Package Type

Hygienic Air Handling Unit

Operation & Maintenance
Manual

“The Efficient Way of Air Handling Unit”
www.acsklima.com
Thank you for choosing

**ACS and CLIMACS brand**

Package Type Hygienic Air Handling Units.

In addition to “Air Handling Units Installation, Operation and Maintenance Manual” supplied with each unit, this manual contains instructions for the first installation, operation and maintenance of the software automated system.

*All the best...*
IMPORTANT

All instructions and information given in the “Air Handling Units Installation, Operation and Maintenance Manual” are also valid for this package type hygienic air handling unit. You can access all our manuals from the products menus in our web site www.acsklima.com

Besides providing heating, ventilation and air conditioning, Package Type Hygienic Air Handling Units are capable of regulating the air pressure of the hygienic area both positively and negatively. Therefore, air handling units should not be shut down except for the periods of maintenance, cleaning or fault conditions. Please keep in mind that shut down of the air handling unit may lead to the contamination risk in the hygienic location.

Due to hygienic and package type design of the unit, it should be installed on a level floor with sufficient strength to carry the load of the unit; the installation method should allow easy cleaning and good drainage of condensed water. The installation location must be free of contamination sources such as chimney, dump, etc.
The instructions of the manufacturer should be followed prior the operation for the first time (or after annual maintenance).

After that, below points should be checked:

For annual maintenance, shut down the air handling unit and turn off all motor switches, turn off the power.

Make sure that the all compartments are cleaned and no foreign object or material is left in the unit. Please check no duct isolation residues, tapes, nuts, hand tools are left behind.

Please check all the handles on doors and access panels.

If the unit is installed outside make sure that it is placed under an overhead shelter and check the joints of gaskets.

In addition to check of connections; all notifications shown on the control panel must be carefully inspected and intervened.
AIR FILTERS

The air delivered by the air handling units are cleaned by the filters as the air passes through.

Failing to check the filters as instructed, may cause health risks and faults in the unit; it also may cause to increased energy consumption.

PANEL FILTERS (FRONT FILTER)

Weekly checking and cleaning of the filters is necessary following the commissioning of the unit. A drop in the pressure level is an indication of the filter pollution. The time that a filter takes to get polluted depends on the operation duration of the unit as well as the ambient weather condition and pollution where the unit is located, eg., city and industrial regions. An optionally available automation system can be used to detect and notify the pollution level of the filters.

Panel filters can be cleaned by one of the following methods:
- Shaking and vacuum cleaning,
- Compressed air,
- Washing with warm water (not pressurized)

If the unit is actively operated, change the front filters at least once per three to six months depending on the pollution level of the ambient environment. Please take care to insert the new filter correctly and check also the gaskets on filter skids; if worn out change the gaskets and finally using clamping lever fix the filters in position to provide air tightness.
2nd and 3rd STAGE FILTERS

Check if there is any pressure drop and inspect the condition of the gaskets on the skids. The most significant indication of a filter pollution is the pressure drop.

Max Pressure Difference = 1.6 \times \text{Initial Pressure Difference} + 40 \, \text{Pa}

When the max pressure drop is reached remove and renew the filter. Make sure that the filter frame firmly sits on the outer cassette and check that the contact between doors and filters is good.

Correct positioning and good sealing affect the filter performance.

