DanVex AD-10000

Adsorption air dehumidifier

» Operation manual

CONTENT

Safety instructions

AD series dehumidifiers meet all the requirements stated in European safety regulations and standards.

All persons admitted to operate or maintain the DanVex AD-10000 dehumidifiers should read these instructions manual and to be briefed for its safe operation.

Only the personnel with sufficient knowledge of the dehumidifiers operation principle is permitted to perform the adsorption dehumidifiers operation and maintenance.

Only authorized personnel with special education is permitted to perform maintenance and repair works on electrical system.

Only authorized service center personnel is permitted to perform repair works on electrical components.

It is prohibited to install or operate the units in the locations subject to explosion hazard..

Before opening any panels of the unit body it is required to disconnect the dehumidifier from the mains.

Before starting any maintenance works the dehumidifier should be out-of-operation for 15 minutes.

The unit's panels must be always closed except when the dehumidifier is being maintained.

The dehumidifier can be used for air drying at atmospheric pressure only.

Never use the dehumidifier without filters since the drying rotor can get contaminated which will cause loss of efficiency.

This manual should always be at hand and not far from the dehumidifier.

The dehumidifier maintenance and inspection works should be performed in accordance with a fixed schedule.

Only original spare parts should be used.

It is required to receive a written approval from «DanVex Oy» or from its local representative for any changes or modifications of the dehumidifier.

Introduction

This specification is a technical document that certifies the DanVex AD-10000 dehumidifier parameters and characteristics.

Purpose

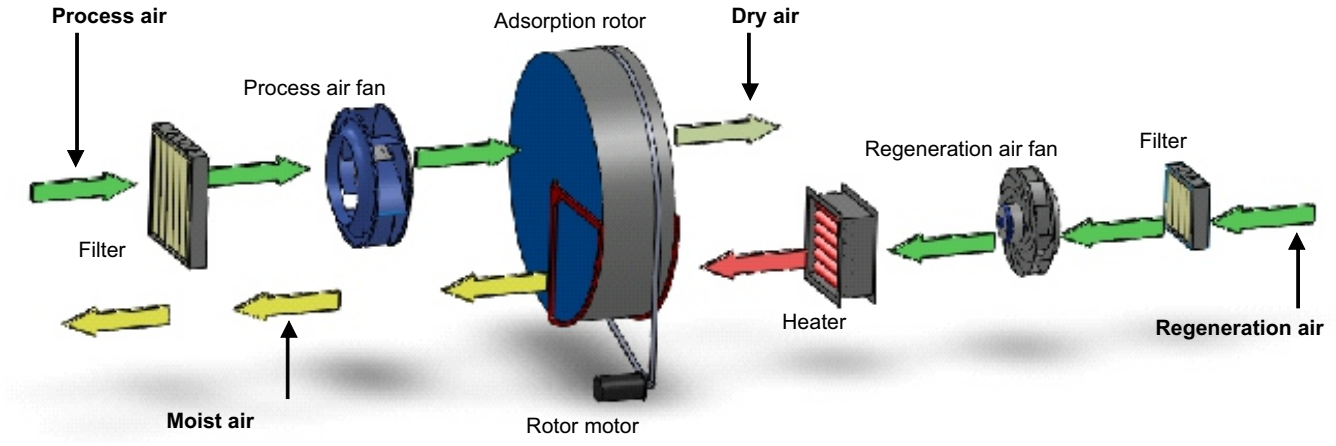
DanVex AD-10000 (in short AD-10000) is designed for efficient air dehumidification with the air humidity up to 100%, at the temperature from –20ºC to +40ºC with minimum energy consumption. It can be used either as an independent unit for installation inside and outside of premises where air humidity control is required or along with an air treatment system.

Operation principal

The main dehumidifier part is a rotor having a cellular structure made from fibrous ceramic material and SelicaGel. The rotor is divided into two zones by a sealing device: one for dehumidification, another for regeneration.

Thus, the dehumidifier works with two air flows. The volume of the dehumidified air is bigger. The air flow of a smaller volume is used for moisture removal from the dehumidifier rotor. The rotor is subject to the action of different oppositely directed air flows by sectors. The air flow to be dehumidified (PROCESS AIR) passes through the biggest sector. The moisture from the air is trapped (adsorbed) by the rotor material. The air leaves the rotor in dehumidified condition (DRY AIR) and is directed to a certain part of the building or a technological process where dehumidified air or a certain air humidity levels are required. Since the rotor rotates slowly the incoming air always contacts with the rotor active part, thus a continuous dehumidification process is assured.

