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1. ABOUT THIS MANUAL

This document specifies the instructions for installation, operating and maintenance of the Condensers (FCH, FCV, FCW models) manufactured by FRITERM A.Ş., Turkey.

The instructions below must be followed strictly for the health and safety reasons during installation and maintenance of products.

Upon receipt, the product should be visually inspected, and in case of any damage or fault, the supplier must be notified within 7 days.

The manufacturer will not accept any responsibility in these situations:
- Damages caused by persons,
- Damages product due to the disregarding of the recommendations indicated in this handbook.

1.1 Examining the operating manual

To follow the instructions defined in this document is a prerequisite for safety of the staff and for the products to be operated in a fault-free and safe manner.

- The operating manual must always be available.
- All persons who are responsible for the transport, assembly, initial commissioning, operating, maintenance or repair of the component must be acquainted with the operating manual. The operator should accept in written form that they are acquainted with the operating manual.
- Whenever you have difficulty in understanding and/or comprehend and description or definition given/expressed in this manual, please immediately ask for help from an expert or from then manufacturer. It is of great importance to understand this manual completely and correctly for the sake of labor health and safety.

1.2 Responsibilities

1.2.1 Manufacturer’s Responsibilities

- The manufacturer is strictly responsible for supplying a manual accompanying the product which comprises the necessary and enough detailed information regarding the installation/mounting and operation of the product. Besides, the product is expected to fulfill the requirements and satisfy with the anticipated functioning.
- The construction of the product should comply with the presumed operational conditions. The product is expected to be robust enough and resistive against all the mechanical, thermal and chemical challenges. The material used to produce should be compatible with the fluid and the mixture of fluids used as heat transfer media.
• All the materials and components used in constructing the product should be resistive against all the stress and pressure that the product will be subjected to.

1.2.2 Contractor’s Responsibilities (Installation, Commissioning)

• Should follow all the instructions and provide all the conditions stated in this manual.
• All the documentation accompanying the product are complementary to this manual. The safety instructions and all other information stated in this manual should be considered.
• The national regulations regarding the protection of environment and labor safety should be strictly followed besides the instructions for safe and correct operation.
• In case of any problem encountered during the installation, FRITERM A.Ş. should be informed and asked for technical assistance if necessary.
• Emergency instructions and the required infrastructure should be prepared and ready for use in any case.
• The regular maintenance/servicing periods and instructions should be determined and defined.
• If storage of the product for a long period is needed, a clean, non-hazardous and low humidity environment is recommended.
• The fans of the products that are stored horizontally are recommended to be run for 4-5 hours a week. In case of difficulty of running the fans, then they should be covered and protected from rain and excess humidity.
• In case of storing vertically, it is not recommended to store more than 1 month.

1.2.3 Operator’s or Owner’s Responsibilities (Operation and Maintenance)

• The director is the responsible person who employs the adequate staff for servicing operating and monitoring the system.
• All requirements and instructions in this operating manual must be complied with.
• The documentation of purchased products is a constituent part of this operating manual. All safety information in this operating manual and all other information must be observed.
• All relevant regulations concerning accident prevention and environmental protection must be complied as well as the confirmed technical regulations for safe and proper working.
• Personal ineligibility. All the work should be conducted by authorized and trained personnel.
• Any defect/damage/malfunction caused by disregarding the instructions given in this manual is the responsibility of the operator.
• Any defect/damage/malfunction caused by the misuse of the product is the responsibility of the operator.
• The product should not be put in operation without the completion of the installation and commissioning.
• The personnel who is responsible for the operation/servicing/maintenance of the product should be provided with all the necessary documentation including this manual.

