ÜNTES®

HEATING VENTILATING AIR CONDITIONING

POOL DEHUMIDIFIER UNIT

ASSEMBLING, START UP, MAINTENANCE and USER MANUAL

Please read this manual first!

Dear Customer,

Thank you for preferring UNTES. We hope that your product which has been manufactured in modern facilities and passed through a strict quality control procedure will give you the best results. Therefore, we advise you to read through this manual carefully before using your product and keep it for future reference.

• Please read the Operation Manual before installing and starting your machine
• Particularly follow the instructions related to safety.
• Keep this Operating Manual within easy reach. You may need it in the future.

Sincerely,

UNTES Heating Ventilating Air Conditioning Inc.

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1. GENERAL SPECIFICATIONS

UHNS type Pool Dehumidifier Units are designed for dehumidifying the moist air that affects the comfort conditions in the swimming pool halls.

A large amount of water can evaporate from the water surface of swimming pool depending on the water surface area, water temperature, the activity, ambient temperature and humidity ratio. By this evaporation the amount of moisture in the air increasing to undesired values. Condensation comes happen at the windows, walls and other cold surface depending on high moisture ratio in the air and because of the condensation, corrosion and bacteria growth can be seen. In addition, it causes reducing the blood circulation in humans, leads to the prevention of ability to move in.

It is possible that, undesired moisture in a room can be dehumidified a controlled manner with UHNS type Pool Dehumidification Unit by providing energy recovery. In the dehumidifying action providing heat recovery up to 70% is possible according to temperature differences with the thanks to plate type heat recovery in the unit.

Model	Birim / Unit	Type	UHNS 051	UHNS 063	UHNS 080	UHNS 100	UHNS 125	UHNS 160	UHNS 180	UHNS 200	UHNS 252	UHNS 315
Nem Alma Kapasitesi[1] VDI 2089 / Dehumidifier Capacity[1] VDI 2089	**[kg/h]**		**32,4**	**40,1**	**50,9**	**63,6**	**79,5**	**101,8**	**114,5**	**127,2**	**160,3**	**200,3**
Nem Alma Kapasitesi / Dehumidifier Capacity*	**[kg/h]**	**PL**	24,9	28,2	38,1	42,5	58,1	68,8	**80,4**	87,4	110,1	150,0
		HP	25,1	27,7	38,1	42,2	57,0	65,6	**79,3**	85,7	109,2	143,4
		OO	22,5	25,9	35,5	40,3	52,2	62,8	**71,3**	81,5	104,7	135,1
Hava Debisi / Air Flow	**[m³/h]**		5.100	6.300	8.000	10.000	12.500	16.000	**18.000**	20.000	25.200	31.500
Soğutma Batarya Kapasitesi / Cooling Coil Capacity*	**[kW]**	**PL**	31,9	37,3	48,9	57,8	74,7	88,4	**107,2**	114,0	144,6	189,1
		HP	31,6	36,2	48,4	55,3	74,0	87,1	**106,7**	111,1	141,9	183,8
		OO	34,0	40,2	51,8	61,2	80,9	95,2	**113,9**	122,4	155,9	206,6
Sulu Batarya Isıtma Kap. / Water Heating Coil Cap.**	**[kW]**		63,6	68,9	103,9	111,2	138,2	157,7	**219**	224,6	280,3	318,8
Kompresör-Devre Sayısı / Compressor-Circuit Number	**[adet / no.]**		1 - 1	1 - 1	1 - 1	1 - 1	1 - 1	1 - 1	**1 - 1**	2 - 2	2 - 2	2 - 2
Vantilatör Cihaz Dışı Statik Basıncı / Ventilator External Static Pressure	**Yüksek / High [Pa]**	**PL**	500	550	600	625	800	850	**825**	625	750	700
		HP	550	650	675	750	575	600	**575**	750	800	850
		OO	500	550	625	700	825	550	**525**	675	825	800
	Düşük / Low [Pa]	**PL**	125	200	250	250	400	400	**375**	200	375	450
		HP	200	300	350	400	250	275	**250**	300	450	550
		OO	175	250	325	350	450	250	**225**	250	450	550
Aspiratör Cihaz Dışı Statik Basıncı / Aspirator External Static Pressure	**Yüksek / High [Pa]**	**PL**	500	550	600	625	800	850	**825**	625	750	700
		HP	550	650	675	750	575	600	**575**	750	800	850
		OO	500	550	625	700	825	550	**525**	675	825	800
	Düşük / Low [Pa]	**PL**	125	200	250	250	400	400	**375**	200	375	450
		HP	200	300	350	400	250	275	**250**	300	450	550
		OO	175	250	325	350	450	250	**225**	250	450	550

[1] VDI 2089'a gore (üfleme havası nemi = 9 g/kg, havuz mahal havası nemi = 14,3 g/kg) /
According to VDI 2089 (supply air humidity =9g/kg, air humidity in the pool hall =14,3g/kg)

* Mahal şartları 30 ^{0}C KT ve %55 BN / Pool hall condition at 30 ^{0}C DB and 55% RH.

** Dış ortam şartları -12 ^{0}C KT ve %90 BN, Su sıcaklığı 90-70 ^{0}C / Outlet air temp. -12 ^{0}C DB and 90% RH. Water temperature is 90-70 ^{0}C.

PL: Plakalı Isı Geri Kazanımlı / Plate Type Heat Recovery **HP:** Isı Borulu Isı Geri Kazanımlı / Heat Pipe Heat Recovery

OO: Isı Geri Kazanımsız / Without Heat Recovery

Model	Birim / Unit	Type	UHNS 051	UHNS 063	UHNS 080	UHNS 100	UHNS 125	UHNS 160	UHNS 180	UHNS 200	UHNS 252	UHNS 315
Vantilatör Motor Gücü / Ventilator Motor Power	Yüksek / High [kW]	PL	2,2	3,0	4,0	5,5	7,5	11,0	11,0	11,0	15,0	18,5
		HP	2,2	3,0	4,0	5,5	5,5	7,5	7,5	11,0	15,0	18,5
		OO	2,2	3,0	4,0	5,5	7,5	7,5	7,5	11,0	15,0	18,5
	Düşük / Low [kW]	PL	1,5	2,2	3,0	4,0	5,5	7,5	7,5	7,5	11,0	15,0
		HP	1,5	2,2	3,0	4,0	4,0	5,5	5,5	7,5	11,0	15,0
		OO	1,5	2,2	3,0	4,0	5,5	5,5	5,5	7,5	11,0	15,0
Aspiratör Motor Gücü / Aspirator Motor Power	Yüksek / High [kW]	PL	2,2	3,0	4,0	5,5	7,5	11,0	11	11,0	15,0	18,5
		HP	2,2	3,0	4,0	5,5	5,5	7,5	7,5	11,0	15,0	18,5
		OO	1,5	2,2	3,0	4,0	5,5	5,5	5,5	7,5	11,0	15,0
	Düşük / Low [kW]	PL	1,5	2,2	3,0	4,0	5,5	7,5	7,5	7,5	11,0	15,0
		HP	1,5	2,2	3,0	4,0	4,0	5,5	5,5	7,5	11,0	15,0
		OO	1,1	1,5	2,2	3,0	4,0	4,0	4,0	5,5	7,5	11,0
Ses Basıncı Seviyesi Sound Pressure Level***	High [dB(A)]	PL	68	68	69	71	72	73	73	75	76	77
		HP	68	68	69	70	70	73	73	75	76	78
		OO	67	68	69	70	71	73	73	75	76	77
	Low [dB(A)]	PL	67	67	68	69	70	74	74	74	74	76
		HP	67	67	68	69	72	73	73	74	74	76
		OO	67	67	68	68	71	72	72	73	74	76
Toplam Çekilen Güç / Total Absorbed Power	Yüksek / High [kW]	PL	15,1	17,3	26,9	27,2	36,1	49,4	51,3	53,1	70,2	88,7
		HP	14,9	17,9	26,5	28,1	32,9	43,8	49,5	55,2	71,6	90,5
		OO	14,1	16,1	25,4	25,7	33,6	40,2	45,2	50,1	66,1	82,8
	Düşük / Low [kW]	PL	13,5	15,4	24,5	23,8	31,7	42,7	44,5	46,2	61,9	81,8
		HP	13,4	16,0	24,2	25,0	29,5	39,5	43,6	47,6	63,9	82,2
		OO	12,9	14,6	23,4	22,7	29,5	36,3	39,7	43,1	58,0	76,0
Elektrik Beslemesi / Elect. Supply				400 V / 50 Hz / 3 Phase								

[1] VDI 2089'a gore (üfleme havası nemi = 9 g/kg, havuz mahal havası nemi = 14,3 g/kg) /
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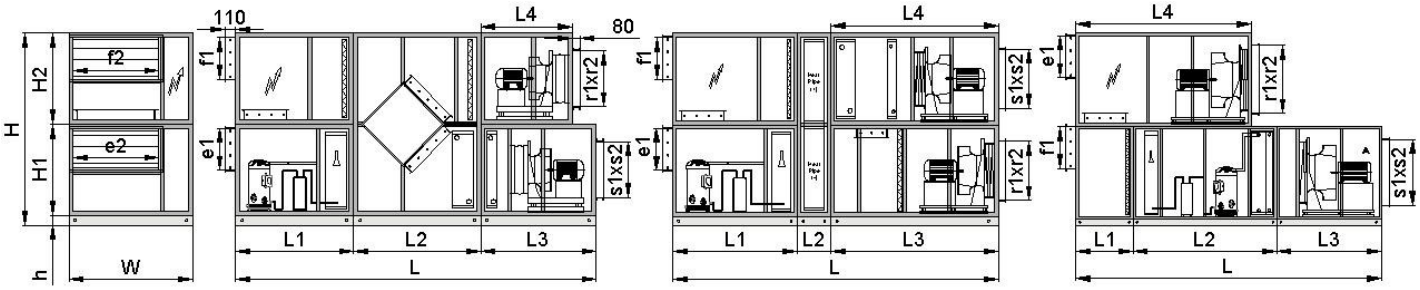
** Dış ortam şartları -12 ^{0}C KT ve %90 BN, Su sıcaklığı 90-70 ^{0}C / Outlet air temp. -12 ^{0}C DB and 90% RH. Water temperature is 90-70 ^{0}C.

*** Cihaz gövdesinden yayılan ses değerleri olup akustik tedbirleri alınmış olan kanal bağlantılı üniteler için geçerlidir.
Values are the sound levels coming from the case of the unit and it is valid for the Units which have acoustic precautions and a channel connection.

PL: Plakalı Isı Geri Kazanımlı / Plate Type Heat Recovery **HP:** Isı Borulu Isı Geri Kazanımlı / Heat Pipe Heat Recovery
OO: Isı Geri Kazanımsız / Without Heat Recovery

1.1. Dimensions And Weights



PL plakalı ısı geri kazanımlı
PL plate type heat recovery

HP ısı borulu ısı geri kazanımlı
HP heat pipe heat recovery

OO ısı geri kazanımsız
OO without heat recovery

Model	Unit	Type	UHNS 051	UHNS 063	UHNS 080	UHNS 100	UHNS 125	UHNS 160	UHNS 180	UHNS 200	UHNS 252	UHNS 315
L	[mm]	PL	3.496	3.796	3.866	4.246	4.561	4.756	4.756	5.316	5.956	6.346
		HP	3.266	3.416	3.466	3.716	3.966	4.166	4.166	4.466	4.966	5.116
		OO	3.154	3.289	3.449	3.749	3.912	4.094	4.094	4.454	4.911	5.141
L1	[mm]	PL	1.222	1.282	1.282	1.412	1.512	1.512	1.512	1.712	1.912	1.912
		HP	1.222	1.282	1.282	1.412	1.512	1.512	1.512	1.712	1.912	1.912
		OO	-	-	-	-	-	-	-	-	882	967
L2	[mm]	PL	1.202	1.342	1.342	1.487	1.627	1.627	1.627	1.907	2.192	2.472
		HP	422	422	422	422	422	422	422	422	422	422
		OO	2.262	2.292	2.377	2.572	2.672	2.672	2.672	2.957	2.372	2.412
L3	[mm]	PL	1.072	1.172	1.242	1.347	1.422	1.617	1.617	1.697	1.852	1.962
		HP	1.622	1.712	1.762	1.882	2.032	2.232	2.232	2.332	1037+1617	1037+1767
		OO	892	997	1.072	1.177	1.240	1.422	1.422	1.497	1.657	1.762
L4	[mm]	PL	822	922	962	1032	1072	1252	1252	1292	1392	1482
		HP	1622	1712	1762	1882	2032	2232	2232	2332	1037+1617	1037+1767
		OO	1532	1692	1732	1932	2072	2242	2242	2492	2792	2932
W	[mm]		1.147	1.272	1.342	1.467	1.692	1.872	1.872	2.142	2.342	2.632
H	[mm]		1.704	1.834	2.094	2.214	2.344	2.604	2.604	2.744	2.994	3.244
H1	[mm]		797	862	992	1052	1117	1247	1247	1312	1437	1562
H2	[mm]		797	862	992	1052	1117	1247	1247	1312	1437	1562
h	[mm]		110	110	110	110	110	110	110	120	120	120
e1 x e2	[mm]	PL	360 x 660	360 x 785	447 x 855	535 x 930	535 x 1105	535 x 1285	535 x 1285	622 x 1555	622 x 1755	710 x 2000
		HP	360 x 660	360 x 785	447 x 855	535 x 930	535 x 1105	535 x 1285	535 x 1285	622 x 1555	622 x 1755	710 x 2000
		OO	360 x 710	360 x 835	447 x 905	535 x 930	535 x 1155	535 x 1335	535 x 1335	622 x 1605	622 x 1805	710 x 2045
f1 x f2	[mm]	PL	360 x 660	360 x 785	447 x 855	535 x 930	535 x 1105	535 x 1285	535 x 1285	622 x 1555	622 x 1755	710 x 2000
		HP	360 x 660	360 x 785	447 x 855	535 x 930	535 x 1105	535 x 1285	535 x 1285	622 x 1555	622 x 1755	710 x 2000
		OO	272 x 1025	360 x 1150	360 x 1220	447 x 1345	447 x 1570	447 x 1750	447 x 1750	535 x 2020	535 x 2220	622 x 2510
r1 x r2	[mm]		450 x 450	500 x 500	560 x 560	630 x 630	710 x 710	800 x 800	800 x 800	900 x 900	1000 x 1000	1100 x 1100
s1 x s2	[mm]		450 x 450	500 x 500	560 x 560	630 x 630	710 x 710	800 x 800	800 x 800	900 x 900	1000 x 1000	1100 x 1100
Weight	[kg]	PL	1.060	1.220	1.400	1.750	2.050	2.600	2.600	2.860	3.580	4.490
		HP	1.045	1.215	1.370	1.690	2.000	2.450	2.450	2.880	3.630	4.605
		OO	860	980	1.130	1.440	1.670	2.050	2.050	2.310	2.895	3.540

L Lenght **W** Width **H** Height **e** Exhaust air outlet damper **f** Fresh air inlet damper **r** Return air inlet **s** Supply air outlet
L Uzunluk **W** Genişlik **H** Yükseklik **e** Egzoz çıkış damperi **f** Taze hava giriş damperi **r** Dönüş havası giriş **s** Üfleme havası çıkış

1.2. Working Modes

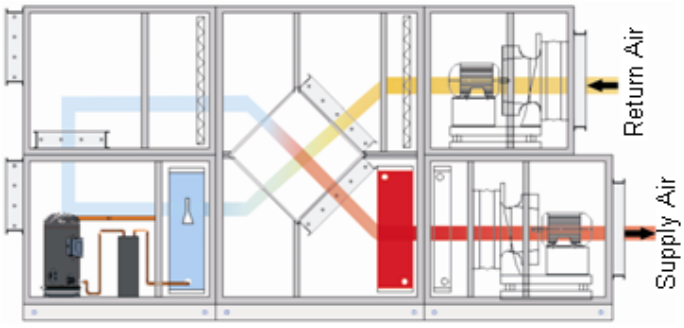
In accordance with the conditions of room temperature and humidity information via microprocessor, whether you need to get moisture is detected. When dehumidifying is not needed, compressors are switched off. Dampers' blade positions are determined according to required supply air temperature with thanks to managing of damper servomotors by microprocessor. This prevents unnecessary energy consumption. When additional heating is required, it is provided by controlling the 3 way valve on the water heating coil.

Operating scenarios in different conditions controlling by microprocessor are given below.