The air flow used for the rotor regeneration is called regeneration air (REGENERATION AIR). It is heated up to 140°C and when passing through a small sector it removes the moisture trapped by the rotor material. The moisture is removed from the rotor in the form of humid air (MOIST AIR) which is discharged outside the dehumidified loop



- The air to be dehumidified passes through the rotor. Water molecules are absorbed by the rotor.
- The rotor is reactivated by another air flow preheated to 140°C. The moisture is removed from the room in the form of moist air.

Pic.1. Dehumidifier air flows diagram

Design
The dehumidifier answers IP 44 protection class according to IEC.

Body
The dehumidifier body is made of stainless zinc-plated steel. It is thermally insulated which allows the dehumidifier to be used in low-temperature premises and prevents condensate formation inside the dehumidifier.
The body has a frame structure which allows easy moving of the dehumidifier during transportation and installation.
The dehumidifier is equipped with detachable panels and doors that assure access for maintenance and repair.
The rotor drive belt tension mechanism and a sealing system assures the dehumidification reliable and efficient operation.

Rotor
The dehumidifier is equipped with a drying rotor manufactured in accordance with unique technologies covered by a patent in force. The rotor represents a matrix consisting of numerous air channels. It is made of composite material with introduced active SelicaGel and assures a very large contact area with air flow for moisture adsorption in the small volume of the rotor. This material is highly efficient for water molecules attraction and retention, it is noncombustible and explosion-proof, with a long service life. The rotor manufacturing technology assures production of a product capable of saturated air processing without risk of destruction, it means that the rotor can be used along with a precooler. Besides, the rotor will not be damaged even if the fan or the reactivation air heater fail to function.

Filters
The dehumidifier is equipped with two filters. One filter is located at the dehumidified air inlet, the another one is installed at the reactivation air inlet.

Air flow fans: for dehumidified air flow and for reactivation air flow
The fans are of a radial type, single phase, IP 54 class, ISO F. The fans maintenance can be performed after the service panels are removed.

Electric panel
Electrical components are located inside the dehumidifier and can be reached through detachable or opening panels. Switches and indicators are located in the front part of the dehumidifier.

Reactivation air heater
The reactivation air heater consists of a heating element.

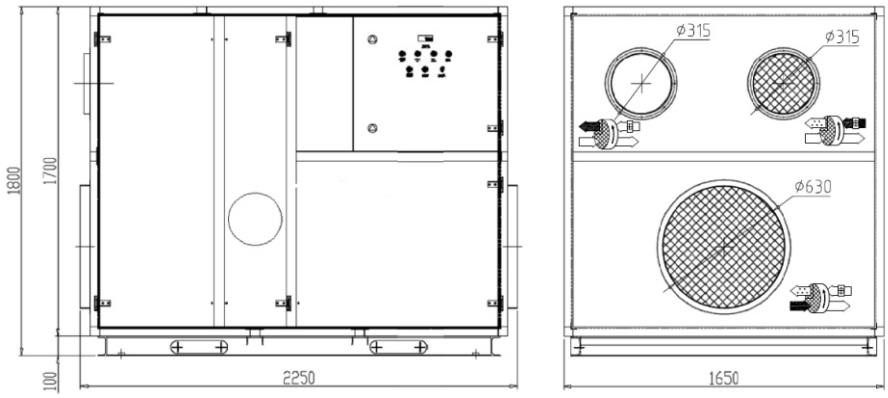
Control panel
DanVex AD-10000 dehumidifier is equipped with an automatic control system. All commands are input using the buttons located on the control panel with a LCD-display.

Dimensions and weight

Insignificant design changes are possible!

Table 1

Length	Depth	Height	Dehumidified air	Dry air	Reactivation air	Moist air	Weight
2250mm	1650mm	1800mm	ø 630 mm	ø 630 mm	ø 315 mm	ø 315 mm	980 kg



Pic. 2. AD-10000 dehumidifier dimensions

Installation

Installation and the covered area

AD-10000 dehumidifier is designed for indoor installation. It should be positioned upright on an even surface. It is recommended to fix the dehumidifier. It is required to leave some free space (1500 mm) in front and above the dehumidifier for filters, fans and rotor maintenance and inspection.

Channel connections for permanent installation

The dehumidifier can be installed directly in the room to be dehumidified or in a separate ventilation chamber. In case of special versions it can be places outdoors as well. To assure better parameters and efficiency the air outlets should be equipped with diffusers.