Table 1: Pressure differences for panel (front) filters

<table>
<thead>
<tr>
<th>FILTER CLASS</th>
<th>INITIAL PRESSURE DIFFERENCE</th>
<th>RECOMMENDED MAX PRESSURE DIFFERENCE</th>
</tr>
</thead>
<tbody>
<tr>
<td>EU - 2</td>
<td>35 , \text{Pa}</td>
<td>150 , \text{Pa}</td>
</tr>
<tr>
<td>EU - 3</td>
<td>35 , \text{Pa}</td>
<td>150 , \text{Pa}</td>
</tr>
<tr>
<td>EU - 4</td>
<td>45 , \text{Pa}</td>
<td>150 , \text{Pa}</td>
</tr>
</tbody>
</table>

Table 2: Pressure differences for 2nd and 3rd stage filters

<table>
<thead>
<tr>
<th>FILTER CLASS</th>
<th>FILTER CLASS</th>
<th>RECOMMENDED MAX PRESSURE DIFFERENCE</th>
</tr>
</thead>
<tbody>
<tr>
<td>EU - 4</td>
<td>45 , \text{Pa}</td>
<td>150 , \text{Pa}</td>
</tr>
<tr>
<td>EU - 5</td>
<td>80 , \text{Pa}</td>
<td>200 , \text{Pa}</td>
</tr>
<tr>
<td>EU - 6</td>
<td>80 , \text{Pa}</td>
<td>200 , \text{Pa}</td>
</tr>
<tr>
<td>EU - 7</td>
<td>80 , \text{Pa}</td>
<td>200 , \text{Pa}</td>
</tr>
<tr>
<td>EU - 8</td>
<td>95 , \text{Pa}</td>
<td>300 , \text{Pa}</td>
</tr>
<tr>
<td>EU - 9</td>
<td>95 , \text{Pa}</td>
<td>300 , \text{Pa}</td>
</tr>
</tbody>
</table>

Note: ACS package type hygienic air handling units are supplied with automation system by which you can easily monitor the filters on touch sensitive panel screen.

ATTENTION

BAG, MPACK AND HEPA type filters cannot be cleaned and reused. These should be changed upon completion of life cycle

*Please contact to ACS engineers to get information on special filters*
AIR DAMPERS

Check that the rotation of the flaps is not obstructed.

Do not touch the body or flexible connections.

Remove the accumulated dust by compressed air.

If you observe any problem in opening or closing of the flaps call an authorized service.

IMPORTANT

Silencers chambers should be inspected carefully. If there the surfaces of the silencer chambers are damaged, the glass wool inside may be caught by the air flow and carried away towards the filters. This may damage the filters and pollute the ambient air.

(ACS, wraps the glass wool by a special fabric in order to minimize the risk.)

STEAM TYPE HUMIDIFIERS

At the beginning of each season, clean the strainer in the steam feed of control valve.

Annually check the control valve, condensed water discharge system and dispersion pipe.

Humidifier boiler and electrodes should be checked at least once per year. If the water used in the system is not distilled water then the frequency of checks should be increased depending on the chemical composition of the water used.

Following the periodic checks of humidifier section the operation of the humidifier can be checked from the air handling compartments after humidifier. Looking towards air flow direction a steam increase should be observed.
HEATERS, COOLERS AND HEAT RECOVERY EXCHANGERS

Cleaning of air inlet side should be checked at least once per year. Surrounding weather and environmental conditions may require more frequent checks. Remove the parts and clean them applying pressurized water in the opposite direction of air flow.

If the pollution is severe please check the condition of the filters.

---

**Please follow below steps if water heat exchangers will be removed for cleaning and maintenance:**

- ✔️ Discharge the water inside the exchangers
- ✔️ Dismantle the exchanger and piping connections
- ✔️ Remove the side panel
- ✔️ Dismount the nuts fixing the exchanger
- ✔️ Remove the exchanger

---

**Please follow below steps to locate leakage in water heat exchangers:**

- ✔️ Clean the surface and the fins of the exchanger
- ✔️ Charge the exchanger with water
- ✔️ Locate the leakage
- ✔️ Discharge the water
- ✔️ Using oxy-acetylene welding repair the small cracks or holes located on copper pipes
- ✔️ It may not be possible to repair the exchanger if the reason of leakage is cracks caused by freezing, or if the leakage is between the fins.
- ✔️ Charge the exchanger with pressurized water to check welding.
LOCATING LEAKAGE IN DX (REFRIGERANT CHARGED) HEAT EXCHANGERS:

☑️ After shutting down the unit and switching off the power, clean the surface of the exchanger by compressed air or water.

