

LUKO's FD-S & FD-X Series DUCTED DEHUMIDIFIER

User's Manual



KEEP THESE INSTRUCTIONS FOR FUTURE REFERENCE

Thank you for choosing our dehumidifier. This owner's manual will provide you with valuable information necessary for the proper care and maintenance of your new dehumidifier. Please take a few moments to read the instructions thoroughly and familiarize with all the operational aspects of this dehumidifier. This unit removes excessive moisture from the air to create a more comfortable environment.

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Foreword

Purpose

This manual provides all the information about this precise dehumidifier, including the structure, installation, principle, work process and the detailed operating instruction is provided.

Content

Dehumidifying control system, operating ways, maintain, and regular failure and failure elimination

Rights Reserved

We reserve the rights of updating/explaining all contents of manual involved.



Warning!

All electrical connections works must be done by local professionals, according to relevant provisions to operate, or some loss of life, personal injury, property loss may be happened. Please read through the manual before electrical works, avoiding any fault operation that causing loss of life or property. Please contact the supplier or the manufacturer if there are any issues arises that are not stated in this manual.

1 SAFETY INTRODUCTION

1.1 Safety

This series of dehumidifier is in conformance with all provisions of European security requirements and standards, the safety of worker and equipment are taken into care while in design and manufacture process. In each section of the manual, there are safety information and explicitly pointed out operation that may causes danger. And it is mark with "Danger" as a warning sign.

This manual provides information on the appropriate ways of operating the dehumidifier. It shall serve as a guideline only and are not liable for any personal responsibility or meeting local safety regulations. During the installation and operation of the equipment, everyone shall bear the liability as listed below:

- To ensure the equipment in good condition according the description provided in this manual;
- Do care the safety of yourself and others;
- Dehumidifier should be operated and maintenance by related qualification professionals;
- Do not install dehumidifier around the explosive protection devices;
- Cut off the power before open any cover in the housing;
- When the operation ended, please allow the equipment to cool down at least 15 minutes before begin the maintenance service;
- The machine panel should be closed at all time if maintenance work is not carried out;
- Dehumidifier is limited to atmospheric pressure condition to dehumidify;
- Filter device must be installed before using the dehumidifier;
- Removing or deleting the marks/declares/notes in the dehumidifier is prohibited;
- The manual should be kept well for using in the future;
- Original spare parts should be used for any replacement;
- The written permission from manufacture must be needed before repairing the dehumidifier;

1.2 Applications:

The dehumidifiers are widely used in hotels, office buildings, hospitals, commercial, research institutions and other applicable places. Its working principle is to remove excess moisture by drying the air under normal atmospheric pressure. Its working humidity range is from 40%-90% (the humidity can be reduced to 40% at most), and working temp range is 5 °C to 35 °C. If the ambient operating temperature is beyond this range, the dehumidify capacity will be affected, this issue does not reflect on the quality of the equipment itself.

1.3 Manual Content

This manual content includes most info about installation, operation, maintenance, and failure analysis and others.

Note: this manual is applicable to other precise dehumidifiers of the same range.

2 INTRODUCTIONS OF DEVICE

2.1 Standards

The design meets IEC protection class IP 45 requirements.

2.2 Structure

2.2.1 Housing and body

- Adopts steel frame structure, compact, strong, robust, and the defrosting technology effectively preventing the "frozen" issue;
- Easy to open / access panel for replacing filter
- Water tray equipped ensures that all condensate water drain out, preventing water stagnation.

2.2.2 Inlet / Outlet Air Panel

- Removable filter is equipped in each air inlet;
Centrifugal fan with steel volute and blades, high efficiency and low noise.

2.2.3 Refrigeration system

- The design of the dehumidifier uses energy-saving heat exchanger. It can effectively regulate the fluid flow volume, maximizing freezing capacity, and ensuring compressor operate well. Meanwhile, dried filter was introduced in this system to prevents clogging/impurities in expansion valve or capillary
- Patented defrosting structure, it brings stable operation of refrigeration system
- Hydrophilic membrane fin (heat exchanger), heat transfer efficiency increases by 20%. Good insulation material also increases insulating effect by 15%

2.2.4 Compressor

Compressor is the core part of this dehumidifier. It directly affects dehumidifier performance. It is the heart of this dehumidifier, provides powers for whole system. Our dehumidifier is built with reliable and high efficiency compressors.

2.2.5 Throttling device system

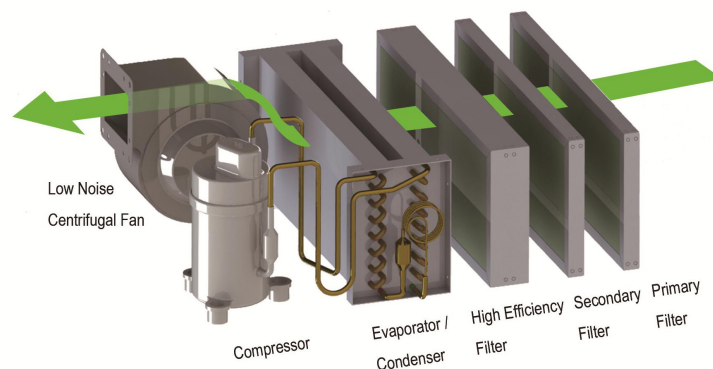
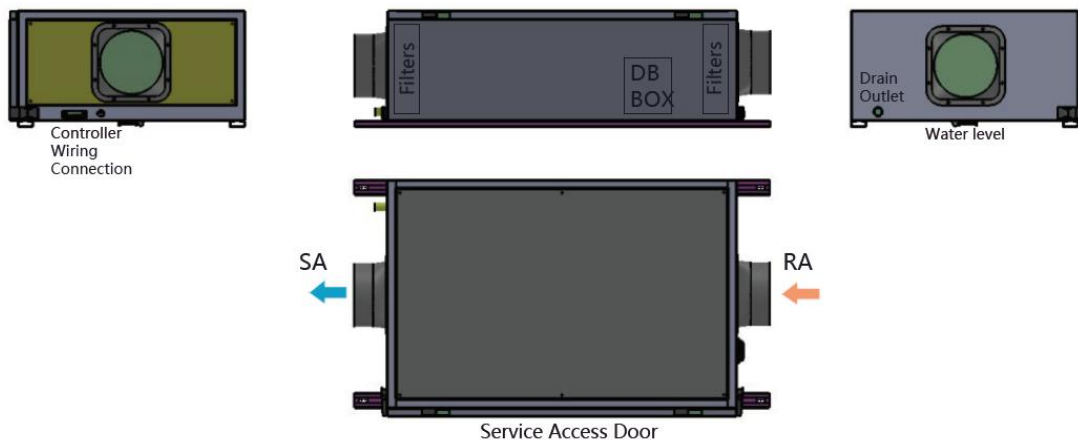
- Throttling device system is one of four vital items in the refrigeration systems. It will reduce the liquid refrigerant (coming from condenser) high pressure, make the refrigerant absorb heat under low pressure (low temp) while vaporization happen. It's ensuring high pressure in condenser and low pressure in evaporator. As a result, the loss of cooling capacity is reduced thus ensuring higher efficiency. It also prevents over-heating on the compressor.