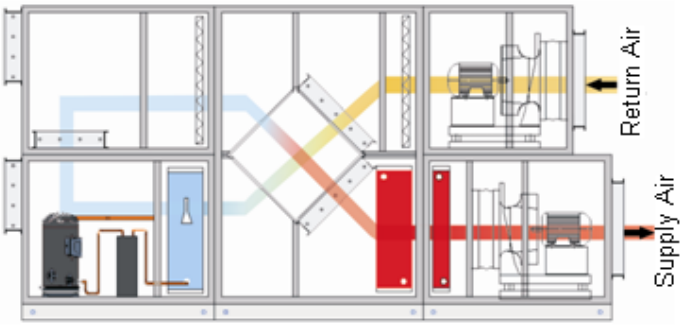
1.2.1. Working With 100% Return Air

In the absence of the need for fresh air, according to different temperature and humidity conditions, the following scenarios take place.

Humid Room Air
Compressors must be working on due to humid room air. When the return air is passing through the evaporator, cooling occurs and the moist in the air condenses (Picture - 1a). The cooled air is reheated by condenser. Total heating capacity for the return air occurs depending on the compressors' capacities. If this capacity is not enough, water heating coil can be activated, see Picture – 1b.

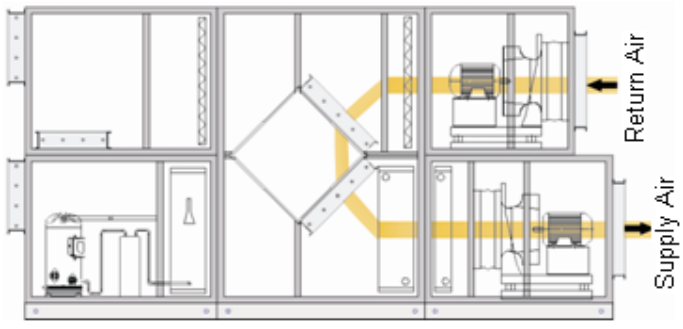


Picture - 1a

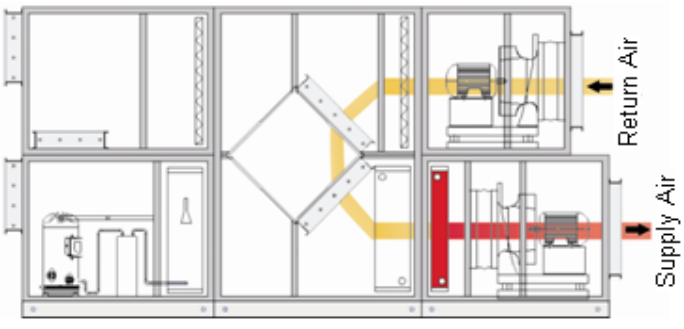


Picture – 1b

Dry Room Air
In the absence of the need for fresh air and when the room air is dry, the unit will work like Picture 2a, just only take the room air data. The room air will send to room again without passing through the plate type heat recovery unit. If the room air temperature is lower than the setting point, water heating coil will be activated like given Picture 2b.



Picture – 1c

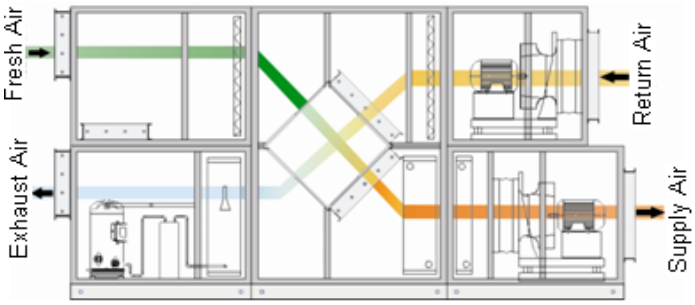


Picture – 1d

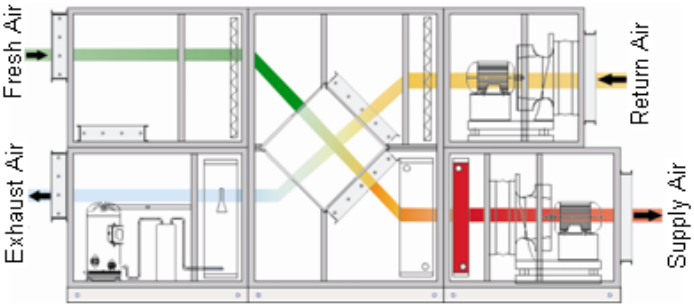
1.2.2. Working With 100% Fresh Air

The following scenarios occur when the fresh air needed. When the unit is working with 100% fresh air, compressors are not activated because of dehumidification is not needed.

When the specific humidity ratio of the fresh air is lower than the setting point and dry bulb temperature of fresh air is about the setting point, the unit will work like Picture 3a. Return air will be exhausted after the heat on the return air transferred to fresh air passing through the plate heat recovery unit. When the fresh air is lower, the water heating coil can be activated like given Picture 3b.



Picture - 2a



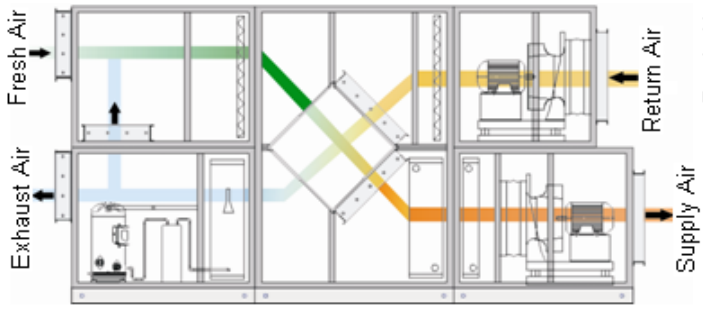
Picture – 2b

1.2.3. Working With Mixed Air

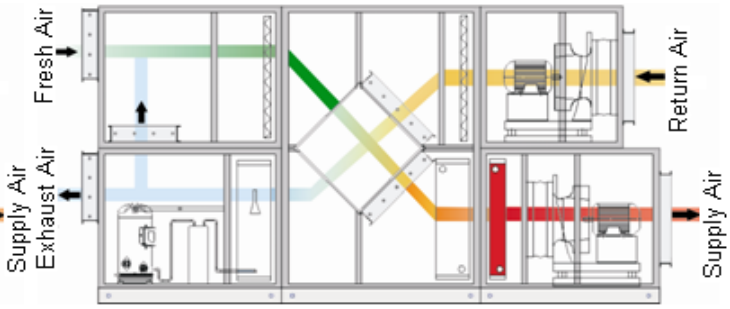
It is applied when the fresh air is needed in a specific ratio.

When the specific humidity ratio of the fresh air is lower than the setting point and dry bulb temperature of fresh air is about the setting point, the unit will work like Picture 4a and Picture 4b.

Compressors are not activated because of dehumidification is not needed. Some amount of return air will be exhausted after the heat on the return air transferred to fresh air passing through the plate heat recovery unit. Other amount of return air is mixed with fresh air and send to the room again, see Picture - 4a. Microprocessor defines the damper's blade position according to the humid and temperature information. Microprocessor can activate the water heating coil according to these information and when the fresh air temperature is too low, see Picture – 4b.



Picture - 3a

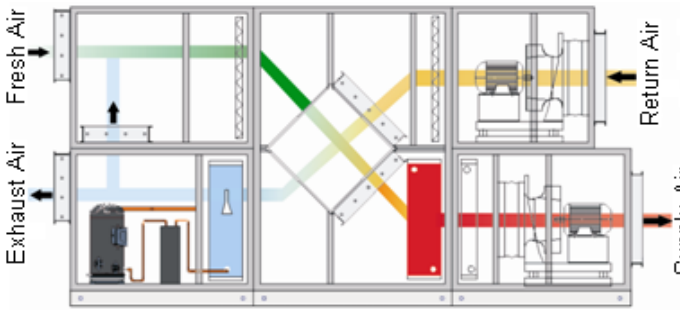


Picture – 3b

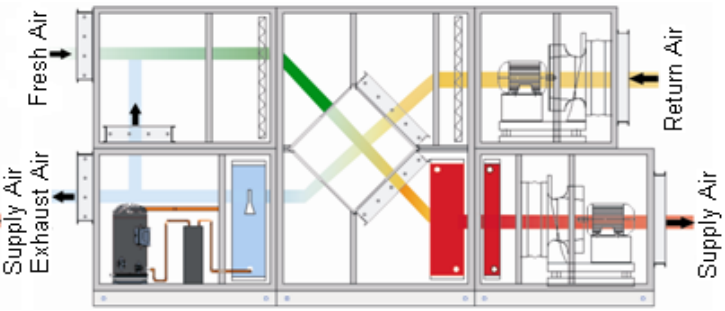
When the specific humidity ratio of the fresh air is higher than the setting point and dry bulb temperature of fresh air is lower than the setting point, the unit will work like followings.

Compressors are switched on because, the specific humidity ratio is high. Some amount of return air will be exhausted after the heat on the return air transferred to fresh air passing through the plate heat recovery unit. Other amount of return air is mixed with fresh air and send to the room again, see Picture – 4c. Other amount of return air is mixed with fresh air and send to the room again.

Microprocessor defines the damper's blade position according to the humid and temperature information. Microprocessor can activate the water heating coil according to these information and when the fresh air temperature is too low, see Picture – 4d.



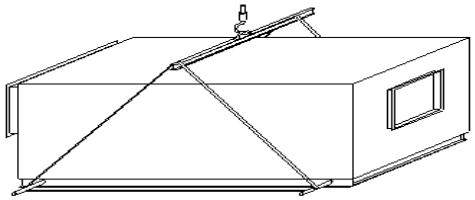
Picture – 3c

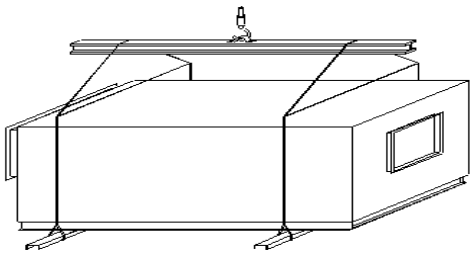


Picture – 3d

2. TRANSPORTATION and STORAGE

- Do not trail along the unit while carrying it to the installation area. Use the carriage and raise up holes under the unit .Do not ever carry it from pipe connections door arms or duct connections.
- Do not put high weight that may cause deflection on the Unit.
- Assure that the damper is closed when the unit is out-offing duty.
- Do not put the unit to the environments where the relative humidity ratio is over 80% and where the environment temperature is less than –20°, more than 40°.
- Chemical substances and other hazardous gas or burn steams should be kept out of touch with the unit itself and unit equipments.
- The air handling units can be damaged during the carriage especially if a winch is used. In order to carry smaller units it is better to use forklift. The carriage and downloading of the big units should be done by winch. During the carriage and downloading of the unit, in order not to damage it, use appropriate rope according to the weight and dimensions of the unit. As it seen on the picture additional bars must be used not to cause deflection on the frame of equipment. During the carriage, pay attention that nobody stands in the area of carriage.



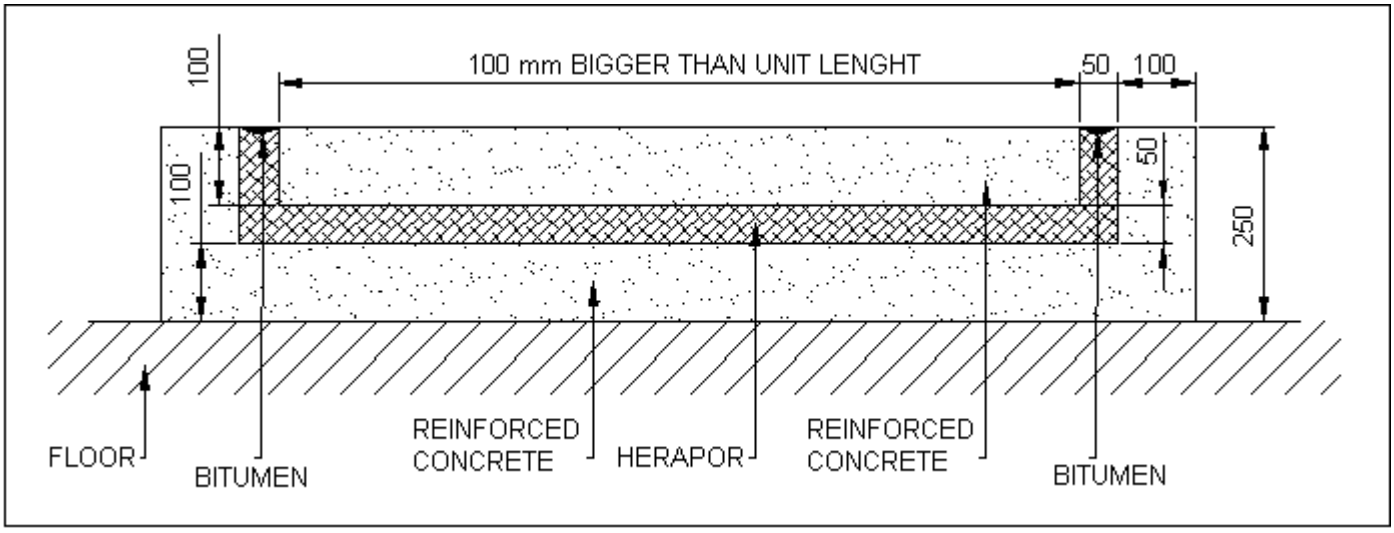


- Before the packing, placement of labels showing the declaration values of the unit and the warning stamps is done. During the loading the carriage and the transportation against the deformation the units are wrapped with stretch nylon tightly before the packaging and the packaging is done by boxing. The pallets should be larger than the units against the possible damages that can occur.

NOTE: *Any damage caused by faulty carriage and storing is not under the guarantee scope of UNTES.*

3. INSTALLATION

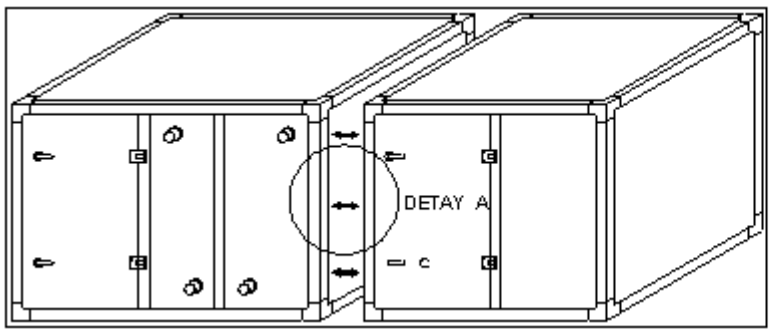
Before the production of the unit the client should control where the unit will be put if it is okay with the size of the unit and if the floor is hard enough to carry the unit. There should be enough places around the unit for the service and piping purposes. The base that the unit will put on must be high enough for siphoning (how to calculate siphon height will be explained following sections.). If the unit is to be used at a silence needed place like hospital or hotel, it should be placed on a concrete level where it is filled with styropors as seen on the picture below.



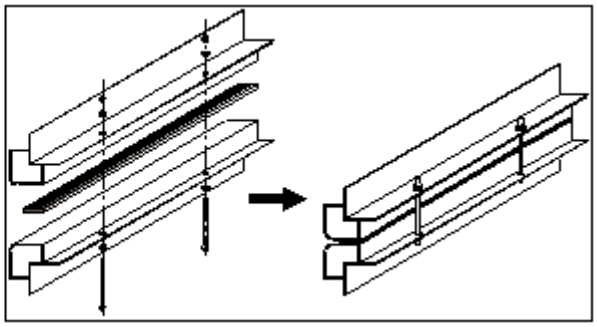
If the air handling unit is established exposed to the ambient air, it must be prevented by coving.
If the units will be hanged to the ceiling, a base must be constructed from steel that must not be damaged by weight of unit and vibration. If it is needed extra support and bars must be used. After the unit is put on the hanged base it must be mounted to the wall from its upper sides.

