of that product. Ergo, we produce all the other components of a system in addition to plate heat exchangers and we focus on the constant development of engineering staff required to provide an end-to-end application.

We provide a “solution” rather than a product with our business development, presales, sales and after sales services provided by our expert engineers.

In our 15th year, we continue to grow as a solution partner for projects that need high technology in more than 60 countries with our internationally approved high-quality plate heat exchangers; components such as accumulation tanks, boilers, industrial pumps and installation materials that completes these exchangers to form a system; and complementary services provided by our expert engineer staff.

ISO CE GOST CERTIFICATE 799 33 13 TSE-HYB TURQUM® TURKISH QUALITY OF MACHINERY

APPLICATION FIELDS

HEAT TRANSFER PRODUCTS

• Gasketed Plate Heat Exchangers • Brazed Heat Exchangers • Shell & Tube Heat Exchangers • Air Fan Oil Cooler • Economizers • Coils and Radiators

PRESSURE VESSELS

• Water Heater Tanks • Water Storage Tanks • Buffer Tanks • Expansion Tanks • Stainless Steel Process Tanks • Balance Tanks / Dirt Separators / Air Separators • Vapour Separator • Pressured Air Tanks • Neutralization Tanks • Air Tubes • Steel IBC Tanks with ADR

COMPLETE SYSTEMS UNITS

• Heat Stations • Steam Package Systems
• Special Designed Systems • Dosing Systems
• Substations • Thermoregulators

FOOD GRADE SYSTEMS

• Pasteurizers with Plate Heat Exchangers • Hygienic Pasteurizers with Shell & Tube Heat Exchangers
• Cheese and Whey Systems • UHT - Sterilization Systems
• CIP Systems • Hygienic Storage and Process Tanks
• Homogenizers • Standardization Systems • Evaporators
• Turn-key Projects

FLUID TRANSFER PRODUCTS

• Lobe Pumps • Hygienic Centrifuge Pumps • Turbo / Roots / Centrifuge Blowers • Drum Pumps • Acid Pumps
• Dosing Pumps • Monopumps • Air Operated Double Diaphragm Pumps (AODD)

FLOW CONTROL UNITS

• Butterfly Valves • Ball Valves • Globe Valves • Knife Gate Valves • Actuators • Check Valves • Strainers
• Thermoplastic Valves • Plastomatic Valves

ENERGY SYSTEMS

• Boiler Systems
• Solar Collectors
• Water Heater Tanks For Solar

CONTENTS

1. GENERAL INFORMATION

1.1 General Specification

This manual and the wiring diagram supplied with the unit must be kept in a dry place for possible future consultation. The manual provides information on installation and correct use and maintenance of the unit.

Before carrying out installation, please carefully read all the information contained in this manual, which describes the procedures necessary for correct installation and use of the unit. Carefully follow the instructions contained in this manual and comply with the current safety regulations. The unit must be installed in conformity with the laws in force in the country of use. Unauthorized tampering with the electrical and mechanical equipment invalidated the warranty. Check the electrical specifications given on the data plate before making the electrical connections. Read the instructions given in the specific section on electrical connections. Deactivate the equipment in case of a fault or poor operation. If the unit requires repairs, only contact a specialized service centre recognized by the manufacturer and use original replacement parts. The unit must be installed outside and connected to a hydronic cooling and/or heating system. Any use different from that permitted or outside the operating limits given in this manual is prohibited (unless previously agreed on with the firm).

The manufacturer declines any liability for damage or injury due to non-compliance with the information given in this manual.

1.2 European Directives

The company hereby declares that the machine in question complies with the matters prescribed by the following Directives:

- Machinery directive 2006/42/EC
- Pressurized equipment directive (PED) 97/23/EC
- Electromagnetic compatibility directive (EMC) 2004/108/EC
- Low voltage directive (LVD) 2006/95/EC

1.3 Unit Identification Plate

The figure on the left illustrates the identification plate of the unit:

Model	A
Serial Number	B
Year of Manufacture	C
Total Absorbed Power	D
Power Supply	E
Refrigerant	F

Figure 1; Unit front label

Model	G	
Total Absorbed Power	H	
Nominal Current	I	
Techinal Manual	J	
Evaporator	K	
Power Supply	L	
Max. Ambient Temperature	M	
Sound Pressure Level	N	
Transport Weight	O	
IP Protection Grade	P	
Cooling Circuit		
Refrigerant	Q	
Refrigerant Mass	R	
Refr. Max Working Pressure	S	T
Process Water Cooling Circuit		
Set Point Temperature	U	V
Water Pump Power	W	
Max Water Pressure	X	

Figure 2; Unit back label

1.4 General Safety Information

One of the leading causes for accidents while operating and servicing industrial machines is failure to respect elementary safety and revention standards.

- This manual has been drafted with the intent of helping the operator to correctly install the unit, supplying him with all indications for correct use and efficient maintenance of the appliance, while attempting to eliminate or reduce residual risks. Please report further potential hazardous conditions to the manufacturer.
- Before installing and operating the unit, please read carefully all the information in this manual describing correct work procedures.
- This manual and the wiring diagrams supplied with the unit must be kept carefully for future reference and during the entire lifespan of the machine.
- Abide by the instructions contained in this manual and comply with safety standards in force.
- The appliance must be installed in accordance with national legislation in force in the country where it is used.
- Unauthorized electrical or mechanical tampering with equipment NULLIFIES THE WARRANTY, relieving the company from any liability.
- Check the electrical features carried on the serial number plate before performing electrical connections. Read the instructions in chapter 5 regarding electrical connections.
- When interfacing with other machines, make sure they are compatible and carefully follow the indications provided in their use and maintenance manuals. The declaration of conformity issued by the manufacturer of each individual unit making up the plant does not entail automatic conformity of the plant itself to current standards. The customer is responsible for having the plant undergo such verification.
- Perform even the most trivial operations on the unit after having put on clothing compliant with international work safety standards.

The Personal Protective Equipment indicated in the manual refers exclusively to hazards relating to the unit. It is up to the user to assess the extent of hazards related to the environment in which the unit is installed.

The company using the unit is responsible to make sure that those fulfilling the various tasks:

- Have the skills indicated in each chapter.
- Read and understand the manual.
- Receive specific training to correctly operate the unit.
- Are aware of the accident-prevention standards relative to work safety and to the unit they are about to deal with.

1.5 Important Warnings

Please respect all the instructions and warnings declared on to the manual and directly on the machine. Otherwise, the manufacturer declines all the responsibilities for accident and other failures due to any lack of negligence.

- The units can only operate by trained personal.
- When mounting or servicing the unit, it is necessary to read this instruction manual carefully, to conform all the specification labels on the unit, and to take any possible precautions of the case.
- Never block the fresh air inlet and warn outlet air from the condenser.
- Please be careful for pressure in refrigeration circuit and electrical equipment inside the unit; while maintenance and servicing.
- Before connecting the machine to the power supply; be sure that the values are match with unit requirements which is shown on the label located back-on to the unit.
- Always use individually protections as well as aprons, no-slip waterproof shoes, rubber gloves, protective eye-glasses and a mask.
- If any modification done without notice of manufacturer and not observing the rules of manuals will cause warranty coverage invalidity.

1.6 Terminological Definitions and Meaning of Symbols Used on the Unit and in the Manual

The manual uses indifferently the terms fridge, chiller and refrigerator; likewise the terms temperature controllers and temperature control unit; free cooler and heat exchanger; pumping unit and pumping control unit are used in an equivalent manner. The generic term water is often used in place of a glycol mixture. The following pages carry the symbols which could be used in the manual or are present on the units, with a short description of their meaning and the message which the manufacturer intends on communicating to those operating them.

The following are the symbols used in the manual:

Refers to procedures or practices that, If not performed correctly, will cause serious damage to health, injury or death and the product.

Danger: Electric discharge.

Important information.

Danger: Hot surface.

Protective footwear must be worn.

Protective gloves must be worn.

Face shield must be used.

Respiratory protection must be used.

1.6 Operation Range

The cooling capacity (the values of which are carried in the relative tables attached to the technical data) varies depending on the intended versions. The ambient temperature and the water exiting the chiller have temperature limitations beyond which operation is placed in jeopardy.

For the unit treated in this manual, these are carried in the following table:

	MIT-SG-S, MIT-SG-S, MIT-SG-P, MIT-SG-W, MIT-SG-W, MIT-SG-ER2, MIT-SG-MIT-SG-ER2-P, MIT-SG-W-W	ARA-S,MIT-SG-AR, HEA-S	MIT-SGA-S, MIT-SGA-S, MIT-SGA-P, MIT-SGA-W, MIT-SGW-W
Outlet Water Temperature (*)	+5 °C / +30 °C	+5 °C / +30 °C	+5 °C / +30 °C
Maximum Ambient Temperature	+46 °C	+46 °C	+55 °C

(*) The outlet fluid taken into consideration is water. Mixtures of water and glycol can reach lower temperatures than those indicated. (See paragraph 4.4.2 for the percentage of glycol to be mixed with water according to the temperature).

1.8 Warranty

The manufacturer is only responsible for the unit in its original configuration: any intervention which alters this configuration or operating cycle must be agreed upon or carried out by the manufacturer himself.

The warranty does not include parts subject to normal wear (filters, fan belts if present, pump bearings and mechanical seals, contactors, fuses and other expendable parts along with their transportation expenses).

The warranty does not include damage caused by transportation or by errors, tampering or incorrect maneuvers and in any event by failure to respect routine and extraordinary maintenance, the indicated limits and the instructions for use supplied by us.

