DEHUMIDIFIER UNIT FOR RADIANT SYSTEMS FLUSH-MOUNTING INSTALLATION IN FALSE CEILINGS KDS

KDSHY026

Description

The **KDS** units are monobloc units for installation in false ceilings, to be combined with radiant systems for moisture control.

Versions and product codes

Units

Product code	Dehumidification	Cooling integration	Technical communication ref.
KDSHY026	**YES**	**NO**	**0932EN**
KDSRHY026	YES	YES	0933EN
KDSRHY350	YES	YES	0934EN

Accessories

Product code	Description
KDSPLY026	**Delivery plenum with 4 units Ø 100 mm for KDSHY026 and KDSRHY026**
KDSPLY350	Delivery plenum with 6 units Ø 100 mm for KDSRHY350

Technical data

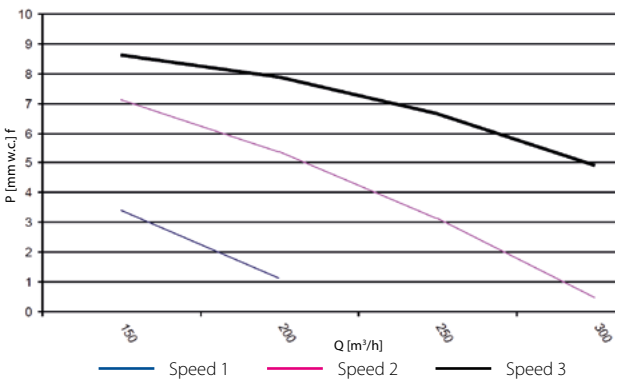
CONSTRUCTION CHARACTERISTICS	
Cooling compressor	Airtight, single-cylinder alternative
Refrigerant gas	R290 - 84 g
Electricity supply	230 V 50 Hz
Pre-cooling coil	Copper pipes (2 rows) and aluminium fins with hydrophilic treatment
Evaporator coil	Copper pipes and aluminium fins with hydrophilic treatment
Post-heating coil	Copper pipes and aluminium fins
Water connections	2 x 1/2"F
Fan	Dual suction centrifuge with direct-coupled motor, 3 speeds
Air filter	With filtering material in synthetic fibre class G3 (EN 779:2002)
Nominal operating temperature range	15÷30 °C
Safety features	Inlet water temperature check, evaporator, condenser, alarm signal LED and relay

CHARACTERISTIC DATA	
Air flow rate [m³/h]	200
Pressure available (factory configuration) [Pa]	15
Moisture removed (26 °C - 65% R.H. - inlet water 15 °C) [l/24h]	24,7
Max. absorbed electric power [W]	260
Electric power absorbed by fan [W]	30
Total water flow rate [l/h]	240
Water circuit loss of pressure [kPa]	11
Weight [kg]	29

NOISE DATA			
Sound power level db (A) (ISO 3747)	Speed 1	Speed 2	Speed 3
Ventilation	39,6	41,4	46,2
Dehumidification	46	47,5	49,2

NB: the equivalent sound pressure level depends on the room where the unit is installed, and the presence or absence of ducts and/or plenums. Generally speaking, the value is 7-10 db (A) lower than the sound power level, and this value falls further when there are ducts and/or plenums.

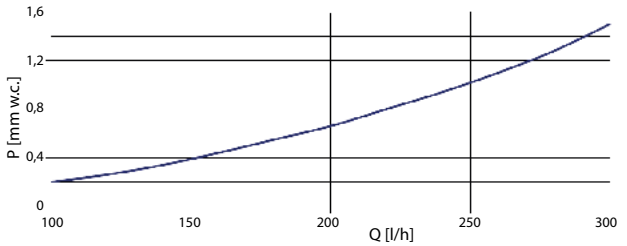
FAN AIR FLOW RATE



PERFORMANCE					
Dehumidification - Air flow rate 200 m³/h [air conditions 24 °C - 55 % UR]					
T	A	B	C	D	E
12	1439	481	16,6	688	237
15 *	1297	412	14,2	631	249
18	1179	363	12,5	584	251
Dehumidification - Air flow rate 200 m³/h [air conditions 24 °C - 65 % UR]					
T	A	B	C	D	E
12	1566	692	23,9	910	249
15 *	1372	577	19,9	799	252
18	1259	516	17,8	739	253
Dehumidification - Air flow rate 200 m³/h [air conditions 26 °C - 55 % UR]					
T	A	B	C	D	E
12	1626	609	21	828	249
15 *	1424	490	16,9	711	251
18	1304	438	15,1	662	254
Dehumidification - Air flow rate 200 m³/h [air conditions 26 °C - 65 % UR]					
T	A	B	C	D	E
12	1769	843	29,1	1065	252
15 *	1559	715	24,7	393	254
18	1354	587	20,3	814	257