3.1. Connection of Modules

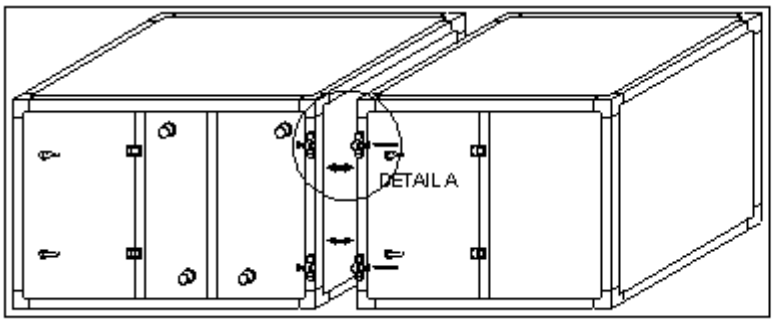
- Control the service direction of the unit and make the connection properly in order of the modules shown at the specs.
- The gasket given by the producer should be pasted on the connection surfaces before the connection.
- Connect the modules with the connection elements given. Avoid screwing the screws to much in order not to harm the panels and gasket. All the screws must be screwed equally. (Connections must be done as it seems in the picture below).



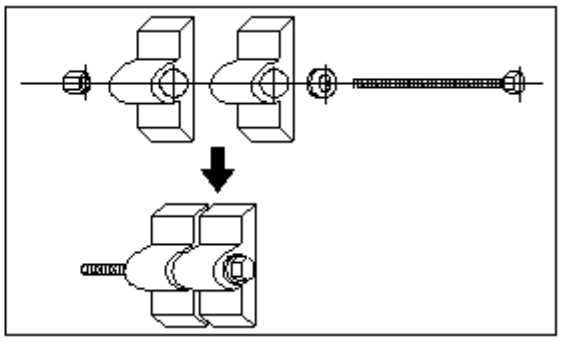
Connection of modules



Details (Detail A)



Module connection for Standard unit



Details (Detail A)

- Ensure that the placement of unit horizontal with floor thanks to water gauge. Service doors must be open and close easily. If the equipment is not in balance will cause air leaks and drainage of condensation water can also cause problems.
- When placing the unit, free space of at least the width of the unit must be take into consideration from service side. Otherwise, filter, heater and cooler will not be able to be removed.
- After combining the unit, check whether there is any by-pass region or not. If there is, realized the reason and make it correct.

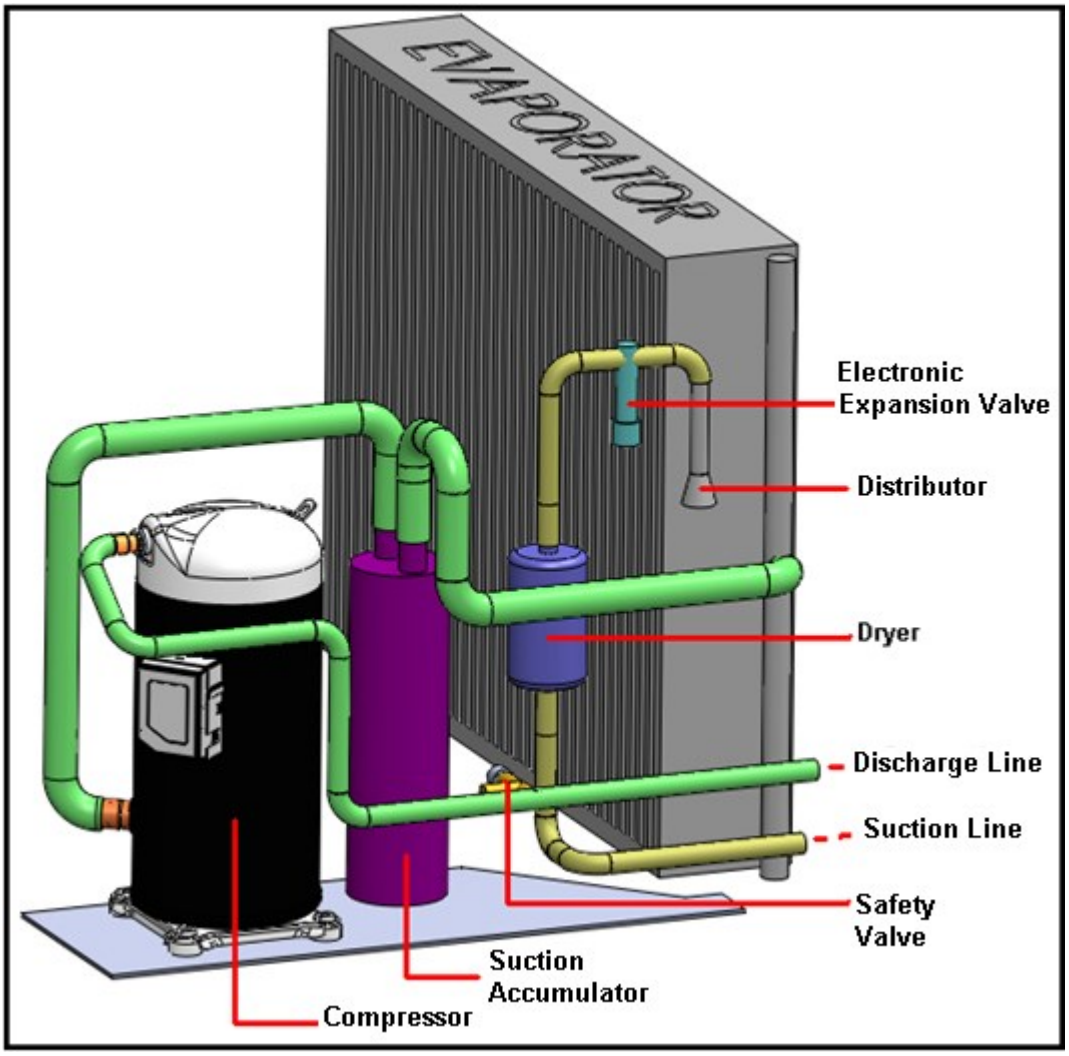
3.2. Cooling Circuit Sheme and Refrigerant Charge

Mechanical layout of the cooling system is given below. Here, suction and discharge lines are combined with copper pipe from the condenser coil process is carried out through the connector on the pipe ready for connection. Connection details are shown below.

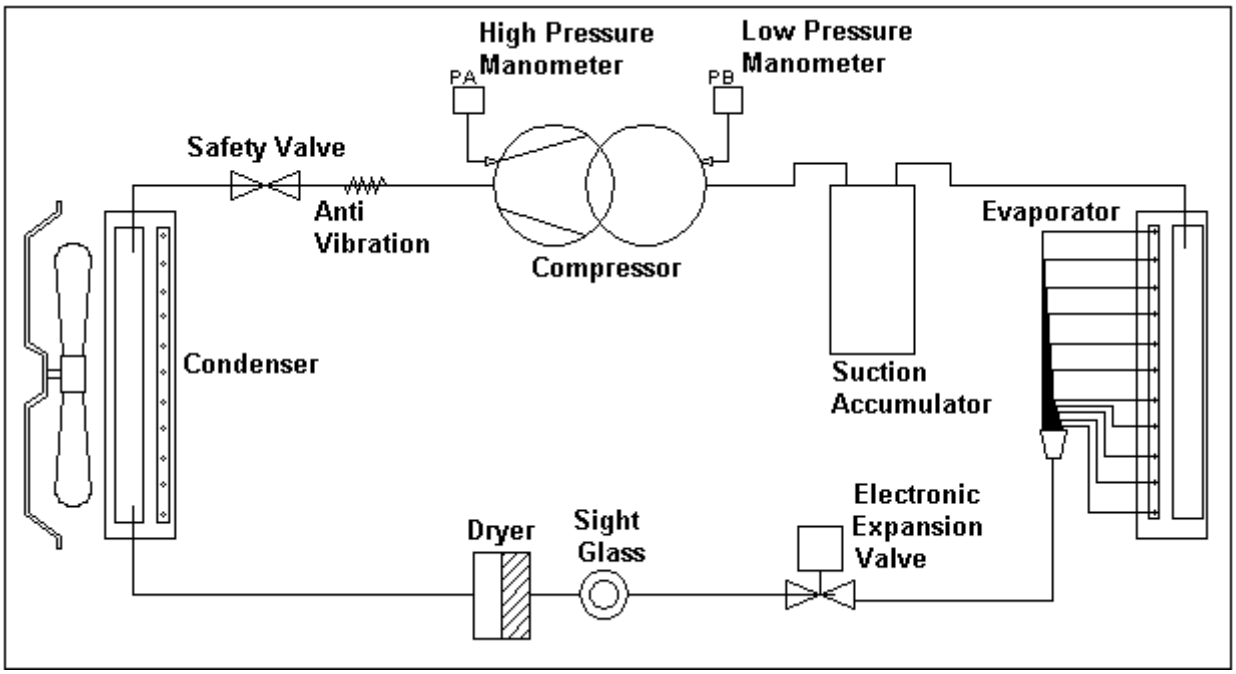
Connector is ready for connection to suction and discharge lines for with plate type recovery unit

For the plate type heat recovery unit, connection is carried out by copper tubes supplied with the unit as follows. Leakproof must be provided by making welding to the connection area.

Connector connection was done of suction and discharge lines for with plate type recovery unit



Mechanic cooling layout



Cooling circuit line

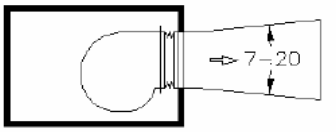
Gas circuit is filled with nitrogen gas because of the leakege test after producing. Through the connector pipe connection between the condenser and mechanical volume has been made, the unit should be vacuum and then gas charge can be started. Gas amount indicated in the following table.

Model	Unit	Type	UHNS 051	UHNS 063	UHNS 080	UHNS 100	UHNS 125	UHNS 160	UHNS 180	UHNS 200	UHNS 252	UHNS 315
Gas Amount, R 410A	[kg]	PL	7,3	10,7	16,8	20,4	19,2	27,15	27,7	32,9	49	64,5
		HP	7,3	10,7	16,8	20,4	19,2	27,15	27,7	32,9	49	64,5
		OO	7,3	13,4	16,8	24,4	22,9	33,7	32,9	46,3	58,4	77,1
Discharge line pipe diameter	[mm]	PL	22	22	28	28	35	35	35	28*2	35*2	35*2
		HP	22	22	28	28	35	35	35	28*2	35*2	35*2
		OO	22	22	28	28	35	35	35	28*2	35*2	35*2
Liquid line pipe diameter	[mm]	PL	16	16	18	22	28	28	28	22*2	28*2	28*2
		HP	16	16	18	22	28	28	28	22*2	28*2	28*2
		OO	16	16	18	22	28	28	28	22*2	28*2	28*2
Water heating coil, head diameter	[mm]		33,2	33,2	33,2	33,2	42,2	42,2	48,3	48,3	60,3	60,3

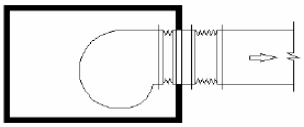
PL: With Recovery Unit **HP:** heat pipe heat recovery **OO:** Without Recovery Unit

3.3. Duct Connections

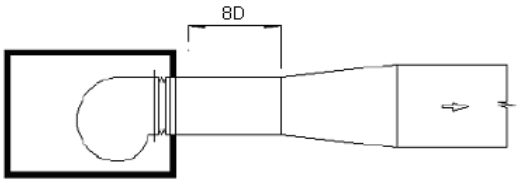
- At the connection points of the ducts it should be used gasket in order to prevent air leakage. And the impermeability should be provided by towing two ducts to each other with clips.
- All air connections should be connected to the unit with flexible joins. Not using flexible joint may cause vibration on ducts and the places that the ducts are connected.
- The wrong connections and installation made can change the air flow conditions.



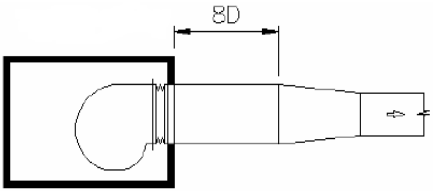
If the supply air has no duct connection makes the connection according to the shape given below .Because this type of connection provides the air to have less turbulence before the air is sucked out. This is more important at the applications of grill and distributor where the pressure losses are calculated according to laminar flow.



The ducts should be connected to fan exit mouth with a flexible connection component. And it should stay at a tight position to provide sound and vibration isolation.



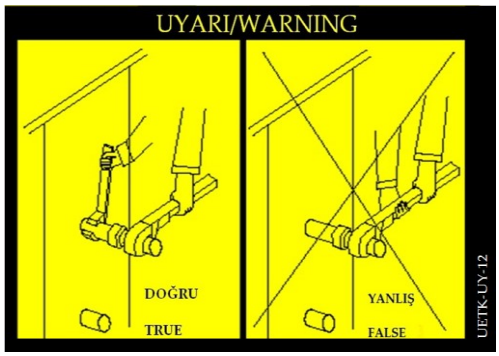
If the flow is in a duct section that is larger than the fan exit at the exit of the fan , before the enlarging part there should be a parallel connection of 8 times of The axis of the fan and with a degree of 7-20°.



If the flow is in a duct section that is smaller than the fan exit at the exit of the fan , before the narrowing part there should be a parallel connection of 8 times of the axis of the fan and with a degree of at most 45°.

3.4. Pipe Connections

- While connecting the heating and cooling inlet-outlet pipes, pay attention to pipes and fittings so that filter unit or panels must not have difficulty to come out. Also between pipe lines and connection mouths, connection pieces with flange should be putted
- For heating and cooling connection lines, ventil for air discharge and drainage valves should be used.
- All installed pipes external to the unit should be supported by appropriate supports in order not to put the weight on coil connection pipes.

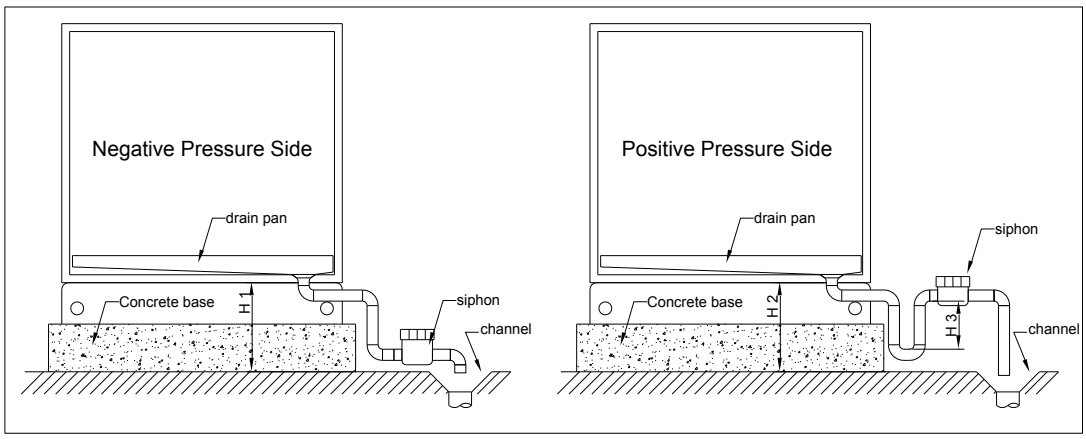


- As a standard, the inlet of heating and cooling is from bottom outlet is from top. The pipe installation should be made according to.
- While doing the pipe connection it is advised to use double wrench. Other case may cause unwanted turn of coil copper connections, causing break or decrease in cross section of connection copper pipes.
- By-pass should be made in order to provide circulation and prevent any freezing risk for the time that tree way valve is not working.
- All connection and installation pipes should be isolated.
- The pipes should be adjusted so that system can continue to work from By-pass in case of heating or cooling coil is to be changed.
- For the units working with more than 60% fresh air, install a circulation pump at pre-heating cell
- Do not operate the ventilator before activating the heat pump at any circumstance. This way you can prevent from freezing-risk.

- In order to avoid the transition of vibration combine inlet-outlet of humidifier pump cell connecting mouths with flexible material.
- You should use CE certificated product for the pipe connection.

3.5. Drainage Connection

- The drainage pipe diameter should not be smaller than condensing plate exit pipe diameter.
- To clean the sediment that is formed in the condensing plate and in the pipes, the connections should be demountable easily and the drainage pipe and condensing plate connection should be made by sleeve or flange.
- It should be connected to U shaped pipe and filled with water in order not to cause air suction or, for the positive pressure side, to come out of the unit.
- A slope not less than 1/50 should be given to drainage line
- Each drain outlet on the unit must be drained (with siphon) separately. It is advised to use open channel, instead of closed pipe to collect the drains. This is important especially hygienic units to prevent the unit from entrance of unwanted sewage.

