UTH-UTHZ

Energy recovery high efficiency dehumidifiers

CE

R407C

The energy recovery high efficiency dehumidifiers UTH range have been designed to grant the complete control of temperature, humidity, the energy recovery and the fresh air treatment in the covered swimming pools or in other applications with very high internal loads. The UTH units can operate in environments up to 36°C and are able to manage up to 30% of fresh air.
The range includes 7 models, which covers airflows range from 1500 to 6000 m^3/h.
The use of double-passage-cross-flow energy recovery allows to increase up to 20% the dehumidification capacity in comparison to the traditional dehumidifiers.
The use of the double passage in the energy recovery, in fact, allows the free sensible pre-cooling of the air near to the saturation point, giving so the possibility to the unit to work, basically, in latent load.

VERSIONS

- **Version with temperature control UTHZ: These versions are supplied with a remote condenser and are used in those applications where it is necessary the simultaneous control of temperature and humidity: Dehumidification mode: the internal condenser is activated; the unit dehumidifies and heats up the room temperature; Cooling mode: the remote condenser is activated; the unit dehumidifies and cools down the room temperature.**

ACCESSORIES

- **Partial heat recovery**
- **Low ambient temperature device with heat recovery**

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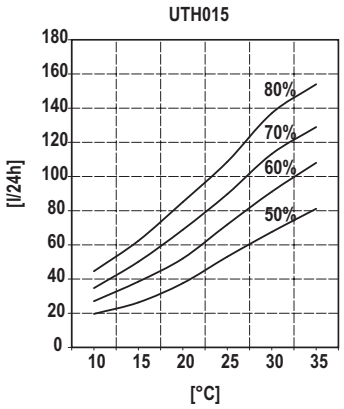
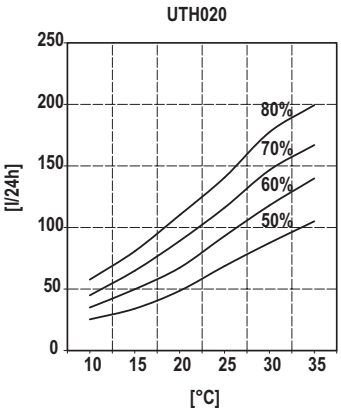
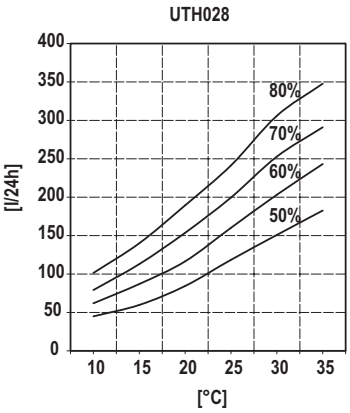
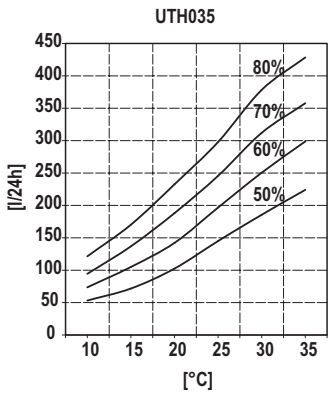
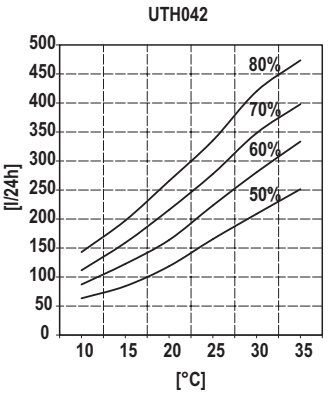
Mod.		UTH015	UTH020	UTH028	UTH035	UTH042	UTH052	UTH060
Moisture removed [1]	l/24h	137	178,1	306	378,4	440,1	568,5	683,5
Moisture removed [2]	l/24h	91,1	117,9	203,2	250,5	294,1	376,9	454,8
Moisture removed [3]	l/24h	182,3	235,2	406,1	501	588,2	753,8	909,6
Compressor input power [1]	kW	1,6	2,1	3,6	4,5	5,1	6,6	7,9
Nominal input power [1]	kW	2,5	3	4,8	6,1	7	9,1	10,4
Nominal input current [1]	A	6,2	7	10,4	13,6	15,3	20,4	22,8
*Partial heat recovery [4] (accessory)	kW	2,2	2,2	3,7	4,5	5,8	6,7	8,1
Hot water coil [5]	kW	15	18,3	28,4	33	44	50,8	55,8
Total air flow	m^3/h	1500	2000	2800	3500	4200	5200	6000
Available static pressure	Pa	200	200	200	200	200	200	200
Maximum fresh air flow	m^3/h	450	600	845	1050	1260	1560	1800
Refrigerant		R407C	R407C	R407C	R407C	R407C	R407C	R407C
Sound pression [6]	dB (A)	63	63	66	66	68	69	69
Temperature operating range	°C	10-36	10-36	10-36	10-36	10-36	10-36	10-36
Humidity operating range	%	50-99	50-99	50-99	50-99	50-99	50-99	50-99
Weight	Kg	290	305	400	420	570	590	620
Power supply	V/Ph/Hz	400/3~+N/50						