Moist air duct

Moist air should be discharged outside the dehumidified loop (to outdoors). The air duct should be as short as possible to minimize the possibility of condensation of the moisture from the moist air. The duct should be slightly inclined downwards to prevent the condensate entering the equipment. In case it is required to install the moist air duct upright it should be insulated and drain holes should be drilled in the lowest part of the elbow bend (2-4 mm).

Regeneration air duct

The regeneration air duct should be as short as possible. A metal net is installed at the duct input to prevent foreign matters entering the dehumidifier. There is no need to insulate the duct. The duct inclination angle is optional.

Dehumidified and dry air ducts at the dehumidifier installation inside the dehumidified loop

As a rule in case the dehumidifier is installed in the dehumidified loop air ducts for the air intake are not required. A dry air duct is connected with the air-ducting system for dry air distribution inside the premises.

Dehumidified and dry air ducts at the dehumidifier installation outside the dehumidified loop

In case the dehumidifier is installed outside the dehumidified loop either a recirculation or an open circuit is used. If a recirculation circuit is used the air to be dehumidified is supplied from the loop via an air duct and the dehumidified dry air is supplied to the dehumidified room the same way. If an open dehumidification circuit is used only dry air is supplied to the room.

Electrical connection

Please see the attached electric diagram

Technical data of AD-10000

Table 2

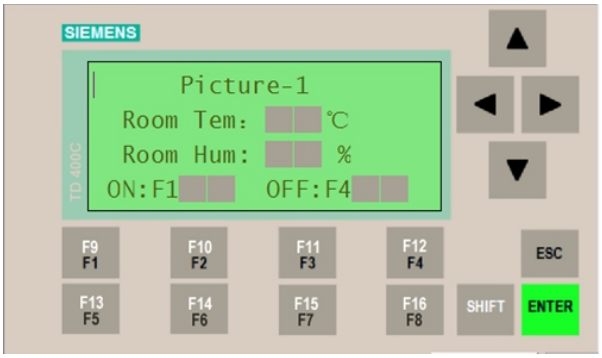
Parameter	Unit	Value
Dehumidified air*		
Rated air consumption	m^3/hour	10000
Pressure	Pa	500
Reactivation air*		
Rated air consumption	m^3/hour	3500
Pressure	Pa	250
Electric power and rated current		
Total power	kW	80
Voltage (3 phase, 50 Hz)	V	380/400
Reactivation air heater		
Heater capacity	kW	70
Heater type	-	Tubular Heating Element
Miscellaneous data		
Maximum sound pressure level	dB(A)	65
Operational temperatures range	°C	–20…+40
Standard filter: dehumidified air	-	EU3
Reactivation air	-	EU3
IEC protection, the whole dehumidifier	-	IP44

* The above mentioned values are nominal based on the air temperature of 20°C and the air density of 1,2kg/m^3

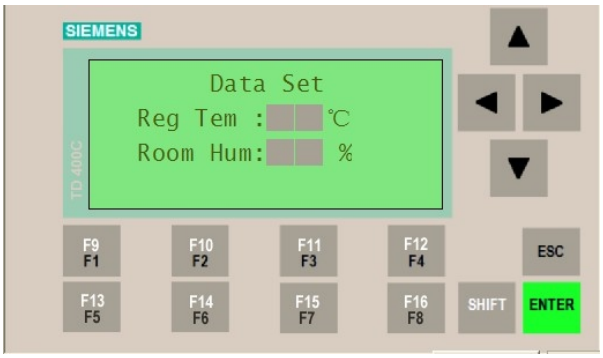
Commissioning

Start up procedures:
1. Make sure the dehumidifier is disconnected from the power supply source and that its main switch is in OFF position.
2. Open the dehumidifier service panels and make sure there are no foreign matters inside the dehumidifier.
3. Make sure all air throttles are opened and that channels are clean and not blocked.
4. Make sure that air filters are installed and clean.
5. Manually turn the fans impellers and make sure they rotate freely.
6. Check the internal fuse.
7. Close the service panels and connect the dehumidifier to 380/400V power supply.
8. Switch on the dehumidifier power supply. The following will be displayed on the control panel LCD:

