

Air Humidifiers

For DV Air Handling Units



Air Humidifier DVX

For DV Air Handling Units

- High humidification efficiency
- Maximum performance with minimum operating cost
- Simple to install and easy to service

Operating principle

The operating characteristics of the DVX series are based on the natural effect of water evaporation when air stream passes over a wet surface. Air picks up water vapour which decreases the air temperature since the heat of evaporation comes from the air. This principle ensures that a gas to air mixture occurs without any liquid water being released. Only when carry over occurs, water droplets would be released to the air stream. This is the major difference between the media pad and water spray humidifiers.

Media pad

DVX humidifiers are available with HU-CELL; a sorption material:

- HU-CELL-Pads are fibreglass sheets with wetting agents and water adsorbent additives. Using corrugated and cross channel configuration ensures a more expanded area to release as much moisture as possible. HU-CELL media has a compact structure maintaining optimum performance at low pressure drop. As HU-CELL pads are inorganic, they are incombustible. It's inorganic compound makes it odourless. HU-CELL media contains a small amount of silver ion which acts as a biocide to prevent fungus and also helps any water deposits to release from the media allowing it to stay clean.

The HU-CELL material is assembled in stainless steel sheet frames with an integral watering system. The system is easy to monitor and service.



Construction

standard components

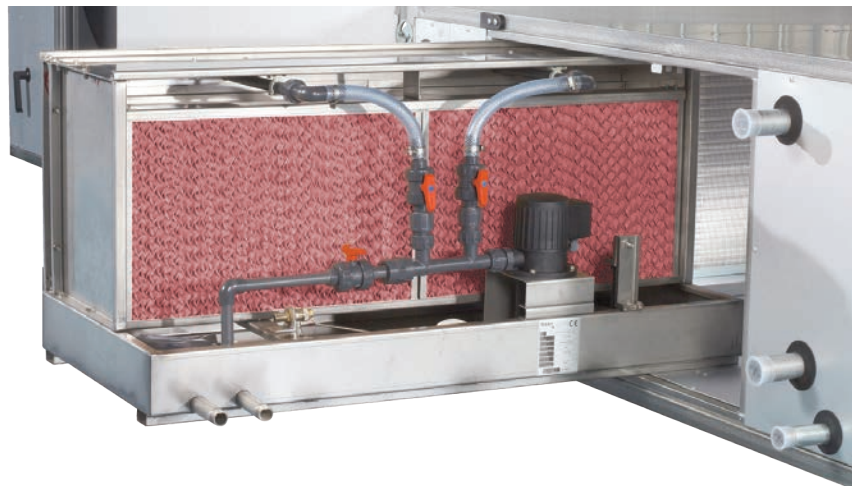
- Water basin, side and top frames
- Automatic float water filling valve
- Overflow and deconcentration device
- Drain and overflow nozzles
- Water pump
- Water level (pneumatic/electric) switch
- Watering & bleed-off piping
- Water flows control valves
- Evaporative media pad cassettes.

Installation example



Into an air handling unit

The DVX evaporative humidifier is usually incorporated into an air handling unit after the pre-heating coil and before the cooling coil, as illustrated in the photo. The humidifier is serviced down stream. The DVX humidifier can be delivered in all sizes from DV 10 to DV 240.



Main typical applications

- Comfort air conditioning systems in office buildings, hotels, shops, etc.
- Air evaporative coolers for industrial halls summer refrigeration.

DV Air handling unit with single heating coil

DV Air handling unit with single heating coil

The performance control can be achieved by an ON-OFF hygrostat acting on the pump motor contactor.

The evaporative process into the Mollier chart

The illustration on page 5 shows an example of the usual design process for humidification into the Mollier chart: Starting from outside air at $-3\text{ }^{\circ}\text{C}$ and 40% RH to achieve air at $22\text{ }^{\circ}\text{C}$ and 50% RH.

Single heating coil + humidification

See illustration with 1-2-3 on page 5.