☑️ Straighten the bent fins by using a fin comb.

☑️ If ice is observed during operation let the ice melt down naturally and inform the technical service.

☑️ If you think that there is a refrigerant leakage in the system please inform the technical service.

"Prevent freezing of water inside heat exchangers"

If the water inside the pipes of exchanger freezes, this will severely damage the pipes. For this reason, if there is a risk of freezing the antifreeze should be added to circulating water. If you are planning to take the exchanger out of operation for a short period, at least, make sure the water inside the exchanger is partially circulated.

Some condensed water might be observed in the return compartments of heat exchangers that serve for cooling or heat recovery. Please check the condensing water drainage.

Please clean by using either compressed air or water in the opposite direction to air flow.

You can also use a very soft brush.

Straighten the bent fins by using a special fin comb.
Make sure that the impeller is fixed on the motor shaft tightly.

Check if fan and motor rotate freely.

Make sure that there is no foreign object at the inlet of the fan.

Check the rotation direction of the fan. To do that, momentarily switch on and off the power then observe the rotation direction of fan.

Check that the motor shaft and fan inlet flange are aligned.

Check the motor and its connections.

Check that flexible connections are secured tightly and not damaged; duct connections are designed according to the recommendations of the manufacturer with acceptable engineering applications.

Check the setting of the motor protection switch is correct.

Switch on the power and let the fan to reach to its full speed.

---

Do not forget to observe below points!

- Excessive vibration
- Strange noise
- Axial alignment of motor and fan flange
- Proper lubrication
- Motor current and voltage values
If any problem is observed shut down the unit immediately.

Switch off the power.

Secure the fan to prevent unintended rotation of the impeller.

Inspect the source of the problem carefully and rectify it if necessary.

The operation of the fan should be observed periodically for the first 8 hours of the operation.

Pay attention to excessive vibration or noise during this observation.

Check that the input current of motor and temperatures of the bearings are within the limits specified by the manufacturer.

Finally, switch off the fan to do below checks:

- Axial alignment of motor and fan flange
- Bearing temperature
- Fan and motor fixing bolts

Fan speed should not be changed without consulting the firm. If a higher speed of rotation is required the power rating of motor should be checked for required capacity. The load on the bearings and fan must be recalculated by the manufacturer. Vibration absorbing isolators should be checked once per year for damage.

Annually check the balance of the fan. Clean dust on the suction funnel and rotor. Accumulation of dirt on the rotor may impair the balance. If pollution is severe check the filters and upgrade the filters if necessary. If the fan is equipped with a suction damper, every three months check the suction damper for proper operation. To do that, switch off the fan first then operate the suction damper and observe the operation of servomotor, connections and flaps.
MAINTENANCE PROGRAM

A protective maintenance program is an important part of an active safety program. Maintenance works should be carried out by trained and experienced personnel. Do not attempt to conduct any maintenance unless the power is switched off and the fan is secured.

Package type hygienic air handling units are the kind of devices that directly relate to human health. Therefore, except for routine cleaning and maintenance, the works requiring a special attention must be performed only by the trained personnel. Maintenance period varies depending on the operation conditions. Recommended maintenance program is given below.

Warnings on filter pollution etc. will be given automatically and can be followed in the screen of the systems equipped with the automation. The warning should be followed carefully and necessary precautions must be taken immediately. Ignoring these warnings may lead to an automatic shut down of the unit due to self-protection.
Once Per Week:

- Check the condition of filters. Clean, wash or change if necessary.
- Check the level of pollution in the condenser heat exchangers, and wash if necessary.
- Please keep in mind that above checks may be required more frequently depending on the climate and environmental conditions.