2.2.6 Protection devices

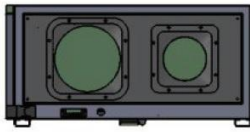
- Dehumidifier controller is specially designed according the operation of the dehumidifier and it is designed to optimize its performance. Motor overload and short circuit protection is included as well.
- Start-up delay protection: If the dehumidifier is power off during operation, it will take 3 minutes to turn on again. This is a delay protection for protecting the compressor.
- Shutdown delay protection: When the dehumidifier is power off, the fans will keep running for 3 minutes, to cool down the dehumidifier thus reducing the internal heat of the dehumidifier.
- Fans operation mode: The fan will run and stop according to the RH setpoint.
- High temperature protection: Prevent the compressor running continuously at high temperatures;
- Low pressure protection: Prevents the dehumidifier running without refrigerant to avoid compressor from being overload.

2.2.7 Product Diagram

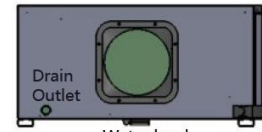
FD-S Series



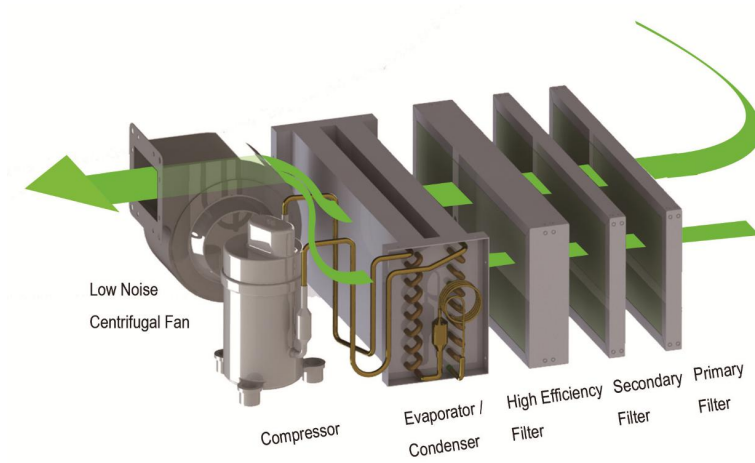
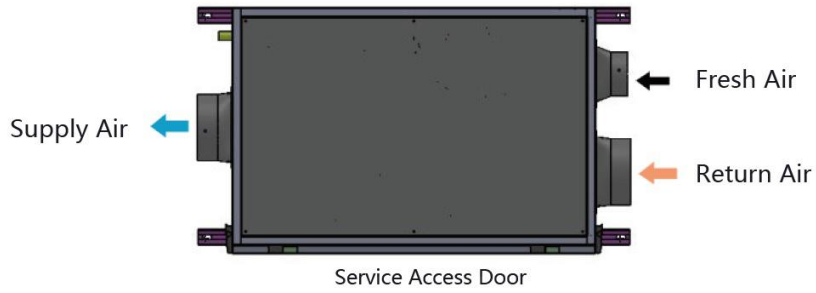
FD-X Series



Controller
Wiring
Connection



Water level



3 INSTALLATIONS

3.1 Brief introduction

Ceiling Mounted dehumidifier can be installed in many places, depending on the requirements of owners. It can also integrate with current ventilation system via duct system. This chapter records info about preparation work, and installation work and etc. Please serve it as a guide before installation.

3.2 Delivery and storage

To ensure the quality and reliability of each dehumidifier, it has been thoroughly tested in factory. If dehumidifier has to be stored for a while prior to installation, please take notes of the following:

- ① Keeping transport package in good condition;
- ② Avoiding physical damage;
- ③ Dehumidifier should be stored indoor and covered properly to prevent dust, frost and rain intrusion.

3.3 Inspection before installation

Unpack package and check machine: If any damage is found, please contact supplier / manufacturer.

3.4 Moving machine

Please check the dehumidifier weight before any loading / unloading. The dehumidifier is equipped with caster wheels, it can move on the ground. For moving the unit of a longer distance, it is advice to use proper equipment (trolley or forklift) to move the goods. It should be take note that the dehumidifier shall be lifted up properly and the lifting point should be away from the motor, control system and exposed pipe to avoid any damages onto the equipment.

3.5 Installation Location

For best operation and maintenance service, it is advice to install the dehumidifier indoor / inside of room with extra space for routine maintenance/checking in order to prevent condensation inside the dehumidifier, the unit should not be exposed to environment where temperature is below the process air's dew point. Please place the device near to power source.



NOTE: Please provide enough space around the dehumidifier for troubleshooting and maintenance service purpose.

3.6 Ground/Base

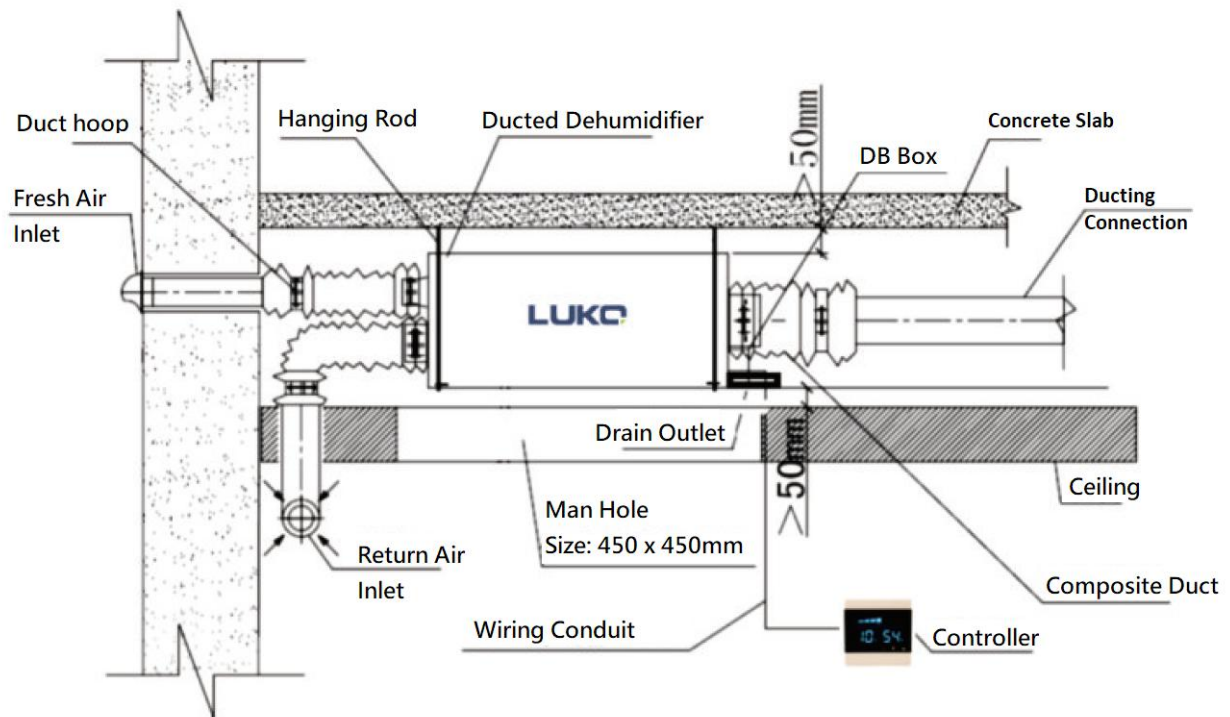
Dehumidifier must be installed horizontally with well-balanced level. Please use horizontal ruler to measure the level during installation.