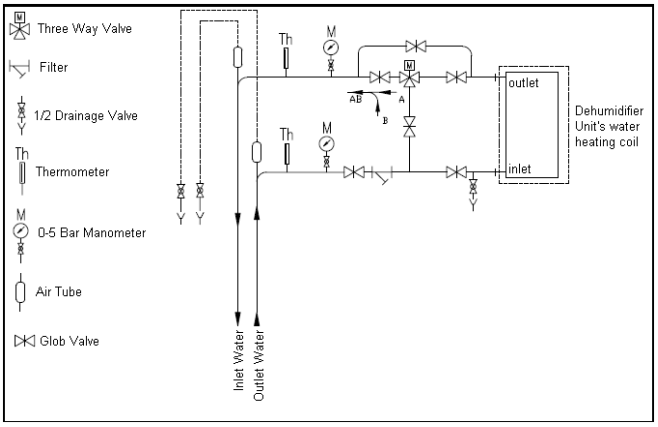


H1-H2 is the height of the total base (total of concrete base that is build by the customer and the metal case produced by the UNTES connected with the unit). H3 is the siphon height. H1-H2-H3 is a function of the static pressure (P) in mm water gage that the unit has in the cell that includes drain pan. It must be asked from UNTES for each unit.

H1 = P + 50 (in mm)
H2 = 1.5 x P + 50 (in mm)
H3 = 1.5 x P

If a unit has positive pressure side and negative pressure side siphon together, for the base height, positive pressure side calculations must be used.

3.6. Three Way Valve Connection and Connection of The Duct Type Humidity-Temperature Sensor



Should be made the electrical connections of the duct type humidity-temperature sensor which sent in the electrical panel of AHU according to the electrical project. The humidity-temperature sensor should be mounted into fresh air duct at a point as far away as possible from fresh air inlet damper of AHU.

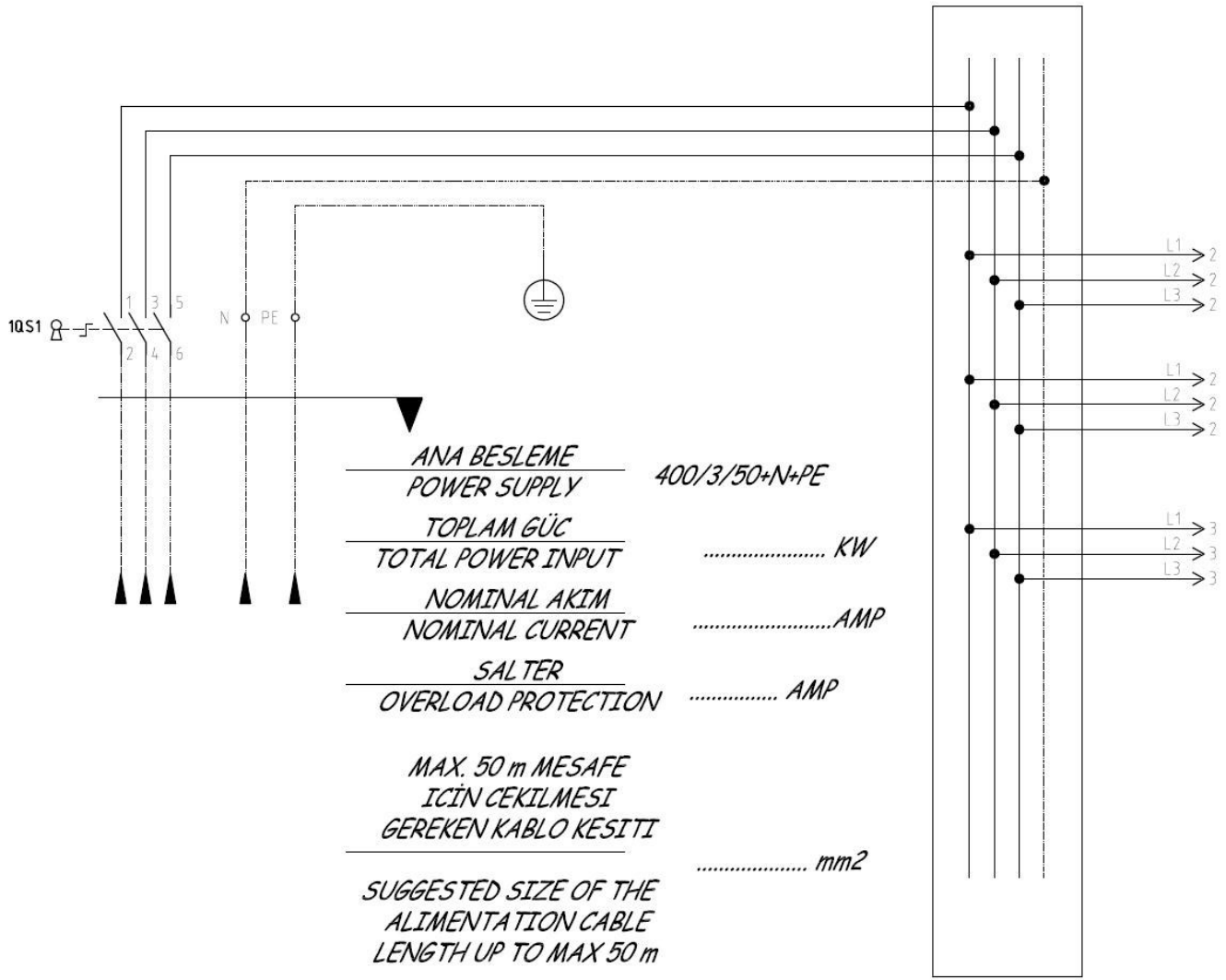
3.7. Electrical Connections and Circuit Diagram

- All electrical connections should be designed according to the national standards and EN 60204
- The unit must be earthed well.
- All *switch equipment,* cables and all other connection equipments used should be chosen and designed appropriate with the properties of the unit.
- Other than the switch on the electrical board, near the air handling unit an emergency stop switch and maintenance switch must be put according to unit electrical properties and scheme given in the instruction guide.
- At normal applications used in one speed motors directly connected. 5.5 kW and over motors star-delta connection should be done.
- The electrical connections should be made by specialists and it should be made according to electrical diagrams given in enclosure the instruction guide and drawings supplied by the manufacturer, properly. For connection problems not proper with the electrical diagram, the unit would be accepted as out of warranty.
- Thermo relay adjustments should be made as following:
  - Direct start: Thermo relay should be arranged according to the current rate defined on the motor label.
  - Star-Delta start: Thermo relay should be arranged according to the 58 % current defined on the motor label.
- Motor Clemens labels are made according to international standards. The phases are labeled as U.V.W and earth.
- Voltage value given at the label should be checked with the main supply.

- Connection details are shown at the electrical diagram which is found sticked on the connection box or in the user guide.
- The standards make it necessary to earthing all the motors properly. For this reason an earth terminal is found inside the electric panel or terminal box.
- In order to prevent the motors to over work and to work in two phases, the motors should be protected by electric circuits or magnetic breaker.
- If the motor needed to be changed for a reason, it must be change with a new motor which has the same characteristics and it must be CE marked. Otherwise it won't be in the responsibility area of UNTES Company.
- Electrical equipment that will be used for Air handling unit (thermo relay, switches, wires etc.) must be CE marked.
- The characteristics of motor are given at the end of the guide. The selection of motor is done according to formulation given below.

$N = (V \times P_T \times 1{,}21) / (3600 \times 102 \times$ ה$)$;

N= Güç (kW), V= Hava Debisi (m^3/h), P_T= Toplam Basınç Kaybı (mmSS),
55,0) imireV naF malpoT =ה– 0,70)



ANA BESLEME / POWER SUPPLY — 400/3/50+N+PE

TOPLAM GÜC / TOTAL POWER INPUT ..... KW

NOMINAL AKIM / NOMINAL CURRENT .....AMP

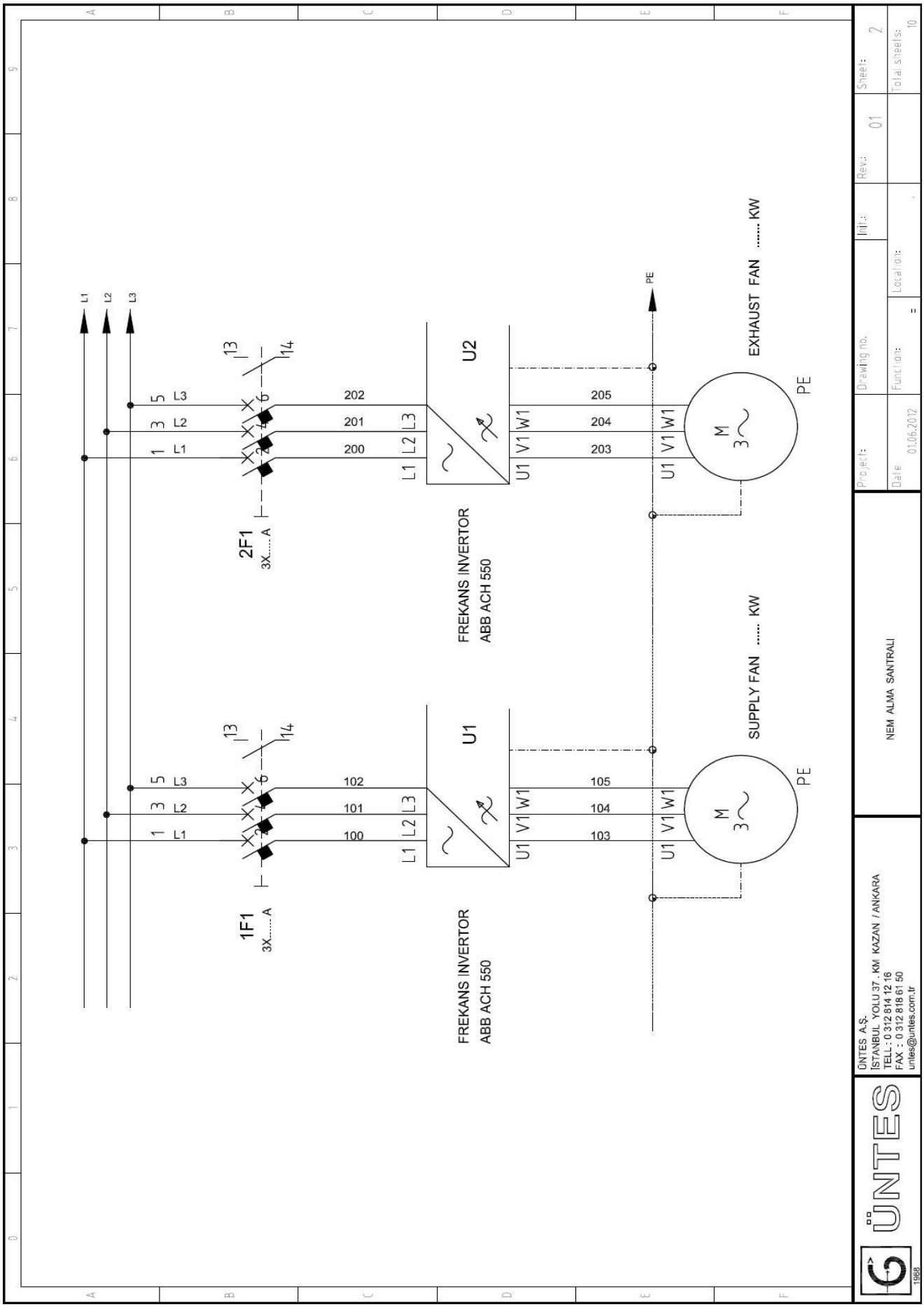
SALTER / OVERLOAD PROTECTION ..... AMP

MAX. 50 m MESAFE İCİN CEKILMESI GEREKEN KABLO KESITI mm2

SUGGESTED SIZE OF THE ALIMENTATION CABLE LENGTH UP TO MAX 50 m

ÜNTES 1968	ÜNTES A.Ş. İSTANBUL YOLU 37 . KM KAZAN / ANKARA TELL : 0 312 814 12 16 FAX : 0 312 818 61 50 untes@untes.com.tr	NEM ALMA SANTRALI	Project:	Drawing no.:	Init.: / Rev.: 01 / Sheet: 1
			Date: 01.06.2012	Function:	Location: / Total sheets: 10

ÜNTES



The other diagrams are attached.

4. THE COMPONENTS OF THE UNIT

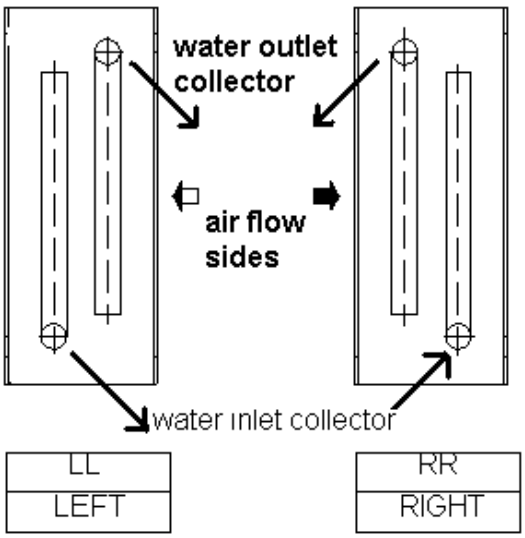
4.1. Air Dampers

- Air dampers are controlled by automatic control equipments (servomotor). Controlling the claps at the recirculation cell, do the right arrangements for the operating of the unit and fix the arm. This operation should be done after the ventilator is on and the air-volumes are measured. At recirculation air dampers, the mixing ratio of fresh air and the media is limited up to an interval of the damper. In this case please do not change the settings of the damper.
- If it is needed to operate it manually, please use the damper arm given with the unit.
- The dampers must be turned off while the unit is not working. Especially for fresh air dampers, it causes the item filters to get dirty, reduction in its ability to hold the dust and consequently non qualified climatization.
- It is recommended to make an ambient air grill, in front of fresh-air dampers in order to protect it from rain, birds and etc.

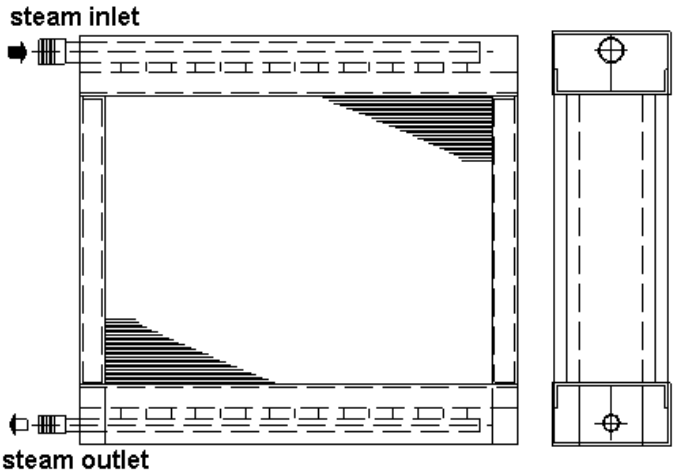
4.2. Air Filters

- Panel filters and raw filters are fixed on to the unit before the delivery.
- For the raw filters EU-3 and EU-4;
  1. Open the access door that labelled as filter and Take filter cassettes out.
  2. After cleaning the particles on the unit properly (by air in the direction opposite to the direction of air in the unit), you can wash the filter with warm water. After your filters are dried, you can put the cassette back to the unit.
  3. Do not ever squeeze the filter by bending it and keep it away from high-pressure water. If there is not an automatic system to show the contamination level of filter, it is recommended to make an eye-control on and repeat the cleaning operation described above if it is necessary. After 4-5 washing operation please change the raw filter with the new raw filters
- For all filters after cleaning or changing operation be sure that filters are installed tightly and their gaskets are placed allowing no air by-pass.
- For filters if there is an electronic cont. system, for setting point, uses the max. Pressure difference given in the following pages.

4.3. Coils

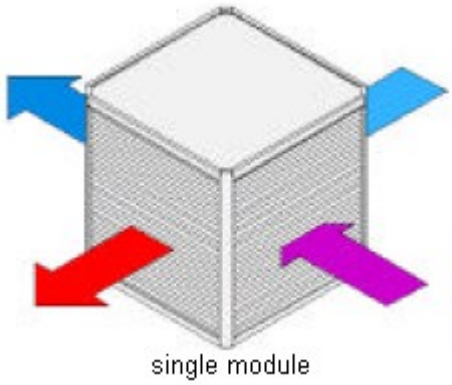


- Water heating coil is send with three way valve that controlled by microprocessor.
- All coils are controlled and tested against the water leakage. The plates are controlled also against damage. However the plates can be damaged during the delivery, concerning this probability it is better to check them before it is mounted. Unless the unit pipe connections are ready, the plastic covers on the exit of coil-pipes should not be taken off.
- Take into consider that during the settlement of the unit, piping it and other connecting processes the coil may be moved off if it is necessary.
- Since plates are made of aluminium which is a soft material, they may easily bended or crushed. This point should be considered carefully while cleaning the plates.



