

EN



DRY COOLERS

INSTALLATION, OPERATION AND MAINTENANCE INSTRUCTIONS

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Contact:
Address : Organize Deri Sanayi Bölgesi
18. Yol 34957 Tuzla İSTANBUL, TURKEY
Telephone : (0216) 394 12 82
Fax : (0216) 394 12 87
E-mail : info@friterm.com
Web : www.friterm.com

This document **specifies the instructions** for installation, operating and maintenance of the **Dry - Coolers (FYKS, FDKS and FVKS models)** manufactured by FRITERM A.S., Turkey.

NOTE: FOR WET-DRY COOLERS, PLEASE SEE WATER SPRAY SYSTEM INSTRUCTIONS TOGETHER WITH DRY COOLERS INSTRUCTIONS.

1. GENERAL

The instructions below should be followed strictly for the health and safety reasons when installing and maintaining the equipments listed above.

Upon receipt, the equipment should be visually inspected, and in case of any damage or **deficiency**, the supplier should be notified within seven days.

2. HANDLING AND STORAGE

Check if there is any damage on product or package.

Store the equipment in the original packaging in a dry area protected from the **improper weather conditions** or protect it from dirt and **improper weather** until final installation.

Avoid exposure to extreme heat and cold.

Avoid excessive storage periods (one year of storage at maximum is recommended).

If the equipment is stationary for long periods in a humid atmosphere, the fans should be switched ON for minimum of two hours every month to remove any moisture that may have condensed within the motors.

During lifting, a suitable lifting tool like a forklift or a crane is to be employed as in the drawings below. When lifting the equipment with hauling hooks, it is necessary to use a lifting beam connected to the hooks.

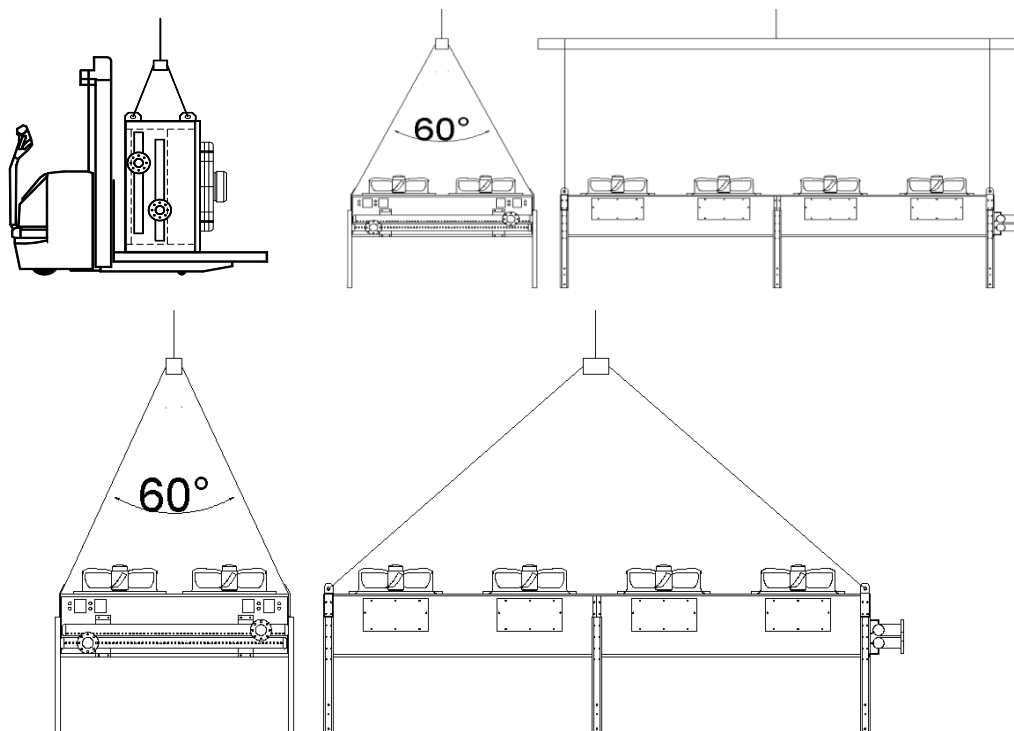


Figure 1. Handling scheme during carriage

If lightweight equipment is to be handled without a lifting vehicle, excessive care should be taken and suitable gloves should be used.