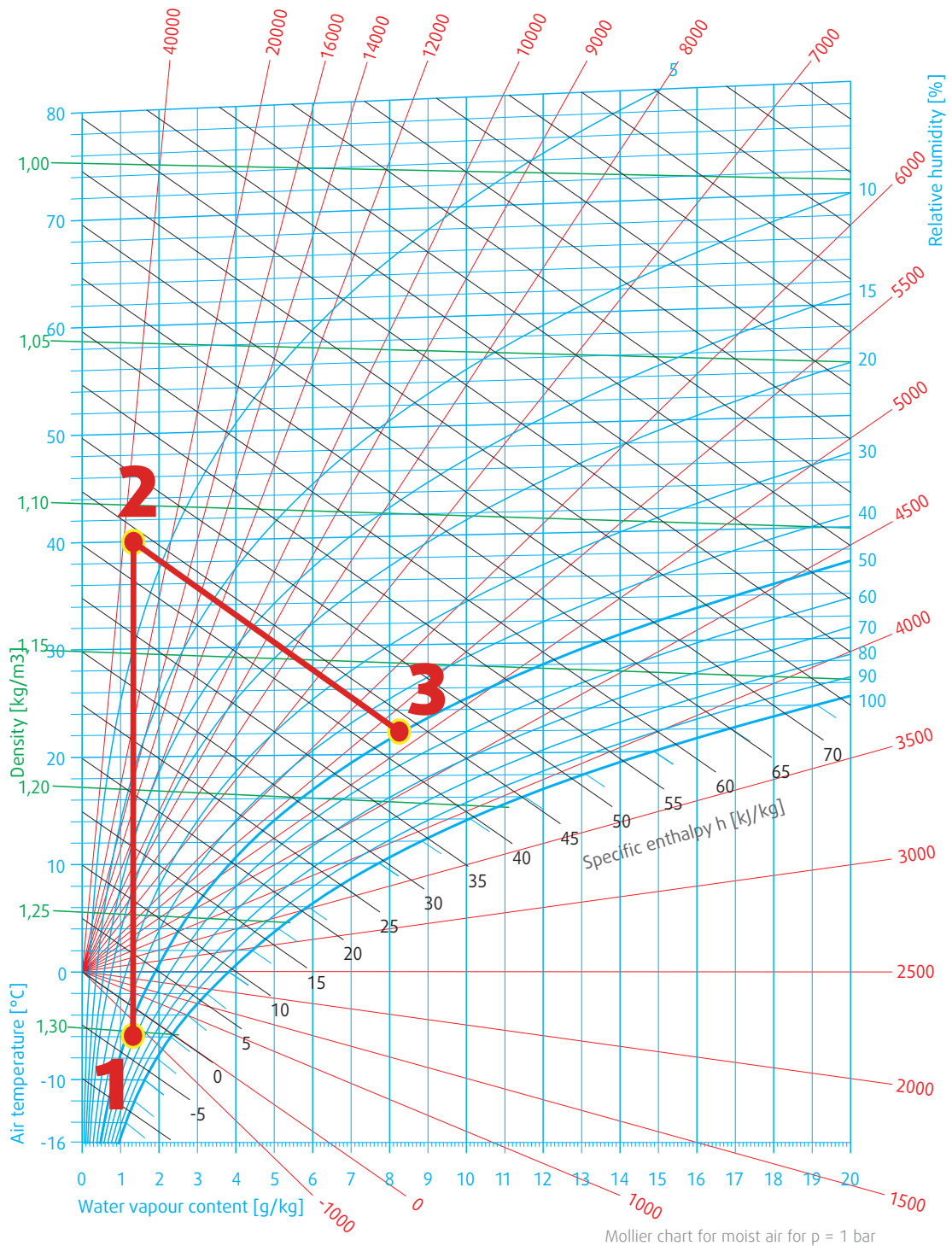
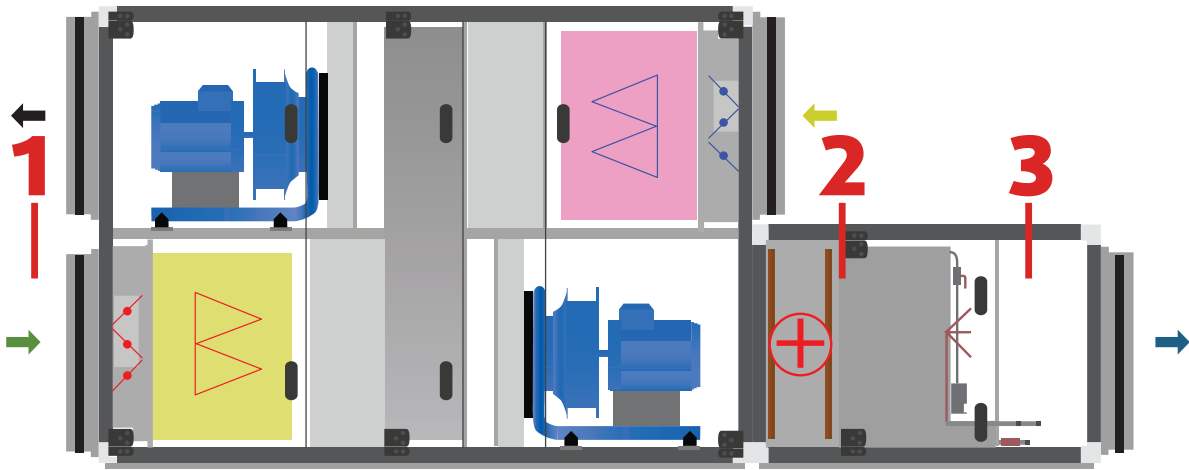
This example has absolute humidity increase from 1.5 g/kg to 8 g/kg .