- To achieve the air control, the air temperature is requested to be max. 40 °C at suction part of the unit.
- In order to prevent from freezing the water entering the coil should be min. +2°C.
- The coil sides in the coils should be totally closed. The air should flow easily touching totally to the coil surface.
- At vapour batteries entrance should be from top, exit should be from bottom. Because the vapour has been transformed by the phase, the steam condenses and goes out of the battery by the help of collector.
- While mounting the vapour battery into the unit, it should be placed with a suitable slope and any problem that will cause return problem for condense water must be eliminated.
  If the side where the vapour condenses is connected to condense tank with opposite slope and during the stop if the water left on the battery comes across with vapour, “steam impact” occurs. In this case the condensed steam cannot be thrown away from the system by condense trap. When the unit starts operating again the liquid left at the battery will start a sudden expansion. This sudden pressure increase will go on till the coil pipe damages.
- At steam batteries because of the corrosive effect of vapour and the pressures occurring of expansion, pipes are established as direct as possible.
- At steam batteries high thickness pipes should be used and more than two row coils shouldn’t be selected.

4.4. Plate Type Heat Recovery Unit


single module

In the heat recovery units which are named as plated, aluminium plates are used which are shaped in a way to create different ways for the exhaust air and fresh air. Fresh air and exhaust air meet on the unit in a way that they can never mix up and there occurs a heat exchange through the plates. Cleaning of this unit is very important because, exhaust air can hold some dusts although it is filtered.

Plate heat exchanger are regularly produced out of 0,15 mm thick seawater resistant aluminium foil. To prevent dirt inside the supply as well as exhaust air should be pre-filtered.

The most common dirt and pollution are dry layers of dust which can be cleaned by using high pressure air. Stronger dirt like wet, greasy and smearing particles have to be cleaned by a high pressure cleaner and steam respectively with hot water. Single block plate heat exchangers can be easily cleaned with a high pressure steam cleaning device. Modular built up plate heat exchangers should be divided in their single blocks and then be cleaned as before. When putting the blocks together again after cleaning please make assure, that the sealing is reinstalled with professional care, otherwise leakages (air and condensate) can occur.

We advise to take a hot water – high pressure cleaning device for cleaning of plate heat exchangers. These units should have following parameters:

Nozzle : plane jet nozzle
Pressure : up to 20 bar

Amount of water	: up to 450 l/h
Temperature of warm water	: up to 70° C
Distance to the plate surface	: min. 300 mm
Nozzle direction	: 90° offset to the embossed foil
Cleaning direction	: from extract side to exhaust side

WARNING: *For very strong resisting dirt you can also use detergent (like biological detergent, washing detergents, etc). In this case you need to clean up finally with fresh water. PLEASE DO NOT USE ALUMINIUM CLEANER! THESE CLEANER CONTAIN ACID AND THERFORE ARE NOT USABLE FOR THE SURFACE OF OUR PLATE HEAT EXCHANGERS*

4.5. Fan Parts and Inverter

Fans used in the units are fans that are coupled directly by three phased motors with two poles. Electric motors are convenient motors that can operate with frequency inverters. Fans can easily supply extra pressure loss emerged from dirty filters and low flow because of their performance sloping.

Blow fans (ventilator) are normally produced with frequency inverter. With this regard, ventilator provides fixed air flow by in accordance with pressure loss change. Similarly, suction fan (aspirator) is produced with frequency inverter normally. Aspirator provides the indoor to be under fixed pressure with adjusting its cycle, when indoor pressure becomes unbalanced.

Inverter is controlled by means of the micro processor. Micro processor takes the signals between 0 – 10 V from the differential pressure switch that is positioned one end to fan suction inlet and the other end to cabin where air flow speed is nearly 0 is connected to fan suction. Micro processor measures air flow in direction with values taken from this differential pressure switch and gets set air flow by changing fan revolution when there is a difference from set air flow. This enables blow air flow to be fixed. Frequency inverter operation principles are given in “Inverter Manual” book which given with user manual.

4.6. General Structure of Direct Expansion Battery Units

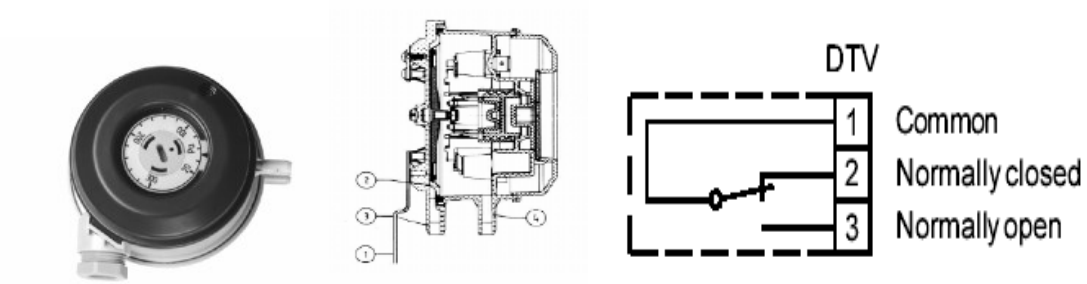
- Other models have one circuit while 200 and up models have two circuits. Cooling capacity control is generally done by means of On-Off compressor operations method. However, if system operates with % 100 fresh airs or the indoor temperature and humidity variability should be in very short intervals, it is recommended to use capacity controls equipments in the system.
- Both two circuits include compressor of its own, expansion valve and two pressure switches. Low pressure switch is in automatic reset. But, automatic reset occurs under micro processor control. To ensure the safety of reset compressor in high pressure switch it is done manually and the switch stops refrigerant circuit when it receives high pressure. In both situations, unit continues to give low and high pressure alarm.
- There are observation glass and dryer filter on liquid line.
- Compressors are used in scroll type and protection against electric waving. Additionally, it possess crankcase heater. Compressors are installed in blowing line. Batteries with direct expansion are designed as two cycled or one cycled.
- There is a double sloping condensation pan under batteries and humidification panel and pan is connected to a joint - siphon that enables drainage blocking air inlet by means of a bracket. Siphon is given with the device individually and after the siphon is placed in the appropriate height; siphon connection is made by customer. Thanks to sloping on the pan it remains unloaded during the operation of the device.

4.7. Capacity Control at the Water Heating Coil

Capacity control at the heater with hot water is carried out by means of three way valve controlled by the micro processor. Valve in the relative band carries out controlling by means of relative turning on and off. For example, when the case is that the relative band is 2 ˚C, the set point is 20 ˚C, at 22 ˚C signal 0 V (i.e. valve is turned off), at 18 ˚C 10 V (i.e. valve is turned on) and at the interval values control is carried out in the points according to the signal voltage values which are determined by the requirements.

4.8. The Usage of Differential Pressure Switches for Filter Dirtiness

Differential pressure switches are available for following of dirtiness on the pre-filter (G4) and the last-filter (F7-F9). Micro processor follows the signals coming from the differential pressure switches in accordance with dirtiness pressure values (at the below table) and gives signals on screen when overcome on dirtiness pressure. This alarm doesn't stop the device but signal persists until filters are changed.



Differential pressure switches settings of Filter dirtiness are carried out in the factory during testing according to values in table, below. If customer wants to settings with different values, they can be used. However recommended values are given in table below. To adjust the differential pressure switches upper cover is opened and adjustments are implemented by inner key. Setting value can be followed from the scale on the differential pressure switches.

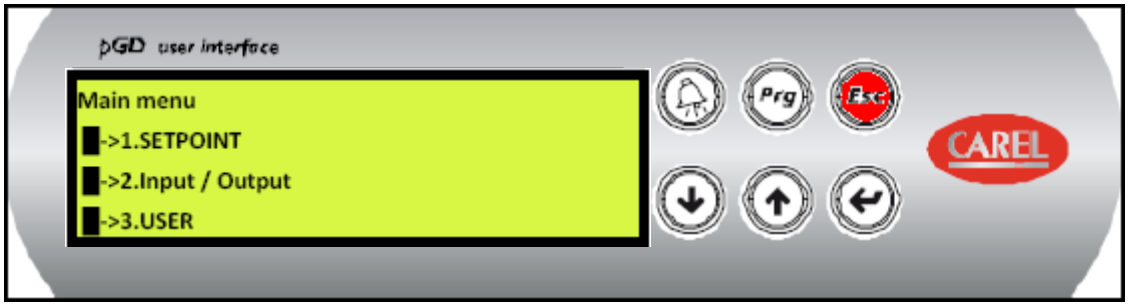
FILTER TYPE	**POSITION**	**DIRTINESS PRESSURE [Pa]**
G4 FILTER	FRESH AIR INLET	200
G4 FILTER	RETURN AIR INLET (MIXED AIR UNIT)	200

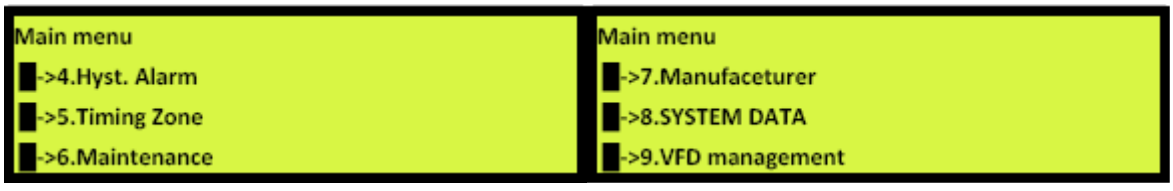
Dirtiness pressure values of filters on the device

5. DISPLAY

Alarm Button: allows you show the alarm codes and reset the alarms.	
Program Button: direct to the user home page menu	
Esc Button : provides access to main menu and transition to the previous page.	
Down Button : to move the page down and reduce the numeric values	
Up Button : to move the page up and increase the numeric values	
Enter Button : provides access to selected menu and approve the entered values	

5.1. Main Menu

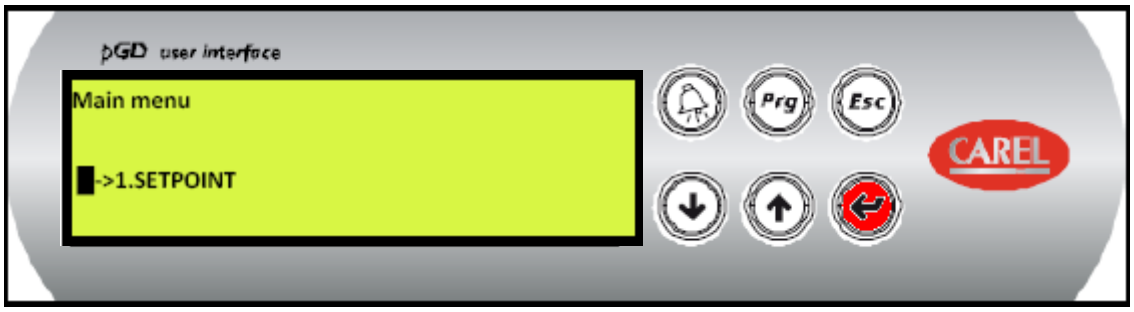




ÜNTES

5.2. SetPoint Menu

"Set Values" tab, the "Enter" key can be accessed with.



Room regulation	S1
Setpoint	:30.0°C
Differen.	:02.0°C
Neutral Z.	:01.0°C

Supply Regulation	S2
Setpoint	:30.0°C
Differen.	:02.0°C
Neutral Z.	:01.0°C

Humid. Regulation	S3
Room set.	:55.0%rH
Differen.	:10.0%rH
Neutral Z.	:05.0%rH

Reg. Pre heating	S7
Setpoint	:030.0°C
Differen	:002.0°C
Integr.time	:600s

Supp. Fan flowrate	Pw
Set-zon1	:..... m3/h
Set-zon2	:00000 m3/h
Set-zon3	:00000 m3/h

Supp. Fan flowrate	Pw1
Set-TOTL.	:..... m3/h

Airflow rate	G00
Percentage of return	
to supply	:100%

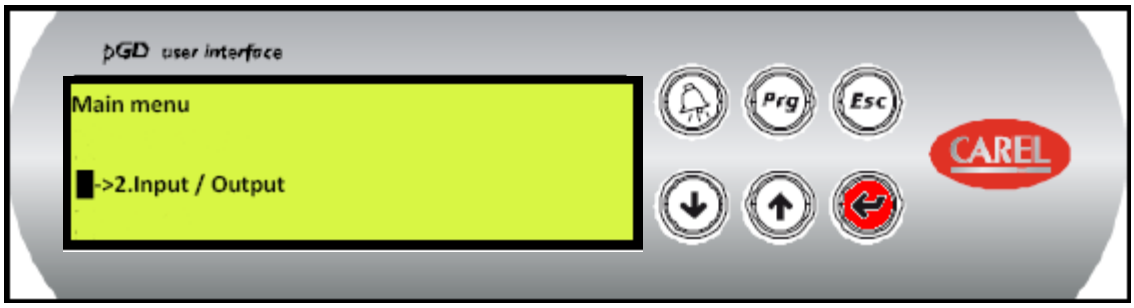
During (NCE)	Pu1
Night/clean/economy	
Van.afr ratio %	:050
Fresh air %	:000.0

During (NCE)	Pu2
Night/clean/economy	
Heat.:ON	Cool.:OFF
Post. Heating:OFF	

Kademeli Mutfak	Cs1
Dusuk D.	:00000 m3/h
Orta D.	:00000 m3/h
Yuksek D.	:00000 m3/h

5.3. Input/Output Menu

"Input / Output" satırındayk the "Enter" key provides access to.



Temperature probe I0 Room :..... C Middle :..... C Supply :..... C	Temp. Probes I1 External :..... C Ejection :..... C
Humidity probes I2 Room :.....%rH Supply :.....%rH External :.....%rH	Pressure probe I4 Supply :.....Pa Room :.....Pa
Pressure probe I4a Supp.free :.....Pa Retr. free :.....Pa	Digital input *A*I9a (C=close O=Open) 1 : OOOOO OOOOO :10 11 : OOOOO OOO :18
Digital input *B*I9b (C=close O=Open) 1 : OOOOO OOOOO :10 11 : OOOOO OOO :18	Analog Output Ia Valve Heating :....%
Analog outputs Ic Post-heating valve :....%	Damper Outputs Id External :....%
Damper outputs Id1 Middle (dehum.) :....%	Analog output Ie Fans Supply :....% Return :....%

Analog output	Ig1
Compressor1	:....%
Compressor2	:....%

Analog output	Ig2
Condenser1	:....%
Condenser2	:....%

Analog Output	Ig3
Hot Gas By-Pass valf	
HGBP valf1	:....%
HGBP valf2	:....%

Digit. Outputs	*A*Iha
(C=close O=Open)	
1 : OOOOO OOOOO	:10
11 : OOOOO OOO	:18

Digit. Outputs	*B*Ihb
(C=close O=Open)	
1 : OOOOO OOOOO	:10
11 : OOOOO OOO	:18

Refr. Press.Probes	Ij
Refrigerant Circuit1	
OutD. Pres.1	:..... Bar
OutD.1Te/Tc	:..... C

Refr. Press.Probes	Ik
Refrigerant Circuit1	
InD. Pres.1	:..... Bar
InD.1Te/Tc	:..... C

Refr. Press.Probes	Ij
Refrigerant Circuit2	
OutD. Pres.2	:..... Bar
OutD.2Te/Tc	:..... C

Refr. Press.Probes	Iu
Refrigerant Circuit2	
InD. Pres.2	:..... Bar
InD.2Te/Tc	:..... C

5.4. Displaying Alarm History

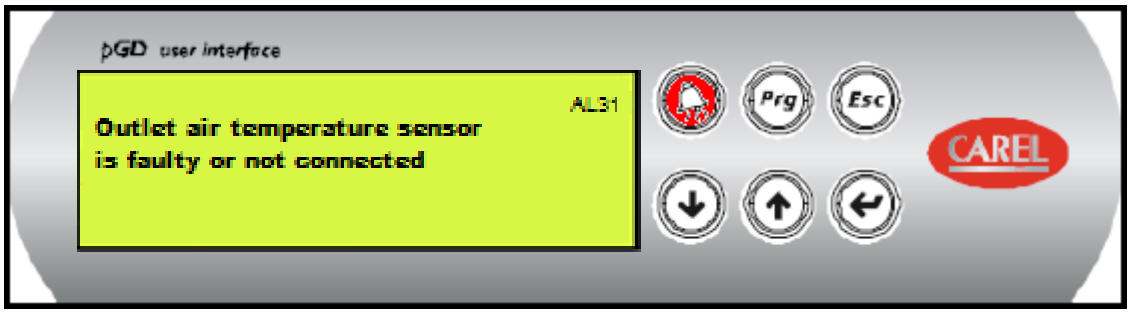
"Alarm histories" tab, the "Enter" key provides access to

Digitals Outputs	J0
Fan	
Supply. T1	:A01
Supply. T2	:A00

Digitals Outputs	J1
Fan	
Return T1	:A02
Return T2	:A00

5.5. Alarm Views

Display of alarms that at the moment using the alarm button is provided.