3. INSTALLATION

The system **installer** is responsible that the inherent installation and security information are harmonized with the valid standards and guidelines (DIN EN 292 / 294).

The EMC guideline is to be observed in connection with the control units. The manufacturer or operator of the entire plant is responsible for keeping to the EMC guideline 89/336/ EEC.

Before installing, it should be ensured that the technical specifications of the equipment are in accordance with the desired working conditions.

3.1. Location

The equipment 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 suitable for the working environment.

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 the inlet air should not be undesirably heated or cooled by some other equipment.

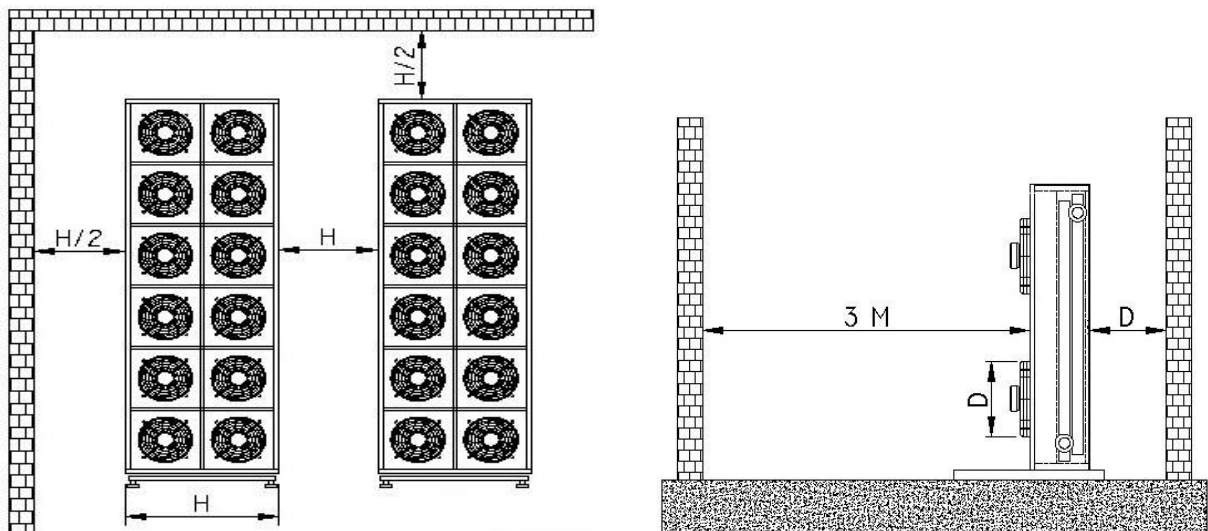


Figure 2. Minimum recommended distances for installation

3.2. Mounting

Installation and electrical connection are to be performed by qualified personnel only.

Care should be taken while unpacking and installing of the products in order not to cause any damage to the tubes and piping connections.

It must be ensured that no electrical supply connection exists during installation.

The mounting position of the equipment should be in accordance with its design.

The connections used for mounting should be adequate to support the total operational forces.

The equipment should be mounted in such a way that no compressor vibration would be carried to the equipment and vibration dampers can be used if required.

Leg Mounting

Legs have been delivered unmounted with the equipment.

For every **leg**; 6 piece M10x25 nut, M10 bolt and 12 piece spangles are given. The product is delivered with lifting eyes on. The equipment is delivered with lifting eyes mounted on it.

The electrical connection should not be done unless the legs are mounted.

Nuts, bolts and spangles that are given, must be completely used for the mounting.

For the horizontal (YK) type mounting:

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

For the vertical (DK) type mounting:

- In the mounting surface; fix the equipment with two lifting eye and afterwards begin the foot mounting.
- Make sure that the mounting of two **legs** using 2 spangles and a nut for each bolt. must be used.
- Lower down the equipment slowly.
- The position control must be maintained with a water gauge placed on the equipment. The Dry Cooler must be positioned parallel to the surface.
- Fix the equipment to the surface.

The **leg** type due to the fan diameter and the nut holes according to the mounting are in accordance with the tables given below.