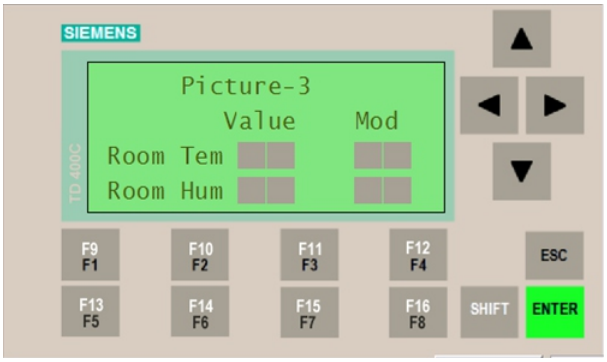
9. Press «F1» to start the dehumidifier. The dehumidifier will start with default settings. Use «F4» button to stop the dehumidifier. It should be noted that after switching off the fans and the rotor continue operation for 5-10 minutes to prevent the overheating protection tripping.



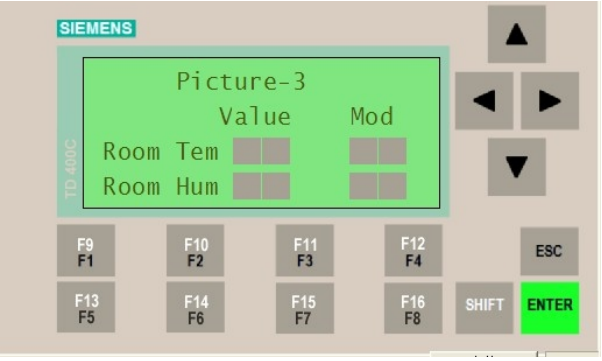
10. Press «ESC» to enter the setting menu «Setting data 1». Enter temperature, relative humidity and regeneration temperature by pressing «▼» or «▲» buttons till the required values are set. Press «ENTER».



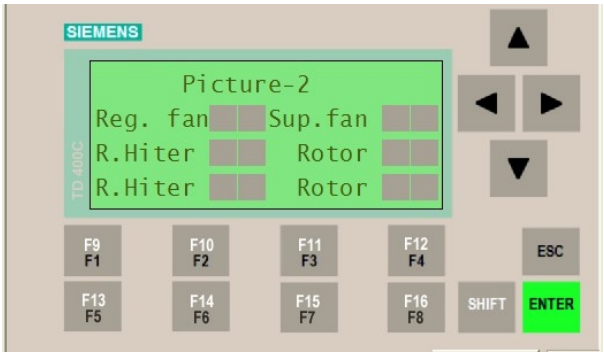
11. Press «▼» or «▲» for navigation, correction of temperature and relative humidity range. Press «ENTER».



12. Press «▼» or «▲» for correction of regeneration air and process air temperature range. Press «ENTER».



13. Press "ESC" to enter the "Working mode 1" menu to get information on the operation conditions of process air fans, regeneration air fan, rotor and heater motor.