The manufacturer or his agent will not be held liable for indirect damage fully or partially ascribable to the customer's negligence.

The manufacturer or his agent will not be held liable for consequences deriving from use of non-original spare parts.

All assistance service covered by warranty, extraordinary maintenance and repairs are reserved for the manufacturer's specialized technicians. These operations are therefore not described in this manual.

Refer to the general sales conditions in the contract for details and duration of the warranty.

1.9 Manufacturer

EKİN ENDÜSTRİYEL
Isıtma-Soğutma San. Tic. Ltd. Şti.

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2. GENERAL INFORMATION

2.1 Designation of The Model

MIT-SG - A - S 802 S&T / R - 00 - ST R407

Company Code	
Condenser Type	
A	Air Cooled Condenser
W	Water Cooled Condenser
Compressor Type	
S	Hermetic Scroll Compressor
P	Semi-Hermetic Piston Compressor
W	Semi-Hermetic Screw Compressor
Unit Model	
No of Compressors	
1	1 Compressor
2	2 Compressor
4	4 Compressor
Evaporator Type	
P	Plate Type Heat Exchanger
S&T	Shell&Tube Heat Exchanger
Fan Type	
F	Axial Fan
R	Centrifugal Fan
Integrated Tank Type	
0	Without Tank
A	Athmospheric
B	Pressurized Tank
Water Pump Type	
0	Without Water Pump
1	1 Water Pump
2	2 Water Pump
Equipment	
ST	Standard
FR	Heat Recovery
Refrigerant	
R407C	R134A / R404A

2.2 Basic of Refrigeration

In this cycle, a circulating refrigerant such as Freon enters the compressor as a vapor. The vapor is compressed at constant entropy and exits the compressor superheated. The superheated vapor travels through the condenser which first cools and removes the superheat and then condenses the vapor into a liquid by removing additional heat at constant pressure and temperature. The liquid refrigerant goes through the expansion valve (also called a throttle valve) where its pressure abruptly decreases, that results in a mixture of liquid and vapor at a lower temperature and pressure. The cold liquid-vapor mixture then travels through the evaporator coil or tubes and is completely vaporized by cooling the warm water. The resulting refrigerant vapor returns to the compressor inlet to complete the thermodynamic cycle.

2.3 Description of Components

Figure 3; Details of components

POS.	1	2	3	4	5	6	7	8	9	10	11	12	13
Part Descr.	Fan	LCD Touch Screen	Emergency Stop	Evaporator	Expansion Valve	Dryer	On / Off Fuse	Liquid Receiver	Manometer Gauge	Compressors	Water Pump	Condenser	Framework

2.3.1 Framework

It consists in a self-support system made of galvanized carbon and powder painted steel sheets. The various metallic components are connected by means of threaded junctions (screws) or steel rivets. The panelling can be easily removed though requiring specific tools and the intentional action of the operator. They make it easy for all components requiring maintenance to be accessed. It is indicated in figures 3.

2.3.2 Compressors

The standard version of the MIT-SG-S, MIT-SG-S, MIT-SGA-S, MIT-SGA-S, MIT-SG-W and MIT-SG-ER2 chillers uses high-efficiency hermetic scroll compressors, operating individually on independent circuits. The intrinsic features of this type of compressors make the units less subject to vibrations and therefore more silent. Depending on the chiller model, there can be only one compressor or two compressors operating in distinct circuits or again four compressors operating in distinct circuits. The windings of the electrical motor of the compressors are equipped with temperature control by means of thermistors. The compressors are housed in the lower compartment of the unit, easily accessible for maintenance by removing the protective panelling and the metal air filters. The compressor is indicated in figures 3.

2.3.3 Condenser

The condensers of the all series of chillers are the finned pack type with air cooling flowing from the inside to the outside of the unit. The condensers are dimensioned so as to obtain the maximum thermal exchange yield with minimum head loss of primary and secondary fluids. The constructive features and operating modes of these heat exchangers make them easy to be dirtied by dust or pollen in the air, thus reducing the air passage cross-section and limiting performance. For this reason the unit is equipped with air filters which constitute part of the closing of the compressor compartment. For applications in salty or particularly aggressive environments, you may request a superficial protective treatment of the materials in direct contact with air. It is indicated in figures 3.

2.3.4 Expansion Valve

Thermal Expansion Valves (TXVs) are precision devices designed to regulate the rate of refrigerant liquid flow into the evaporator in the exact proportion to the rate of evaporation of the refrigerant liquid in the evaporator. It is indicated in figures 3.

2.3.5 Evaporator

In the standard version, it is the “shell and tube” type, specifically dimensioned to ensure minimum head loss of fluid to be cooled with maximum performance of the heat exchanger. It is positioned inside the inertial storage tank in the compressor compartment. In special versions of the unit, a plate evaporator can be included, again housed in the compressor compartment. It is indicated in figures 3.

2.3.6 Fan

Three types of fans can be installed.

- High head centrifugal fans suitable for air channelling are installed on the standard version. They are anchored onto the roof of the chiller in a position which cannot be reached by the operator unless voluntarily and using specific tools. They are switched ON/OFF; they belong to insulation class F and protection degree IP54.
- The special version can use axial type fans with aluminium blades and scythe profiles. They are housed on the roof of the chiller and supported by an upper protective grille. A lower protective grille is also installed to complete the safety protection. They may be switched ON/OFF. (Variable speed axial fans with phase cut are also available as EXTRAS). They are insulation class F. The protection degree is IP 54 and they are equipped with circuit breakers built into the motor.
- Variable speed EC type axial fans can be used in special versions; they are insulation class F and protection degree IP 54. The fans are indicated in figures 3.

2.3.7 Refrigerant (Refrigeration Gas)

The right chosen refrigerant is the key to reach high performance unit. Thus location, local regulation and process knowledge should be emphasizing very carefully.

R407C: This refrigerant is a mixture gas with 3 Hydroflorocarbon. Percentage of mixtures is contain % 23 R32 + % 25 R125 + % 52 R134A. After the Montreal Protocol, R407C gas become more popular refrigerant due to ozone-friendly structure and performance curves similar to R22 (high ozone depleting potential). Beside of that, the reason to use R407C gas in industrial process cooling system is; unit with R407C is more reliable and able to resist to temperature waves from the process and different capacity load this will affect the COP (Coefficient of Performance) of the unit.

R134A: This refrigerant became a must for use in tropical region regarding to handle to high pressure working condition. In that case, unit with R134A gas is not decreasing the performance under 62°C ambient temperature desert condition.

R404A: Mostly use for low temperature application as well as low process systems and cold room applications. Suitable working range between -5°C to -45°C.

R410A: Sold under the trademarked names Suva 410A, Forane 410A, Puron, EcoFluor R410, Genetron R410A, and AZ-20, is a zeotropic, but near-azeotropicmixture of difluoromethane (CH_2F_2, called R-32) and pentafluoroethane (CHF_2CF_3, called R-125), which is used as a refrigerant in air conditioning applications. R-410A cylinders are colored pink.

2.3.8 Dryer

The liquid-line filter drier prevents moisture and foreign matter, introduced during the installation process, from entering the expansion valve and the solenoid valve. When water is mixed with refrigerant and oil, and heat is added by the compressor, acid is formed that can damage the valves or compressor.

2.3.9 Solenoid Valve

A solenoid valve is used to stop the flow of refrigerant within the system. These valves are magnetically operated, and an electric winding controls the opening and closing of the valve. The valve is typically a normally-closed type so that it is closed when deenergized.

2.3.10 Pipe Glass

A moisture-indicating sight glass is installed in the liquid line, upstream of the expansion valve, It enables the operator to observe the condition of the refrigerant:

- Indicate its moisture.
- Detect the presence of bubbles in the liquid line prior to entering the expansion valve.

2.3.11 Liquid Receiver

Liquid receiver is used for to storage of refrigerant for unit in use and while servicing the unit, buffer between liquid and hot gas and avoid entering hot gas into evaporator.

2.3.12 Flow Switch

Flow switch controls the water flow in the systems. In case of an emergency due to evaporator freezing or any other obstacle for water flow; it will effect immediately and stops running the unit to avoid any problem forehand.

2.3.13 Low-High Pressure Mamometers

Low-High pressure gauges are providing information for evaporation and condensation of the refrigerant inside the cooling circuit.

2.3.14 Electrical Circuit Features

In the standard version, the electrical system is equipped with the following accessories:

- Electrical control board with IP44 execution, with open doors it maintains the protection degree IP20, equipped with air circulation active while chiller is running.
- Load disconnection switch with front-operated rotary operating mechanism and door lock.
- Automatic magnetic and thermal switches with missing phase detection (overload devices) to protect compressors, fans and pump.
- Device controlling sequence of compressor phases.
- Control contactors for compressors, fans and pump.
- Auxiliary circuit transformer (24 Volt).
- Fuses protecting transformer and auxiliary circuit.
- Phase sequence control by means of relays keeping the unit from operating when the correct phase sequence is not respected.
- Microprocessor control system including:

    - Local user terminal on chiller displaying status by means of symbols and the main controlled sizes (temperature setting and set differential, alarms, contactor, etc.).
    - Temperature control on chiller storage tank.
    - Compressor rotation with FI.F.O. logic.
    - Compressors and pump working hour count and setting of hour limit for programmed maintenance.
    - Antifreeze function by means of probe at evaporator outlet.
    - Free contact input on terminal board for remote ON/OFF control.
    - General chiller alarm changeover potential-free contact on terminal board.
    - Alarm log.