Once Per Month:

- Check the operation of the fan and motor; adjust if necessary.
- Check the injection nozzles and the humidifier valve.
- Check water flow in the drainage pipe.
- Check the condition of the entrance door hinges and the lid gaskets; lubricate the hinges if necessary.

Once Per Every Six Months:

- Check the operation current of motor.
- Check the fan and motor bearings for high temperature and noise.
- Check the operation of control instruments.
- Check condensed water tray, siphon and drainage pipe.
- Check circulation pump and motor of the humidifier.
- Check the condition of the strainer of the humidifier.
- Check the condition of cold / hot water or steam pipe system.
- Check lids, duct connections for air leakage (suction and blowing) and if a leakage is located take precautions immediately.
Once Per Year:

- Check the isolation of the filter frame.
- Change the synthetic wool in panel filters.
- Check the heat exchangers and fins. Wash by water jet if necessary.
- If any, straighten the bent fins by using a fin comb.
- Check the heat exchangers for leakage.
- Bleed the heat exchangers with water.
- Check the tightness of the bolts fixing the fan and motor.
- Check lubrication of motor and fan bearings.
- Check the operation of the dampers.
- Check the doors of the air handling unit for easy opening and closing.
- Check the conditions of the fittings and valves in piping system.
- Check all cabling, control and isolating apparatus and terminal connections etc.

In case a part is changed during a maintenance consult the relating section of the manual and follow the instructions to restart the unit.

Following the checks summarized above, if you still observe some problems such as the air flow rate is excessive or insufficient; or set temperature cannot be reached in the location; or intended pressure values cannot be reached in the location etc., please check outer systems (conditions and air tightness of ducts, VAVs - CAV - duct type heaters, operation of duct dampers, condition of surrounding environment). If you have any difficulty in detecting such problems you may call ACS engineers and technicians for support.

IMPORTANT WARNING

All maintenance instructions and warnings above are essential for smooth operation of the unit. Failing to follow the instructions or ignoring warnings notified on unit’s screen (the unit automatically logs the warnings) and continuing the operation may lead to severe faults and make the warranty invalid.
RECOMMENDED MAINTENANCE SPECIFICATION

Upon the end of warranty period, please check below points to cover in your maintenance contract when you sign a maintenance contract with a third party. Please do not make a maintenance contract with any person or company who are not qualified.

- Hot and cold water heat exchangers to be washed with chemical agents.
- Air handling unit compartments to be cleaned with chemical agents.
- All filters in the air handling unit to be checked, cleaned and if necessary replaced.
- Air dampers to be checked and adjusted.
- Water inlet strainers and nozzles of the steam humidifier to be cleaned.
- Re-heater and pump (if any) flow directions to be checked.
- Droplet catcher to be checked
- DX heat exchangers to be checked and cleaned.
- Refrigerant leakage test to be conducted in the cooling system.
- Condenser heat exchangers to be washed with chemical agents and the fans to be checked.
- Heat exchangers to be checked for leakage.
- Motor and compressor current and voltage values to be measured.
- Compressor oil to be checked.
- Overall operation and performance values to be retrieved.
- Hygiene of units to be provided by use of alcohol.
- Filters to be re-installed and checked for air tightness.
- Freeze thermostat setting to be checked.
- All site equipment (sensors) operation to be checked.
- Water tank of the steam humidifier to be checked and if necessary cleaned.
- Electrodes of the steam humidifier to be checked and if necessary renewed.
USING OF CONTROL PANEL TOUCH SCREEN

(The values in the screenshots are examples. They don’t use for making adjustments.)

**Adjustable Date and Time from Settings Page**
- **DATE**
- **TIME**

**Indication showing momentarily status of the air handling unit**
- **Sistem kapalı**: Means the air handling unit is not operating.
- **Damper açılıyor**: The air handling unit is operation and dampers are open.
- **Sistem çalışıyor**: Dampers are open and fans are in operation.
- **Rezistans soğutuluyor**: If the electric heater is on when the air handling unit is switched off, following the shutting off the whole system fans will continue operate for 2-3 mins to cool down the heater.