3.7 Ducting Connection

The dimension of ducting for inlet and outlet air should be in line with ISO7807 recommended values. Ducting should be connected with the connection part on flange, meanwhile, the screw bolt is limited to within 20mm. While connecting the ducting, some notes as below:

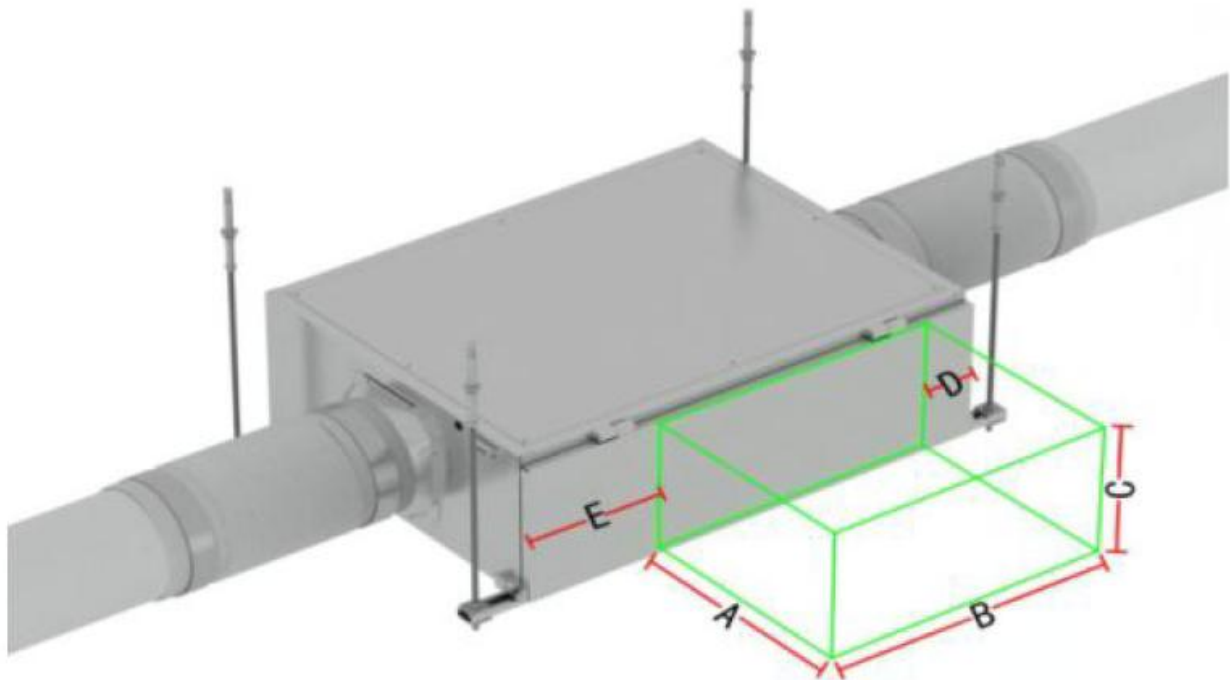
- In order to reduce loss of static pressure, do the best to shorten the length of the ducting;
- To ensure performance of machine, all rigid (galvanized) ducting fittings are required to have air-tightness;
- The ducting should have a good capacity of thermal insulation, then the phenomenon of moisture condensation inside pipe wall will be avoided, and the pipeline won't be corroded;
- To reduce noise and vibration transmitted along the pipes, the good quality, soft and strong airtight adapting pieces should be used in the joint parts;

3.8 Ducting Connection Diagram (example)



3.9 Service Access Space Allocation

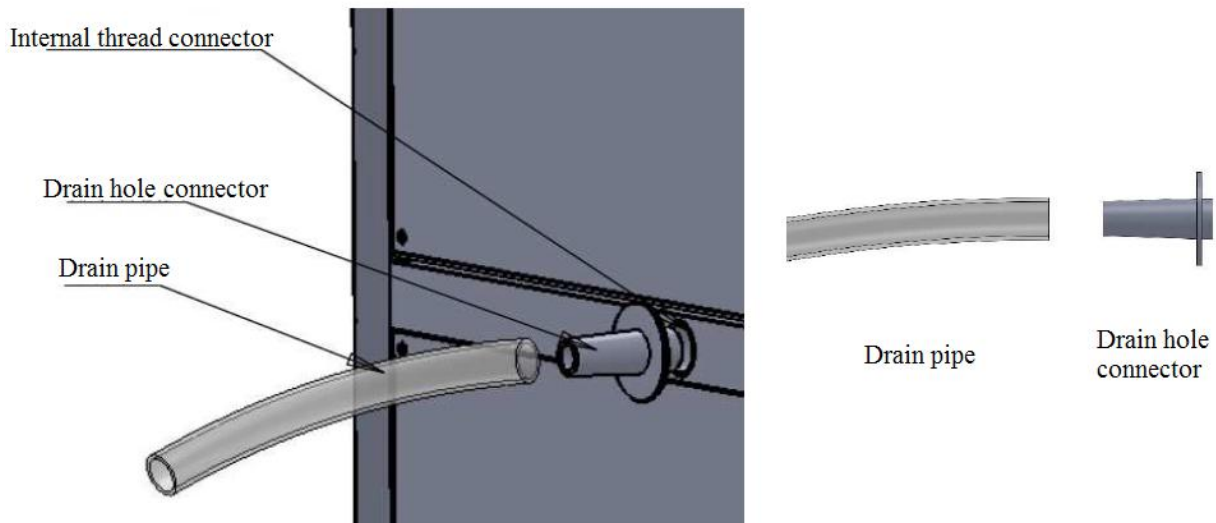
Please allocate the space require as per the table for access to service the unit.



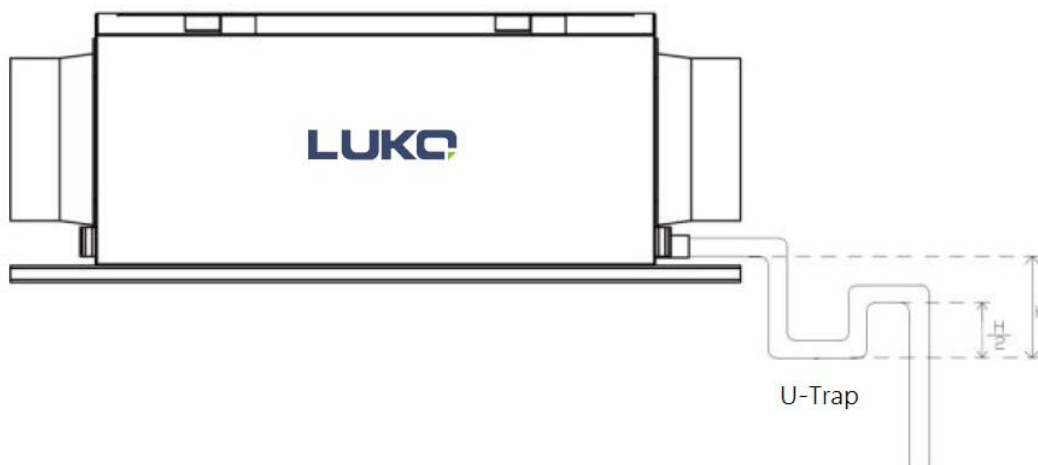
Model	Service Area		Void Area / No Blockage	
	A	B	E	D
FD-S28L / X28L	400mm	490mm	100mm	100mm
FD-S40L / X40L	500mm	600mm	100mm	100mm
FD-S60L / X60L	500mm	600mm	100mm	100mm
FD-S100L / X100L	600mm	650mm	100mm	100mm
FD-S140L / X140L	600mm	650mm	100mm	100mm
FD-S180L / X180L	500mm	500mm	270mm	100mm
FD-S250L / X250L	500mm	500mm	270mm	100mm
FD-S380L / X380L	500mm	600mm	370mm	100mm
FD-S500L / X500L	500mm	600mm	370mm	100mm

3.10 Drainpipe connection

Drainpipe is a transparent hose, please connect it as per the drawing as below:



It is strongly advised to install a U-Trap with PVC pipe or any other pipe that are suitable. This would help to allow the condensate water flow out smoothly.