2.4 Optional Accessories

3. TRANSPORTATION, RECEIVING, STORAGE, HANDLING, UNPACKING, AND POSITIONING THE UNIT

3.1 General Information Concerning Safety and Specific Risks

The unit must be handled by expert personnel in compliance with safety and health standards in force.

While handling, positioning and unpacking the unit, operators was must wear safety shoes and protective gloves to avoid contact with straps, wood splinters, staples and any other element capable of causing cuts and abrasions.

Since it is not possible to foresee all the dangerous situations that could arise, the safety warnings present in the manual must not be considered comprehensive.

3.2 Transporting The Unit

During transportation, the unit must be positioned stably on the means used. If travelling over especially bumpy roads, a material capable of absorbing blows and vibrations as much as possible must be placed between the unit and the flatbed of the transportation vehicle; therefore the unit must be appropriately blocked in place. Contact the manufacturer or his agent to receive further information concerning transportation methods and special procedures to be followed to further protect machine components to keep them from being damaged. The manufacturer will not be held liable for damage deriving from transportation of the unit organised by third parties.

3.3 Receiving The Unit

Upon arrival, check to make sure the unit has not been damaged during transportation and that all the parts are present according to the order. In the event of visible damage or missing pieces, immediately right it down on the transportation document, adding the words: Withdrawal with reserve due to evident deficits / damage by transportation. Report them via fax both to the supplier and carrier within and not beyond 3 days after reception.

3.4 Storage

Shelter from sunlight, rain, sand and wind.
Maximum temperatures: 60 °C; minimum: -5 °C. (*)
Maximum humidity: 90 % u.r.

Do not place other objects on top of the unit.

Do not deposit the load in areas where it may generate dangerous situations or where use of equipment and emergency exits are impaired.

(*) Valid for units not yet activated or units which process glycol water. Otherwise it is recommended to drain water from the unit before storing it in a place where the temperature does not drop below freezing, possibly indoors to avoid damage deriving from fluid left inside the water circuit freezing.

3.5 Handling The Unit

To handle the unit, the pick-up points must be easily accessible. Therefore if necessary, partially or fully remove packaging before performing handling (chap. 3.6). Use only equipment compliant with safety requirements: make sure they have documentation declaring their conformity. The lifting equipment must have a load capacity greater than the weight of the unit (indicated outside of the packing or else on the electrical control board).

Check that all chains, hooks, rings and belts are in good conditions. Cables, chains and ropes must never be applied directly to the lifting eyebolts: use lifting bars to avoid side loads on hooks and eyebolts. If a hooking system is used, check the safety device.

Before moving the unit, make sure there is no process liquid inside and that it is disconnected from the electrical and hydraulic system; block any freely moving parts. Protect sharp edges with rags and cardboard. Do not lift the unit by its components. If ropes are used for lifting, make sure the load is distributed evenly on them. The minimum angle which the rope can form with the horizontal axis must be less than 45°. Accelerations and lifting speed must remain within safety limits. Do not leave the load suspended in the air longer than strictly necessary: plan beforehand the operational phases of the entire process of lifting, shifting and placing the load. The manufacturer does not supply lifting bars, belts, hooks, or frames distributing the load.

While being moved, the load must remain perfectly flat regardless of the type of equipment operating. Liftingand moving the load must be aided by using rods, boards or hooks at a safety distance: never do it with bare hands.

The operator in charge must be able to:

- Have an overall view of the path.
- Provide information to the crane operator remaining in a visible position.
- Interrupt the manoeuvre if dangerous situations arrive.

Make sure that all workers are in a safe position; do not allow people to access the handling area.

3.5.1 With Forklift Truck

Make sure that the forklift truck has suitable capacity and forks longer than the width of the unit. Insert the forks in the appropriate spots on the frame as indicated in the attached layouts. During handling, take all the precautions indicated in the previous paragraphs.

3.5.1 With Overhead Crane

Make sure that the overhead travel crane has suitable capacity. During handling, take all the precautions indicated in the previous paragraphs. For lifting and positioning the lifting equipment, see the attached layout.

3.6 Unpacking The Unit

Remove the packaging covering the unit; make sure it is in good conditions, immediately contacting the manufacturer in the event of evident anomalies (see point 4.3). Dispose of the packaging in compliance with standards in force in the country where unpacking has occurred.

3.7 Placing The Load

Position the unit on previously determined and designed surfaces, perfectly flat and structured adequately for the weight and dimensions of the chiller. Do not deposit the load in areas where it may generate dangerous situations or where use of equipment and emergency exits are impaired.

Whatever the means used to handle the load, you must pay attention when placing the unit on the surface intended to house it. Set the unit down delicately without unhooking it from the support means, eventually using rods, boards and hooks at a safety distance. During this phase, the operator is subject to the risk of being crushed; do not go too close to the machine and use all required PPE.

4. INSTALLATION

4.1 Professional Profiles of Installer

Make sure that whoever is in charge of operating and servicing the unit has read this manual and correctly understood its content.

The unit must be installed by specialised personnel provided with technical know-how such to avoid the dangers deriving from operations carried out in the presence of electrical power and water-based fluids.

4.2 General Information Concerning Safety and Specific Risks

Protective gloves must be worn while installing the unit to avoid harm due to contact with elements of the machine and of the system and to avoid contact with additives of the fluid to be cooled (category II gloves protecting from risks of a mechanical nature and electrician gloves).

Wear safety shoes to keep your lower limbs from being crushed or perforated.

Always wear adequate work attire: shirt or protective overalls worn correctly. While installing the unit, pay attention to the presence of residual risks which could not be completely eliminated by the manufacturer. We especially point out the presence of sharp profiles in the threading of the hydraulic connections (in/out) of the chiller. While removing and handling panels, pay attention to the danger of crushing limbs. The manufacturer has indicated residual risks on the unit with specific labels as indicated in the table in chapter 2. Since it is not possible to foresee all the dangerous situations that could arise, the safety warnings present in the manual must not be considered comprehensive.

4.3 Positioning, Installation Space and Technical Clearances

Make sure that the support surface of the machine is perfectly horizontal, capable of supporting the weight at full load and sufficiently rigid with the machine operating.

The Air-Cooled Series chillers, in standard configuration, and Water-Cooled Series chillers can be installed indoors or outdoors. If installed outdoors, it is recommended to protect the control instrument from the elements and from direct sunlight. When positioning the unit, respect the minimum free space around it, carried in the assembly drawing and/or in the installation layout (if present) attached to this manual. If there is no indication in the attached layouts, we recommend leaving at least 1.5 meters of space free from obstacles on each side and avoiding placing it near sources of heat and dust. If air-condensed chillers are installed indoors, make sure that the size and ventilation of the room provide adequate air supply to the condensers. Make sure that roofs sheltering the chiller are not too close, reducing the air flow or causing hot air recirculation.

During winter, you must take suitable measures to keep internal components from being damaged by the water freezing during shutdown in the presence of low ambient temperatures (always keep the water pump running or else add a suitable percentage of monoethylene glycol depending on the minimum temperature reached: see indications in the table in chapter 6.4.2).

4.4 Connections

Before carrying out any operation, make sure that the electrical power is disconnected. Hydraulic and electrical connections must be carried out by persons having the technical-professional skills qualifying them for installation, transformation, extension and maintenance of the systems and capable of checking their safety and functionality.

4.4.1 Hydraulic Connections

While doing the hydraulic connections, never operate with open flames near or inside the unit. The supply and return connections of cooled water and those of the condensation circuit (if present) can be distinguished by the labelling placed on the hydraulic connections. In any case, refer the layouts attached to this manual. Always connect the automatic filling (if present) to the water mains. It is recommended to always insert a mechanical filter which can be inspected on the chiller return piping and on that of the condensation circuit (if present) with a mesh having a filtering capacity of 500 µm. If you need to apply more selective filters, contact the manufacturer or his agent. It is recommended to install a shut-off valve on all the hydraulic connections to keep from having to drain the entire system when servicing the unit. The water distribution circuit and the condensation circuit (if present) must be closed and watertight and inplemented with the necessary precautions for forced water circulation systems, namely:

- Pipes resistant to operating temperatures and at least 10 bar pressure, with a diameter limiting head losses as much as possible.
- When needed, thermally insulate the pipes with quality condensation-proof insulating material; to determine the thickness suitable for the application, consult the installation layout attached (if present) or else contact the manufacturer or his agent.
- Insulation from vibrations by inserting vibration-proof joints between the chiller and the system and between chillers when there are several machines in parallel.
- Installation of thermal expansion compensation devices.
- Installation of automatic air bleed valves at the higher points and discharge valves at the lower points.
- Shut-off ball valves, sumps and sleeves for mounting thermometers in zones for detecting temperature and pressure (the manufacturer recommends installing pressure gauge fittings and temperature probes on the condensation water inlet and outlet pipes in water-condensed versions).
- Expansion vessels properly calculated depending on the amount of the fluid filled and its minimum and maximum temperature.

Wherever pipes with quick connection fittings are used, make sure that the fittings do not excessively reduce the crosssection of the pipes. See Chapter 8 for hydraulic layouts when connecting the unit to the system. It is strictly forbidden to hydraulically connect more than one unit in series.

4.4.2 Hydraulic Connections of Machines in Parallel

The presence of other machines connected in parallel is allowed only when they are chillers with a pressurised hydraulic circuit and the same operating logic. Before beginning installation, make sure that the head pressure of the pumps of the chillers are very similar one to another: if not, regular operation of the units with lower head pumps would be compromised. Every unit connected in parallel with others must be equipped with a non-return valve, preferably installed on the supply piping of each chiller. If case of doubts, contact the manufacturer or his agent.