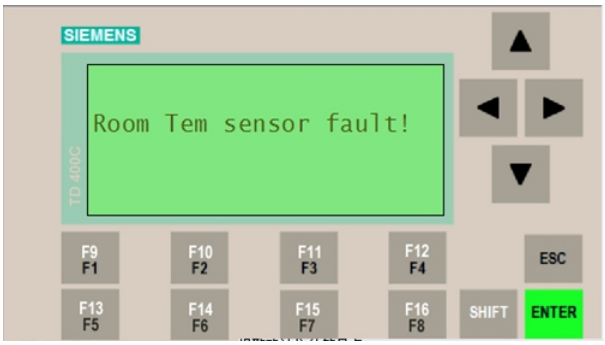


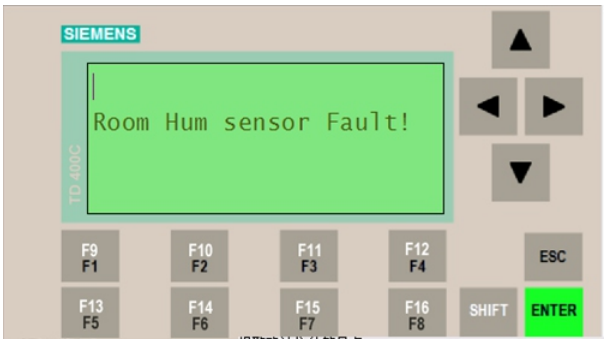
Alarm signals

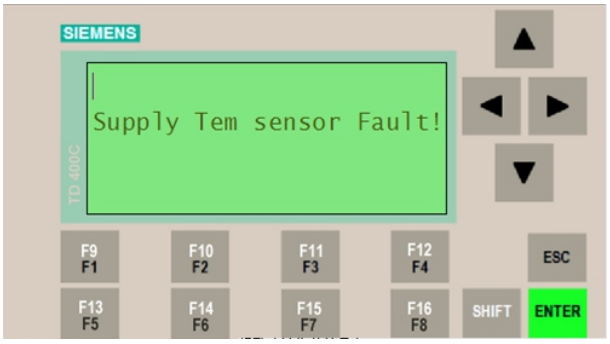
In the dehumidifier there are two types of alarm signals: the first type is used to announce about serious failures, the second type is used to announce about minor problems.
In case of a serious problem a buzzer will sound, the failure cause will be displayed on the screen and the dehumidifier will stop. In case of a minor problem a buzzer will sound and the failure cause will be displayed on the screen.
An acoustic signal is the indication of improper operation. Press «F2» to switch the acoustic signal off. Press «ENTER»

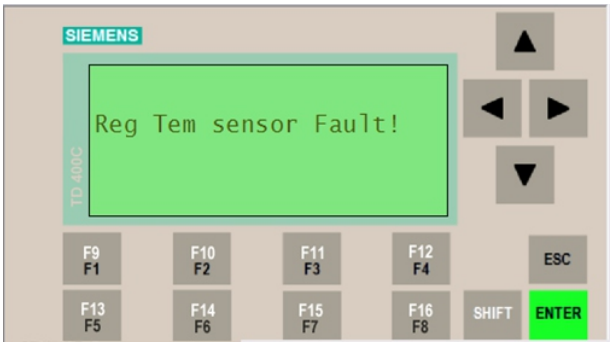

SIEMENS
Reg Fan fault!
TD 400C
F9 F1
F10 F2
F11 F3
F12 F4
ESC
F13 F5
F14 F6
F15 F7
F16 F8
SHIFT
ENTER


SIEMENS
Supply Fan Fault!
TD 400C
F9 F1
F10 F2
F11 F3
F12 F4
ESC
F13 F5
F14 F6
F15 F7
F16 F8
SHIFT
ENTER


SIEMENS
Room Tem sensor fault!
TD 400C
F9 F1
F10 F2
F11 F3
F12 F4
ESC
F13 F5
F14 F6
F15 F7
F16 F8
SHIFT
ENTER


SIEMENS
Room Hum sensor Fault!
TD 400C
F9 F1
F10 F2
F11 F3
F12 F4
ESC
F13 F5
F14 F6
F15 F7
F16 F8
SHIFT
ENTER





Maintenance

The dehumidifier can operate for a long time providing the maintenance schedule is observed. The maintenance schedule depends on its operational environment, air contamination level and installation place. It can be corrected based on the actual conditions.

Improper maintenance and service can cause the reduction of the dehumidification efficiency and the humidifier components failure.

ATTENTION! For the dehumidifier maintenance:

Turn off the dehumidifier 15 minutes before the front service panel is opened. It will allow the dehumidifier to cool down.

Disconnect the dehumidifier from the mains by turning the switch to OFF position and disconnecting the power plug from the mains socket.

Filters

The dehumidifier is equipped with two separate filters, one for process air and one for regeneration air. The filters are located in front of their appropriate inputs and are used for cleaning of the air entering the dehumidifier.

The filters cleaning and replacement intervals are based on the amount of dust and particles in the air at the place of installation. It is recommended to check the filters at least once per month.

Never use the dehumidifier without filters.

Rotor

The rotor is maintenance free. However for cleaning purposes it can be flushed out by compressed air. A rotor cleaning procedure requires special knowledge, for this reason it is recommended to call the manufacturer's representative for assistance. The rotor bearing and the rotor surface should be checked once a year.

Motors
The motors are maintenance free.
It is required to check the motors once a year or in case of abnormal sound.

Heater
The regeneration heater is maintenance free, however twice a year it should be checked for mechanical damages.

Rotor belt
It is required to carry out regular inspections of the belt tension.

Seals
It is required to carry out regular inspection of the seals for damage and dust contamination.