3.11 Electrical connection

Be careful! All electrical connection works must meet local electrical equipment installation standards, done by qualified professionals.

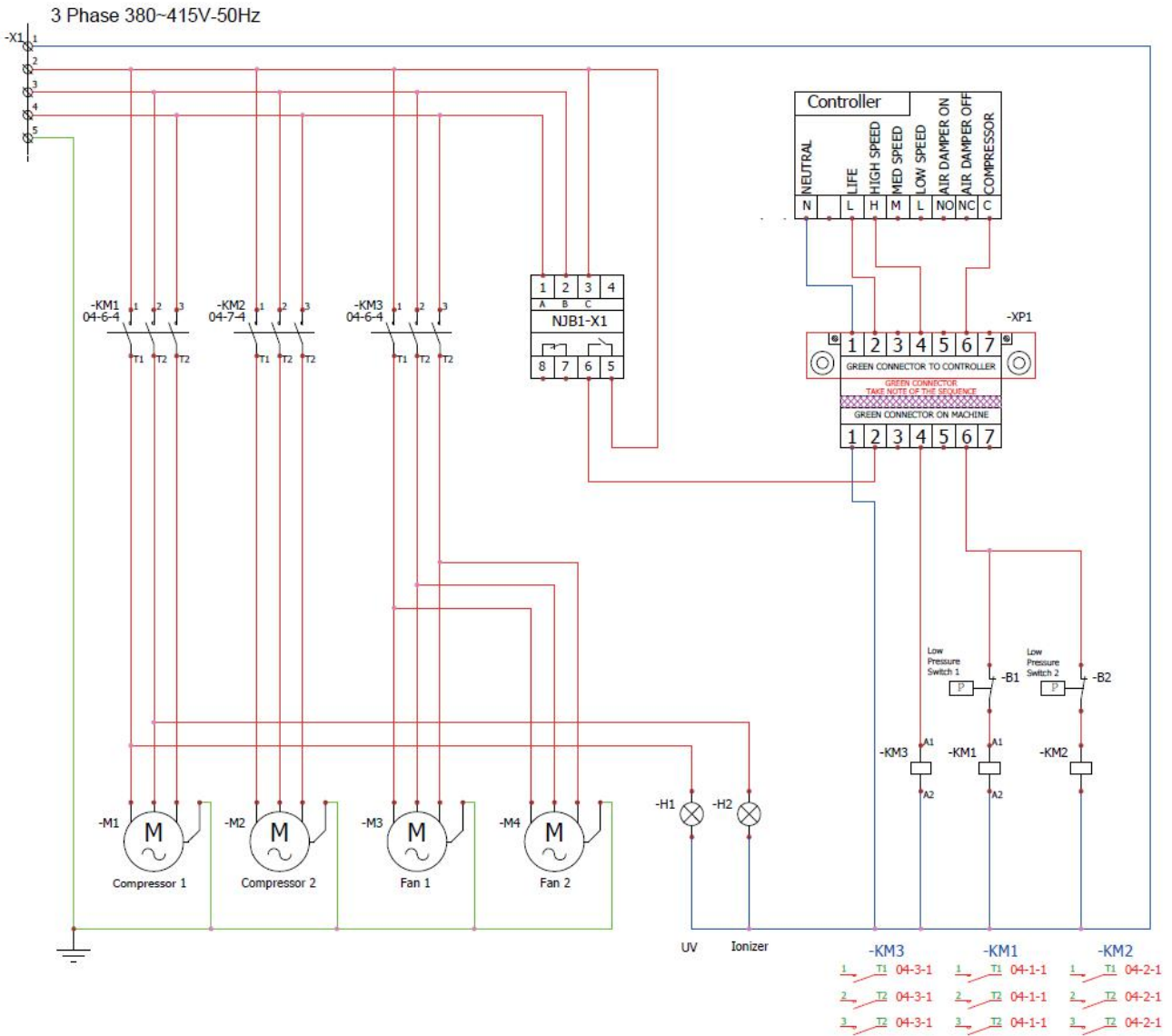
- It is forbidden to connect the power supply beyond the specified voltage and frequency;
- Before the connecting the power supply, the electrical point should be checked to ensure that its voltage and frequency fluctuation does not go beyond $\pm 10\%$;
- Unit must be grounded and turn off power during checking work.

3.12 Sensitive elements connection

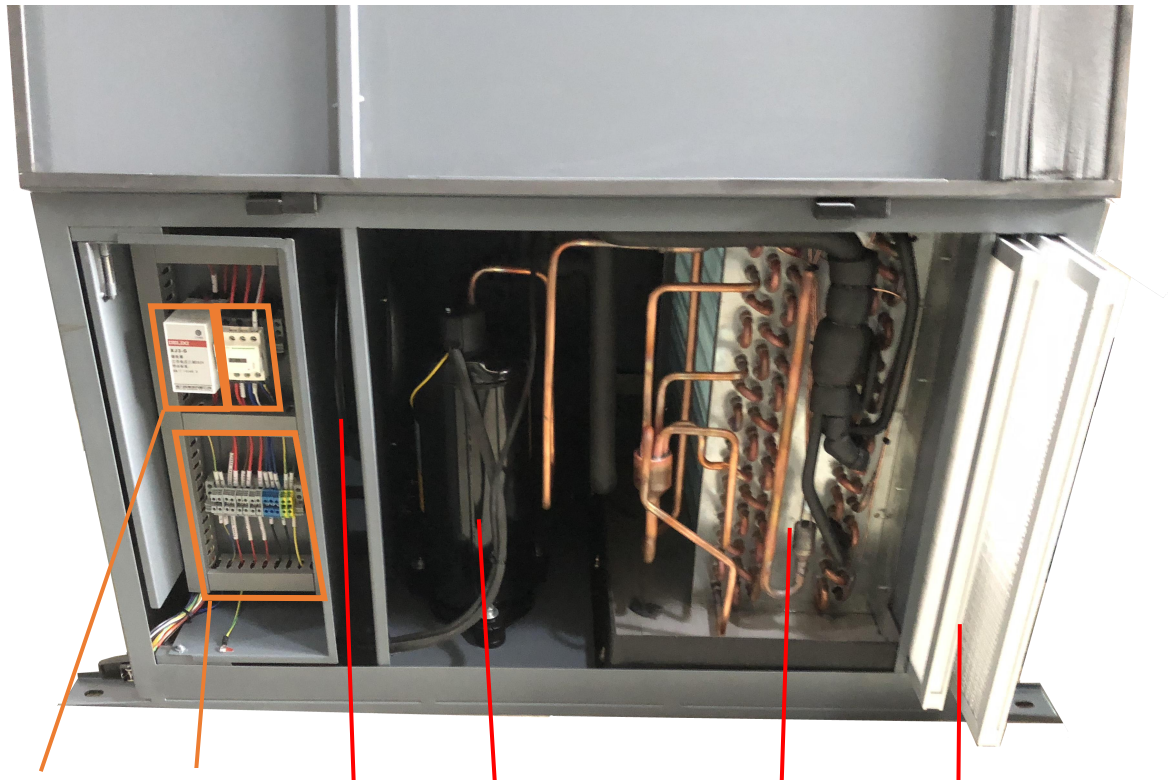
The installation of temperature and humidity detection devices should follow the requirements as below:

- Temperature and humidity detection devices should be installed above ground 1m - 1.5m, to ensure the device can detect the humidity of the dehumidifying area;
- Detection device should be installed away from dry air or wet air or airflow from outside;
- Temperature and humidity detectors should stay away from cooling equipment,
- do not directly exposed to sunshine place, as the change of the temperature will affect the actual assessment;
- External control system must be compatible with the low voltage control circuit of dehumidification equipment.