4.4.3 Electrical Connections

Make sure that the electrical system where the chiller is installed has suitable capacity for its operation and has been installed correctly in compliance with standards in force. Make sure it is provided with an appropriate earthing system to which the unit must be connected. The electrical supply of the chillers is provided by a 4-wire cable (three phases plus earth), passing through a cable gland, connected to the main switch (QS). The earth wire must be connected to the specific earth terminal (PE). Position the cable in a way that it is sheltered from any type of strains: it is very dangerous to pull, trample or crush the electrical power cable; a damaged cable could cause short circuits and personal harm. It is recommended to install a disconnection switch with fuses or an automatic circuit breaker on the electrical supply line of the chiller having the capacity indicated in the wiring diagram. Installation must be done in an easily accessible place. Voltage, frequency and number of phases must comply with that indicated on the unit's identification plate: using a voltage different from that indicated on the identification plate can cause irreparable damage not covered by the warranty. The power supply voltage of the unit must be balanced: voltages must have equal values. Consult the table in the wiring diagram to set up power cables, referring to the nominal mains voltage and to a maximum length of 15 metres. The cross-section of the wires must be increased for longer extensions to avoid excessive voltage drops. These chillers are provided with options which interface the machine and the rest of the system as described hereafter. Consult the attached wiring diagrams for any details.

Centralised Alarm: Inside the electrical control board (see wiring diagram), there is a potential-free changeover contact, which switches whenever a chiller alarm is triggered. This makes it possible to connect an acoustic or visual external centralised alarm (optional).

Remote Control: The chiller can also be started and stopped from remote position. The remote on-off button must be connected between the terminals indicated in the attached wiring diagram.

4.5 Air Ducts

Air ducts should always be installed to send away air exhausted by the chiller. It allows transferring hot air far from the chiller, which can be used for heating rooms during winter. They also allow expelling hot air during the summer, thus improving climatic conditions inside the plant. The ducts must have a cross-section larger than the discharge vents of the fans (minimum 0.3 m^2). They should be further increased if longer than 15 m. The curves must have an ample radius and the discharge vents, provided with adjustable louvered grilles, must be the shape of the diffuser in order to limit load loss. It is recommended to support the channelling with a roof or wall and that vibration-proof bellows be used to connect it with the chiller. The louvered grille installed on the roof of the chiller must be removed when mounting the duct. The grilles installed on the discharge vents of the duct must be calibrated so that the motor of the centrifugal fan is within the maximum allowed electrical absorption (read on the plate of the motor).

5. COMMISSIONING

5.1 Commissioning The Pressurized Equipment

The chillers treated in this manual consist in a pressurised system (refrigerator circuit), in their turn important components of a pressurised hydraulic system (chilled water distribution circuit). Based on the features of the chiller, technical documentation regarding pressurised equipment could be required by legislation in the country of installation.

5.2 Professional Profile of Installer

The operator must at least have:

- Knowledge of the technology of the unit and specific experience running it.
- Basic general knowledge and basic technical knowledge sufficient to read and understand the content of the manual, including the correct understanding of the drawings.
- Knowledge of safety standards:
    - General (hygiene and safety at work, accident prevention at work).
    - Specific (for the type of application).
    - In force in the country where the unit is installed.

5.3 General Information Related With Safety and Specific Risks

During the entire commissioning phase, protective gloves must be worn to avoid harm caused by contact with components of the unit and of the system and to avoid contact with additives of the fluid to be cooled.

Wear S2 type safety shoes.

Always wear adequate work attire: shirt or protective overalls worn correctly.

When operating inside the technical compartments, it is compulsory to use protective equipment for your face, head and respiratory tract.

While commissioning the unit, pay attention to the presence of residual risks which could not be completely eliminated by the manufacturer. In particular:

- Danger of crushing upper and lower limbs while removing and handling panels.
- Presence of non-insulated hot surfaces: especially the high pressure pipes of the refrigeration circuit, among which the condenser pipes for air-condensed units.
- Presence of moving parts: In particular, the risk occurs near the pump and fans. Do not wear objects which could get stuck between the moving parts which could cause serious accidents: before starting to work, remove jewellery, watches, ties and other; hair must be gathered and protected.
- Presence of pressurised and live parts: the pressure in the refrigeration circuit and the electrical components could create risky situations during installation and maintenance.
- Only for air-condensed units: presence of sharp profiles on condenser fins. The outside of the machine could be equipped with a filter which also work as protection from these fins (optional), whereas no protection is foreseen inside the machine.

The manufacturer has indicated residual risks on the unit with specific labels as indicated in the table in chapter 1.6. Since it is not possible to foresee all the danger situations that could arise, the safety warnings present in the manual must not be considered comprehensive.

5.4 Primary Inspection

Commissioning the chiller consists in carrying out the checks described in the following paragraphs.

5.4.1 General Check-Up

Perform preliminary checks every time the unit is started:

- Make sure that all connections are performed correctly (see chapter 4.4).
- Check to make sure that the shut-off valves of the unit are open.
- Make sure that ambient temperature is within the acceptable limits for the unit.
- Check the pressure gauge of the hydraulic circuit making sure it indicates sufficient presence of fluid inside the system (approximately 0.5 bar with the unit stopped).
- Check the gas high pressure gauge to make sure the refrigeration circuit is pressurised. If the gas pressure gauge is near 0 bar, this means that the circuit has been damaged and has lost gas.
- Make sure that the line voltage is within ±10% of the nominal value.
- Check that the main switch is in the “I” position, so that the crankcase heater(s) (*) (if installed) can operate.

(*) To reduce dead times during start up, after having connected the power supply, as explained in chapter 4.4.3, we suggest to rotate the main switch on the “I” position. This provides the power supply to the chiller (standby mode) and the crankcase heater(s) can operate.

The crankcase heater is used to keep the oil in the compressor bottom at an acceptable temperature, when the compressor does not work. Specifically, it is intended to avoid refrigerant fluid to condensate and mix with the oil at the bottom of the compressor. Each time that the chiller is started after a long shut down (first start up, start after a week end) the crankcase heater should be started some hours before the compressor. At the first start up, in particular, if the heaters are started (at least) 12 hours in advance long delays are not necessary or, on the other hand, risks due to a “cold start”.

5.4.2 Filling The Unit

It is recommended to load the utilities circuit and the condensation circuit with water (possibly with glycol) having the features carried in the attached table, in order not to jeopardise machine functionality and duration. Water is normally topped up with the automatic filling system located at the rear of the chiller and connected to the water mains by a specific fitting, or else by means of the glycol loading tank (optional) on the outside of the unit. It could take a few hours to load the system the first time. However this could be considerably sped up by connecting the waterworks or the glycol mixture filling system to the hydraulic system outside the unit or by connection to the drainage of the storage tank inside the chiller. This forces pressurised fluid to enter and air inside the circuit to exit; when filling has completed (air no longer comes out of the automatic bleed valves), you can leave only the automatic loading system enabled since it is sufficient for future small top ups. The pump (MP) can then be turned on, immediately checking the way the motor rotates (see next paragraph). The presence of air in the circuit, due to incomplete filling, is highlighted by the water pressure gauge oscillating and the triggering of the flow alarm; in this case you must stop the pumps and repeat filling. Check the “optional attachment” of this manual to be sure that the filling system is different from the standard one and for any further information.

Refer to the “optional sheet” attached to this manual to verify if the filling is different from the standard one and for further information. If the chiller is set lower than +5 °C, or if you expect the ambient temperature where the chiller is placed and the remaining part of the system to drop below 0°C, you must add antifreeze in the form of pure monoethylene glycol. The recommended percentages of glycol in the mixture are carried in the following table:

%Glycol	Minimum Water Temperature	Minimum Ambient Temperature
10	3 °C+	2 °C -
15	0 °C	5 °C -
20	3 °C -	8 °C -
25	6 °C -	10 °C -
30	10 °C -	15 °C -
35	14 °C -	19 °C -
40	18 °C -	23 °C -
45	23 °C -	28 °C -

To calculate the volume of water inside the system, and therefore the amount of glycol to be mixed, you must add the water capacity of the chiller with that of the pipes in the system, which can be quantified with the aid of the following table, which provides water content expressed in litres/metre for various diameters of steel pipes.

5.4.3 Water Quality and Specification

Features of Recirculation and Cooling Water			
	Closed Loop User	Condensing Water	
		Free-Cooler Dry-Cooler	Cooling Tower
Total Alcalinity	< 450 ppm	-	-
Chlorides	< 150 ppm	< 100 ppm	< 50 ppm
pH Value of Cooling Water	7 < pH < 8.7	7 < pH < 8.5	7 < pH < 9
Total Water Hardness	Min. 50 ≠ mx 300 ppm	Min. 70 ≠ mx 100 ppm	Min. 80 ≠ mx 150 ppm
Solid Particles	-	-	-
Dissolved Gas (CH_4 - H_2S)	-	-	< 50 ppm
Iron (FE) Ions	< 0.5 ppm	< 0.05 ppm	< 0.5 ppm
Sulphide Ions	-	-	< 100 ppm
Ammonia (NH_3) Ions	< 0.5 ppm	-	< 0.5 ppm
Silicon ($SİO_2$) Dioxide	< 50 ppm	-	-
Water Condustivity	100 ≠ 2500 µS/cm	30 ≠ 1000 µS/cm	-
Organic Substances	-	-	-
Water has to be odouriess, colourless and clear.			