1.3 Warranty

• The manufacturer warrants that the equipment delivered to the client shows no defects caused by failure of design, material, manufacturing and/or workmanship within the warranty period.
• The client must notify in written form within 10 days from the receipt of the goods, any perceptible defect including transport damages. For hidden defects, he/she must notify the defect in written form and in details within 10 days from observation time.
• Unless otherwise agreed, the warranty period shall be 24 months starting from the date of delivery.
• The warranty does not cover defects in the product’s operation stemming from a fault in materials or parts provided by the client, nor shall it cover an installation that has not been assembled according to the manufacturer’s instructions and according to professional practice.
• The warranty shall not cover equipment and/or its accessories if they have been modified by the client without manufacturer’s written consent.
• The warranty clause can only be invoked by the client if the equipment is used normally and in conformity with its purpose and manufacturer’s instructions.
• The manufacturer’s liability hereunder shall be limited to repair, modify or replace the parts or equipment that shows defect within the limitation of the items under this article.
• The warranty period of the repaired or modified or replaced parts or equipment shall in no way extend the warranty period of the original ones.
• The works resulting from the warranty conditions shall be carried out in the manufacturer’s workshop after the client has sent the defective equipment or parts for repair or replacement.
• The manufacturer’s responsibility is strictly limited to the obligations as stipulated herein and it is expressly agreed that he shall not be found to make any other indemnity. In
particular, he shall in no case be liable to compensate loss caused directly or indirectly by a defect in the equipment delivered.

- The product should be installed and commissioned in accordance with the national/international regulations and rules.
- The power supply which the product is supplies should not deviate 10% from the values given on the label.
- For the fans having thermal protection, the related wiring should be definitely done and it is considered as contractor’s and/or owners responsibility. Any defect caused by misconnection of the thermal protection wiring in accordance to the circuit diagrams given in this manual would be out of manufacturer’s warranty.

2. SAFETY REGULATIONS

2.1 Symbols and warning signs

The following terms and/or symbols are used in the operating manual for particularly important information.

Safety messages and symbols are quoted at the relevant positions in the operating manual if there is danger such as death, personal injury and environmental damage. These safety warnings must be strictly adhered to.

- **DANGER**
  Indicates a hazardous situation which, if not avoided, may result in death or serious injury

- **WARNING**
  Indicates a hazardous situation which, if not avoided, may result in serious injury.

- **CAUTION**
  Indicates a hazardous situation which, if not avoided, may result in moderate or minor injury.

- **NOTICE**
  Additional notes, information and tips.
IN CASE OF DANGER!

- Switch off the power
- Switch off the main
- Please ask assistance from an authorized technician or expert.
- Please do not try to resolve any problem by trial and error.

2.2 Personal protection

While working on and standing by the product, protective clothing must be worn.

**WARNING**

- Safety shoes
- Safety helmet
- Protective gloves for fitting and repair work
- Chemical-resistant clothing and protective gloves for cleaning work, especially when handling solvents
- Safety goggles for cleaning work, especially while handling solvents or using compressed air for cleaning
- Hearing protection

2.2.1 Personal protection signs

- Head Protection
- Eye Protection
- Foot Protection
- High Visibility Clothing
- Protective Clothing
- Hand Protection
- Respiratory Protection
2.2.2 Warning signs

- No Smoking
- High Voltage
- Hand Injuries
- Fire Risk
- Flammable
- Hot Surfaces
- Poisoning Danger
- Frostbite Hazard

2.3 Warnings

- In an unexpected situation use the emergency stop button which is set up on an easily accessible place.
- Do not exceed maximum operating pressure given on the unit's type plate.
- Unless the advised safety devices available or fully active the unit must not be operated.
- Set up the unit with extreme cleanliness.
- The unit must not be operated if it is damaged. FRİTERM A.Ş. must be informed about all damages.
- The unit must be installed, operated and maintained by authorized/qualified personnel only.
• In case of using any other coolant may cause damage, leakage, danger and environmental pollution.

• No modification is allowed on the product without written permission from the manufacturer.

• Operational conditions are limited within the specified range by the manufacturer. In case of need to operate the product out of the range, a confirmation should be asked from FRITERM A.Ş.

WARNING

The product is delivered with 2 bar pressure. Upon receipt, it must be checked with schrader valve.