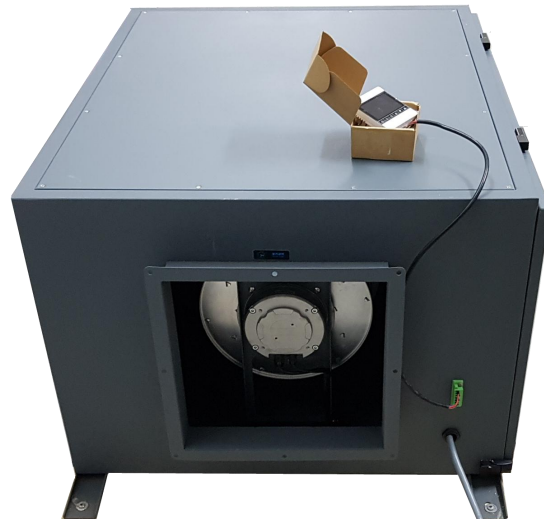
3.13 Electric Diagram



3.14 Machine Picture Diagram



- 3 Phase Protector & Contactor
- Wiring Terminal
- EC Fan
- Compressor
- Heat Exchanger
- Filters



Supply Air Outlet
FD-S Series
FD-X Series



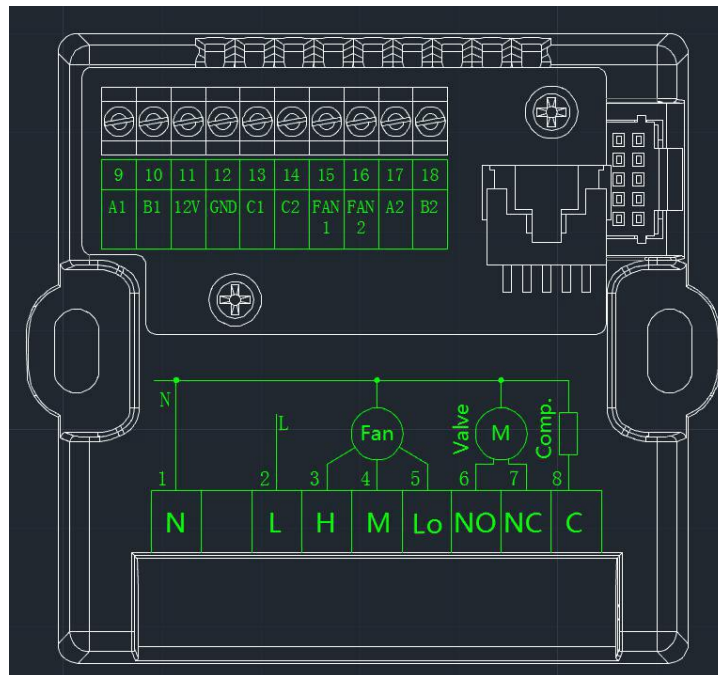
Return Air Inlet -
FD-S Series



Fresh Air Damper and
Return Air Inlet -
For FD-X Series

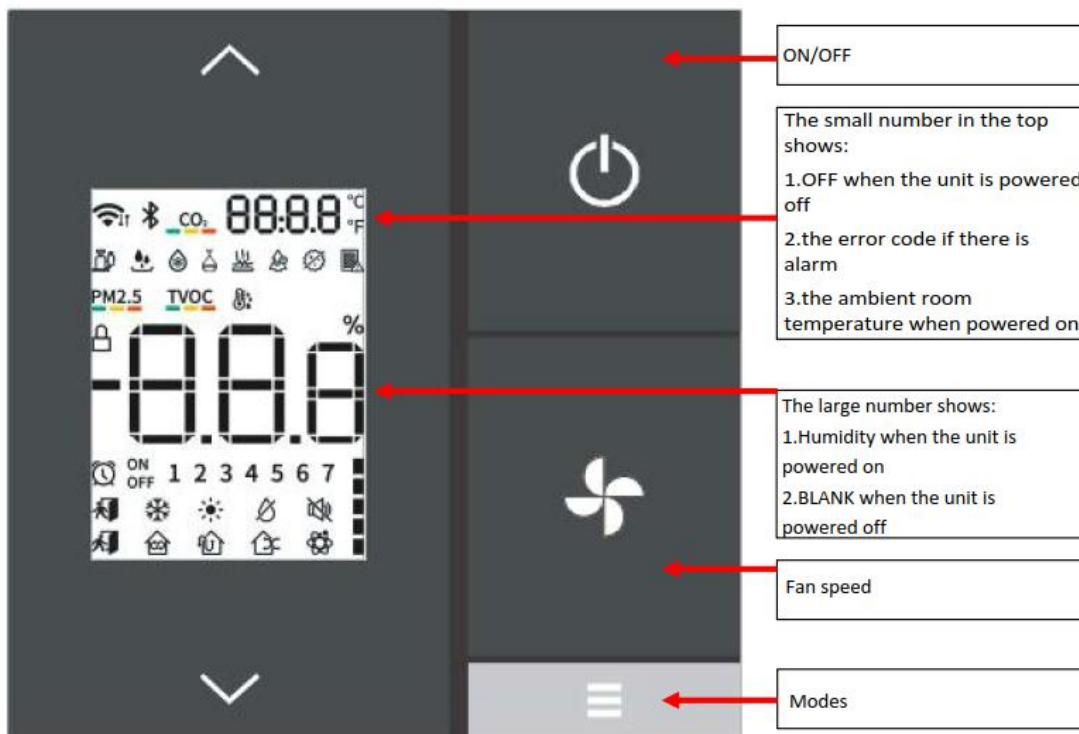
4 OPERATIONS

4.1 Controller Terminals:



Terminal	Description	Load
L, N	230VAC	Power supply
Relay 1 - H	230VAC output, Max.1A	High fan speed
Relay 2 - M	230VAC output, Max.1A	Medium fan speed; Fan coil valve
Relay 3 - Lo	230VAC output, Max.1A	Low fan speed; Humidifier
Relay 4 - C	230VAC output, Max.1A	Compressor
Relay 5 - NO	230VAC output, Max.1A, SPDT(single-pole double-throw)	Air damper open
Relay 5 - NC	230VAC output, Max.1A, SPDT(single-pole double-throw)	Air damper close
EC FAN1	0~10V	DC motor supply fan
EC FAN2	0~10V	DC motor exhaust fan
GND	Low current common terminal	
RS485 - A1	Communicate with external temp.& humidity sensor	
RS485 - B1	Communicate with external temp.& humidity sensor	
RS485 - A2	Communicate with third-party	
RS485 - B2	Communicate with third-party	
12VDC	Power the external temp.& humidity sensor	

4.2 Controller Interface:



4.3 Parameters Setting

A. General parameters

ON/OFF:

*Short press to turn on/off the controller: the small OFF appear in the top when the unit is powered off and disappear after 3 minutes.

*Short press to exit during parameters setting.

Fan Speed:

Press to adjust the fan speed.

Air Damper:

Press to open or close the air damper.

Mode Change:

Short press & to change the available system working mode.

Humidity Set:


Press  to reduce humidity, press  to raise humidity (1% change on each press).

Temperature Set:

Only for the available system working mode.