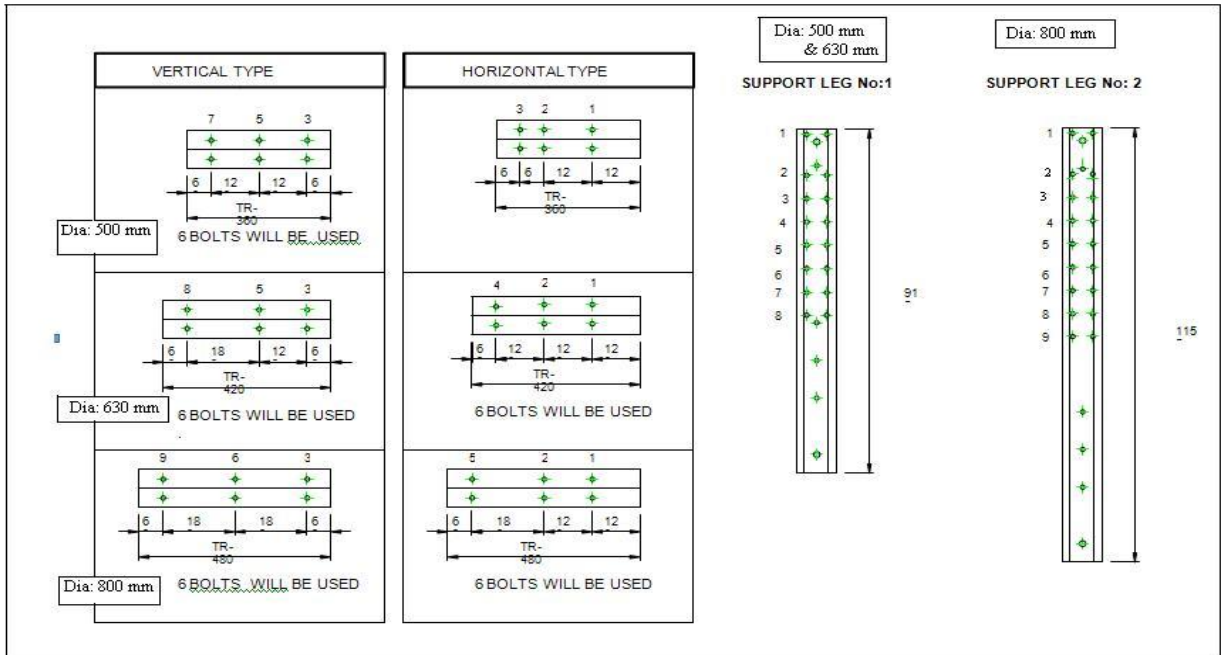


Figure 3. Legs Mounting Scheme

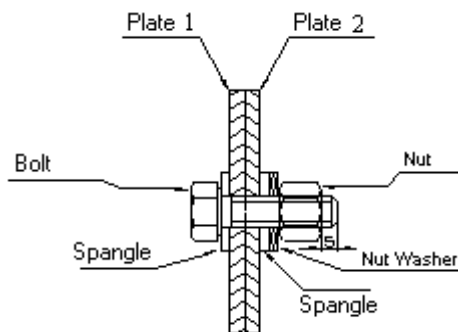


Figure 4. Ideal mounting Scheme

The electrical connection schemes are in accordance with the tables given below.