After checking, unless the product has 2 bar pressure Friterm must be notified immediately.
2.4 Improper use

Danger of injuries in improper using;

2.4.1 Hazardous rotating machinery

Danger of cutting hands and fingers. Lids should be unscrewed by an authorized technician.

Use hand protection.

2.4.2 Hazardous voltage

Electrical voltage can cause serious injuries or death. Do not contact with voltage direct or indirect. Do not forget to power off the unit before you begin maintenance work.

2.4.3 Hazardous thermal

Some of the components of the unit such as fin and tube have high temperatures.

Danger of burns and frostbites.
The danger of frostbite can occur in case of high volume leakage during maintenance or because of defect. Since the pressure of liquid refrigerant will drop suddenly down to atmospheric pressure (uncontrolled expansion) the temperature will drop well below zero which may cause frostbites on skin. Protective gloves should be used.

### 2.4.4 Hazardous refrigerant

Direct exposure to some types of HFC refrigerants can cause unconsciousness, shortness of breath, and irregular heartbeat. It can also cause confusion, drowsiness, coughing, sore throat, difficulty breathing, and eye redness and pain. Direct skin contact with some types of refrigerants can cause frostbite or dry skin. Hence, respiratory mask must be worn.

If the concentration of refrigerant increase there will be a risk of asphyxia due to reduced oxygen concentration. Hence, ensure working rooms are well-ventilated.

No smoking.

### 2.5 Environmental protection

While handling the product, it has to be ensured that materials which can endanger the environment are disposed of properly. Service materials must not be allowed to enter the sewerage system and the underground water system.

All relevant national regulations concerning environmental protection and the technical issues for safe and proper working must be complied.
3. LABELLING

3.1 Product code

<table>
<thead>
<tr>
<th>Series</th>
<th>FCV 3 80 11</th>
<th>B111 1 S D</th>
</tr>
</thead>
<tbody>
<tr>
<td>FCH: Horizontal Type</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FCV: Vertical Type</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FCW: V-Type</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Generation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Product Type</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fan Diameter</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fan Count</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

D: 400 V 3~ 50 Hz A
Y: 400 V 3~ 50 Hz Y
EC: EC Fan

Fan Type
S: Standard
L: Low Speed
Q: Quite
E: Extremely Quite

Fin Pitch

Physical Characteristic of the Coil

3.2 Type plate

<table>
<thead>
<tr>
<th>Type</th>
<th>FCV 3E 50 23 B011 2 QY</th>
<th>Fan speed</th>
<th>(Δ/ Y) 660/ 510 rpm</th>
</tr>
</thead>
<tbody>
<tr>
<td>Serial Nr.</td>
<td></td>
<td>Total Power</td>
<td>(Δ/ Y)0.84/ 0.54 kW</td>
</tr>
<tr>
<td>TS min/ max</td>
<td>-40/ +100 °C</td>
<td>Power Supply</td>
<td>400 V AC 3 Ph 50 Hz</td>
</tr>
<tr>
<td>Weight</td>
<td>294 kg</td>
<td>Max. Opr. Pr.</td>
<td>28 Bar</td>
</tr>
<tr>
<td>Internal Vol.</td>
<td>25.4 L</td>
<td>Test Pr. / Medium</td>
<td>34 Bar / Dry Air</td>
</tr>
<tr>
<td>Medium</td>
<td>Refrigerant / Fluid G2</td>
<td>Prod. Year</td>
<td>2016</td>
</tr>
</tbody>
</table>

FRITERM TERMİK CİHAZLAR SAN. ve TİC. A.Ş.
İŞKÜSİ SİLÜH SOKAK NO: 15 A-12 ÜZVİ FASER İZDİA 3485/ İSTANBUL / TÜRKİYE
E-mail: info@friterm.com Web: http://www.friterm.com

3.3 Friterm Logo
4. TECHNICAL DATA

4.1 Standards

- 97/23/EC PED (Pressure Equipment Directive)
- EN 378 “Refrigeration systems and heat pumps, technical safety and environmental requirements”
- Capacity standard for condensers is defined according to the EN 327 standard (Heat Exchangers - Forced Convection Air Cooled Refrigerant Condensers - Test Procedure for Establishing Performance)
- The system installer is responsible for that the inherent installation and security information are harmonized with the valid standards and guidelines (DIN EN 292 / 294).