Filter:



Long press  &  for 5 seconds to display the run time, wait for 5 seconds to exit.

Long press  for 10 seconds to clear the alarm and reset the time.



B. Factory Parameters


Factory parameters setting:


Long press  for 5 seconds to enter the factory parameters setting mode: the parameters code R, P, O, H, C, A, D, F will appear;




Press  or  to select the parameters code R, P, O, H, C, A, D, F;

Short press  to set the code;

Press  or  to adjust the code value;

Short press  to save the code value;

Short press  to exit without saving during the code value setting or return to the previous page;

Long press  &  &  for 3 seconds to reboot the controller's settings;

10 seconds without any changes in setting, the value will not be saved and exit to the home screen.

4.4 Symbols Description:

Symbol	Description
	WIFI connection established
	WIFI connection not established
	ESP32 trigger
	Defrost
	Filter max. working time alarm
	Compressor relay output active
	*Compressor working *Flashing when the minimum humidity protection is activated
	Humidification
	Timer
°F	H05=1, temperature in degrees Fahrenheit
°C	H05=0, temperature in degrees Celsius
60%	Current humidity
■■■■■	Current air speed, AC 3 speeds, DC 1~5 speed.
	100% return air
	100% fresh air
	Mixed fresh and return air
	Dehumidification mode
	Cooling mode
	Heating mode

4.5 Mode / Function

4.5.1 Dehumidification Working Mode:

Working mode	H04=0
Function	Dehumidification
Relay 1	High fan speed
Relay 2	Medium fan speed
Relay 3	Low fan speed
Relay 4	Compressor
Relay 5	Air damper open

4.5.2 Description

If the humidity of the air is higher than the setting, the fan turns on; 5 seconds later, the compressor turns on.

If the humidity of the air is lower than the setting, the compressor turns off; 3 minutes later, the fan turns off.

4.5.3 Initial Value

Initial Value

The controller has data memory function when there is power failure.

The initial value as below:

- *Fan speed: High
- *Air damper: close
- *Mode: the same before the power failure

4.5.4 Fan Control

- I. The initial value is high speed, can be adjusted manually.
- II. DC motor (0~10V) fan has 5 fan speeds, which can be set separately.
- III. AC motor fan speed can be adjusted manually when H04=0:
 - a. F01 = 1, High fan speed available
 - b. F01 = 2, High fan speed & low fan speed available
 - c. F01 = 3, High fan speed & medium fan speed & low fan speed available
- IV. High fan speed & low fan speed available when H04=1.
- V. High fan speed available when H04=2.

Fan works according to F02 when achieve the set humidity and temperature (only for the available system working mode):

- F02 = 1, The fan turns off 3 minutes later after achieved the set humidity and temperature (only for the available system working mode)

F02 = 2, The fan keeps working after achieved the set humidity and temperature
(only for the available system working mode)

4.5.5 Air Damper Control

Air damper works according to H01, R03 when the unit is turned on manually.

- I. Open or close air damper manually when H01=0:
 - a. Air damper close: 100% return air
 - b. Air damper open: mixed fresh and return air
- II. Open or close air damper automatically when H01=1:
 - a. Indoor humidity \geq R03: air damper close; Indoor humidity \leq R03~R04: air damper open.
 - b. Can switch to manual mode from automatic mode and works manually for 30 minutes and continue to work automatically.
 - c. Air damper close when the unit is powered off manually.

4.5.6 Defrost Control

4.9.1 Defrost conditions: Indoor temperature \leq D3

4.9.2 Defrost mode: compressor cycle off & fan runs at high speed

4.9.3 Defrost stop conditions:

- a. Defrost time \geq D2.
- b. Unit is turned off manually.
- c. Unit is turned off faulty.

4.5.7 Alarm

- a. Filter Alarm
- b. Built-in temp. & humidity sensor error
- c. RS485-1 Communication Error

4.6 Parameters Code / Function

Parameters	Code	Default	Precision	Range
Humidity set (dehumidify)	R01	50%	1%	1%~99%
Air damper automatic close/open value	R03	50%	1%	1%~99%
Air damper humidity differential	R04	3%	1%	1%~10%
Indoor temp. set	R05	25(77°F)	0.5(1°F)	5~35°C(41~95°F)
Humidity set (humidify)	R06	70%	1%	1%~99%
Humidity differential (humidify)	R07	3%	1%	1%~10%
Air damper automatic close/open	H01	1	/	0 - no in use 1 - in use
Filter alarm	H02	200	1	0 - no alarm 100 - 990,1=10 hours
Defrost interval	D01	40 minutes	1 minute	30~60 minutes
Defrost stop	D02	10 minutes	1 minute	1~15 minutes
Defrost start	D03	17(62°F)	1(2°F)	1~20°C(34~68°F)
AC fan speed set	F01	1	/	1 - low speed 2 - medium speed(DC motor fan:1,2 - low;3,4,5 - high) 3 - high speed(DC motor fan:1,2 - low;3,4 - medium;5 - high)
Fan set under achieved humidity	F02	1	/	1 - turns off 3 minutes later after achieved the set humidity 2 - keeps working after achieved the set humidity
FAN1, DC fan motor, speed 1 voltage	F03	500(5V)	10(0.1V)	400~950
FAN1, DC fan motor, speed 2 voltage	F04	600(6V)	10(0.1V)	F03~950
FAN1, DC fan motor, speed 3 voltage	F05	700(7V)	10(0.1V)	F04~950
FAN1, DC fan motor, speed 4 voltage	F06	800(8V)	10(0.1V)	F05~950
FAN1, DC fan motor, speed 5 voltage	F07	900(9V)	10(0.1V)	F06~950
FAN2, DC fan motor, speed 1 voltage	F08	400(4V)	10(0.1V)	400~950
FAN2, DC fan motor, speed 2 voltage	F09	500(5V)	10(0.1V)	F08~950
FAN2, DC fan motor, speed 3 voltage	F10	600(6V)	10(0.1V)	F09~950
FAN2, DC fan motor, speed 4 voltage	F11	700(7V)	10(0.1V)	F10~950
FAN2, DC fan motor, speed 5 voltage	F12	800(8V)	10(0.1V)	F11~950
RS485-2 Baud rate	P01	0		0-4800 1-9600

RS485-2 Address	P02	1		1~255
RS485-2 Protocol	P03	0		General open protocol
RS485-2 Communication status	007			0 - abnormal 1 - normal
Software version	009			
Dew point	010			
Absolute humidity	011			

4.7 Working Status Display

Type	Range	Precision
Indoor temperature	-30~99°C, -22~210°F	0.1°C, 1°F
Indoor humidity	0~100%	0.10%
Absolute humidity	0.0~99.9	0.1g/kg
Fan's running time	0~999	10 ours

4.8 Error Code

Error	Code
Built-in temp. & humidity sensor failure	E01
External temp. & humidity sensor failure	E02
RS485-1 communication failure	E03

4.9 Error Code Address

Address	Function Code	Object	Byte	Read Only or Read/Write	Data
0x1001	03/16/16	ON/OFF	2 bytes	Read/Write	0 - OFF 1 - ON
0x1002	03/16/16	fan speed	2 bytes	Read/Write	1 - 1st fan speed 2 - 2nd fan speed 3 - 3rd fan speed 4 - 4th fan speed 5 - 5th fan speed
0x1003	03/16/16	air damper close/open	2 bytes	Read/Write	0 - close 1 - open
0x1004	03/16/16	humidity set	2 bytes	Read/Write	1~99%
0x1006	03/16/16	air damper automatic humidity set	2 bytes	Read/Write	1~99%
0x1008	03/16/16	air damper automatic close/open	2 bytes	Read/Write	0 - not in use 1 - in use
0x101B	03/16/16	temperature set	2 bytes	Read/Write	5~35°C