With a single heating coil you will need to heat up the air to a high starting temperature before the humidification. This will allow you to end up with the desired air conditions.

1. The air is heated up from $-3\text{ }^{\circ}\text{C}$ and 40% RH through the rotary heat exchanger and furthermore through the heating coil until the desired temperature is reached.
2. Now the air has a RH of 3% and a temperature of $40\text{ }^{\circ}\text{C}$. As the air passes through the humidifier, the saturated pads of the humidifier pass on the moisture to the air. This changes both the humidity of the air as well as the temperature.
3. Ending with $22\text{ }^{\circ}\text{C}$ and 50% RH by following the enthalpy lines in the Mollier chart.

How to choose in SystemairCAD

When choosing the design with one heating coil, it can be difficult to reach 100% accurate end temperature and humidity. If this is the chosen solution you may have to change the CelPad thickness of the HU-CELL material. This will always be a balance of choosing the correct humidifier thickness and the correct starting temperature before humidification. The selection can be made in the SystemairCAD and calculated instantly to find the leaving air conditions of the AHU.



DV Air handling unit with two heating coils

The evaporative process into the Mollier chart

The illustration on page 7 shows an example of the usual design process for humidification into the Mollier chart with 2 heating coils (pre- and post heating): Starting from outside air at $-3\text{ }^{\circ}\text{C}$ and 40% RH to achieve air at $22\text{ }^{\circ}\text{C}$ and 50% RH.

Pre-heating + humidification + post heating

See illustration with 1-2-3-4 on page 7.

This example has absolute humidity increase from 1.5 g/kg to 8 g/kg .