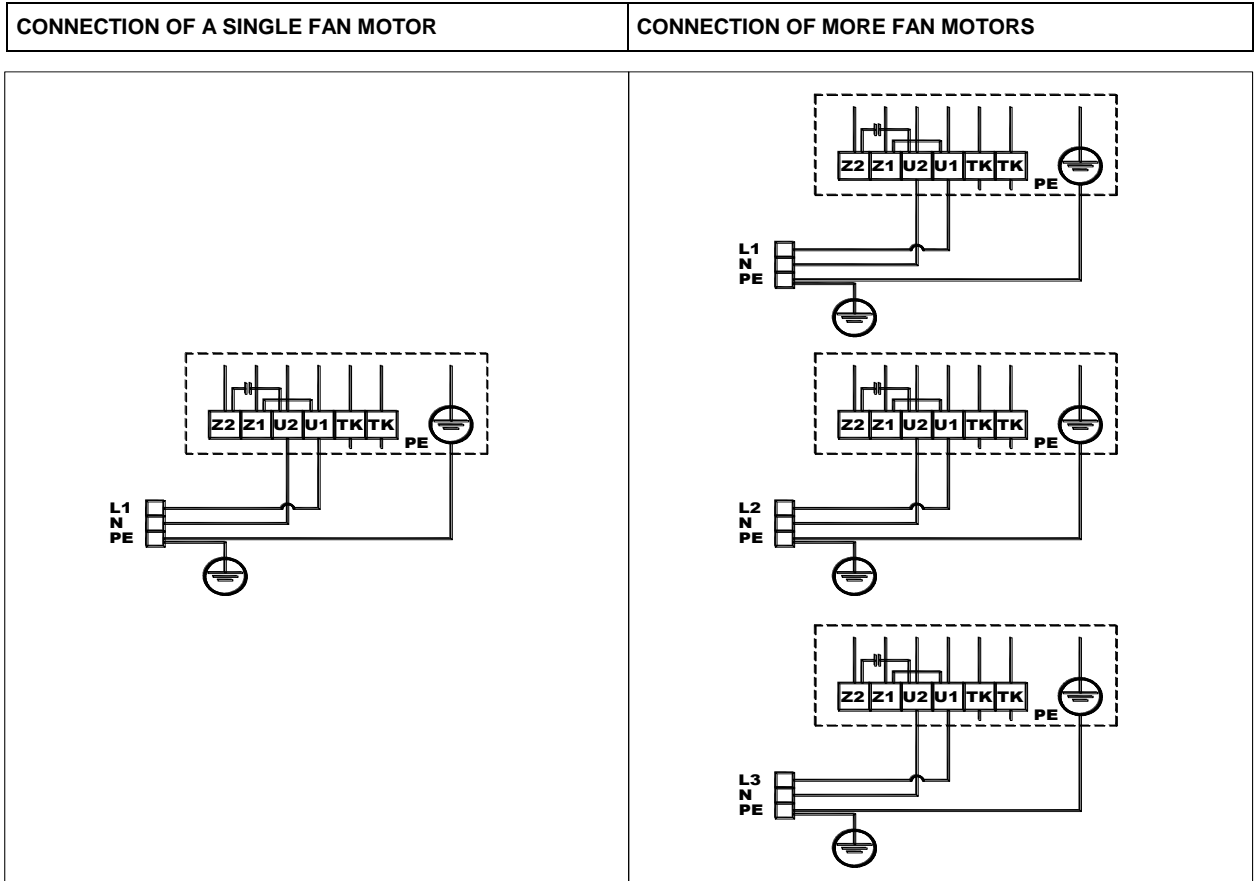


Figure 5. Ø500mm and Ø630 mm mono-phase motor connection

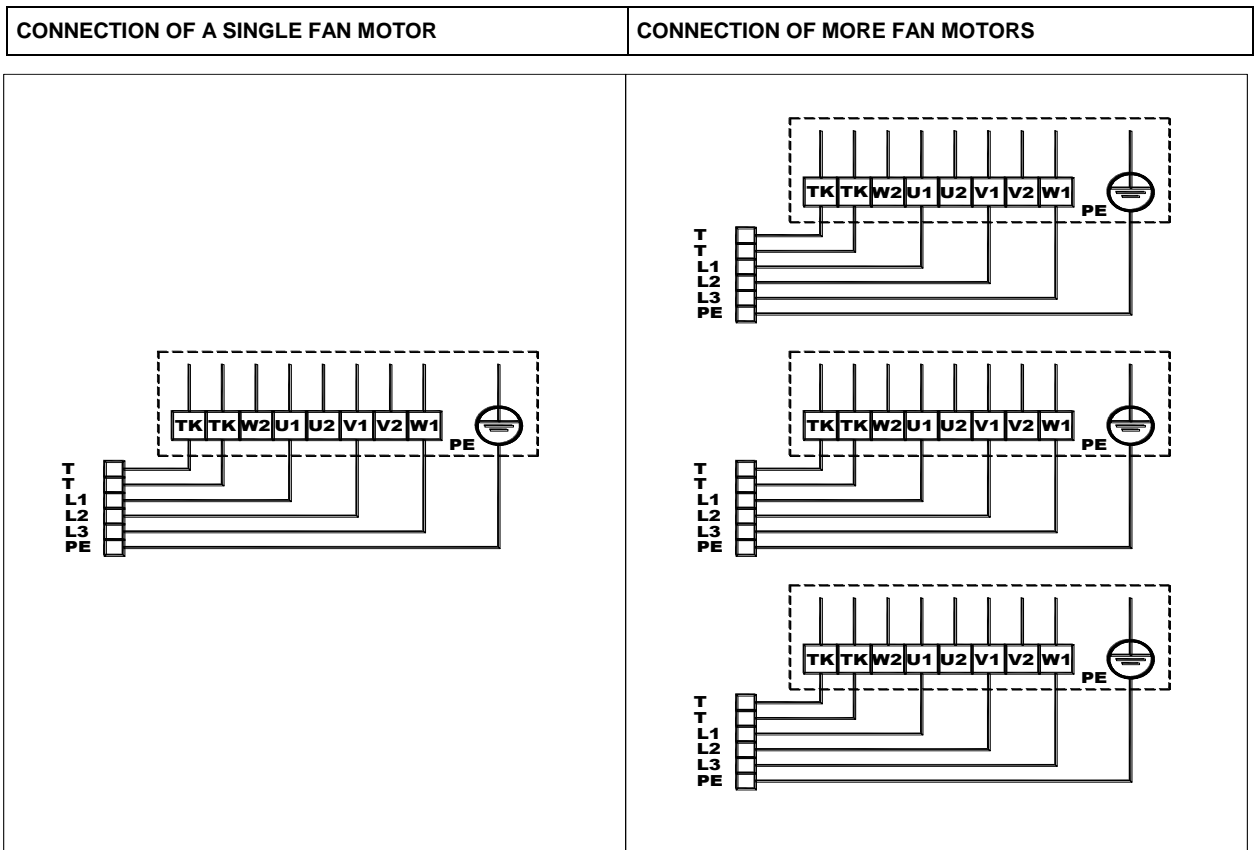


Figure 6. Ø800 mm three-phase motor connection

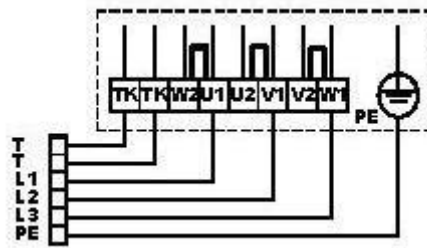


Figure 7. Tri-phase fan high rpm connection scheme

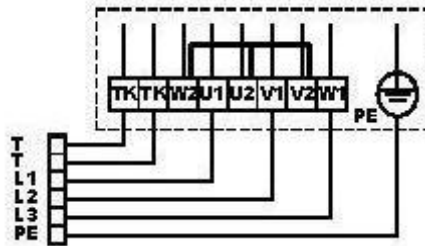


Figure 8. Tri-phase fan low rpm connection scheme

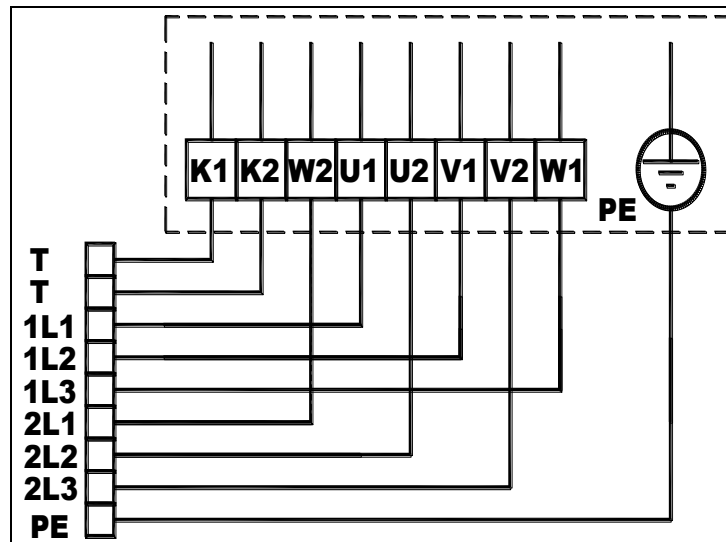


Figure 9. Tri-phase fan double rpm connection scheme

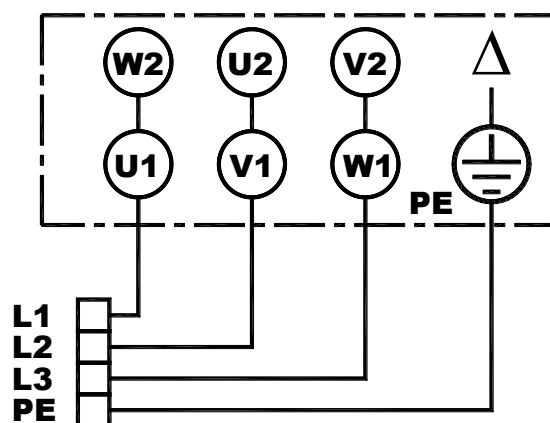


Figure 10. Ø 1250 motor Δ connection

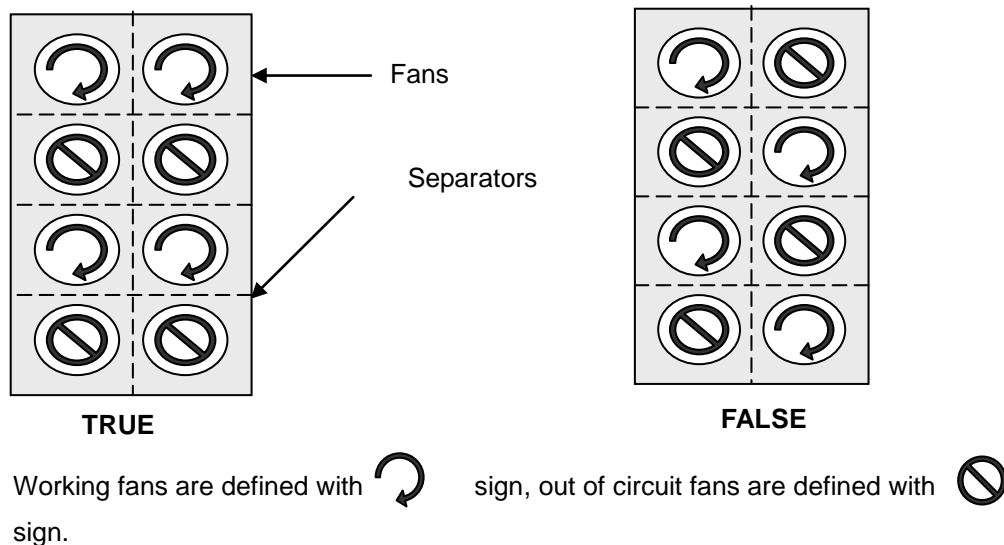
Electrical connection diagrams for fans. The fans described above are of standard products. Other suitable fans may be used with the same basis. Refer to product catalogs for the diameters and the number of the fans.

The electrical connection must comply with the relevant specifications and special attention must be given to correct installation of the ground wires.