T: supply water temperature [°C] (* Design temperature)
A: total cooling capacity [W]
B: latent cooling capacity [W]
C: dehumidification capacity [l/24h]
D: power required for the water cooler [W]
E: electric power absorbed [W]

WATER CIRCUIT PRESSURE LOSS



Main components

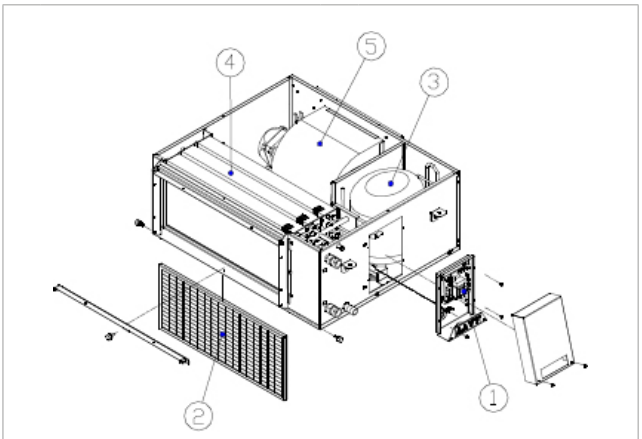
STRUCTURE: in galvanised metal panels entirely covered with a sound-absorbent coating in foam polyurethane with open cells.

FILTERING SECTION: filtering structure in galvanised metal, with G3 filter that can be removed from every side of the unit.

COOLING CIRCUIT: in copper pipes, finned aluminium coils with copper pipes, alternative piston-operated cooling compressor - 10 cc; moisture filter.

HYDRAULIC CIRCUIT: in copper pipes, with finned aluminium coil and copper pipes for air pre-treatment and post-treatment. The galvanised metal unit frame contains the finned coils for air treatment, the cooling circuit for dehumidification, the suction air filter, the condensate collection basin, the delivery fan, and the electric command panel.

FAN: dual suction centrifuge with forward blades, with direct-coupled 3-speed motor; the operating speed is set by choosing the wires to be connected to the electricity supply.



Legend			
1	Electric command panel compart-ment	4	Finned coil
2	Suction air filter	5	Fan
3	Cooling compressor		

Figure 1 -Components

Operation

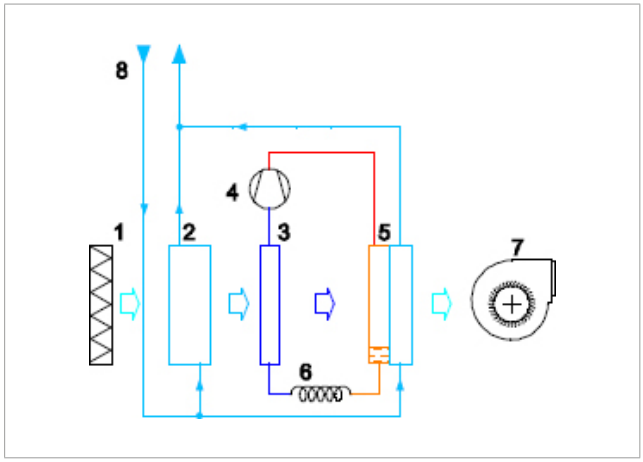


Figure 2 - Operating diagram with neutral air

The KDSHY026 dehumidifier is a cooling cycle unit designed as a system component. Cooling systems use cooled water at temperatures between 15 and 20 °C, which is sufficient to bring the rooms to the required temperature but not sufficient to dehumidify them. Dehumidification requires water at 7 °C, produced by the chiller at a notably lower flow rate than water at 15-20 °C. Water-chilled dehumidifiers with a cooling cycle keep the air humidity in the room at optimum values (55-65%), offering the following advantages compared with other systems:

- they use the cooled water from the radiant panel system;
- they allow the air to be treated without altering its temperature, so without any negative effect on the behaviour of the radiant panels and their adjustment system.

Fig.2 shows neutral air operation.

The air is filtered via the filtering section **(1)** and is pre-cooled via the cooled water exchanger **(2)** from the collector of the radiant system **(8)**. The use of cooled water to pre-cool the air is fundamental for the efficiency of the process, as it minimises the use of electricity by the cooling compressor **(4)**. The air is then dehumidified by passing through the finned coils of a cooling circuit: the actual dehumidification takes place in the first coil **(3 - evaporator)**, while in the second **(5 - condenser)** the post-heating operation uses the heat developed by the cooling circuit. The coil **(5)** has a second row, called "post-treatment", located just downstream from the cooling circuit condenser. Its job is to reduce the temperature of the air expelled from the unit so the value is no higher than the inlet temperature.