6. ALARM CODES

KODU	ALARM
AL00	No active alarm
AL01	Digital access of supply air flowswitch
AL02	Digital access of return air flowswitch
AL03	Dirty filter/s
AL04	Dirty filter/s
AL05	Thermal ventilator fan alarm
AL06	Thermal aspirator fan alarm
AL07	Thermal alarm of compressor 1
AL08	Thermal alarm of compressor 2
AL09	Thermal alarm of heating pomp
AL10	Thermal alarm of cooling pomp
AL11	Thermal alarm of heater
AL12	High pressure presostat alarm of compressor 1
AL13	Low pressure presostat alarm of compressor 1
AL14	High pressure presostat alarm of compressor 2
AL15	Low pressure presostat alarm of compressor 2
AL16	Humidifier alarm from digital input
AL17	Fire / Smoke alarm
AL18	IGK (recuperator) dirty filter alarm
AL19	Door switch alarm
AL20	Direct expansion alarm from digital input
AL21	Freezing alarm
AL22	Ventilator pressure sensor is faulty or not connected
AL23	Aspirator pressure sensor is faulty or not connected
AL24	Outlet humidity sensor is faulty or not connected
AL25	Supply temperature sensor is faulty or not connected

AL26	Room temperature sensor is faulty or not connected
AL27	Room humidity sensor is faulty or not connected
AL28	Setting compensation sensor is faulty or not connected
AL29	Freeze temperature sensor is faulty or not connected
AL30	Egzoz temperature sensor is faulty or not connected
AL31	Outlet air temperature sensor is faulty or not connected
AL32	Air quality sensor is faulty or not connected
AL33	VOC+CO2 Air quality sensor is faulty or not connected
AL34	Pre heater sensor is faulty or not connected
AL35	Outlet humidity sensor is faulty or not connected
AL36	Defrost temperature sensor is faulty or not connected
AL36	Defrost 2 temperature sensor is faulty or not connected
AL37	Measurement alarm compressor 1
AL38	Measurement alarm compressor 2
AL39	Measurement alarm ventilator
AL40	Measurement alarm aspirator
AL41	Clock card is error or not connected
AL51	Digital inlet general error
AL52	Supply air flow sensor, analog input
AL53	Return air flow sensor, analog input
AL54	Alarm on DX system
AL55	Thermal alarm on last heater
AL79	Enter the registration code in 000 hour, system will be stoped
AL80	Air flow is lower than setting point
AL81	Energy problem
AL82	Damper error
AL83	1. circuit outlet pressure probe is faulty or not connected
AL84	1. circuit inner pressure probe is faulty or not connected
AL85	2.. circuit outlet pressure probe is faulty or not connected
AL86	2. circuit inner pressure probe is faulty or not connected
AL87	Temperature probe is faulty or not connected
AL88	Compressor1 inner protection error
AL89	Compressor2 inner protection error
AL90	Condenser 1 error
AL91	Condenser 2 error
AL92	Expansion valve 1 error
AL93	Expansion valve 2 error
AL94	Oil pressure 1 error
AL95	Oil pressure 2 error
AL96	Comunication problem with second PCO

7. CLEANING and MAINTENANCE

7.1. Maintenance of Dehumidifier Unit

A protective maintenance program is an effective part of security program. The maintenance job should be done by expert personnel. Do not try to make any kind of maintenance activity before the electricity is cut and fan security is supplied. In general standard dehumidifier units do not require special cleaning and maintenance activity except the routine one. The maintenance period changes according to working conditions. The main sections that require periodic maintenance are air filters, humidifier pool. The below maintenance program is advised.

7.1.1. Once a Month

- Check the water flow from drainage pipe.
- Check the isolation situation of entrance door's hinges, if necessary grease the hinges.

7.1.2. Once In Six Months

- Check the working current of the motor.
- Check the fan and motor bearings' temperature and noise level.
- Check the operation of automatic control equipment.
- Check the condensing plate U siphon and the drainage line.
- Check the warm hot water or vapor pipe system's condition. Add chemicals if necessary.

7.1.3. Once a Year

- Check the filter frame isolation and change the filter.
- Check the coils and the wings. If necessary clean with sprayed water.
- Evacuate the air inside the coils.
- Check the motor and fan roller's oil.
- Check if dampers are working.
- Check if doors can be opened easily and the lock system is working
- Check the situation of valves and fittings at piping system.
- Check all wires, control and isolation items, terminal connections.

Notice: *In case any part is to be changed, refer to the related section of the user guide and make the necessary applications according to working conditions.*

Consult to the relative part of the guide about greasing the rollers.
To take off the coil for maintenance and cleaning purposes apply the below operations when it is necessary.

- Discharge the water in the coils.
- Separate the coils from pipes.
- Take off the side panels.
- Take off the bolts fixing the coils.
- Take off the coils.

In order to find other leakages at the coil apply the below operations:

- Clean the coil surface and the wings.
- Full the coil with water. (preferred under pressure)

- Determine the leaking place.
- Unload the water.
- Close the crack or the hole determined by welding if it is possible.
- If the welding is not possible apply to the manufacturer
- Check if the weld is successful by water again.
- To install the coil back fallow the instructions from reverse

7.1.4. Changing Filters

- The maintenance of the filters should be made at the planned time. Dirty filters may decrease the air – flow and consequently the capacity. The maximum pressure differences recommended for different types of filters are shown in the figure as below. If you see these values in manometer the filters should be cleaned or changed these values should not be exceed. Synthetic or metal filters can be washed or cleaned.

Pressure differences for pre-filter

Filter Quality	Initial Pressure Difference	Maximum Pressure Difference Advised
EU-3	40 Pa	140 Pa
EU-4	50 Pa	140 Pa

Periyodik kontrollerde aşağıda belirtilen noktalar da kontrol edilmelidir;
The following points should be checked in periodic checks:

- The isolation material used in heat and sound isolation
- Cable isolation
- Control panel Electrical cables and other electromechanical parts
- Metal and collared surfaces
- Connection elements like screw nuts and washers

7.2. Equipments to be Used In The Course Of Cleaning Process

During the cleaning of the devices both solid wastes (removed dirty filters, operator clothes, worn belt (if exists) etc.) and liquid wastes (washing and rinsing water wastes) can be generated.

Solid wastes should be thrown away with the solid wastes after they are put in the leak proof containers. Differently, liquid wastes will be thrown away by the liquid waste system of the air conditioner device. This system should be connected to liquid waste system of the hospital beforehand.

7.2.1. Cleaning Method

Dehumidifier units may get damaged when it is exposed to high temperature and intense water because it consists of electronic parts (Electric motor, micro processor, sensing elements etc). Additionally, refrigerant system may get damaged under the intense pressure.
Required water and disinfection for the disinfection process should be used by atomized. Rinsing operation also should be carried out in this way. After that wastes should be sent to drainage system as liquid waste. Atomized water can be provided by atomizer equipments. Water added ammonium chloride in %4 proportions can be used as atomized in the cleaning and washing operation. Instead of ammonium chloride, other equivalent chemical products can be used.

We can analyze hygienic air conditioner pack in three main parts:

7.2.1.1. Cleaning Procedure of the Working Parts

Inner surfaces of the working parts are always in contact with outer air and operation room air (for devices with mixed air). Although there are filters in the unit and inlet of the outer air, this contact results in multiplication and placing of the micro organisms in the inner parts of the devices.
So, these surfaces should be regularly cleaned and disinfected.
As long as responsible technicians don't say opposite, cleaning and disinfection should be done every months not considering whether the device is operating or not. This is carried out as long as there is no operation which causes micro organisms to multiply (Especially for devices mixed air). In this case, cleaning and disinfection should be done except regular cleaning.

Before start cleaning and washing operation, if it is needed, heating and cooling batteries can be removed from their places to increase the productivity of the process. Hot and cold water valves should be closed to execute the removing operation. In this way the batteries are isolated from the water circulation system. This can be done by means of removing screws that connect battery to the unit and by being slipped on slipway it is on. In this way, like other units batteries can be cleaned and disinfected easily.

Cleaning and disinfection procedure should be executed in the way below:

- Make sure that you have all required materials and spare filters.
- Stop the unit and cut off the electricity by switching off the main switch and service switch.
- Put a warning on the electric panel stating that device is taken to service and electric switch shouldn't be switched on.
- If they are gotten dirty, remove the gross filters in the fresh air inlet and throw away according to solid waste extermination procedure.
- Filters should be removed from the device (G4 quality filter at the returning air, G4 quality filter on the inlet air). Removed filters should be put in a closed isolated box and should be exterminated according to solid waste extermination procedure of the hospital. Spare filters should be jointed later. Otherwise they may get damaged and dirty in the course of cleaning and disinfection.
- Removed the drop holdings.
- Wash and disinfect completely the working parts of the returning side by means of a hand atomizer of %4 ammonium chloride solution in accordance with the order in the below.
  - (For mixed air devices) the air exhaust damper
  - (For mixed air devices) the returning air fans. Make sure that the fan motor is wholly cleaned by turning it with hands. Don't forget to open the drainage plug under the fan.
  - (For mixed air devices) solution is sprayed from the top and front of the heat recovery battery (if exists) at the air returning side and spraying process persists until solution flows at the back bottom.
  - (For mixed air devices) all pipes in the cabin,
  - (For mixed air devices) the heat recovery pump (if exists),
  - (For mixed air devices) the returning air damper and damper flanks,
  - (For mixed air devices) The area between filter and damper,
  - (For mixed air devices) Filter case of circulating air,
  - (For mixed air devices) all lateral walls of department on condition to begin from the top.
  - (For mixed air devices) Base drainage pan of the returning air cabin

- Rinse the working parts of the returning side that have fulfilled their cleaning process spraying with sterilized water in pulverized way. Rinsing process should be carried out in the same sequence stated in the above that is washing process sequence.
- Wash and disinfect completely the working parts of the blowing side by means of a hand atomizer of %4 ammonium chloride solution in accordance with the order in the below.
  - Body and flanks of the outer air damper
  - The area between the outer air damper and the filter.

  - Case of the outer air filter
  - Solution is sprayed from the top and front of the heat recovery battery (if exists) at the air blowing side and spraying process persists until the solution flows at the back bottom.
  - All pipes in the cabin.
  - Drainage pan of the heat recovery battery at the blowing air side (if exists).
  - At all cooler and heater batteries, solution is sprayed from top and front side of the battery and spraying process persists until solution flows at the back bottom.
  - (For mixed air devices) Body and flanks of mixed damper
  - All lateral walls of the department on condition to begin from the top.
  - Base drainage pan of the returning air cabin.
  - The working parts of the blowing side that have fulfilled their cleaning process spraying with sterilized water in pulverized way. Rinsing process should be carried out in the same sequence stated in the above that is the washing process sequence.
- Clean the returning air fan and the fan cabin. Make sure those fan motors have been cleaned in all by turning it with your hand. Don't forget to open drainage plug under the fan.
- Rinse the fan and fan cabin that have fulfilled their cleaning process spraying with sterilized water in pulverized way.
- Humidification cabin
  - All pipes in the cabin
  - Drainage pan
  - All inner walls beginning from the top
  - Bottom base
  - Rinse the humidification cabin that has fulfilled their cleaning process spraying with sterilized water in pulverized way.
  - Wash and disinfect drop holdings taken out by being removed.
- Install all drop holdings and batteries into their places if they have been removed.
- Install new filters into their correct places at the unit.
- Make sure that all inner parts have been dried.
- Provide electric connection by lifting the main switch and service switch.

7.2.1.2. External Cleaning Procedure of the Unit

Just clean the external surface is enough because of the painted surface.

- Disconnect the electricity by turning the main switch off also close the service switch on the unit.
- Put a notice on the main switch saying that unit is under maintenance.
- Clean the frame work with an alcoholic solution (or with any other chemically equivalent solution) by sprinkling it on the surface, and remove it with a clean cloth wiping firmly. For no reason the framework shall be cleaned with solvents (acetone, benzene, petrol, Trichloroethylene, etc…) or with powers or abrasive creams which might damaged it. After cleaning the cloths used for cleaning the unit must put in to hermetically sealed container and then must be disposed with the waste of the hospital.

After cleaning connect the electricity again by turning the main switch and service switch on.

8. SECURITY and WARNINGS

Dehumidifier units are produced appropriate with the standards TS 2000, IEC 335-1, EN 60204-1 and according to the conditions of European Community Directives LVD 73/23 EEC, EMC 93/68 and EMC 93/68 and they have CE mark on.
The moving parts inside the unit like fan motor pump etc. and the electrical parts and hot parts (hot water and steam coils, pipes and control elements) are accepted to be dangerous regions. In order to work in these regions the necessary equipment and protection should be used.

Air handling unit are used for heating, cooling and ventilating other air conditioning reasons. Using them for other purposes is considered to be non-rule usage. In such cases the manufacturer would pretend no responsibility.

NOTE: *Standard units cannot be used during the discharge of combustible and flashing gases. In such applications moveable parts like fan and motor should be chosen exproof.*

- To start-up and installation operations of the unit should be appropriate with the standards of the user's country. It is user's responsibility to obey the laws and the standards. The user should keep away from any behavior that would cause danger.
- It is absolutely forbidden to make a change on the unit either by the user or by the operator. Any damage that reasons from such a change would be considered out of warranty.
- The unit should be run by only authorized personnel with the necessary precautions taken.
- The user or the operator never should take off or turn off the items used for security. If they are put away for maintenance reason, they should be replaced after the maintenance and their function should be checked.
- During any kind of maintenance, the electricity should be cut off.

8.1. Product Identification Labels

8.2. Warning Labels

ATTENTION!
CONNECT UNIT'S DUCTS WITH CANVAS

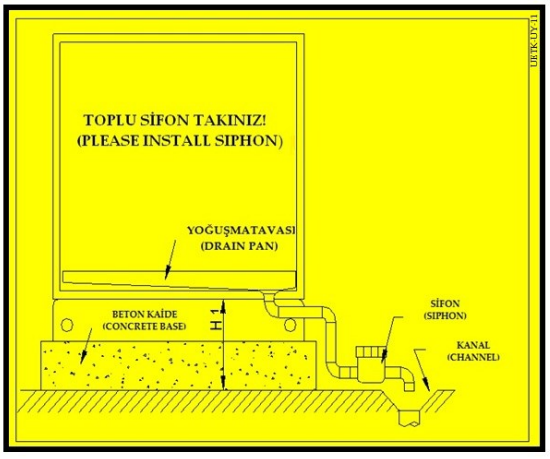
UYARI/WARNING

Drenaj bağlantısı yapılacaktır.
Please connect to drain system.
Toplu sifonlarla aynı hatta bağlamayınız.
Never connect to same drain system with siphon.
Fan sonrası ve öncesi giderleri ayrı ayrı gruplayınız.
Connect the drains on (+) pressure side and (-) pressure side separately.
Drenaj hatları sonunda toplu sifon giderleri hariç vana bulunmalıdır.
Use valve at the end of drain pipe (except siphon pipe)

UETK-UY-01

DİKKAT!
KAPIYI AÇMADAN ÖNCE FANI DURDURUNUZ.

ATTENTION!
BEFORE OPENING THE DOOR, THE FAN MUST BE STOPPED.



UYARI/WARNING

Filtre değişimi ve cihaz temizliği sırasında kullanım kılavuzunda tavsiye edilen kişisel koruyucuları kullanınız.