0x101C	03/16/16	working modes	2 bytes	Read/Write	0 - dehumidification 1 – cooling + dehumidification 2 – heating + dehumidification 3 – cooling + humidification 4 – heating + humidification 5 - humidification
0x101D	03/16/16	humidification set	2 bytes	Read/Write	1~99
0x2001	03	indoor temperature sensor	2 bytes	Read Only	
0x2002	03	indoor humidity sensor	2 bytes	Read Only	
0x2003	03	external temperature sensor	2 bytes	Read Only	
0x2004	03	external humidity sensor	2 bytes	Read Only	
0x2005	03	fan running time	2 bytes	Read Only	1=10 hours
0x2006	03	failure	2 bytes	Read Only	bit0: built sensor failure bit1: external sensor failure bit2: filter alarm bit3: minimum absolute humidity protection bit4: in defrost
0x2007	03	dew point	2 bytes	Read Only	
0x2008	03	absolute humidity	2 bytes	Read Only	

4.10 Safety Cautions

Dehumidifier has high-speed moving parts. Before running, make sure panel is closed correctly and no debris present at the exterior. Do not use force to open the machine during operation otherwise, it will cause serious consequences to dehumidifier.

- A. Temperature and humidity sensors are sensitive components, do not touch the components;
- B. All wires are distinguished by colors, please let professionals do the wiring work;
- C. Temperature and humidity control should be placed in clean environment. Acetone, chlorine or high concentrations smoke and will cause damage;
- D. Humidistat is sensitive to ambient humidity. Do not place in dusty area.
- E. If some problem happened to the dehumidifier, it would stop. Please check the machine first before turning on again.
- F. Don't move dehumidifier or unplug until the fan stops;

5 MAINTENANCES

5.1 Maintenance introduction

The dehumidifier system can run for a long time and requires very little maintenance. The maintenance of the dehumidifier is beneficial to the long-term operation of the unit. The frequency of maintenance depends on the operating conditions of the unit, and the quality of the installation environment. The maintenance cycle of the dehumidifier should be determined according to the environment and installation location of the equipment. Therefore, the recommended maintenance interval can be determined according to the actual installation situation. Improper maintenance may reduce the performance of the equipment.

5.2 Filter

The unit is equipped with an independent filtering device to handle fresh air. The filtering devices are installed at the inlet of the equipment, so that the air entering the equipment can be cleaned and filtered. The interval between cleaning or replacing the filter unit should be based on the amount of dust and particles contained in the air at the installation site. Never operate the equipment without a filter. In this case, dust impurities may reduce the dehumidification performance of the equipment, and at the same time may cause the compressor to start frequently under unnecessary defrost control. It is recommended that the filter device is checked at least once a month. The unit is equipped with two standard filters: G4 + F7, which need to be checked every three months. Filters that are not cleaned / replaced in time may affect the unit's dehumidification capacity and effect.

5.3 Fan Motor

The motor is equipped with bearings. The bearing has the same service life as the motor, so no additional maintenance is required. Check the motor once a year to ensure that it is in proper condition. However bearings will wear off over time, please take note and check the fan running condition once a year.

5.4 Machine cleaning and maintenance

Warning!

- Only clean the unit after turning it off and disconnecting the power, otherwise electric shock or injury may occur.
- Make sure that the unit is not washed with water under any circumstances, otherwise electric shock may occur.
- Pay special attention when cleaning the unit and use a stable ladder.
- Volatile liquids such as thinner or gasoline will damage the unit's components (only use a soft dry cloth and a damp cloth moistened with neutral detergent to clean the outside filter of the unit) .
- If there is any abnormality, please contact the after-sales service personnel for guidance.

5.4.1 Maintenance during start of usage season

- Check the air inlets and outlets of indoor and outdoor units for blockages.
- Check that the ground wire is intact.
- Check whether the line connection is intact.
- Check whether text appears on the remote controller's display after the power is turned on.
- Check whether the outdoor unit mounting bracket is damaged. If it is damaged, please contact the authorized repair center. If the outdoor unit is rusty, paint should be applied to the rusty area to prevent its enlargement while ensuring personal safety.

5.4.2 Maintenance during end of usage season

- When the weather is fine, the air supply is run for half a day to dry the inside of the machine.
- If the unit will not be used for a long time, please turn off the power to save energy; the text on the remote controller display will disappear after the power is turned off.
- Check whether the outdoor unit mounting bracket is damaged. If it is damaged, please contact the authorized repair center. If the outdoor unit is rusted, paint should be applied to the rusted area to prevent its enlargement while ensuring personal safety.
- Special protective cover can be used to wrap the external machine to prevent rainwater, dust, etc. from entering the external machine and corroding the unit.

5.4.3 Maintenance of key components

- Open the equipment door directly below the unit to replace and maintain different components inside the unit.
- Unscrew the fixing piece, remove the filter assembly (fresh air) and filter assembly (exhaust air), rinse them with water, dry them, and put them back in place.
- According to the replacement parts, it is recommended to replace the primary filter and the intermediate filter every 6-8 months, and replace the high efficiency filter every 12 months.
- It is recommended to replace the heat exchange core every 24 months, which can be replaced by rotating the fixing piece.
- It is recommended to replace the humidifying membrane every 24 months. When replacing the humidifying membrane, first remove the screws fixing the two brackets of the water tray, remove the brackets, and then flip the water tray to expose the humidifying film for replacement.

5.4.4 Maintenance procedures

The table lists the routine inspection and maintenance procedures for the unit's general components, which may not include the equipment-related external components. If necessary, refer to other relevant information provided by the equipment manufacturer.

Component	3 months	6 months	9 months
G4 primary filter	Clean primary filtration	It is recommended to replace the G4 filter	Replace G4 primary filter
F7 Secondary filter	Clean F7 secondary filter	Clean F7 secondary filter	Replace F7 secondary filter
Compressor	Check whether the compressor works normally and whether the vibration is normal.	Check if the compressor wiring is loose	Check the compressor wiring and make sure the wiring is not loose, and there are no signs of damage or overheating.
Heat Exchanger	Remove debris and dust trapped on the bilge and surface of the coil	Clean the dirt on both surfaces	Check the coil for grease.
Controller	Check whether the functions of the controller are normal	Determine if the wiring on the back of the controller is loose	Check if the controller logic is accurate
Main Control Board	Check whether each function is normal	Check wiring and make sure it is not loose	Check wiring for water stains and keep dry
Defrost valve	Check wiring and make sure it is not loose	Check if the defrost valve is working properly	Check for signs of overheating and clogging. Check if the coil is normal.
Insulation / Seal	Check for signs of injury and displacement. Replace if worn or damaged.	Check for air leakage, if any, please add a seal.	Check for signs of damage and displacement. Replace if worn or damaged.
Fan / Fan Motor	Check wiring and make sure it is not loose	Check if there is wind coming from the end of the air supply. If not, please turn off the unit.	Check whether the wind speed at the end of the supply air is normal and perform calibration.

5.5 Inspection and maintenance procedures

1. Outer inspection at least once a month

Ensure that the exhaust and fresh air enclosures are not blocked or blocked by leaves, grass or snow. During winter, it is particularly important not to allow snow to block the tube cover or filter frost (anti-bird net).

Warning: Outer blockage could induced imbalance.

2. Clean air filter

- Open the access door, allowing the core to slide out, move the filter, and wash with clean water or mild soapy water. Do not wash in the dishwasher.