5.4.4 Rotation of the Motors and Pumps

Measure the pump absorption using a specific instrument (ammeter) and compare it with the value carried on the motor identification plate. The pump must absorb 5-8% less than the value on the plate. If this condition does not occur, you must reduce water flow rate by shutting the bypass valve at the end of the line (if present) in order to reduce recirculation on the return line of the chiller or else by acting on the adjusting valve on the pump supply line.

If the unit does not start, it could be due to:

- Incorrect phase sequence (only models with scroll compressors): the unit could be provided with a phase sequence control (KAF), which does not allow the controller to be powered if phase sequence is incorrect. Therefore you must disconnect power, open the electrical control board and invert two phases on the power cable arriving from the mains.
- Aphase is missing: check the connection of each individual phase.

When these preliminary checks have been completed, close all the panelling using the intended tools and fixing devices (screws, locks, etc..) for safety purposes.

5.5 Starting and Work Temperature Settings

MIT-SG-S, MIT-SGA-S and MIT-SG-W units are equipped with a different electronic control than that of the remain versions. Therefore the start-up systems and work settings are also different. Please take a look more deeply on chapter 6.5 for remaining versions control. Never run the pumps without water: lack of fluid causes serious damage to internal parts.

5.5.1 MIT-SG-S, MIT-SGA-S and MIT-SG-W Starting and Working Temperature Settings

Start the unit only after having carried out the preliminary checks described previously.

Starting the unit:

- Control the all magnetic thermics are in ON.
- Power the unit by means of the main switch.

Working temperature settings:

- On the screen press the set buton.
- Using and buttons to find “SP” sign.
- Press the set button and find “COOL” sign.
- Press the set button and change the desire setting temperature.

5.5.1. MIT-SG-S2, MIT-SG-S, MIT-SG-P, -MIT-SG-W, MIT-SGA-S2, MIT-SGA-S, MIT-SGA-P, MIT-SGA-W, MIT-SG-W, MIT-SG-ER2, MIT-SG-MIT-SG-ER2-P, MIT-SG-W-W, MIT-SGW-W Starting and Working Temperature Settings

Start the unit only after having carried out the preliminary checks described previously.

Starting the unit:

- Control the all magnetic thermics are in ON.
- Power the unit by means of the main switch.

Working temperature settings:

5.6 Shut Down

When the set working temperature has been reached, the compressor of the refrigeration circuit stops automatically while the water circulation pump remains active to ensure a nonstop supply to the utilities and to provide instantaneous temperature control. When chiller operation is not required, press the key for at least 5 seconds, but do not touch the door locking main switch (on/off): thus the crankcase heater remains powered this is very useful to keep the compressor from being damaged. The warranty on the compressor will terminate if these instructions are not followed.

5.7 Routine Start-Up

Before each start-up:

- Do a visual check making sure there is no abundant fluid leakage near the unit.
- Make sure the electrical power cable is in good conditions and is not in traction.
- Make sure all the chiller panels are positioned correctly.
- Make sure the process water filling system is efficient and connected to the unit.
- Make sure that the pressure gauges indicate the correct refrigerant and water pressure.

Start the unit according to the instruction in paragraph 4.5.

To start the chiller after a shut down:

- Make sure the pump rotates freely;
- Check the gas pressure in the refrigeration circuit (pressure warning by pressure gauges with unit stopped);
- Make sure the valves of the hydraulic connections are open.

Start the unit according to the instruction in paragraph 4.5.

5.8 Emergency Stops

There are emergency buttons on the standard version of the unit. The emergency stop is therefore carried out by cutting power to the chiller by acting on the main switch.

6. USING THE UNIT

6.1 Professional Profil User

Even though the unit operates automatically, it must be periodically monitored and interventions on the electronic control must be performed by specialised personnel provided with technical know-how such to avoid the dangers deriving from operations carried out in the presence of electrical power and water-based fluids. Make sure that whoever is in charge of operating and servicing the unit has read this manual and correctly understood its content. The user is not qualified to perform maintenance (unless provided with suitable skills).

6.2 Intended Use of The Unit

The standard version of the unit treated in this manual has been designed to cool water or glycol water at a temperature less than 5 °C. Correct use requires that the chiller be positioned and installed according to the instructions provided in chapters 3 and 4 of this manual. The user must strictly comply with them in order not to jeopardise unit operation and to avoid determining poor safety conditions for the operators.

6.3 Unallowed Use of the Unit

Any use not mentioned in this manual is prohibited. Contact the manufacturer or his agent if in doubt regarding use of the unit.

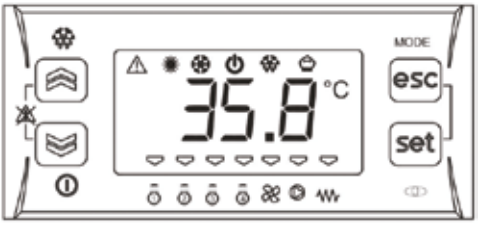
To process fluids other than water or water and glycol mixtures, to have the unit work at different temperatures than those of the range of application for which it was designed (chapter 2) or to place it in environments with especially aggressive atmospheres can irreversibly damage the components of the chiller. The unit cannot be used in work environments where there is the possibility of the formation of an explosive atmosphere (94/9/EC “ATEX”) The manufacturer will not be held liable for damage to objects or personal harm caused by failure to comply with these prescriptions. Failure to respect the standards carried in this manual and any unauthorised modifications to the unit will cause the warranty to cease immediately.

6.4 Electronic Control for MIT-SG-S, MIT-SGA-S and MIT-SG-W

6.4.1 Symbology of Display

The symbols and keys listed in the following tables refer to the figure.

Symbol	Meaning of LED On	Colour
	Compressor 1 Open	Orange
	Compressor 2 Open	Orange
	Compressor 3 Open	Orange
	Compressor 4 Open	Orange
	Fan(s) Active	Orange
	Water Pump On	Orange
	Resistance On	Orange
	Heating Mode On	Red
	Cooling Mode On	Blue
	Alarms	Red
	Stand by Mode	Green



Before proceeding with the following operations, make sure that personnel using the unit has read chapter 5 and fully assimilated its contents.

6.4.2 Switching Unit On / Off

Power the unit by means of the main switch. The unit is turned on and off by switching the emergency stop, or else by pressing the key  for 5 seconds.

6.4.3 Ayar Noktasının (SP) Belirlenmesi

To adjust the set-point of the microprocessor control, do as follows:

- Press the set buton an " AI " will appears;
- Using  and  to find " SP " sign;
- Pressing the set buton and " COOL " sign appear;
- Pressing the set buton again and you will see the set point now;
- Press the  and  to change desired set point value;
- Pres the set buton to save the new value;
- Pres the esc buton few times to return the main menu and to view the temperature.

6.4.4 Alarms

There are two types of chiller control alarms:

1. Blocking type, which switch the unit OFF (among these: faulty process probe, pump circuit breaker); they are detected even when the unit is OFF.
2. Non-blocking type, which allow the unit to operate displaying the alarm code only.

The alarms can also be:

3. Manually restored, namely the operator must reset the alarm on the unit keyboard,
4. Automatically restored, namely the unit restarts automatically when the alarm condition disappears. In the event of an alarm, the general alarm output is activated, used to remotely re-transmit the unit's alarm condition.

6.4.5 Troubleshooting

Alarm	Cause	Solution
ER00 (Phase Failure)	• Problem with supply.	• Check supply.
ER01 / ER 02 (High Discharge Pressure Alarm)	• Condenser is filthy, sufficient air does not circulated through fins. • The ambient temperature is above the design limits. • The fan motor does not function. • The extractor hood does not exist or misassembled.	• Clean the filthy condenser. • Make sure the device gets fresh air. • Have the fans checked by an authorized electrician. • Get an extractor hood for the fans to exhaust hot air.
ER05 / ER 06 (Low Suction Pressure Alarm)	• The compressor's suction pressure is too low.	• Shut down the device and contact the technical service.
ER10 / ER 11 (Thermic Failure)	• The current that the compressor gets is more than it is supposed to get (FLA).	• Shut down the device and contact the technical service.
ER 15 / ER 16 (Oil Pressure Alarm)	• The oil level of the compressor is lower than it is supposed to be.	• Check the compressor oil level.
ER20 (Water Flow Alarm) In Ex Versions	• Low or no water flow.	• Make sure the water pump works normally. • Check the water level. Add if necessary. • Otherwise, restart the device when you remove the failure.
ER21 (Water Pump Thermic Failure)	• The current that the pump gets it more than it is supposed to get (FLA).	• Shut down the device and contact the technical service.
ER 30 (Freeze Thermostat Alarm) In Ex Versions	• Insufficient water flows through the evaporator. • Thermostat settings are below the limit values.	• Check the water level. Add if necessary. • Check the thermostat settings, or add some antifreeze.
ER35 (High / Low Temperature Alarm)	• The water temperature is above the parameters (See section 5.1).	• Change the water in the tank.
ER40 (Thermic Failure)	• The current that the fan gets is more than it is supposed to get (FLA).	• Shut down the device and contact the technical service.
ER60 / ER 61 (Water Temperature Sensor Failure)	• Water temperature sensor does not work.	• Shut down the device and contact the technical service.