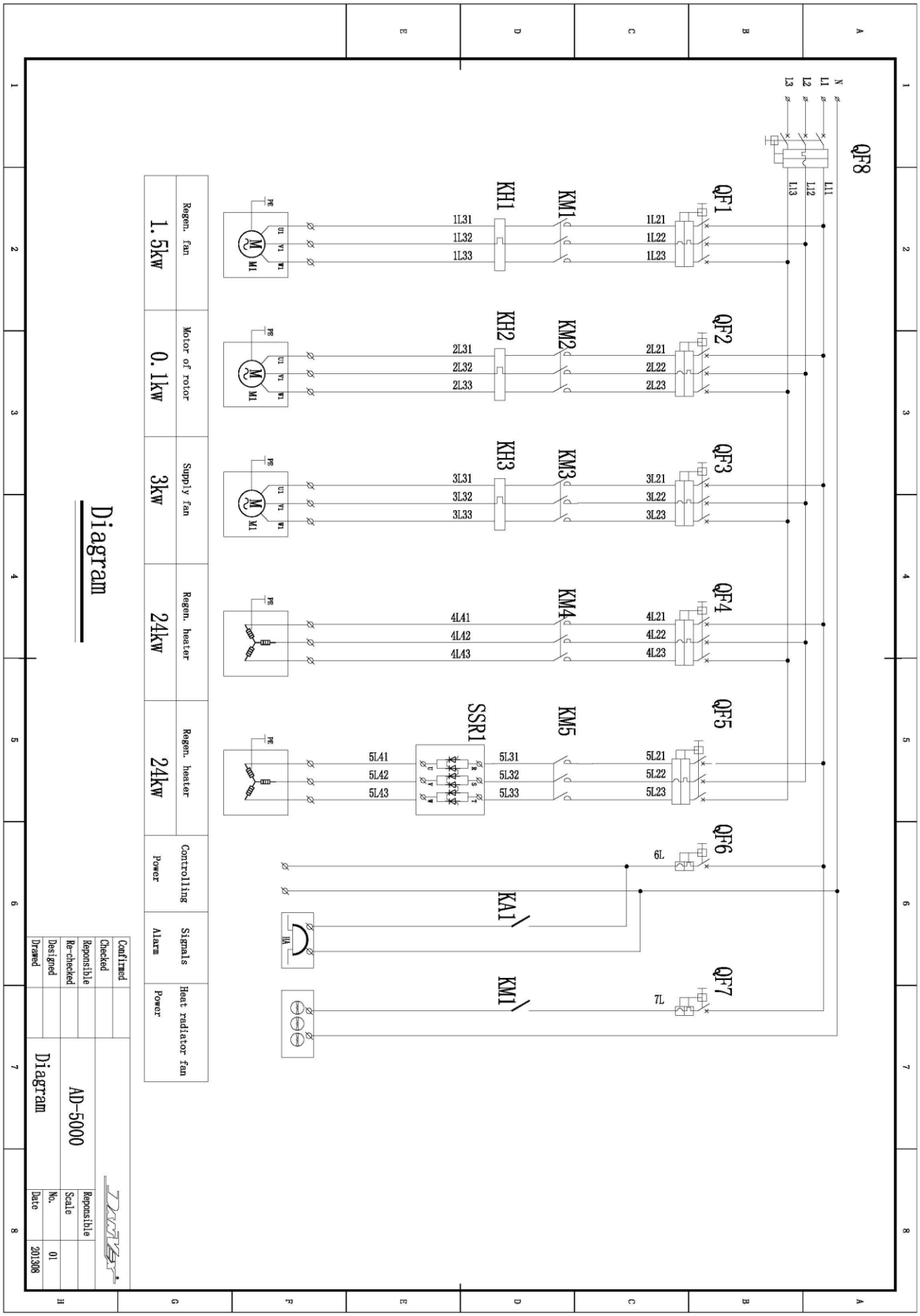
Transportation
Please observe the following rules of the dehumidifier transportation and storage:
Upon delivery it is required to check the dehumidifier for transportation damages.
The dehumidifier should be protected from rain and snow.
The dehumidifier should always be in upright condition.
It is not allowed to put heavy objects on the dehumidifier.