LED display diagnostics

Red "POWER" LED: a fixed light indicates that the power supply is enabled.
Green "COMPR" LED: indicates dehumidification consent. A fixed light indicates that the compressor is working. A flashing light indicates that the compressor is in standby following start-up or a fault.
Alarm LEDs 3 and 4: see the table below

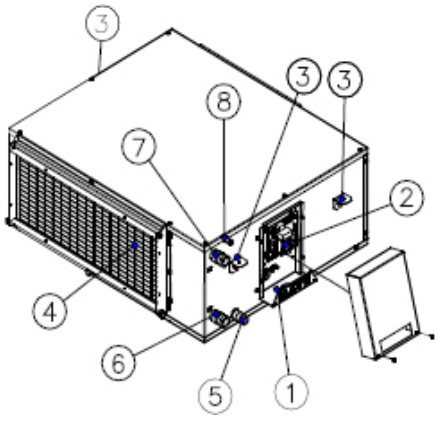
◯ = LED off ● = LED on ◐ = LED flashing

Yellow LED ALARM1	Red LED ALARM2	Diagnosis	Permanency
◯	◯	No alarm	
◐	◯	Room temperature too high, or empty circuit	Permanent alarm
●	◯	Room temperature too low	Permanent alarm
◯	◐	Maximum cooling pressure lockout	Permanent alarm
◯	●	Delivery water temperature higher than 30 °C	It resets by itself, if the temperature falls

Yellow LED ALARM1	Red LED ALARM2	Diagnosis
fast flashing ◐		One of the probes is faulty: 1 flash: evaporator probe 2 flashes: water probe 3 flashes: condenser probe
	fast flashing ◐	One of the probes is disconnected: 1 flash: evaporator probe 2 flashes: water probe 3 flashes: condenser probe

Nota.
In the event of a permanent alarm, the compressor stops and does not restart. To reset the alarm, disconnect the electricity supply to the electronic card and then reconnect it again.

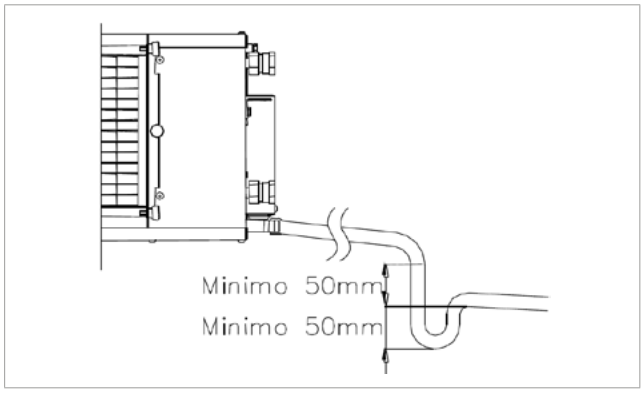
Connections



Legend			
1	Access to electrical connections	5	Condensate drainage (Ø 14 mm)
2	Electric command panel	6	Water inlet (1/2"F)
3	Coupling bracket (hole Ø 6 mm)	7	Water outlet (1/2"F)
4	Suction air filter	8	Vent

Figure 3 - Connections

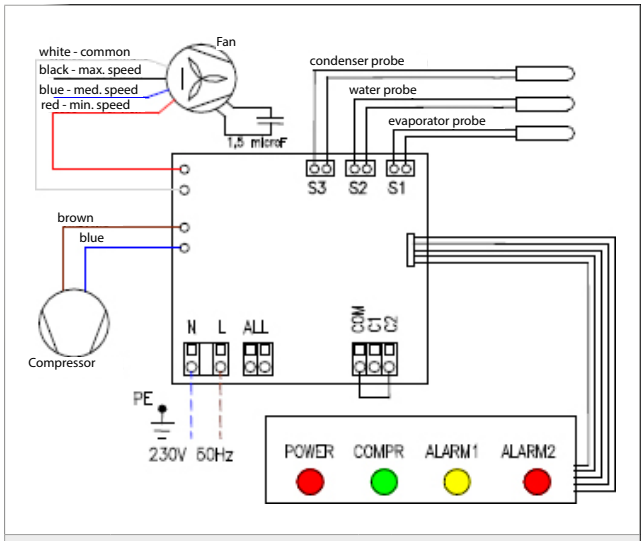
Condensataion drain:
- The condensate drain must have a slope adapted to the size and length of the tube;
- It is necessary to provide a siphon, and only one, to prevent suck back of air from the drain pipe.