Place each filter returns to its original position and slide the core back to the original position.

To ensure safe relocation of machines, please note the following items.

When installing or moving the machine, do not mix anything other than the specific refrigerant in the refrigerant circuit. Please vacuum all the air inside the tube. If air or other substances are mixed in, the system pressure will rise and the compressor will burst.

Do not inject refrigerant that is inconsistent or unqualified when installing or moving the machine. If the refrigerant is inconsistent or unqualified, it may cause problems such as poor operation, malfunction, mechanical failure, and even major safety accidents.

When relocating or repairing the refrigerant, first perform the cooling operation, and then completely close the high-pressure side valve (liquid valve). After about 30-40 seconds, completely close the low-pressure side valve (air valve), immediately stop operation and cut off the power. Note that the maximum time to close the valve should not exceed 1 minute.

If the time to close the valve is too long, air may be mixed in and the system pressure may increase, resulting in a compressor burst accident and injury.

When recovering the refrigerant, you must ensure that the liquid and gas valves are completely closed, and the power is turned off before removing the connection pipe.

If the compressor is still running without disconnecting the power supply, and the connecting pipe is removed when the shut-off valve is opened, air will mix in, causing the system pressure to rise and a compressor burst accident will cause injury.

When installing the machine, it must be ensured that the connecting pipe is securely connected before starting the compressor. If the compressor is started before the connection of the connecting pipe is completed and the shut-off valve is opened, air will mix in causing the system pressure to rise, and a compressor burst accident may cause injury.

Do not install in places where corrosive or flammable gases may leak. If a gas leak occurs and gathers around the unit, it may cause an explosion accident.

Do not connect in the middle of the wire. When the connecting wire is not long enough, please contact your local authorized service center to re-equip a special wire with sufficient length. Poor connection may cause electric shock or fire.

The power cords between the indoor and outdoor units must be properly connected using the specified power cords, and the terminals should not be directly affected by external forces and should be fixed with wire clamps.

Insufficient capacity of the power cord, incorrect wiring, or poor contact with the terminals may cause electric shock or fire hazard.

6. Troubleshooting

In the following cases, please contact your local LUKO's representative.

Harsh sound during operation.
 Air switches or leakage protection switches are often turned off.
 Accidentally poured impurities or water into the machine or controller.
 Pungent smell during operation.
 The power cord and plug are abnormally hot.

Stop operation and unplug the power plug.

The purpose of this section is to help operators analyse the cause of the fault and master the method of troubleshooting. The humidity level can be controlled according to the requirements, convenient for automatic control. In order to facilitate faulty analysis, please refer to the circuit diagram and related materials provided.

- There is a high voltage inside the unit. Before taking any troubleshooting measures, make sure that the unit's power is turned off.
- There is a high temperature area (compressor) inside the unit. Allow the unit to cool before performing maintenance work.
- The adjustment, maintenance and repair of the machine should be performed by qualified technicians, and the relevant personnel should be aware of the high temperature and high pressure inside the unit.

When servicing and maintaining the high-pressure refrigeration system and high-voltage circuits, the human body may be exposed to health hazards, which may cause death, serious personal injury, and / or property damage. Repair and maintenance services can only be performed by professional maintenance technicians.

Failure symptoms	Troubleshooting steps recommended
<p>No dehumidification. Machine is not in operation. The fan and compressor are not running, and the controller is not power on.</p>	<ol style="list-style-type: none"> 1. The device is not plugged in, or there is no power supply to the power outlet 2. The controller is damaged or faulty 3. Internal or control wiring is not well connected 4. 3 Phase Protector is faulty or incoming 3 phase sequence is incorrect. 5. Voltage failure. 6. Low Pressure Switch Activated. Possible of Gas leakages. Please check the gas pressure with a refrigerant gauge manifold. If the gas pressure is low, please check the welded point on the Heat Exchanger and the copper tube to find the leakage point.
<p>No dehumidification. When the initial dehumidification ventilation control is turned off, the compressor is not running but the fan is running.</p>	<ol style="list-style-type: none"> 1. Controller No.10 pin no power output (please refer 3.15 Machine Picture diagram) 2. The compressor electric circuit is damaged 3. Poor connection in compressor circuit 4. Possibility of capacitor faulty 5. Possibility of compressor is overloaded 6. Possibility of compressor is damaged
<p>The fan does not rotate when the ventilation function is activated. With the humidity control device turned on, the compressor runs for a short time, and then frequently starts and stops, and eventually the compressor does not run.</p>	<ol style="list-style-type: none"> 1. There are obstacles preventing the fan from rotating. 2. Check the Controller Pin No.2 whether there is any DC Voltage output of 0 – 10V. 3. Check if the Controller Pin No. 1 (com/gnd) is properly connected. 4. If after checking the controller there is no DC output, please replace with a new controller. 5. The fan bearing wear off, causing the fan doesn't rotate. 6. The fan does not run leading to voltage protection 7. Possibility of fan faulty
<p>Evaporator coils continue to frost and have low dehumidification capacity.</p>	<ol style="list-style-type: none"> 1. Refrigerant shortage, possible of leakages. 2. The air filter (s) is too dirty causing insufficient of airflow. Or duct connection is not properly done, causing insufficient of airflow passing through the dehumidifier. 3. Filter Drier is blocked, require to replace

<p>The device is able to drain some water but does not reach the expected performance.</p>	<ol style="list-style-type: none"> 1. Air temperature and / or humidity drops 2. Humidity Level on the controller require calibration 3. The device has entered the defrost cycle working state 4. Air filter is too dirty or clogged. 5. Low refrigerant charge, cause by possible leakages 6. Air leaks, such as loose caps or leaking at supply / return air ducting. 7. The compressor is damaged 8. The air duct is not installed properly, and the air volume is insufficient
<p>After installation, commissioning and shutdown after a period of time, water overflows from the machine.</p>	<ol style="list-style-type: none"> 1. The machine is not equipped with proper drainage, the water cannot be removed 2. The drainage is not connected properly, or the piping is illogical, and the water cannot be drained out 3. Some of the drainage pipes are at higher level than the machine drainage hole 4. Leak in the drain pan
<p>Fresh air damper not working</p>	<ol style="list-style-type: none"> 1. Connection to damper not properly connected. 2. Loose connection in ventilation control circuit 3. Loose connection in damper power circuit. 4. Defective fresh air damper.

7 APPENDIX

7.1 Warranty Information

Thank you for choosing our product and services.

PRODUCT MODEL: FD-S and FD-X Series

PRODUCT NAME: DUCTED DEHUMIDIFIER, DUCTED DEHUMIDIFIER WITH FRESH AIR

Warranty Period

We warranty the equipment installed and operated under normal conditions against manufacturing defects for a period of 18 months from date of delivery.

General conditions

- a) The equipment should be operated with proper usage and regular maintenance, as evident with the service records of the authorized personnel.
- b) This unit must not be serviced by any personnel NOT authorized by Fortesvo Sdn. Bhd..
- c) This warranty covers manufacturing defects and does NOT cover parts subjected to conditions of use outside of specifications in operation manual and those exposed to normal wear and tear.
- d) We reserve the right to replace or repair, at our discretion, any defective parts and if the original parts make is not available for whatever reasons, we shall replace with equivalent makes.
- e) This warranty does not constitute a guarantee in all interpretation.
- f) This warranty do NOT cover all labor, freight, downtime, incidental and consequential damages including property and personal injury damages, related to the failure of the product to function properly under the conditions set forth above.

Validity

The warranty shall be null and void should any of the above conditions are not met.