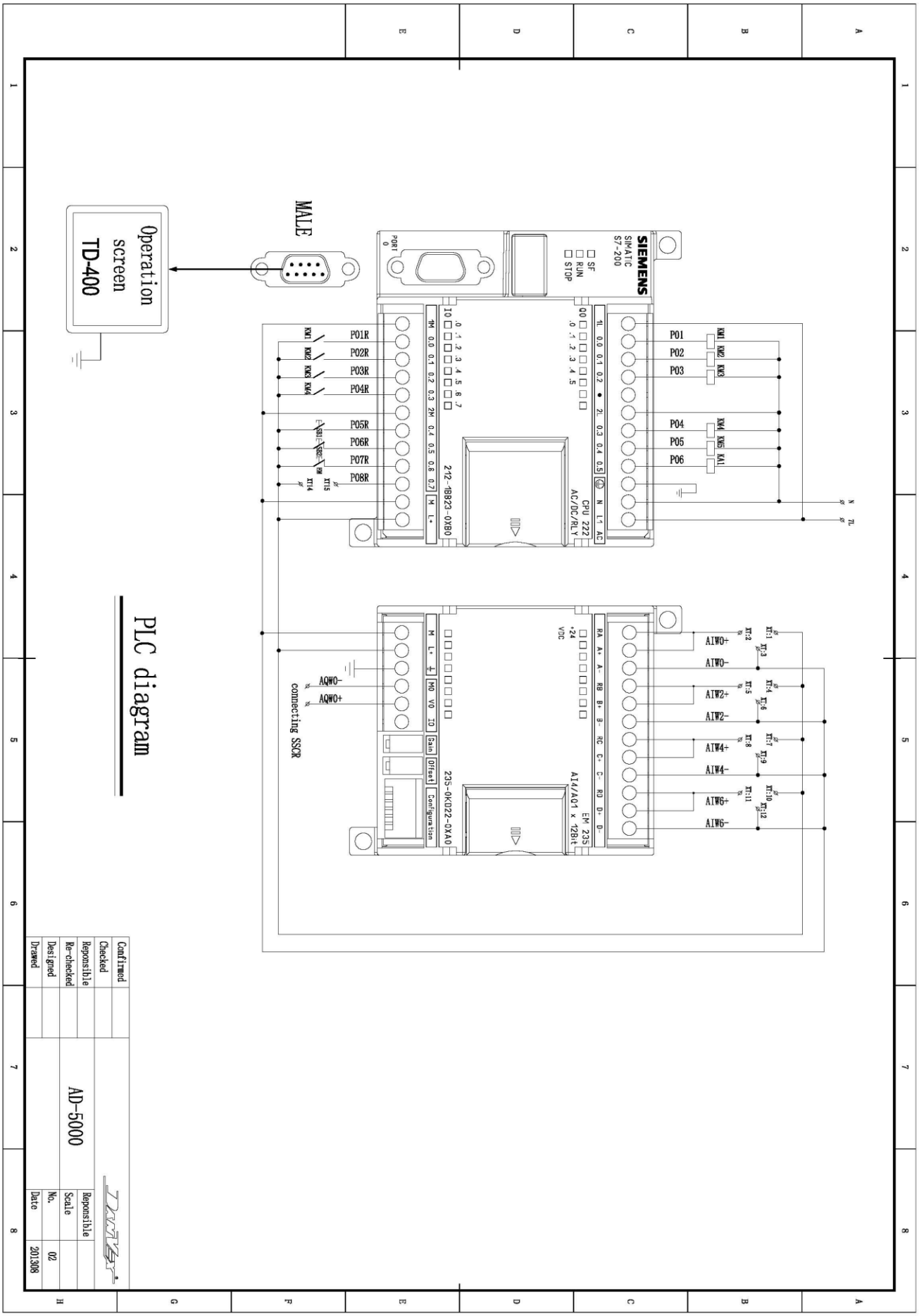
Parts list

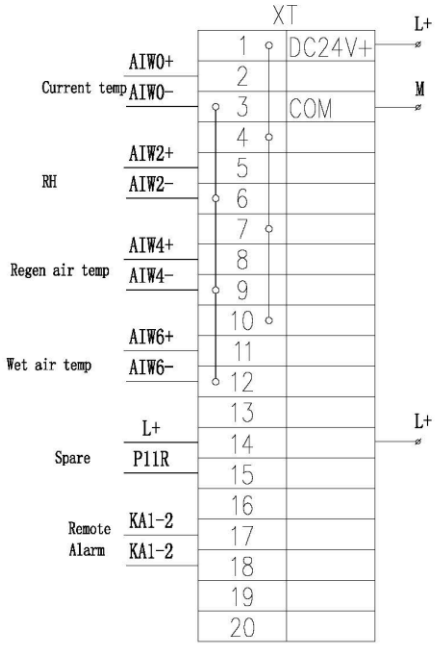
Table 3

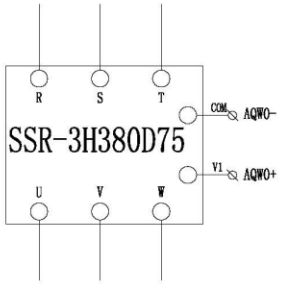
Name	Number per dehumidifier
Rotor drive motor	1
Condenser	1
Belt pulley	1
Rotor drive belt	1
Belt tensioner	1
Dehumidified air fan	1
Regeneration air fan	1
Heater	1
Rotor	1