Step Control Application

In step controlled applications; the fan groups that will work in company or the ones that will be out of the circuit must be formed according to the below schemes defined as "TRUE". Otherwise, the fans that are placed besides working fans will turn in opposite direction and as a result:

1. The air will not be wholly absorbed out of the radiators; instead a portion will be absorbed from the non operated fan side. Consequently the efficiency **will** decrease.
2. When a fan is taken into the circuit which rotates in contrary directions, because of constrain **the fan will be damaged because of constriction**



4. START UP

Before running the unit for the first time, **be sure that** all guards, motor mountings and electrical covers are secure, installation and electrical connection have been completed properly, internal wiring is clear off the fans and the fans can rotate freely.

5. OPERATING

If the equipment is stationary for long periods in a humid atmosphere, the fans should be switched ON for minimum of two hours in every month to remove any moisture that may have condensed within the motors.

Recommended starting value for fans is 6 , maximum 10.

While the fans are running, anything that could pass through the finger guards, like a piece of cloth or long hair, should be kept away from the fans.

Stay away from the airways of the fans while the fans are running.

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 should be stopped and the supplier should be consulted in case of any unusual working condition, like abnormal operating noise, is realized. Intensive vibrations due to out-of-balance running of the fans may lead to outage.

Maintenance should not be performed while the equipment is in use.

As it is not possible to evacuate fully, **equally concentrated** antifreeze should add to keep safe to the dry coolers.