Electric connections

WIRE SECTION

The electricity supply line and the disconnection devices must be determined by qualified electricity design experts; in any case, the cable section must be at least 3x1,5 mm², L + N + E. For operating consent: the cable must have a minimum section of 0,5 mm².



Legend	
Alarm	Alarm relay contacts - 250 V AC - 8 A
COM - C1	Clean contact for ventilation consent
COM - C2	Clean contact for dehumidification consent

Figure 4 - Electric connections

The unit is supplied with the fan connection at its minimum speed (red wire). Depending on the type of system and the losses of pressure in the pipes, you can increase the fan speed by connecting the blue wire (average speed) or the black wire (maximum speed) in place of the red one. The white wire must never be disconnected. The condenser (1,5 microF) is next to the motor on the fan.

Operating consent

The unit operates by means of two digital inputs (clean contact).
Ventilation consent: contact between the COM-C1 terminals. Not usually used, but by closing the contact you can activate the fan only (to force the movement of the air).
Dehumidification consent: contact between the COM-C2 terminals. Usually jumpered if there is no room humidity adjustment system. The unit interrupts operation when the contact between the two terminals opens.

Water-free operation

Warning.
The dehumidifier can operate without cooled water, but the suction air temperature must not be higher than 22 °C.
The dehumidifying capacity of the unit will anyway be lower (reduced by up to 40%).

Warning.
Do not circulate cooling water when the unit is not working for long periods, as condensate could form on the outer surface of the unit itself.

Warning.
After filling the system with water, you are advised to carefully check the seal not only of the connections but also of the unit's hydraulic circuit.

Accessories

There is a delivery plenum, code **KDSPLY026**, insulated and with knockout holes on which you can fix the collars (Ø 100 mm) supplied. The plenum should be connected to the unit, but in any case it can be fixed to the ceiling autonomously so as to sustain the weight of the ducts during dehumidifier maintenance work.

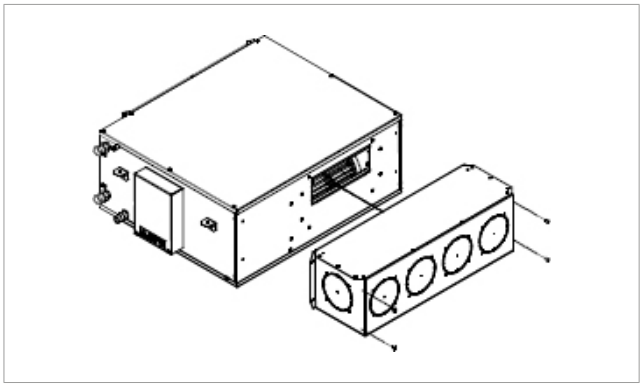


Figure 5 - KDSPLY026 plenum

Dimensions

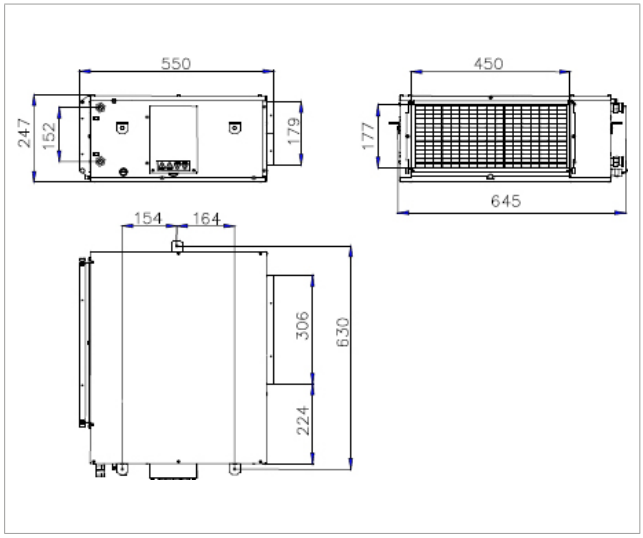


Figure 6 - Dimensions in mm

Nota.
it is important to leave a gap of at least 60 cm on the side of the hydraulic and electric connections, ensuring easy access for any future maintenance and repair work.

Product specifications

KDSHY026

Monobloc duct-type unit for dehumidification, for installation in false ceilings, to be combined with radiant cooling systems. Complete with removable filtering section in synthetic material, class G3 (EN779:2002), centrifuge fan with direct-coupled 3-speed motor, cooling circuit with R290 refrigerant gas, hydraulic circuit, treatment coils with copper pipe and aluminium fins, and 4-way delivery plenum with 100 mm diameter. Dehumidification capacity 24,7 l/24h, air flow rate 200 m^3/h. Nominal temperature working range 15÷30 °C. Water connections 2x1/2" F. 230 V power supply.