4.2 Product

The basic principle is to transfer the refrigerant load in the system to air by the aid of a heat exchanger including fans. Its working principle is that the air sucked by fans cools the refrigerant within the tube while it passing through the fins. Thanks to closed fluid circuit, quantity of water does not diminish hence it is not needed to add extra water to the system.

The unit is delivered for operation with a specific operating point:
- Condensation point
- Superheating point
- Air inlet temperature and air volumetric flow

4.3 Fans

- Highly efficient axial Ziehl Abegg, EBM or equivalent fans are used.
- Fans are arranged for standard draw through air configuration.
- Fans diameters: Ø500/ Ø630/ Ø800/ Ø910 mm
- 400V 3~50Hz,
- Triphase fans can work at two different speeds. Furthermore, providing speed control is optional for EC fans.
- Variable fan speed regulation can be achieved using triphase fans with frequency inverter and sine filter.
- Variable voltage speed control system could be used as an alternative fan speed control system.
• All motors are suitable for speed control applications up to 100%.
• All motors have feature internal thermal protection.
• Standard wiring of all motors are for one speed.
• Working temperature for exterior mounting is between -40 °C and +50 °C - +70 °C.
• Fans are designed with assuming fans working Fans run in a housing designed to maximize air flow.
• Recommended starting for motors is 6 starts per hour, maximum starting for motors is 10 starts per hour.
• In case of prolonged stoppage of system, run the fan motors at least 4 hours per week.
• Motor protection IP54; insulation class F.
• Friterm reserves the right to use fans of different manufacturers. Depending on the type, the fan data may slightly vary.

4.3.1 Fan connection diagrams

230V Fan Connection Diagram
NOTICE

: Only specified section in bold lines are scope of supply.

400V Fan Connection Diagram
NOTICE

: Only specified section in bold lines are scope of supply.
4.4 Sound pressure level

Noise pressure levels (LpA) are determined from the sound power levels (LwA) by using the following formula according to EN 13487 Surrounding Surface Method.

\[
L_{pA} = L_{wA} - 10 \log \left( \frac{S_p}{S_r} \right)
\]

Sp = parallelepiped surface at 10 m
Sr = surface reference (1 m²)

Sound pressure levels given show the average values on a parallelepiped surface at 10 m distance from the unit in open air over a reflecting plain.

<table>
<thead>
<tr>
<th>Distance (m)</th>
<th>Change in Sound Pressure Level (dB(A))</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>20</td>
</tr>
<tr>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>10</td>
<td>0</td>
</tr>
<tr>
<td>50</td>
<td>-14</td>
</tr>
<tr>
<td>100</td>
<td>-20</td>
</tr>
</tbody>
</table>
4.5 Sound power level

<table>
<thead>
<tr>
<th>Fan Capacity (d/min)</th>
<th>Fan Speed (rpm)</th>
<th>Sound Power Level - Lwa - fan basis (dB(A))</th>
<th>Total Sound Power Level - Lwa - per fan (dB(A))</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>63 Hz</td>
<td>125 Hz</td>
</tr>
</tbody>
</table>

5. TRANSPORT AND STORAGE

5.1 Check for completeness and transport damage

- Attention! May cause severe injuries or unrecoverable damages in case of uncontrolled fall down.
- Instructions on lift and transportation should be strictly followed.
- Check if there is any damage on product or package. Immediately after receipt, the delivery must be inspected for possible transport damage. Any damage must be reported immediately to the shipping company. If it is to be expected that the transport damage may affect proper operation, then the product must not be commissioned.
- Upon receipt, the product should be visually inspected, and in case of any damage or shortage, the supplier should be notified within 7 days.
5.2 Transport

The product may only be lifted and moved by persons who:

1. are authorised to operate crane systems,
2. are authorised to drive motorised handling product
3. Also know the transport and lifting instructions according to the operating manual and the assembly drawing.