Use personal protective equipments mentioned in user manual certainly during filter change and unit cleaning.

UYARI/WARNING

Cihazı devreye almadan önce montaj, devreye alma, bakım ve kullanım kılavuzunu okuyunuz.
Read installation, start up , maintenance and user manual completely and carefully before starting the unit up.

Sistemin montaj ve işletmesini ehliyetli personele yaptırınız.
Make the operation and maintenance by authorized personnel.

Cihaz kanal bağlantılarını branda ile birleştiriniz.
Connect ducts with canvas.

Cihazın elektrik bağlantılarını kılavuzunda belirtilen şekilde kalifiye personele yaptırınız ve mutlaka topraklı hat kullanınız.
Please make machine's electrical connections by qualified personnel as defined in user manual and use earth circuit for electrical connections.

Cihaz beyan gerilimine uygun olarak şebeke gerilimini kontrol ediniz.
Check out the voltage conformity in accordance with the voltage declaration in instructions.

8.3. Training of the Personnel

Only the educated personnel are authorized to do install, start-up and maintenance activities. These personnel should get help from technical service of production firm or they should have at least 10 years of experience these personnel should be informed of the following dangers by the user or the owner.

-Electrical connections -Piping -Duct connections -Start up
-Maintenance

For the permanence of the warranty the control and maintenance responsibilities should be accepted and obeyed.

8.4. Preventing from General Dangers

These units are produced according to the 89/392/EEC directives.

In the air handling units Cells that contains fan and motor are designed with two access door. One is just controlling the fan by eye and can easily be open by hand and the other is to maintenance that is needs tools to open. In this way user are protected from any kind of danger. Also cell contains electrical labels.

- Hot water or vapour coil entrances are labelled with the label that shows hot surface. Also steam humidifier sections have the same label.

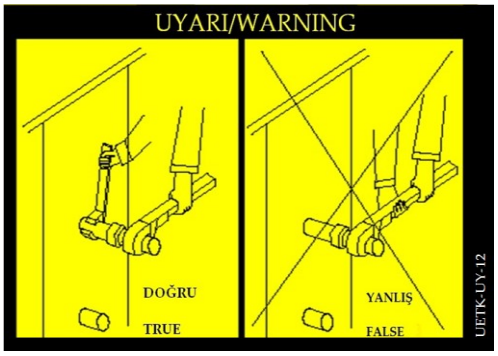
8.5. Recommended Security Applications

- Fan inlet and outlet protections: If the unit fan outlet will be connected to duct, the supply side of the fan won't have any protection guard. Otherwise the fan outlets are to be left opened it is used a protective cage. On the suction side of the fan, on the unit a protection and service door is used not to reach easily to the dangerous parts of fan.
- During the maintenance and repairing activities the technician should cut the main energy supply also the service switch must be closed.
- The entrance of rain and snow inside the unit should be prevented.
- The drainage pipes should be connected directly to the sewer system.
- The damper should be commended automatically.
- In every 3 or 6 mounts the periodical maintenance should be made.
- No water should be formed or enter to the fan sections.

8.6. Unforecasted Dangers

- In addition to moving parts, fans ability to suck various materials creates another kind of potential danger. As those materials passing through the fans are ejected out dangerously by the fan, they create a danger. Hard materials can cause damage on fan wings. The protection cages replaced at fan mouths should protect the fan any particles that might enter in so the cages should be chosen with attention. If the protection will be put away, the energy should be cut and locked.
- The doors of the unit and the ducts should not be opened while it is about to stopping or working. The energy should be cut before the entrance of fan section or duct section.
- Opening the door at the positive pressure side of the unit, be careful against the probability of the crash.

- At the suction part of the unit, be careful against the probability of pull.
- In some cases the stroboscopic effects of the light would show the fan as if it is stopped.
- Noise level: Under normal circumstances the noise level arising from air handling unit does not exceed 80 dBA. (Duct connections made and service doors are closed)
- Under forced circumstances depending on acoustic conditions of the room, the noise level might create danger for human health. Earphone should be replaced if it is possible to face with noise more than 85 dBA.



8.7. Start-Up

- Assure that all parts of the unit are cleaned well. There may be left remaining of duct isolation or stripes etc.
- Be sure that any kind of protection and security nits are existing with the materials they belong too.
- At the first start-up, to clean up the dust cumulated, demontage all the filters and put on low efficient filters which can be thrown away. After this operation, install the main filters. This way we prevent the filters to get dirty at the first use.
- Check if there are leakages at the pipe connections of the coils. Assure that all of the air at the system of the coil is given out. Check if there is any remain part is left on the coil. Control the inlet-outlet valves of the liquid of the heating and cooling parts; turn on cooling valves if it is summer, heating valves if it is winter.
- Assure that all panels are at their place and all service doors are closed.
- Put some water on the condensing plate and control that it goes into the drainage easily.
- Check the belt of the aspirator and the ventilator if it is tight enough or not and check the rolling and friction with your hand by turning it a few times.
- Check the cloth of the flex joint and tight it. If there is any situation that may cause leakage repair it.
- Check if appropriate phase of electricity line is established and appropriate connection to the motor (star delta or delta-star) is made.
- check the pulleys that are fixed on the shaft and belts are tight enough
- Check if the fan and motor pulleys are moving on the same axis.
- Check the rotation direction of fan by giving energy to the motor for a short time.
- Check the air damper positions and fix them. For this purpose you must turn on the unit and measure the air amount first.
- The most common break-down reason of motors and fans is over air-flow against because of the system pressure losses lower than calculated. In order to solve such a problem, at the beginning main system damper should be closed partially and should be opened when it reaches the right air flow.
- Check if the flexible connections are made properly and if they are without any damage .Assure that the duct connections are made according to the engineering standards and producer’s requirements.
- Check the setting of thermal excessive load relay.

- Give electricity and supply the fan to reach the full speed. Check carefully the articles below.

  - Excessive Vibration
  - Extra ordinary noise
  - Competence of belt driven axis.
  - Motor current and voltage values

- Stop the fan after you are sure that there is no problem then restart the fan.
- Check the motor current and if it is suitable with the value of the label on the motor.
- Control the in-out temperature of the coils and arrange the water/vapor flow according to this value. Control if control tools are functioning.
- Set the thermostat and check if the heating coil is working.
- Control the pressure at the filters and be sure they are between limits.

8.7.1. After 2 Weeks of Operation

After the start-up and working process of 2 weeks the below controls should be made:

- The working current of the motor.
- The temperature of bearings should not exceed 70° just after the stop. If it is needed grease the bearings.
- Filters contamination level.
- In order to see the flow make condensation and drainage.
- Working condition of the automatic control tools.

NOTICE: *Search if there is any change at the fan you can see the problems the probable reasons of these problems "breakdown solutions". During your periodical observations, keep in touch with Production Company or with other consultants. If excess vibration is observed; stop the fan till the problem is over. As it can cause unbalance and tiring of fan, be careful not to leave any material on the fan. Any change at fan sound level might show that it is necessary to solve a problem. If the motor temperature is high check the cooling fan of the motor. It can be broken or locked. You must also measure entrance current of motors. An increase of the current would indicate serious changes at the temperature of bearings are caused by wrong greasing usually. If you can not understand where the problem arises from, call the experienced personnel.*

8.8. Control of Electric Parts

Power circuits should be checked and coherency of the voltage levels should be confirmed before beginning to the operations like start-up operation. After then, make sure that all screws on the terminal are strictly tightened. This is also valid for the other equipments operating connectedly to the same control terminal.

That voltage label value is in ± %10 tolerances should be checked by the help of a voltmeter. Another important factor is the control of the rotation direction of the fans. Whether fans are rotating in the correct way should be controlled by giving electric to fans. Otherwise, by replacing two phases in the fan electric connection, the correct rotation of fans should be provided. This should be checked in each change in the electric connection.

Whether the current value that is pulled by fans is not above the level of the values given in the electric schema should be controlled before activating to the compressors. If pulled current values are above the limit values, mechanic operation conditions of the fans should be controlled and probable problems should be solved. After then, when the compressors are started-up, whether currents pulled by compressors are not above the limit values should be checked particularly.

There exist phase sequence and phase keeping relay in the units with the scroll compressor. Led on the phase keeper relay at the panel will light up in green colour in the event of correct connection of the phase sequence and the correct connection of all

phases. Otherwise it doesn't light up and doesn't permit the system to operate. In this situation, phase connections should be controlled if it is not mended phase sequence should be changed. Never phase keeper relay should be bypassed. Otherwise compressor will be seriously damaged. This case is considered as an operator error and is out of the guarantee.

8.9. Control of Refrigerant Circuit Operation

Approximately four hours before the start-up operation, switch on the device supply line should be switched off (with electric). In this way electric is given into the oil crankcase heater and provided that the refrigerant fluid mixed in the oil is evaporated. This prevents any damages resulting from entering of the liquid fluid into the compressor at the first operation. This process should be repeated in the each start-up operation after the periods when device is exposed to long electric cuts. Electric of the device is not cut in the normal operation conditions.

Any damage related to this matter is considered as an operator error and is out of the guarantee.

After this process, firstly open all the valves on the blowing and suction line of the compressor to start-up. Additionally, if it is available in the system open the other valves seen at the liquid tank and circuit schema. From this moment, you can operate the device by pushing the "on" button on the micro processor. After first 15–20 minutes whether the equipments on the refrigerant circuit are operating regularly or not should be checked. For this purpose, control processes in the below should be carried out;

- Gas charge condition in the circuit
- Evaporation pressure
- Condensation pressure
- Extra heating in the suction line (super heating)
- Extra cooling in the liquid line (sub cooling)
- Dirtiness condition of the filters in the fluid line
- Compressor consumption power
- Operation condition of the high pressure switch
- Operation condition of the low pressure switch
- Compressor operation temperature

If we detail these matters;

8.10. Gas Charge Condition in the Circuit

This is the first control to be carried out in a refrigerant circuit. If gas charge amount in the system is not correct any measurements to be executed in the other parameters does not mean anything. It would be enough to observe through observation glass placed on the liquid line whether there is a bubble or not in the gas to control the gas charge. If gas charge is not adequate there will appear bubbles in the liquid (This should be taken into consideration also that excessive gas charge state is not measured in this way.). If there are bubbles in the liquid these means two things. Gas amount may not be enough or there is a gas leakage in the system. If there is an inadequate charge, an amount of charge should be added. If the bubbles are reappearing with time in spite of the gas charge it means there is a gas leakage in the system. In this case leak detection is executed by soap and leak will be repaired.

And also, in the normal conditions, chromatic indicator in the observation glass is green coloured. If the moisture is mixed in the gas, indicator turns into yellow. In this case gas and dryer in the system (dehumidification filter) should be changed.

8.11. Evaporation Pressure

To control this condition, a manometer the last pressure value of which is 8 bars in its scale should be installed to the ¼" diameter service valve at the suction side of the compressor and whether the valve is open or not should be controlled. Evaporation pressure and temperature in the units is generally high. So, if low evaporation temperatures (or pressures) are read, this may have different reasons. In these cases required precautions should be taken with the help of problem determining tables.

8.12. Condensation Pressure

To control this condition, a manometer the last pressure value of which is 30 bars in its scale should be installed to the ¼" diameter service valve at the blowing side of the compressor and whether the valve is open or not should be controlled.

In a regularly operating environment, the condensation pressure should be stabled as far as possible. Low condensation temperature will cause low evaporation temperature and accordingly extra cooling and extra dehumidification will be seen. Additionally, high condensation temperatures will reduce productivity of the refrigerant system and will be caused high electric consumption.

So, condensation temperature is tried to stable around 45–50 ˚C in the operating conditions. This is preferred approximately 15 ˚C more than the outdoor air temperature. For instance, if outdoor air temperature is 30 ˚C, the condensation temperature is preferred as 45 ˚C. This is determined in the course of the condenser selection. It is very natural that the condensation temperature will be inevitably increased while the outdoor air temperature is in the higher values.

8.13. Extra Heating in Suction Line (Super Heating)

Gas exiting from the evaporator and entering into the compressor is in an extra heated condition in the evaporation pressure. The extra heating amount in a regular refrigerant system (the difference temperature between the gas entering into the compressor and exiting from the evaporator) is between 4–10 ˚C.

If extra heating is above 10 ˚C;

1. This means that the expansion valve may be too tightened or defective. Expansion valve adjustment should be carried out. This adjustment should be done by professional personals.
2. Gas charge may be low.
3. Air inlet may be too hot.

If extra heating is below 4 ˚C;

1. This means that the expansion valve may be too opened or defective. Expansion valve adjustment should be carried out. This adjustment should be done by professional personals.
2. Air filters may be dirtied or may be plugged by means of the dirtiness of the battery air passage way.
3. There may be a defective with the fans.

8.14. Extra Cooling in the Liquid Line (Sub Cooling)

Extra cooling is in the condensation pressure coming out of the condenser. However its temperature is below the condensation temperature and this temperature difference can be called as extra cooling (sub cooling). This temperature difference can range from 2 to 8˚ C.

- ❖ If extra cooling amount is below 2 ˚C, it means that condenser is not getting enough heat from the refrigerant fluid.
- ❖ If extra cooling is above 8˚ C, it means that fluid charge is too much.

8.15. Dirtiness Condition of the Filters in the Liquid Line

A filter on the fluid line is vital for the units. If any dirtiness, filthiness and debts that can remain in the gas lines in the course of installing or at the factory environment enters in the compressor, it can cause permanent damages at the compressor.

Regular control and clean of this filter is required. A resistance occurs in the gas flow direction in the event when filter is installed and this resistance can cause early evaporation of the gas and decreasing capacity. This case is observed in the way that bubbles occur in the observation glass and small differences appear between the filter inlet and outlet temperature.

8.16. Absorbsion Power by the Compressor

The power (or current) that pulled by the compressor should be measured from related contactor on the panel during the operation and whether it is above of the limit values given in the documents or not should be controlled.

8.17. Operating Condition of the High Pressure Switch

Connect a pressure sensor the last pressure of which is 30 bars to the ¼" diameter service valve at the blowing side of the compressor. Stop the condenser fans during the operation of the device and follow pressure increasing on the pressure gage. In 1 bar value low pressure switch should be stopped the compressor. Immediately switch off the device if it reaches 25 bars value and the compressor does not stop then control the high pressure switch. If adjustment point is correct, pressure switch may be defective. Don't operate the device unless changing this pressure switch.

8.18. Operating Condition of the Low Pressure Switch

Connect a pressure sensor the last pressure of which is 8 bars to the ¼" diameter service valve at the blowing side of the compressor. Close the valve on the suction side of the compressor during the operation of the device and follow pressure increasing on the pressure gage. In 24 bars value high pressure switch should be stopped the compressor. If it has stopped, open the valve again and the compressor should be restart to operate when it reaches 2,5 bars value. If it reaches 0,7 bar value when the valve is closed stop the device immediately and control the low pressure switch. If adjustment point is correct, pressure switch may be defective. Don't operate the device unless changing this pressure switch.

During the period of restarting of the compressor there will be a delay for 180 seconds.

8.19. Compressor Operating Temperature

The temperature on the top of the compressor have to be around 60–70 ˚C in the normal conditions. This temperature is 20–30 ˚C on the bottom. If temperature is below the level of these values and there is a condensation on the top of the compressor, this means that the temperature of gas returned to compressor is very low. This generally appears when there is a liquid return to the compressor. This case occurs generally when superheating temperature is below the required value. For this purpose, expansion valve adjustment should be controlled. (Section 4.13 extra heating in the suction line (Super heating)

The temperature in the compressor blowing side is 50 ˚C or above, this means expansion valve is supplying inadequate gas transition to the evaporator, this problem must be solved by the expansion valve settings.

Expansion valve settings should be carried out by professional refrigerant personals. Any damages related to these adjustments are considered as an operator error and is out of the guarantee.

9. SERVICE and SPARE PARTS

When technical service is required, our technical service management acknowledges the user about what to do and expertise personnel is charged to check whether the necessary operations have been done or not. If the check result is OK, the expertise personnel makes up the start-up and gives the necessary technical training applied to the user. After the selling, according to lows 2 year warranty starts. All technical service and spare parts requirements can be providing during 10 years with fee.

Other external subjects to warranty are described at start-up, maintenance and installation instruction.
If there is request of technical service for products after their warranty period, pre-discovery, service operations, substitute elements, transportation costs, general costs etc. subjects comes up to a decision after mutual communications.