6.4.6 Reset The Microprocessor

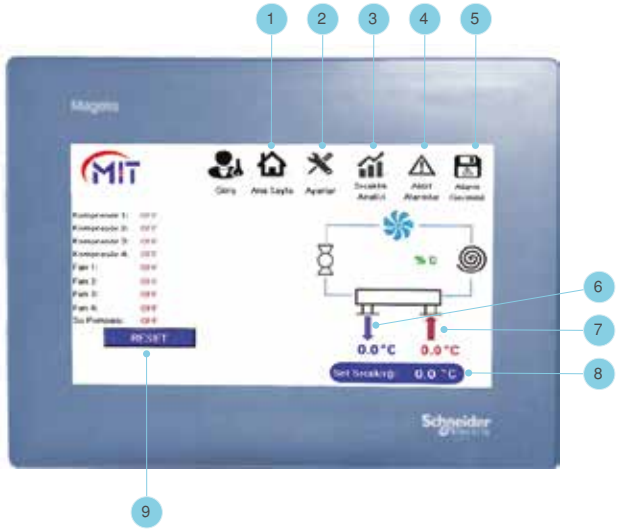
To reset the machine (namely the operator must reset the alarm on the unit keyboard); please press the + together and the click sound will bear. Therefore the machine has already reset.

6.4.7 List of Parameters

Please contact with Ekin Endüstriyel Sales and Technical Office for further information.

6.5 Electronic Control for MIT-SG-S2, MIT-SG-S, MIT-SG-P, MIT-SG-W; MIT-SGA-S2, MIT-SGA-S, MIT-SGA-P, MIT-SGA-W, MIT-SG-AR, MIT-SG-W, MIT-SG-ER2, MIT-SG- MIT-SG-ER2-P, MIT-SG-W-W, MIT-SGW-W

6.5.1 Symbology of Display

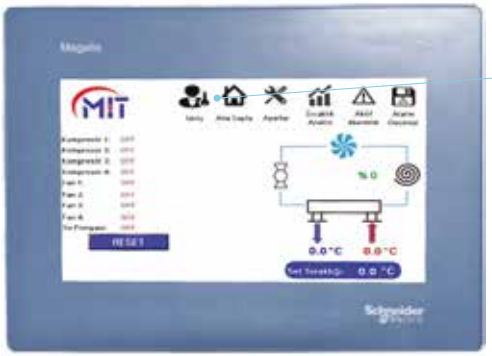


1	2	3	4	5	6	7	8	9
Main Page	Settings	Temperature Analysis	Active Alarms	History Alarms	Water Outlet Temperature	Water Inlet Temperature	Water Set Temperature	Reset

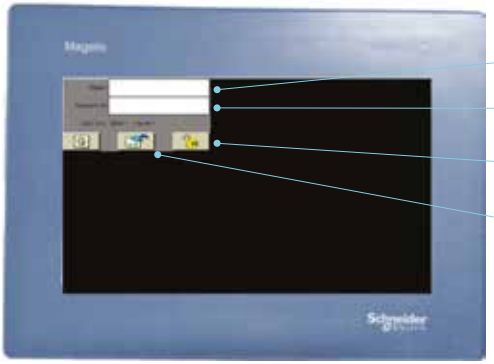
6.5.2 Switching Unit On / Off

Power the unit by means of the main switch.

6.5.3 Adjusting Set Point



Press the login button on the main page.



Type “admin” to the name section.

Type “37226” to the password section.

Press the login button.

Press the main page button for turn back to the main page.

Press the settings button on the main page (please check the general settings 6.5.4).

6.5.4 Cihaz Genel Ayarı

1	Press the differential temperature range (Example: If set temperature is 10 °C and want to work between 8 °C to 11 °C range; please set the temperature to 10 °C, negative range 2 °C and positive range 1 °C).
2	High temperature alarm.
3	Low temperature alarm.
4	The determination of the min. and max.set temperature range.
5	Press the language selection button to go language selection page.
6	Min. comp. on/off time
7	Critical high and low temperature delay time.
8	Flow sensor delay time determination,stop time of the machine when there is no flow.

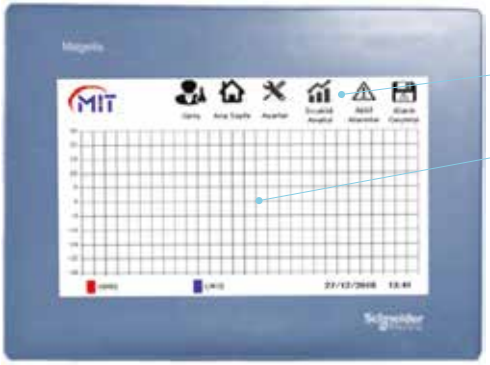
Language selection page.

Active alarm list that active in the unit.

Alarm history list.

Alarm list that actived in the past.

Press the “clear alarms” button deletes the alarm history list.



Temperature analysis graph.

Water inlet and outlet temperature graph.

6.5.5 Alarmlar

Alarm	Cause	Solution
ER00 (Phase Failure)	• Problem with supply.	• Check supply.
ER01 / ER 02 (High Discharge Pressure Alarm)	• Condenser is filthy, sufficient air does not circulated through fins. • The ambient temperature is above the design limits. • The fan motor does not function. • The extractor hood does not exist or misassembled.	• Clean the filthy condenser. • Make sure the device gets fresh air. • Have the fans checked by an authorized electrician. • Get an extractor hood for the fans to exhaust hot air.
ER05 / ER 06 (Low Suction Pressure Alarm)	• The compressor's suction pressure is too low.	• Shut down the device and contact the technical service.
ER10 / ER 11 (Thermic Failure)	• The current that the compressor gets is more than it is supposed to get (FLA).	• Shut down the device and contact the technical service.
ER 15 / ER 16 (Oil Pressure Alarm)	• The oil level of the compressor is lower than it is supposed to be.	• Check the compressor oil level.
ER20 (Water Flow Alarm) In Ex Versions	• Low or no water flow.	• Make sure the water pump works normally. • Check the water level. Add if necessary. • Otherwise, restart the device when you remove the failure.
ER21 (Water Pump Thermic Failure)	• The current that the pump gets it more than it is supposed to get (FLA).	• Shut down the device and contact the technical service.
ER 30 (Freeze Thermostat Alarm) In Ex Versions	• Insufficient water flows through the evaporator. • Thermostat settings are below the limit values.	• Check the water level. Add if necessary. • Check the thermostat settings, or add some antifreeze.
ER35 (High / Low Temperature Alarm)	• The water temperature is above the parameters (See section 5.1).	• Change the water in the tank.
ER40 (Thermic Failure)	• The current that the fan gets is more than it is supposed to get (FLA).	• Shut down the device and contact the technical service.
ER60 / ER 61 (Water Temperature Sensor Failure)	• Water temperature sensor does not work.	• Shut down the device and contact the technical service.

7. MAINTENANCE AND CLEANING

Conducting maintenance operations regularly on the unit helps prevent faults and allows it to always operate with the maximum efficiency. Recording all maintenance operations carried out on the unit with relative date and activity performed helps understanding abnormal situations and unfavourable working conditions, allowing appropriate and adequate corrective interventions.

7.1 Professional Profile of Maintenance Technician

The unit must be serviced and cleaned by specialised and authorised personnel. This operator must therefore have adequate training and experience, must know the technical standards, as well as those regarding safety and first aid. He must have all the Personal Protective Equipment and suitable instruments required for the intervention to be done in compliance with that foreseen by relevant local and international standards in force. He must also have read this use and maintenance manual and understood its contents. Interventions on the electrical control board of the unit (where present) must only be carried out by EP (Expert person, as identified in standard EN 50110). Incorrect manoeuvres or erroneous calibration values of the control equipment can cause serious damage to the unit and also to people.

7.2. General Information Related With Safety and Specific Risks

Carefully read the following information concerning safety before intervening on the unit. The manufacturer cannot be held liable for accidents damaging objects or persons resulting from failure to comply with these instructions. Before performing maintenance on the unit, mark off the area with coloured warning tapes and danger signs. Unauthorised personnel must not enter the marked off area. These precautions can only be removed when work is complete.

Unless expressly indicated otherwise, before any intervention on the unit or accessing internal parts, the maintenance technician must isolate the electrical system from the power mains, acting on the main switch on the control board and blocking it at “0” with the safety device (lock with key) to prevent the unit from being unintentionally activated. Wait for any moving parts to stop (fans, if present). The electrical control boards and the junction boxes on the unit contain components which could be live. The electrical control board may be accessed by turning the main switch on the unit to “0” and using a tool as specified by EN 60204-1. Spanners or tools must be used to access the junction boxes on the unit.

Before carrying out any work which entails the risk of contact with live parts, qualified and trained personnel must implement the double insulation against hazards of an electrical nature.

To carry out certain adjustment and/or maintenance operations, it could be necessary to remove or deactivate safety devices temporarily: these devices must always be restored at the end of the operations and before the unit is reactivated. It is forbidden to service moving parts. Do not release process liquid (and refrigerant fluid for chillers) into the environment. Put them into specific recipients suitable for the subsequent correct disposal according to that foreseen by standards in force at the place of installation. While performing maintenance, pay attention that there is no interference between the operations carried out and people, machines or equipment present in the surrounding areas. Pay the utmost attention that pressure limit devices are not tampered with. While performing welding operations, pay the utmost attention not to overheat components containing oil or flammable liquids: clean them adequately before proceeding with work; always protect the components near the welding area with non-flammable materials. Use non-inflammable detergents to clean the unit. Do not use hydrocarbons. If in doubt concerning the intervention to be performed or if it is unsuccessful, switch the unit off and contact the manufacturer or his agent. When work is over and before restarting the unit, close all the panelling (if present) and restore all the safety devices as foreseen by the manufacturer for standard operation. While servicing the unit, pay attention to the presence of residual risks which could not be completely eliminated by the manufacturer. In particular:

Dangers of a mechanical nature:

- Danger of entanglement.
- Danger of contact with abrasive surfaces and sharp edges.
- Presence of hot surfaces: high pressure refrigeration circuit pipes (if present), electric motors; temperature-controlled areas hydraulic circuit pipes (in units with temperaturecontrolled utilities).
- For air-condensed chillers or units with finned pack heat exchangers: danger of being cut due the presence of sharp profiles on the fins of the condensers and heat exchangers and danger of being dragged by moving parts (fans: even if they are not powered, they could still rotate due to inertia when the panels are opened).