6. MAINTENANCE

Freezing Protection; Since it is not possible to drain all of liquid from the system, dry coolers. Using water and water based liquids, must be protected against freezing by adding adequately amount of antifreeze(glycol) to the water. On the other hand, added antifreeze(glycol) should be checked to not decrease.

ATTENTION !!! It must be chosen 7-10 °C lower temperature in order to provide safely antifreeze(glycol) ratio.

Mixture Freezing Points For Different Antifreeze Ratios	
Volumetric Mixing Ratio	Freezing Temperature
%100 Water	0 °C
% 90 Water + % 10 Glycol	-3 °C
% 80 Water + % 20 Glycol	-7 °C
% 70 Water + % 30 Glycol	-14 °C
% 60 Water + % 40 Glycol	-22 °C
% 50 Water + % 50 Glycol	-33 °C
% 40 Water + % 60 Glycol	-48 °C

Reference: ASHRAE

Maintenance operation is to be performed by qualified personnel only.

Please **follow** the safety regulations and the worker's protection rules by all maintenance and service work (DIN EN 50110).

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

If the tubes within the equipment or the connection pipes were to be repaired, the fluid in the line would better be poured out beforehand.

Regarding the bearings, the fans are maintenance-free for 30-40.000 hours under normal operating conditions. Lifetime lubrication **is not necessary** within this period, and when this period is expired or the bearings are damaged, it is necessary to replace the bearings with original parts.

If the fans are to be worked on for maintenance reasons, the instruction manual prepared by the fan manufacturer should be followed. Contact manufacturer when needed.

After maintenance is performed, ensure that no tools or other foreign materials are left in or near the equipment.

Refer to Initial Starting before operating the equipment after maintenance.

6.1. 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 should be controlled for damage and leakage.

Mechanical and electrical connections of the fans and defrost heaters should be checked. Fans should be able to rotate freely. Finger guard should be stable.

All the fixings, especially fan motor mountings and equipment installation fixings must be ensured to be secure.

6.2. When Necessary

The surface of the heat exchanger should be inspected for dirt and dust, and if needed, should be cleaned by a soft brush, with the help of pressurized air, pressurized hot water or by a similar way. Care should be taken not to damage the fins and the fans. Chemicals that may react with the

materials used in the equipment should not be used. Electrical connections and the fan motors should not be wet while cleaning.

7. SOUND PRESSURE LEVELS

Fan Çapı . Fan Devri Fan Diameter . Fan Speed	10 m'de dBA . dBA at 10 m									
	Fan Sayısı . Number of Fan									
	1	2	3	4	5	6	8	10	12	
S 630 mm (900 d/d-rpm)	44	47	49	50	52	52	53	54	55	
L 630 mm / D (650 d/d-rpm)	37	40	42	43	45	45	46	47	48	
Q 630 mm / Y (480 d/d-rpm)	29	32	34	35	37	37	38	39	40	
S 800 mm / D (880 d/d-rpm)	52	55	57	58	60	60	61	62	63	
L 800 mm / Y (660 d/d-rpm)	45	48	50	51	53	53	54	55	56	
Q 800 mm / D (440 d/d-rpm)	33	36	38	39	41	41	42	43	44	
E 800 mm / Y (330 d/d-rpm)	27	30	32	33	35	35	36	37	38	
S 1000 mm / D (670 d/d-rpm)	55	58	60	61	63	63	64	65	66	
L 1000 mm / Y (530 d/d-rpm)	50	53	55	56	58	58	59	60	61	
Q 1000 mm / D (420 d/d-rpm)	39	42	44	45	47	47	48	49	50	
E 1000 mm / Y (310 d/d-rpm)	35	38	40	41	43	43	44	45	46	

Sound pressure levels in dB at a distance of 10 m for different number of standard fans used in FRİTERM products (REF: EN13487). The test data are taken from fan manufacturers' documents; the values given in the table above are only for comparison and the real values may be different due to the construction of the surroundings and installation characteristics.

8. INVALIDATION OF WARRANTY

The warranty declared in the sales contract is valid only if the instructions given in this manual are not violated.



Adres : Organize Deri Sanayi Bölgesi
18. Yol 34957 Tuzla İSTANBUL
Telefon : (0216) 394 12 82
Faks : (0216) 394 12 87
E-posta : info@friterm.com
Web : www.friterm.com