Suitable transport equipment must be used.

Only lift the packed unit with a forklift with full work length.
Risk of accident due to falling load

The size and weight of the product may cause accidents while transporting.

- Be extremely careful during transport to avoid damage or deformation on the product.
- Only use suitable transport equipment and lifting gear with sufficient load-bearing capacity.
- All precautions should be taken against any possible mechanical risk.
- Never stand or work under suspended loads.
- Wear appropriate protective clothing (helmet, safety gloves, safety shoes).

- During lifting, a suitable lifting tool like a forklift or a crane is to be operated as in the drawings below. When lifting the product with hauling hooks, it is necessary to use a lifting beam connected to the hooks.
- Product is mounted with wooden beams at the bottom. It can be placed on the ground on these wooden beams. These wooden beams provide enough height for forklifts. During landing the product onto the ground, be careful for the notches on the ground and prevent defects of the aluminium fins below the product.
If lightweight product is to be handled without a lifting vehicle, excessive care should be taken and suitable gloves should be used.

**NOTICE**

Be careful not to damage the product by the forks of the forklift. In order not to scratch the product, place a separator material. (cardboard, plywood, isolation material etc.)

**NOTICE**

Vibration absorber stand mounting detail is given as follows

<table>
<thead>
<tr>
<th>Model</th>
<th>A</th>
<th>H</th>
<th>M</th>
<th>N</th>
<th>O</th>
<th>R</th>
<th>S</th>
<th>T</th>
<th>Hardness</th>
<th>Max. Load (kg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>M1</td>
<td>12.5</td>
<td>51.5</td>
<td>M16</td>
<td>168</td>
<td>150</td>
<td>110</td>
<td>4</td>
<td>132</td>
<td>55° ± 5°</td>
<td>500</td>
</tr>
<tr>
<td>M2</td>
<td>12.5</td>
<td>51.5</td>
<td>M16</td>
<td>168</td>
<td>150</td>
<td>110</td>
<td>4</td>
<td>132</td>
<td>70° ± 5°</td>
<td>600</td>
</tr>
<tr>
<td>M3</td>
<td>13</td>
<td>63</td>
<td>M20</td>
<td>200</td>
<td>177</td>
<td>125</td>
<td>6</td>
<td>150</td>
<td>55° ± 5°</td>
<td>850</td>
</tr>
</tbody>
</table>
The legs and vibration absorber mounting should be done by using appropriate size bolts and/or fixing elements.
5.3 Storage

- Store the product in the original packaging in order to protect from improper weather conditions, dirt, moisture and environmental effects and the equipment.
- Avoid excessive storage periods (one year of storage at maximum is recommended).
- If the product is stationary for long periods in a humid atmosphere, the fans should be switched ON for minimum four hours per a month to remove moisture that may have condensed within the motors.
- Pay attention to the instructions on visual signs and labels for safety transport and handling of packaged product.
- Avoid exposure to extreme heat and cold.

**CAUTION**

**Damage caused by improper storage**

Incorrect or improper storage may cause damage to the radiator or radiator components.

6. INSTALLATION

The system installer is responsible for the proper installation according to standards and guidelines (DIN EN 292 / 294) which contains installation and security guidelines. Before installing, it must be ensured that the technical specifications of the product are in accordance with the desired working conditions.

6.1 Location

The product is designed only for permanent installation. It should be fixed to a stable base. The working fluid, the maximum working pressure and the voltage declared by the producer should be proper for the working environment.

**DANGER**

**The working area should be well ventilated and should not be contained any hazardous substances or explosives.**

- Air motion should not be adversely affected by obstructions and inlet air should not be undesirably heated or cooled by some other product.
• The site where the installation process is being carried out should be provided as clean as possible and low humidity.