Attachment


QF8
N
L1
L2
L3
L11
L12
L13
QF1
KH1
KM1
1L21
1L22
1L23
1L31
1L32
1L33
QF2
KH2
KM2
2L21
2L22
2L23
2L31
2L32
2L33
QF3
KH3
KM3
3L21
3L22
3L23
3L31
3L32
3L33
QF4
KM4
4L21
4L22
4L23
4L41
4L42
4L43
QF5
SSR1
KM5
5L21
5L22
5L23
5L31
5L32
5L33
5L41
5L42
5L43
QF6
6L
KA1
KM1
QF7
7L
Regen. fan
1.5kw
Motor of rotor
0.1kw
Supply fan
3kw
Regen. heater
24kw
Regen. heater
24kw
Controlling
Power
Signals
Alarm
Heat radiator fan
Power
Diagram
Confirmed
Checked
Reponsible
Re-checked
Designed
Drawed
AD-5000
Diagram
Reponsible
Scale
No.
01
Date
201308


PLC diagram
Operation screen TD-400
MALE
SIEMENS
SIMATIC S7-200
SF
RUN
STOP
CPU 222 AC/DC/RLY
212-1BB23-0XB0
P01
P02
P03
P04
P05
P06
P01R
P02R
P03R
P04R
P05R
P06R
P07R
P08R
EM 235 AI4/AQ1 x 12Bit
235-0KD22-0XA0
AIW0+
AIW0-
AIW2+
AIW2-
AIW4+
AIW4-
AIW6+
AIW6-
AQW0-
AQW0+
connecting SSCR
Confirmed
Checked
Reponsible
Re-checked
Designed
Drawed
AD-5000
Reponsible
Scale
No.
02
Date
2013.08





SSR1 diagram

Low voltage terminal drawing

Nr.	Code	Name	Data	Unit	Qty	Note
21	EM	Stutter stop		PC	1	
20		Auxiliary contact	LA1D-11N	PC	1	
19		Power	DC24V-50W	PC	1	
18	SB1,SB2	Button		PC	2	
17	FJ	Heat Radiator fan		PC	1	
16	SP	Operation screen	TD-400	PC	1	
15	EM235	Analog Module	6ES7 235-0KD22-0XA8	PC	1	
14	CPU	PLC	6ES7 212-1BB23-0XB8	PC	1	
13	HA	Buzzer		PC	1	
12	SSR1	Solid state relay	SSR-3H380D75	PC	1	
11	KA1	Intermediate relay	AC220V	PC	1	
10	KH3	Thermal relay	6~8A	PC	1	
9	KH2	Thermal relay	0.25A	PC	1	
8	KH1	Thermal relay	2.5-4A	PC	1	
7	KM4、KM5	Cocontactor	LC1D65M7C	PC	2	
6	KM1~KM3	Cocontactor	LC1E09M7C	PC	3	
5	QF8	Molded case switch	125A	PC	1	
4	QF6~QF7	Beaker	C65-C6/1P	PC	2	
3	QF4~5	Beaker	C65-C63/3P	PC	2	
2	QF3	Beaker	C65-C16/3P	PC	1	
1	QF1~2	Beaker	C65-D6/3P	PC	2	

Confirmed		AD-5000		
Checked				
Reponsible			Responsible	
Re-checked			Scale	
Designed			No.	03
Drawed			Date	201308

Warranty obligations

DanVex warrants that all the equipment parts will answer the technical requirements for 12 months from the date of delivery (warranty period).

The warranty does not cover wearable parts such as filters. The warranty covers the defects in workmanship and materials.

During the warranty period DanVex repairs and replaces the part having a defect of material or an manufacturing error.

DanVex completely fulfills its warranty obligations when it supplies the Customer a repaired or a spare part.

Parts repair or replacement does not result in the warranty period extension.

The parts and components replaced under the warranty belong to DanVex.

DanVex or its distributor upon DanVex request has a right to inspect the defective parts and to check the correctness of the warranty claim.

Warranty repair execution conditions:
The damage occurred during the equipment normal operation. All recommendations and instructions of the manufacturer concerning the equipment installation, operation and maintenance were observed. Only original parts and materials were used for the equipment maintenance and repair.

www.danvex.fi