Dangers of an electrical nature:

- Danger contact with live parts (direct contact).
- Danger of contact with live parts due to faulty insulation (indirect contact).
- Danger of thermal radiations due to short-circuits or overloads.

The manufacturer has indicated residual risks on the unit with specific labels as indicated in the table in chapter 2. Since it is not possible to foresee all the dangerous situations that could arise, the safety warnings present in the manual must not be considered comprehensive.

7.3 Operation with Safety Devices Deactivated

Before intervening on the unit with safety devices deactivated, you must contact the manufacturer or his agent for detailed instructions concerning the manoeuvres to be performed. As mentioned in chapter 6, some operations require the intervention of the operator to detect electrical absorption of each phase of unit components. These interventions must be carried out by personnel specialised to work with category 0 and I live systems and implemented with dual insulation against risks of an electrical nature (IEC EN 50110, IEC 11/27). Other operations must be performed with protective panelling removed (where foreseen). In these situations you must operate with the utmost caution, taking into account the residual risks mentioned in this manual and the indications of the labels applied to the dangerous components of the unit. In some air cooled condensed units the intervention of the operator with protective panels removed (condenser compartment) could jeopardise proper operation.

7.4 Periodical Maintenance

Before intervening on the unit to resolve functioning problems, make sure that it has been correctly installed and adjusted. In order to facilitate maintenance, it is recommended to discuss with the user/operator of the system to seek information concerning its recent operation. For air-condensed chillers, make sure the fans are stopped before accessing inside the compartments of the unit. Whenever intervening on electrical connections of the unit or on its disconnection switch, you must verify the rotation direction of the electrical motors. Always use tools adequate for closing systems to remove the buffer panels of the unit (if present) (flat screwdrivers for locks and Philips screwdrivers for screws).

To access components on units equipped with a panelled frame, you must remove the buffer panels of the compartment inside of which they are contained. To access components of the electrical circuit, you must remove the front panels, if present, (electrical control board side) and, after having turned the main switch to “0”, you may open the doors of the electrical control board. The following controls are indicative and refer to clean work environments with regular service: intensify these controls when working in more heavy-duty conditions.

3 Months Maintenance :
Check the following and compare results with commissioning records.

- Check the high pressure and low pressure gauges.
- Check the liquid injection solenoid valve and sight glass.
- Check each circuit sight glass for dryness and bubbles for indication of leaks.
- Check compressor oil level and crank case heater.
- Control setting temperature and check with thermometer as real.
- Chilled water control maintains design temperature.
- Chilled water flow is within design limits of zero to plus 10%.
- Concurrently ensure chilled water pump and flow switch operate efficiently, and that interlocks function correctly.

While you check these parameters and continue to follow tis issues below;

- Record operating conditions.
- Visually inspect the unit for general wear and tear, treat metalwork.
- Visually inspect pipe and pipework insulation. Repair/rectify as necessary.
- Clean evaporator water strainer. At first maintenance visit and then as frequently as necessary.
- Clean condenser coils. Do not steam clean use detergent and stiff bristled brush. For heavy dirt, use either a high pressure water or chemical hose. (Contact with EKİN ENDÜSTRİYEL technical service responsibles).
- Pipework clamps are secure.
- Tightness and condition of fan and compressor mounts.
- Anti-Vibration mounts fixings (if fitted).
- Check the control panel lid for any water leakage

6 Months Maintenance :
Repeat 3 month checks plus the followings.

- Check the water level in the tank.
- Check the anti-freeze level to avoid any damage on the pipeline.

Compressor Maintenance :
Periodic maintenance and inspection of this equipment is necessary to prevent premature failure, the following periodic inspections should be carried out by period or hourly use which ever is sooner.

- 1 Year: Measure compressor motor insulation.
- 7,500 Hours or 4 Years: Inspect compressor oil.
- 20,000 Hours or 4 Years: Inspect oil filter, refrigerant fitler (dryer).

7.5 Extraordinary Maintenance

Any extraordinary maintenance must be carried out by specialised technicians (refrigeration technicians when servicing chillers). Contact the manufacturer or his agent and request the specific intervention procedures before carrying out any extraordinary maintenance.

7.6 Environmental Protection

Refrigerants containing fluorinated gases (e.g.: R407C, R410A, R134a and R404A) are included among substances subject to a special control regime and are prohibited from being released into the environment, in compliance with regulation EC 842/2006. At the end of the operating life of the chiller, it must therefore be recovered and delivered to the dealer or to specific collection centres.

Special attention is therefore recommended during maintenance in order to reduce refrigerant leakage as much as possible. Similar operations must be carried out to recover process fluid when made up of a water and glycol mixture.

7.5 European Regulations on Fluorinated Greenhouse Gases

For countries belonging to the European Community, if your unit contains over 6 kg of fluorinated greenhouse gas, it must undergo continuous and specific monitoring according to that foreseen by Regulation 842/2006 (see data carried on label “R”, chap. 1.3). The technical documentation relating to the above-mentioned regulation is attached to the manual should the unit be included in this field of application.

7.8 Facilitating Service Assistance Phone Intervention

To facilitate phone intervention of the Assistance Service and to quickly identify the causes of problems found on the unit, before contacting the company we recommend carrying out a thorough check of the unit, detecting the state of its components and of the work conditions. To this purpose the maintenance technician is recommended to fill out the attached sheet fully (service attachment) and to communicate the detected data to the operator.

8. DISMANTLING AND WASTE DISPOSAL OF MATERIALS

The correct dismantling of the unit at the end of its lifecycle reduces risks for the operator performing this task and for other persons who may come into contact with the deactivated unit. The correct waste disposal of the components of the unit at the end of its lifecycle facilitates collection, disposal and recycling centres and reduces the environmental impact which this operation requires to a minimum.

8.1 Professional Profile of Operator

The unit must be dismantled by personnel in charge and authorised to intervene on it. These operations must be carried out by maintenance personnel or operators with relative technical knowledge. He must also know how to avoid hazards deriving from performing operations in the presence of electrical power and water-based and refrigerant fluids.

He must have all the personal protective equipment and suitable instruments required to intervene on the unit in compliance with that foreseen by relevant local and international standards in force. He must also have read this use and maintenance manual and understood its contents. Incorrect manoeuvres can seriously harm persons and the environment.

8.2 General Information Concerning Safety and Specific Risks

Protective gloves must be worn while dismantling the unit to avoid harm due to contact with parts of the machine and of the system and to avoid contact with additives of the processed fluid (category II gloves protecting from risks of a mechanical nature and electrician gloves).

Wear S2 type safety shoes with slip-proof soles, electrically insulated from the ground, to avoid crushing the lower limbs and to ensure adequate electrical insulation in the event of accidental contact with live parts.

Always wear adequate work attire: shirt or protective overalls worn correctly. Carefully read the following information concerning safety before intervening on the unit. The manufacturer cannot be held liable for accidents damaging objects or persons resulting from failure to comply with these instructions. Before dismantling the unit, mark off the area with coloured warning tapes and danger signs. Unauthorised personnel must not enter the marked off area. These precautions can only be removed when work is complete. Before any intervention on the unit or accessing internal parts, the operator must isolate the electrical system from the power mains, acting on the main switch on the control board and blocking it in the open position with the safety device (lock with key) to prevent the unit from being unintentionally activated. Wait for any moving parts to stop (such as fans in chillers, if present). Pay attention that there is no interference between the operations carried out and people, machines or equipment present in the surrounding areas. If in doubt concerning the intervention to be performed or if it is unsuccessful, contact the manufacturer or his agent.

While dismantling the unit, pay attention to the presence of dangers of a mechanical nature, such as:

- Danger of being cut due the presence of sharp profiles on the fins of the condensers or heat exchangers (if present) and the threading of hydraulic connections;
- Danger of entanglement;
- Danger of contact with abrasive surfaces and sharp edges.

Since it is not possible to foresee all the dangerous situations that could arise, the safety warnings present in the manual must not be considered comprehensive.

8.3 Sequence of Operation to be Carried Out to Dismantle The Unit and to Dispose of Its Materials

When the unit has reached the end of its life and therefore must be removed or replaced, a series of operations must be carried out. It is important to perform these operations in the same order in which they are listed hereafter.

8.3.1 Disconnecting Electrical Power

First of all, the unit must be switched off by turning the main switch to off, if present. Disconnect the electrical cable from the power mains. Open the electrical control board (if present) and disconnect all wires from the main switch (see wiring diagram). Recover the power cable. To speed up the operation, you may cut the electrical cable where it enters the control board.