### 6.2 Requirements at the set up point

#### 6.2.1 Outdoor set up of FCH unit

![Diagram of Outdoor set up of FCH unit]

\[
A_1 = L \times W \text{ (m}^2) \\
A_2 = 2 \times (L + W) \times C \\
\text{Condition: } A_2 \leq A_1 \times 0.65
\]

#### 6.2.2 Set up next to wall

To avoid the by-pass of the blowing air because of the side wall, prevention accessories must be used and to facilitate suction from the bottom, raising chassis (with a high of half-width of the condenser) or higher extended legs must be used (700-1200 mm).

![Diagram of Set up next to wall]

\[
K \geq W/2
\]
6.2.3 Set up in pit-hallow

Condition;
Fans with ventilation channel:
\[ Z \geq 0,5 \times W \]
\[ L_d = 450 - 600 \text{ mm} \]

Condition;
Fans with Friterm Streamer:
\[ Z \geq 0,5 \times W \]
Fans without Friterm Streamer:
\[ Z \geq 0,65 \times W \]
6.2.4 Several FCH units

\[ W_1 \approx 100 \text{ mm} \quad K \geq W/2 \]

6.2.5 Requirements at the set up point (FCW units)

\[ Z = 2 \times W \]

C value must be set by taking into account the top level of units. Z must be equal to the double of width of the product.
6.2.6 Several FCW units

\[ E/2 \]

\[ K = M + \frac{E}{2} \]

\[ C = (n - 1) \frac{\text{Flow Area}}{K \times 2} \]

Flow Area = Finned Length x Finned Height

6.2.7 Requirements at the set up point (FCV units)

\[ N_{\min} \geq 3 \times H \]

\[ S_{\min} \geq H \]
6.2.8 Side-by-side setup (FCV units)

6.3 Mounting

Stability of units must be provided by users in their plants during mounting against to any vibration.

Air flow should not be faced with any obstacle because of any restriction.

Additional pressure should not be created by fans or motors which are located next to the product.

Installation and electrical connection must be performed by only qualified personnel.

Be careful while unpacking and installing products in order not to cause any damage to the tubes and piping connections.

**NOTICE**

All the legs of the dry cooler must stand on floor and the unit should be levelled.
In case of operating in a windy site (Wind speed>20 km/h), the vertically mounted condensers should be fixed to the wall behind by using threaded rods not smaller than M10 size. Besides, the legs should be fixed on the floor by using appropriate bolts.

Piping should be fixed and supported at a distance of 1.5 m from the unit connection. After the first supporting point, the entire piping should be fixed at each 3 m.
The header connection to the condenser should be made at perfect facing position. Collectors should not be soldered by forcing them to face the piping.

Do not bend the connection pipes while mounting. The pipe connection must be in line.

There should be NO Heat Source close to the condenser, especially hot air outlet ducts.
It must be ensured that no electrical supply connection exists during installation. The mounting position of the product should be in accordance with its design. The connections used for mounting should be adequate to support the total operational forces. The product must be mounted in such a way that no vibration would be carried to the product (vibration dampers can be used if required). Carrier legs and lifting lugs are delivered as mounted on product.

Electrical connections must not be done before mounting the product to the ground with the legs.

Product must not be operated and electrically connected before the mounting legs fixed.

6.3.1 Ideal mounting scheme
6.3.2 Leg mounting

Legs have been delivered demounted with the product. For every leg; 6 piece M10x25 nut, M10 bolt and 12 piece spangles are given. The product is delivered with lifting eyes on. The product is delivered with lifting eyes mounted on it.

While mounting the product, number of legs that must be used depending on current fan counts is specified in the table given below.

### Notice

*For some condensers that have same fan count, the number of legs can be different. For current leg counts please see the catalogues.*

For example, according to Table if the product has 7 fans with 2 rows, 8 legs must be used while mounting the product. It is depicted as in the figure given below.