**Using of Control Panel Touch Screen**
- **Air handling unit start & stop buttons**
- **Air temperature of the air conditioned location**
- **Temperature of the air blown by the air handling unit**
- **Temperature of the fresh air taken from outside**
- **Humidity ratio of the air taken from the air conditioned location**
- **Temperature-humidity set values of the air handling unit**
- **Fresh air ratio**
- **Button to go to date - time etc. setting menu**

**Air handling unit operation mode**
- Winter mode = Heating
- Summer mode = Cooling

**Desired ambient temperature**
**Desired ambient humidity ratio**

**Button to go to the page of active or previous alarms**
| Season Mode Selection | Select to mode in which you want to operate the air handling unit | Winter mode for heating
| | | Summer mode for cooling
| Temperature Set | Enter the desired temperature in the location to be air-conditioned | Enter the speed of the ventilator (operating in suction direction)
| Humidity Set | Enter the desired humidity ratio in the location to be air-conditioned | Enter the speed of the ventilator (operating in blowing direction)
| Aspirator Set | Enter the speed of the ventilator (operating in suction direction) | In terms of percentage (%)
| Ventilator Set | Enter the speed of the ventilator (operating in blowing direction) | In terms of percentage (%)
| Auto Restart Selection | If on is green, the air handling unit automatically restarts upon power is restored following a power failure | If off is green, the air handling unit will standby upon power is restored following a power failure
| Fresh Air Ratio | Enter the fresh air amount that the air handling unit will take | In terms of percentage (%)
| Date-Time Settings | Set system date and time | Shows instantaneous operating percentages of 3-way valve, ventilator (suction) and ventilator (blower)

Touch on the numeric value of the setting you want to change; a numeric keypad will appear. Using the numeric keypad input the desired value then touch on "ENTER", now the new value is set.
## ALARMS AND THEIR MEANINGS