8.3.2 Draining Process Fluid

Make sure all the valves of the hydraulic circuit inside the unit are open (see water circuit layout) while all the shut-off valves (if present) near the inlet and outlet connections and near the connection to the filling pipes (for chiller) are closed, so as to isolate the unit from the rest of the plant. It is recommended to connect the drain cock at the bottom of the tank (if present), or anyhow at the lowest part of the plant, to a flexible hose to send the water to a place suitable for gathering it; to this purpose you must identify the drainage place beforehand. Open the above-mentioned drain cock to fully empty water from the unit. If the water can be reused, it is recommended to recover it by connecting the drain cock to a pump, sending the fluid to a suitably sized recipient. If there is a water and glycol mixture inside the unit, it is compulsory to recover it as described above. This mixture must then be disposed of as dangerous waste in compliance with standards in force in the country of installation. The water and glycol mixture recovered can be reused to fully or partially fill a similar circuit, as long as the glycol still has its anti-freeze properties (see the specifications of the glycol manufacturer) and that the percentage of glycol is sufficient for the features of the plant (see chap. 5). Then disconnect the unit from the hydraulic connections to and from the utilities and to the filling line (if present), complying with the prescriptions for the plant to which the unit is installed.

8.3.3 Draining Refrigerant Fluid

Freon (R134a, R407C or R410A depending on the model) is mentioned among substances subject to a special control regime and prohibited from being released into the environment. At the end of its operating life, it must therefore be recovered and delivered to the dealer or to specific collection centres. Special attention is therefore recommended during dismantling in order to reduce refrigerant leakage as much as possible.

Make sure that all the cocks/valves in the refrigeration circuit are open (see refrigeration circuit layout). Place a t-shaped fitting on the intake pipe of the recovery pump to connect it to two distinct points of the circuit: the first to the connection on the high pressure section of the refrigeration circuit and the second to a filling attachment in the low pressure section. This operation will be over when the high and low pressure gauges (17 and 18 in the layouts) read 0 bar, indicating that the circuit is fully empty. Send the refrigerant into suitable containers (cylinders) and fill them complying with the pressure, volume and temperature limitations prescribed by the manufacturer. The gas collected can either be reused or disposed of in compliance with standards in force in the country of installation. Keep doors, windows and other air inlets communicating with the outside open during this entire operation so that the room is properly ventilated in case of gas leakage.

8.3.4 Draining Lubricant from Compressor(s)

The lubricating oil inside the compressor/s must also be recovered. In order to do this, you must free the compressor/s from the structure of the unit by acting on the fixing screws. When there are several compressors connected one to another, they must also be separated by dismantling the communicating oil intake, supply and equalisation pipes (either unscrewing the threaded connections or sawing them). The plug near the oil level indicator light (if present) must be unscrewed, positioning a recipient suitable to collect the lubricant beforehand. When no more oil comes out from the compressor in the upright position, tip it to empty the oil completely. Use suitable lifting systems (e.g. overhead travel crane) to handle the compressor. The collected oil can be reused unless it has even partially lost its lubricating properties; otherwise it must be disposed of in compliance with standards in force in the country of installation. Send the refrigerant into suitable containers (cylinders) and fill them complying with the pressure, volume and temperature limitations prescribed by the manufacturer. The gas collected can either be reused or disposed of in compliance with standards in force in the country of installation. Keep doors, windows and other air inlets communicating with the outside open during this entire operation so that the room is properly ventilated in case of gas leakage.

8.3.5 Disposing of Structure and Electrical Control Board

If the structure and its components can no longer be used, they must be scrapped and divided according to their product type: this especially holds for the copper and aluminium which are abundant in the unit. The components inside the electrical control board and the electronic control must be collected separately and disposed of in compliance with standards in force in the country of installation regarding waste of electric and electronic equipment (WEEE). Before delivering the units to collection centres (public or private) the labels affixed to the unit must be removed and destroyed (Figure 1 and 2, see chap.1.3). Improper and illegal waste disposal entails sanctions established by local standards in force regarding waste disposal.

CERTIFICATES

EKİN ENDÜSTRİYEL

CERTIFICATE OF WARRANTY

The Document's Comfirmation Date And Number:
The use of this document has been authorized by T.C. Sanayi Ticaret Bakanlığı İl Müdürlüğü in accordance with the Law No 4077 on the Protection of Consumers and the Communiqué on the Implementation of the Guarantee Certificate put into effect based on this Law.

WARRANTY CONDITIONS

1. Warranty period starts from the delivery date of the goods.
2. All parts of the goods are covered by our company's warranty.
3. In case of malfunction of the goods within the warranty period, the time spent in the repair is added to the warranty period. The repair period of the goods is maximum 30 working days. This period starts from the date of notification to the service station of the defect goods. In the absence of service station, this period starts from the date of notification to the seller, dealer, agent, representative, importer,or manufacturer of the goods.
4. In case of malfunction of the goods within the warranty period due to material, workmanship or assembly defects, the goods will be repaired at no cost and no additional cost will be asked from the buyer under the name of changed part price or any other name.
5. Malfunctions arising from the use of the product in contravention of the provisions in the user manual are not covered by the warranty.
6. For the problems that may arise in relation to the warranty certificate can be applied to the Sanayi ve Ticaret Bakanlığı Tüketicinin ve Rekabetin Korunması Genel Müdürlüğü.

For the product that was sold to ..... LTD. ŞTİ. / AŞ / Legal Entity on ...../...../20..... with stated model, brand and serial number, all kinds of manufacturing and material defects are covered by the warranty of our company for one year.

Brand: _____

Model : _____

SELLER **DEALER** **END USER**

NOT: User mistakes are not covered by warranty.

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From our MIT professional system solution center, you can get help with your problems with your pumps, heat exchangers and your system. Our solution center consisting of expert mechanical engineers will be happy to help you.

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- Central and district heating systems.
- Milk, yoghurt, heating, cooling and pasteurization systems.
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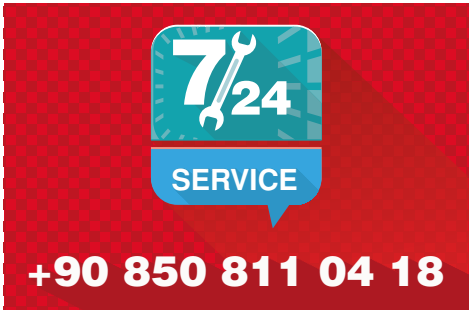
- Oil cooling systems.
- Energy recovery systems.
- Pool heating systems.
- Steam installations.



It is vital for your system to be designed and implemented correctly in the first installation in order to be able to operate at the desired capacity, smoothness and long life. For this reason, you can get first-hand the technical support you need during the installation phase of your system and the problems that may arise in the business; You can reach us **24 hours +90 (216) 232 24 12 in 7 days**.

We would like to reiterate that we will be happy to share our knowledge accumulated over many years with our valued customers in order for your system to work correctly and performance. Ekin will continue to be the best solution partner for you in all applications with all kinds of heating and cooling applications.

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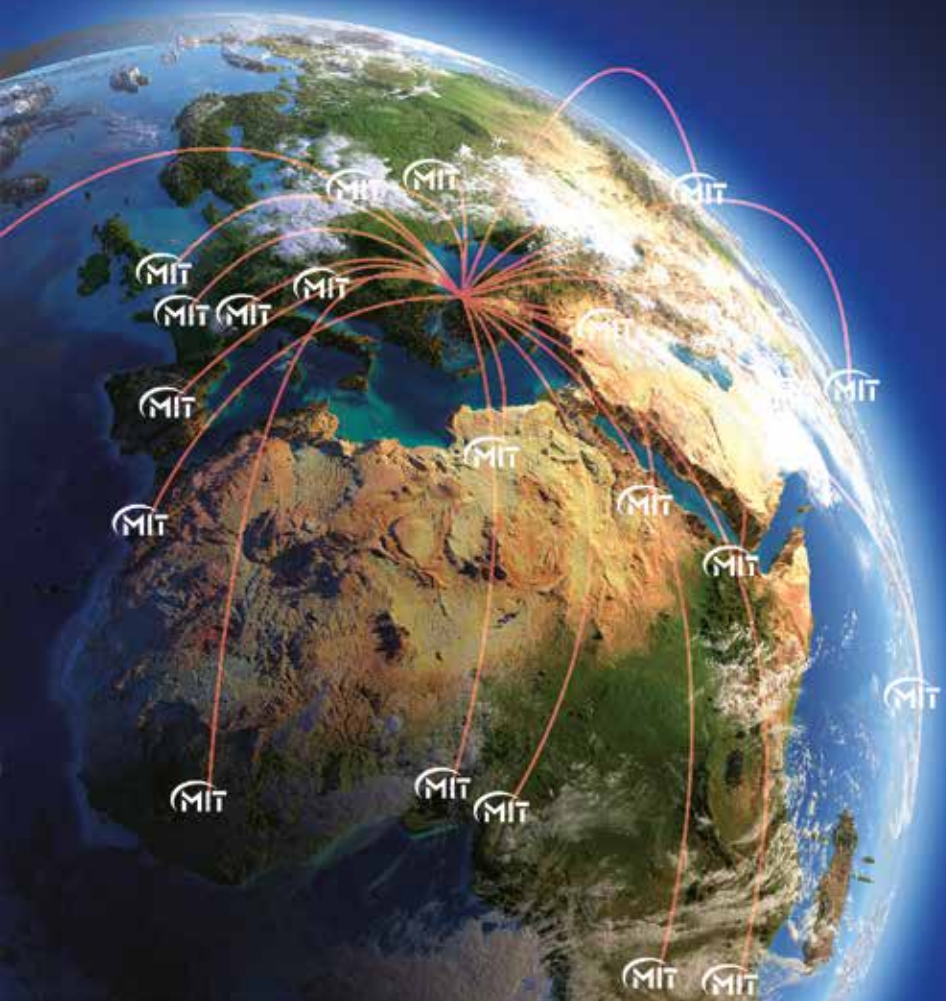

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