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* Schematic representation of the legs
FCH 2E

FCH 2 Sıra* 1 Fan (2 Row* 1 Fan)

FCH 2 Sıra* 2 Fan (2 Row* 2 Fan)

FCH 2 Sıra* 3 Fan (2 Row* 3 Fan)
FCV 2E

TEKNİK ÇİZİM • DRAWING

FCV 2 Sıra* 1 Fan (2 Row* 1 Fan)

FCV 2 Sıra* 2 Fan (2 Row* 2 Fan)

FCV 2 Sıra* 3 Fan (2 Row* 3 Fan)
**FCV 2 Sıra* 4 Fan (2 Row* 4 Fan)**

**FCV 2 Sıra* 5 Fan (2 Row* 5 Fan)**

**FCV 2 Sıra* 6 Fan (2 Row* 6 Fan)**

**FCV 2 Sıra* 7 Fan (2 Row* 7 Fan)**

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Rev. Tarihi: 25.05.2016  Rev. No: 6  Dok. No: KLV.003.ENG
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**Rev. Tarihi:** 25.05.2016  
**Rev. No:** 6  
**Dok. No:** KLV.003.ENG
FCH/ FCV 1 Sıra* 6 Fan (1 Row* 6 Fans)

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FCH/ FCV 1 Sıra* 8 Fan (1 Row* 8 Fans)

FCH/ FCV 1 Sıra* 9 Fan (1 Row* 9 Fans)

FCH/ FCV 1 Sıra* 10 Fan (1 Row* 10 Fans)

FCH/ FCV 2E

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6.4 Electrical Connection

The electrical connection must comply with the relevant instructions and ground wires must be installed correctly.

- The fan speed control could be managed by implementing the FMC (Friterm Motor Control) system.
- The wiring of fans should be done in accordance with the related rules.
- The main power supply cable should be determined according to the electrical power requirements of the product specified on the label.
- A protection thermal relay should be used where absent for the operational protection of the fan.
- Electrical wiring connections/ junctions should be under protection with minimum IP54 class boxes.

Risk of injury by electric shock

When connecting the electronic control to the power supply, injuries by electric shock are possible because of the voltage supply.
- All electrical connections on the product must be made by a qualified electrician in accordance with the electrical engineering rules.

The main power switch should be turned off unless needed before a repairing/maintenance action.

For the horizontal (H) type mounting:

- The product must be fixed with 4 lifting eyes, afterwards must be lifted approximately 1m so as to begin leg mounting.
- Use two spangles and a nut for each bolt while leg mounting.
- Be sure that all legs are equally far away from the surface
- Lower down the product slowly.
• The position control must be maintained with a water gauge on the product. The condenser must be positioned parallel to the surface.
• Fix the product to the surface.

For the vertical (V) type mounting:
• Fix the product with 2 lifting eyes and afterwards begin foot mounting.
• Use 2 spangles and a nut for each bolt must be used.
• Lower down the product slowly.
• The position control must be maintained with a water gauge placed on the product. The product must be positioned parallel to the surface.
• Fix the product to the surface.

6.5 Water Spray System
Two types of water spray system can be used with condensers manufactured by Friterm A.Ş; Ecomesh Water Spray System and Direct Adiabatic Water Spray System.

For the instructions for installation, operating and maintenance of the products with Spraying Systems please look at the “Water Spray System - Installation, Operation and Maintenance instructions” document of Friterm A.Ş.

![Figure 1- Ecomesh Water Spray System for Vertical Type Condensers](image-url)
7. OPERATION

7.1 Initial commissioning

Before running the unit for the first time, be sure that all guards, motor mountings and electrical covers are secure, installation and electrical connection are done properly, internal wiring is kept away from the fans and the fans can rotate freely. Make sure that all the mechanical connections are done in accordance with the rules. Piping is consistent with the guidelines. Before the start-up you may run the fans individually to make sure that they are running properly. Turn on the fluid valves and let the fluid flow right before running the fans. In case you may encounter any problem or disfunction please refer to the manufacturer for the resolution of the problem.