If there is request of periodical maintenance, the frequency of the maintenance, payment conditions, and the sections to be maintained are decided and put into the agreement by the mutual agreement. If those parts to be maintained are not specified in the agreement, the maintenance is done on the points defined by the instruction guide. Periodic maintain madden by technical person can be increase unit's performance.

ÜNTES

10. MOTOR INFORMATION

PERFORMANCE

Speed, Power factor, Efficiency, Moving rotor current
400 V,50 Hz Torque values

3 phase, 400 V, 50 Hz
Service type : S1 (continues)
Protection level : IP 55 (TEFV)
Isolation class : F (105K)
Temp. Increase : Class B (80K)

Power Out	TYPE			Full Load Data								Inertia moment J	Weight B3	Appropriate cable cross section for NYY mm^2
				Speed n	Current I_N A			Torque M_N	Power factor Cos Ø	Efficiency η %				
Kw				min^{-1}	At 380V	Nm		At 4/4 Nm		At 4/4	At 3/4		kg	
2 kutup, 3000 min^{-1}														
0.09	AGM	56	2a	2800	0.26	0.26	0.29	0.31	0.74	65.3	65.0	0.00011	2.7	
0.12	AGM	56	2b	2800	0.39	0.35	0.37	0.41	0.72	66.4	66.0	0.00012	2.9	
0.18	AGM	63	2a	2820	0.50	0.49	0.50	0.61	0.80	66.3	66.0	0.00011	3.3	
0.25	AGM	63	2b	2840	0.65	0.66	0.61	0.85	0.79	69.2	69.0	0.00013	3.7	4*2.5
0.37	AGM	71	2a	2800	1.10	1.05	1.02	1.26	0.73	67.8	67.5	0.00026	5.1	4*2.5
0.55	AGM	71	2b	2780	1.30	1.27	1.25	1.90	0.84	73.5	73.2	0.00034	6.3	4*2.5
0.75	AGM	80	2a	2780	1.80	1.90	1.80	2.60	0.83	71.6	71.3	0.00053	7.8	4*2.5
1.1	AGM	80	2b	2800	2.45	2.50	2.35	3.80	0.83	78.1	78.0	0.00066	8.9	4*2.5
1.5	AGM	90	S2	2800	3.45	3.30	3.30	5.10	0.84	79.2	79.0	0.0011	11.4	4*2.5
2.2	AGM	90	L2	2840	4.90	4.65	4.60	7.40	0.84	81.6	81.5	0.0014	13.8	4*2.5
3	C.AGM	90	L2	2840	6.50	6.20	6	10	0.84	83.7	83.6	0.0017	16	4*2.5
3	AGM	100	L2	2850	6.60	6.10	6	10	0.87	83.2	83.1	0.0024	17.3	4*2.5
4	C.AGM	100	L2	2870	8.20	8	7.60	13.3	0.85	84.8	84.7	0.0031	21	4*2.5
4	AGM	112	M2	2850	8.20	7.80	7.70	13.4	0.87	84.8	84.8	0.0039	27	4*2.5
5.5	C.AGM	112	M2	2870	11	10.8	10.6	18.3	0.86	86.1	86.0	0.0048	30	4*2.5
5.5	AGM	132	S 2a	2870	11.3	11	10.8	18.4	0.84	85.9	85.8	0.0090	33	4*2.5
7.5	AGM	132	S 2b	2890	15.4	14.7	14.3	24.8	0.85	87.6	87.5	0.012	39	4*4
11	C.AGM	132	M2	2915	22	21.5	21	36	0.84	89.2	89.1	0.018	59	4*6
11	GM	160	M2a	2935	22.4	21.5	21	36	0.84	88.5	88.5	0.026	96	4*6
15	GM	160	M2b	2940	28.5	28	27	49	0.86	89.5	89.5	0.034	107	4*6
18.5	GM	160	L2	2940	35	34	33	60.4	0.87	90.5	90.5	0.041	122	4*10
22	C. GM	160	L2	2930	41	39	38	71.7	0.88	91.3	91.3	0.051	140	4*10
22	GM	180	M2	2950	41.5	40	39	71.5	0.88	91.0	91.0	0.064	164	4*10
30	C. GM	180	L2	2940	56	54	52	97	0.88	92.2	92.2	0.082	190	4*16
30	GM	200	L2a	2940	56	54	52	97	0.88	91.8	91.7	0.10	220	4*16
37	GM	200	L2b	2955	68	65	63	120	0.89	92.5	92.5	0.13	240	3*25+16
45	C. GM	200	L2	2960	82	78	76	145	0.90	93.0	93.0	0.15	275	3*35+16
45	GM	225	M2	2960	82	78	76	145	0.90	93.0	93.0	0.19	315	3*35+16
55	C. GM	225	M2	2965	100	95	92	177	0.90	93.3	93.2	0.23	343	3*50+25
55	GM	250	M2	2970	100	95	92	177	0.90	93.2	93.3	0.32	390	3*50+25
75	C. GM	250	M2	2970	134	128	123	241	0.90	93.9	93.9	0.41	450	3*70+35
75	GM	280	S2	2975	136	129	125	241	0.90	93.8	93.8	0.50	540	3*70+35
90	GM	280	M2	2970	161	152	148	289	0.91	94.0	94.0	0.62	590	3*95+50
110	C. GM	280	M2	2975	196	186	180	353	0.91	94.0	94.0	0.74	640	3*120+70
110	GM	315	S2	2980	196	186	180	353	0.91	93.8	93.8	1.3	787	3*120+70
132	GM	315	M2a	2980	235	223	216	423	0.91	93.9	93.9	1.5	895	
160	GM	315	M2b	2980	280	266	258	513	0.92	94.4	94.4	2.0	1020	3*120+70
185	GM	315	L2a	2900	320	304	295	593	0.93	94.5	94.4	2.2	1120	
200	GM	315	L2b	2900	341	330	320	641	0.93	94.5	94.4	2.3	1150	
250	GM	355	M2a	2980	438	416	401	801	0.91	95.0	95.0	2.8	1310	
315	GM	355	M2b	2975	545	518	499	1011	0.92	95.0	95.0	3.6	1460	
355	GM	355	M2c	2980	610	580	563	1138	0.93	95.0	95.0	4.2	1620	
400	GM	355	L2	2980	690	656	632	1282	0.92	95.1	95.0	4.7	1850	

PERFORMANCE

Speed, Power factor, Efficiency, Moving rotor current
400 V,50 Hz Torque values

3 phase, 400 V, 50 Hz
Service type : S1 (continues)
Protection level : IP 55 (TEFV)
Isolation class : F (105K)
Temp. Increase : Class B (80K)

Power Out	TYPE			Full Load Data								Inertia moment	Weight B3	Appropriate cable cross section for NYY mm^2
				Speed	Current I_N			Torque M_N	Power factor	Efficiency ŋ		J		
Kw				n	A					%			kg	
				min^{-1}	At 380V	Nm		At 4/4	Cos Ø Nm	At 4/4	At 3/4			
4 Kutup 1500 min^{-1}														
0.06	AGM	56	4a	1370	0.24	0.25	0.27	0.42	0.56	58.7	58.6	0.000 11	2.7	
0.09	AGM	56	4b	1375	0.35	0.36	0.38	0.63	0.54	64.4	64.2	0.000 12	2.8	
0.12	AGM	63	4a	1365	0.40	0.41	0.42	0.84	0.65	58.8	58.8	0.000 17	3.2	
0.18	AGM	63	4b	1340	0.58	0.60	0.60	1.28	0.65	61.4	61.4	0.000 21	3.7	
0.25	AGM	71	4a	1380	0.81	0.81	0.82	1.73	0.68	63.6	63.5	0.000 40	4.9	4*2.5
0.37	AGM	71	4b	1390	1.20	1.15	1.15	2.54	0.69	70.0	70.0	0.000 54	5.9	4*2.5
0.55	AGM	80	4a	1365	1.60	1.60	1.55	3.90	0.71	70.9	70.8	0.000 83	7.6	4*2.5
0.75	AGM	80	4b	1370	2.10	2.00	2.00	5.20	0.74	72.2	72.2	0.001 1	8.7	4*2.5
1.1	AGM	90	S4	1380	2.70	2.60	2.55	7.60	0.79	76.8	76.7	0.001 9	11.5	4*2.5
1.5	AGM	90	L4	1390	3.60	3.50	3.40	10.3	0.78	78.6	78.5	0.002 4	13.6	4*2.5
2.2	AGM	100	L4a	1400	5.30	5.10	5.20	15	0.77	81.3	81.2	0.004 0	17.3	4*2.5
3	AGM	100	L4b	1405	6.60	6.45	6.35	20.4	0.81	82.9	82.9	0.005 2	20.8	4*2.5
4	AGM	112	M4	1420	8.70	8.20	8.20	27	0.82	84.7	84.7	0.009 2	28.7	4*2.5
5.5	AGM	132	S4	1430	11.8	11.3	11	36.7	0.82	86.2	86.2	0.019	39	4*2.5
7.5	AGM	132	M4	1430	15.8	15.3	15	50	0.80	87.4	87.2	0.026	47	4*4
9	C.AGM	132	M4	1445	19	18	17.5	59.5	0.82	88.4	88.0	0.032	56	4*4
11	GM	160	M4	1455	22.5	21.5	21	72.2	0.84	88.6	88.5	0.054	108	4*6
15	GM	160	L4	1460	30.5	29	28.5	98	0.83	89.5	89.5	0.072	140	4*6
18.5	C. GM	160	L4	1450	37	35	34.5	122	0.83	90.1	90.1	0.084	150	4*10
18.5	GM	180	M4	1460	38	36	35	121	0.82	90.1	90.1	0.11	160	4*10
22	GM	180	L4	1460	44	42	40.5	144	0.83	90.7	90.7	0.13	185	4*10
30	GM	200	L4	1460	57	54	52	196	0.88	91.5	91.5	0.19	240	4*16
37	C. GM	200	L4	1465	69	66	64	241	0.88	92.1	92.1	0.23	260	3*25+16
37	GM	225	S4	1465	70	66	64	241	0.87	92.2	92.2	0.29	275	3*25+16
45	GM	225	M4	1465	84	80	77	293	0.87	92.7	92.7	0.35	320	3*35+16
55	C. GM	225	M4	1470	101	96	93	357	0.88	93.2	93.2	0.44	360	3*50+25
55	GM	250	M4	1470	102	97	94	357	0.88	93.0	93.0	0.54	400	3*50+25
75	C. GM	250	M4	1470	138	131	127	487	0.87	93.3	93.6	0.72	455	3*70+35
75	GM	280	S4	1475	140	133	128	485	0.87	93.6	93.6	0.90	530	3*70+35
90	GM	280	M4	1480	166	158	152	581	0.88	93.9	93.9	1.1	610	3*95+50
110	C. GM	280	M4	1480	204	194	183	710	0.87	94.0	94.0	1.3	660	3*120+70
110	GM	315	S4	1480	205	195	189	710	0.87	94.0	94.0	1.9	770	3*120+70
132	GM	315	M4a	1485	245	233	225	849	0.87	94.0	94.0	2.4	890	3*120+70
160	GM	315	M4b	1485	295	280	272	1029	0.88	94.3	94.2	3.1	1015	
185	GM	315	L4a	1485	340	323	312	1190	0.88	94.4	94.3	3.6	1115	
200	GM	315	L4b	1485	368	350	339	1286	0.87	94.4	94.3	3.9	1165	
250	GM	355	M4a	1485	450	428	415	1608	0.88	95.8	95.8	6.5	1450	
315	GM	355	M4b	1485	560	532	515	2026	0.89	96.2	96.2	8.1	1657	
355	GM	355	M4c	1485	635	603	582	2283	0.88	96.3	96.3	9.4	1800	
400	GM	355	L4	1485	710	675	650	2572	0.89	96.3	96.3	10	1965	

ÜNTES

PERFORMANCE

Speed, Power factor, Efficiency, Moving rotor current
400 V,50 Hz Torque values

3 phase, 400 V, 50 Hz
Service type : S1 (continues)
Protection level : IP 55 (TEFV)
Isolation class : F (105K)
Temp. Increase : Class B (80K)

Power Out	TYPE			Full Load Data							Inertia moment J	Weight B3	Appropriate cable cross section for NYY mm^2
				Speed n	Current I_N			Torque M_N	Power factor	Efficiency ŋ			
Kw					A				Cos Ø	%	Kg/m^2	kg	
				min^{-1}	At 380V	Nm		At 4/4		At 4/4			
6 Kutup,1000 min^{-1}													
0.18	AGM	71	6a	920	0.60	0.61	0.62	1.87	0.64	67.0	0.00064	5.4	
0.25	AGM	71	6b	910	0.83	0.83	0.85	2.62	0.66	65.3	0.00086	6.3	4*2.5
0.37	AGM	80	6a	910	1.10	1.10	1.10	3.90	0.65	74.9	0.0017	8.1	4*2.5
0.55	AGM	80	6b	890	1.50	1.50	1.50	5.90	0.73	72.3	0.0022	9.5	4*2.5
0.75	AGM	90	S6	910	2.20	2.10	2.10	7.90	0.70	74.0	0.0029	11.4	4*2.5
1.1	AGM	90	L6	915	3.10	3.00	3.00	11.5	0.69	76.8	0.0038	13.7	4*2.5
1.5	AGM	100	L6	925	3.60	3.50	3.60	15.5	0.77	76.9	0.0084	19.4	4*2.5
2.2	AGM	112	M6	940	5.30	5.10	5.00	22.4	0.75	82.6	0.013	26.5	4*2.5
3	AGM	132	S6	945	7.00	6.90	6.80	30.5	0.76	82.6	0.022	36	4*2.5
4	AGM	132	M6a	940	9.40	9.00	8.80	41	0.78	82.6	0.028	43.5	4*2.5
5.5	AGM	132	M6b	945	13	12.3	12	55.6	0.76	84.4	0.043	49.6	4*2.5
7.5	GM	160	M6	960	16	15.2	14.3	74.6	0.82	87.1	0.079	115	4*4
11	GM	160	L6	955	23	22	21.5	110	0.83	86.6	0.11	131	4*6
15	GM	180	L6	960	30.5	29	28	149	0.83	89.7	0.16	187	4*6
18.5	GM	200	L6a	970	38	36	35	182	0.83	89.6	0.21	216	4*10
22	GM	200	L6b	975	45	43	41	216	0.82	90.5	0.26	240	4*10
30	GM	225	M6	970	61	58	56	294	0.82	91.0	0.57	330	4*16
37	C. GM	225	M6	980	75	71	69	363	0.82	91.6	0.71	365	3*25+16
37	GM	250	M6	970	75	71	69	364	0.82	91.6	0.77	400	3*25+16
45	C. GM	250	M6	975	90	88	83	441	0.82	91.8	0.99	450	3*35+16
45	GM	280	S6	980	93	90	85	439	0.80	91.8	1.2	530	3*35+16
55	GM	280	M6	985	113	107	104	533	0.80	92.7	1.5	605	3*50+25
75	C. GM	280	M6	985	150	143	138	727	0.81	93.3	1.6	700	3*70+35
75	GM	315	S6	985	146	139	134	727	0.83	93.3	3.3	740	3*70+35
90	GM	315	M6a	985	175	166	161	873	0.85	92.5	4.1	850	3*95+50
110	GM	315	M6b	990	208	198	191	1061	0.85	94.5	5.4	975	3*120+70
132	GM	315	L6	990	247	235	227	1273	0.86	94.2	6.4	1040	3*120+70
160	GM	355	M6a	990	305	290	281	1543	0.84	94.6	7.1	1350	
200	GM	355	M6b	990	380	361	350	1929	0.85	94.4	8.9	1540	
250	GM	355	M6c	990	474	450	431	2388	0.85	94.5	11	1720	
315	GM	355	L6	990	600	570	550	3039	0.84	94.5	13	2100	

This warranty given by ÜNTES is out of scope, if the unit is used out of its purpose and the following cases come happen:

1. Damage and failures resulting from incorrect use.
2. Damages and failures while loading, unloading and transporting after delivery of the production.
3. Damage and failures resulting from low or high voltage; faulty electrical wiring; using different voltage from written value in the product label or user manual.
4. Failures and damage caused by lightning, fire and future.
5. Failures resulting from using contrary to the user manual.
6. Failures resulting from interference to the defective product by other than authorized service personnel.

The mentioned defects can be repaired by charging the cost to you and product warranty starts from date of invoice.

ÜNTES®
HEATING VENTILATING AIR CONDITIONING

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