<table>
<thead>
<tr>
<th>Alarm</th>
<th>Description</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>Phase protection alarm</td>
<td>If one of or all of the phases;</td>
<td>A measurement should be taken by a reliable instrument. Make sure that system is fed by a reliable voltage (3-phase/380V+N).</td>
</tr>
<tr>
<td>Emergency stop is pushed</td>
<td>The air handling unit is equipped with emergency push buttons located next to doors of each suction and blowing ventilators. Besides, each door is equipped with a safety switch.</td>
<td>Check that doors blowing and suction ventilators are fully closed.</td>
</tr>
<tr>
<td>or the lid is open</td>
<td></td>
<td>Check that emergency stops of blowing and suction ventilators are not depressed.</td>
</tr>
<tr>
<td>No air flow</td>
<td>Does inverter receive power?</td>
<td>Check that blowing and suction ventilators run when the air handling unit is started.</td>
</tr>
<tr>
<td>Air handling unit inverter</td>
<td>Blowing or suction ventilator inverter protection trip</td>
<td>Note down the fault codes from the screens of the inverters and inform the codes to the service.</td>
</tr>
<tr>
<td>fault</td>
<td></td>
<td>Check that the water temperature at the inlet of the air handling unit is sufficient (70-90°C)</td>
</tr>
<tr>
<td>Freezing alarm</td>
<td></td>
<td>Prepare your measuring instrument and call the service.</td>
</tr>
<tr>
<td>Compressor 1 motor protection</td>
<td></td>
<td>Check cleaning of condenser heat exchanger</td>
</tr>
<tr>
<td>alarm</td>
<td></td>
<td>If filter and condenser is clean call the service</td>
</tr>
<tr>
<td>Compressor 2 motor protection</td>
<td></td>
<td></td>
</tr>
<tr>
<td>alarm</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Low high pressure alarm</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Date</td>
<td>Polluted Pressure</td>
<td>Clean Pressure</td>
</tr>
<tr>
<td>------</td>
<td>------------------</td>
<td>----------------</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Preliminary Works for the Commissioning of the Unit (According to the Diagram Above)</td>
<td>Cross Section and Type of Cable</td>
<td>Implementation</td>
</tr>
<tr>
<td>---</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>1 Cabling for location blowing and VAV motor (ratio adjusted)</td>
<td>3 x 0.75 Halogen Free</td>
<td>By the electrician of your company</td>
</tr>
<tr>
<td>2 Cabling for location return and VAV motor (ratio adjusted)</td>
<td>3 x 0.75 Halogen Free</td>
<td>By the electrician of your company</td>
</tr>
<tr>
<td>3 Cabling for pressure difference switch for HEPA filter (if any) pollution notification</td>
<td>2 x 0.75 Halogen Free</td>
<td>By the electrician of your company</td>
</tr>
<tr>
<td>4 Cabling for room pressure transmitter sensor</td>
<td>3 x 0.75 Halogen Free</td>
<td>By the electrician of your company</td>
</tr>
<tr>
<td>5 Cabling for the duct type heater (if any) according to power, stage and voltage (220 V or 380 V)</td>
<td>4 x 0.75 Halogen Free</td>
<td>By the electrician of your company</td>
</tr>
<tr>
<td>6 Cabling for temperature limit thermostat of the duct type heater (if any)</td>
<td>3 x 0.75 Halogen Free</td>
<td>By the electrician of your company</td>
</tr>
<tr>
<td>7 Cabling for control panel screen, 24 V DC to control location of the unit</td>
<td>3 x 0.75 Halogen Free</td>
<td>By the electrician of your company</td>
</tr>
<tr>
<td>8 Data cabling for the screen, to the control location of the unit</td>
<td>Cat 6</td>
<td>By the electrician of your company</td>
</tr>
<tr>
<td>9 Air handling unit MMC DCC main branch feeder (according to kW rating)</td>
<td>x</td>
<td>By the electrician of your company</td>
</tr>
<tr>
<td>10 Earthing cabling separate from air handling unit MMC DCC main branch feeder</td>
<td>By the electrician of your company</td>
<td></td>
</tr>
<tr>
<td>11 Pipe connection for water (of suitable hardness) supply to steam humidifier</td>
<td>By the plumber of your company</td>
<td></td>
</tr>
<tr>
<td>12 Water inlet, outlet and 3-way valve connections if there is a water heat exchanger</td>
<td>By the plumber of your company</td>
<td></td>
</tr>
<tr>
<td>13 Drainage connections for humidifier and cooling heat exchanger</td>
<td>By the plumber of your company</td>
<td></td>
</tr>
<tr>
<td>14 Ethernet cabling between the air handling unit and the internet connection point of the company for software updates and remote diagnose</td>
<td>By the electrician or the plumber of your company</td>
<td></td>
</tr>
<tr>
<td>15 Wall installation of the screen case (supplied by ACS), at the control location of the unit. Please send your preference previously.</td>
<td>By your company</td>
<td></td>
</tr>
<tr>
<td>16 Receiving the units at site, transportation of the units to the location specified in the project and making duct connections.</td>
<td>By your company</td>
<td></td>
</tr>
<tr>
<td>17 Implementation of cable trays to protect all cabling done by either ACS or your electrician</td>
<td>By your company</td>
<td></td>
</tr>
<tr>
<td>18 All sensor connections between the unit and the control panel</td>
<td>By ACS</td>
<td></td>
</tr>
<tr>
<td>19 Piping, welding and refrigerant charging works for cooling heat exchanger</td>
<td>By ACS</td>
<td></td>
</tr>
<tr>
<td>20 Commissioning of the units, delivery of training and handing over to operators</td>
<td>By ACS</td>
<td></td>
</tr>
</tbody>
</table>