7.2 Regular commissioning

If the product is stationary for long periods in a humid atmosphere, the fans must be switched ON for minimum of four hours in every month to remove any moisture that may have condensed within the motors. While the fans are running, anything that could pass through the finger guards, like a piece of cloth or long hair, must be kept away from the fans.

- Switch on the main power switch
- Make sure that the fluid is flowing inside the pipes.
- Switch on the fans.
7.3 Shutting down

Fan connection must be disconnected and working fluid circulation must be stopped to shut the product down.

**CAUTION**

After shutting the unit down, the operating pressure must be observed whether the operating pressure exceeds maximum operating pressure or not.

**CAUTION**

Stay away from the air direction of the fans while the fans are running.

**WARNING**

Before touching, it is recommended to ensure that the headers and the connection pipes are neither too hot nor too cold due to working conditions of the fluid inside. The operation must be stopped and the supplier must be informed in case of any unusual working condition, such as abnormal operating noise. Intensive vibrations due to out-of-balance running of the fans may lead to outage. Maintenance must not be performed while the product is in use (*See part 8 for details*).

**NOTICE**

Recommended starting value for fans is 6 per hour while maximum is 10.

7.4 Step control application (If Applicable)

In step controlled applications; the fan groups that will be working and not working must be arranged according to scheme given below which is defined as “TRUE”. Otherwise the problems given below will be observed:

1. The air will not be fully absorbed from by the fans. Hence the efficiency will decrease.
2. When a fan is taken into the circuit which rotates in contrary directions, the fan will be damaged because of constriction.
8. MAINTENANCE

8.1 Maintenance intervals

Maintenance operation is to be performed by qualified personnel only. Please be sure that safety regulations and the worker's protection rules are obeyed during the maintenance and service (DIN EN 50110).

The fluid circulation must be stopped and it must be ensured that no electrical supply connection exists during maintenance. It is advisable to wait till the product comes to thermal balance with its surroundings if possible.

**NOTICE**

If the tubes within the product or the connection pipes are to be repaired, the refrigerant in the line must be drained beforehand.
8.2 Fan motor maintenance

- Regarding the bearings, the fans are maintenance-free for 30000-40000 hours under normal operating conditions. Lifetime lubrication is not necessary within this period, and when this period expires or the bearings are damaged, it is necessary to replace the bearings with original parts.
- If the fans are to be maintained, the instruction manual prepared by the fan manufacturer must be followed. Please contact manufacturer when needed.
- After maintenance is performed, ensure that no tools or other foreign materials are left in or near the product.

**NOTICE**

Follow to Initial Commissioning before operating the product after maintenance.

8.3 Periodical controls (Once a year)

- Corrosion on the fins and tubes should be inspected. If the tubes are worn-out, leakage may occur.
- The pipeline must be controlled for damage and leakage.
- Mechanical and electrical connections of the fans must be checked. Fans must be able to rotate freely and finger guard must be stable.
- All the fixings, especially fan motor mountings and product installation fixings must be ensured to be secure.

8.4 Clean up

**Cleaning the fins**

- One of the effective methods to clean up the fins is to spray pressurized air. This action should be conducted after stopping the fans and turning off the fluid supply valves. The air jet should be provided to be parallel to the fins for the best cleaning results.
- Fins could also be cleaned up by pressurized water jet. The water jet should be provided to be parallel to the fins for best result. This action should be conducted after stopping the fans and turning off the fluid supply valves. The cleaning action should be carried out inside-out. Some harmless solvent/detergents could be added.
to the water to ease the removal of hardened dirt. Any known corrosive/aggressive chemical should be avoided to be used in cleaning action.

- The wiring and fans should not be wetted during the cleaning process.

**Cleaning up the Fans**

- Fans should be cleaned with the aid of pressurized air and a soft brush.

9. TROUBLESHOOTING

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