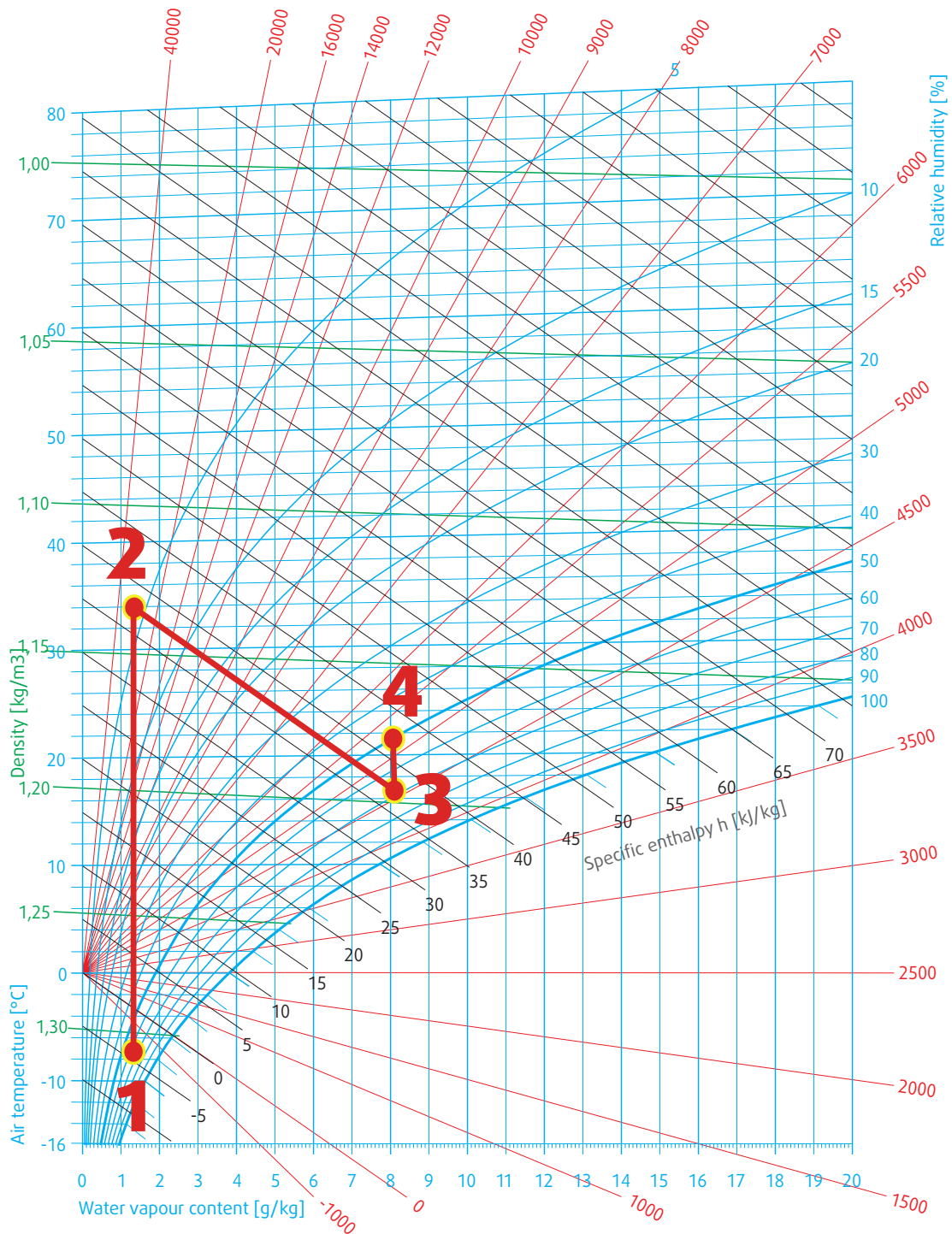
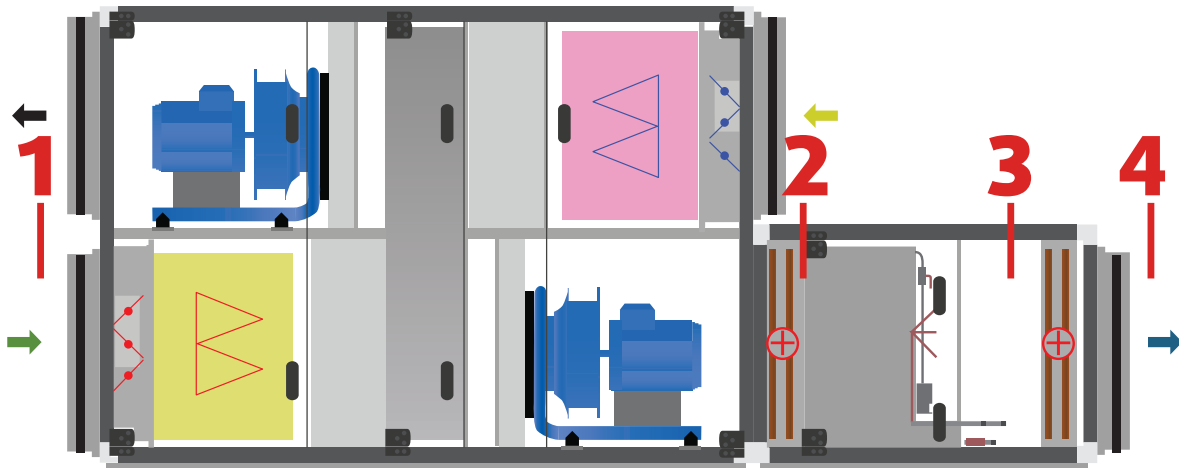
With two heating coils you can accept a lower starting temperature before the humidification. The reason is that if the air temperature is lower after the humidification than desired, you have the possibility to heat up the air in order to end up with the desired air conditions.

1. The air is heated up from $-3\text{ }^{\circ}\text{C}$ and 40% RH through the rotary heat exchanger and furthermore through the pre-heating coil until the desired temperature is reached.

2. Now the air has a RH of 4% and a temperature of $34\text{ }^{\circ}\text{C}$. As the air passes through the humidifier, the saturated pads of the humidifier pass on the moisture to the air. This changes both the humidity of the air as well at the temperature.
3. Ending with $17\text{ }^{\circ}\text{C}$ and 70% RH by following the enthalpy lines in the Mollier chart.
4. After passing through the post heating coil the temperature rises to the end conditions of $22\text{ }^{\circ}\text{C}$ and 50% RH.

How to choose in SystemairCAD

If this is the chosen solution you may have to change the CelPad thickness of the HU-CELL material. You will also have the possibility to change the starting temperature to reach your desired leaving air conditions. Here you will have the possibility not only to change the humidifier thickness but also the temperatures. This solution ensures you more possibilities. However, it is also more demanding for the control system. The selection can be made in the SystemairCAD and calculated instantly to find the leaving air conditions of the AHU.



Mollier chart for moist air for p = 1 bar



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