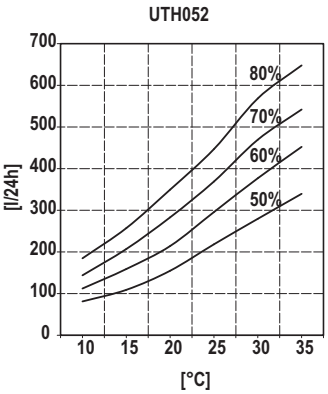


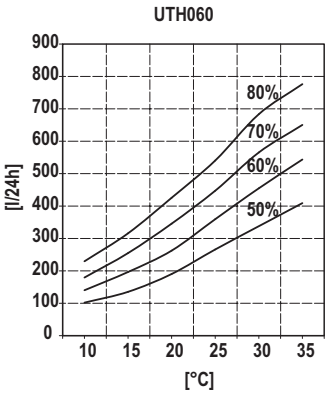












1) Performances refer to the following conditions: room temperature 30°C; relative humidity 80%, fresh air 0%.
2) Performances refer to the following conditions: room temperature 30°C; relative humidity 60%, fresh air 0%.
3) Performances refer to the following conditions: room temperature 30°C; relative humidity 60%, fresh air 30% (5°C-80%).
4) Performances refer to the following conditions: water temperature in / out 25-30°C.
5) Performances refer to the following conditions: room temperature 32°C; water temperature 80/70°C.
6) Sound pressure level measured at 1 mt from the unit in free field conditions according to ISO 3746.

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Mod.		UTHZ015	UTHZ020	UTHZ028	UTHZ035	UTHZ042	UTHZ052	UTHZ060
Moisture removed [1]	l/24h	137	178,1	306	378,4	440,1	568,5	683,5
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Moisture removed [3]	l/24h	182,3	235,2	406,1	501	588,2	753,8	909,6
Cooling capacity [1]	kW	6,10	7,70	13,10	15,30	19,20	23,90	27,80
Compressor input power [1]	kW	1,6	2,1	3,6	4,5	5,1	6,6	7,9
Nominal input power [1]	kW	2,5	3	4,8	6,1	7	9,1	10,4
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Available static pressure	Pa	200	200	200	200	200	200	200
Maximum fresh air flow	m^3/h	450	600	845	1050	1260	1560	1800
Refrigerant		R407C	R407C	R407C	R407C	R407C	R407C	R407C
Sound pression [6]	dB (A)	63	63	66	66	68	69	69
Temperature operating range	°C	10-36	10-36	10-36	10-36	10-36	10-36	10-36
Humidity operating range	%	50-99	50-99	50-99	50-99	50-99	50-99	50-99
Weight	Kg	290	305	400	420	570	590	620
Power supply	V/Ph/Hz	400/3~+N/50						

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6) Sound pressure level measured at 1 mt from the unit in free field conditions according to ISO 3746.

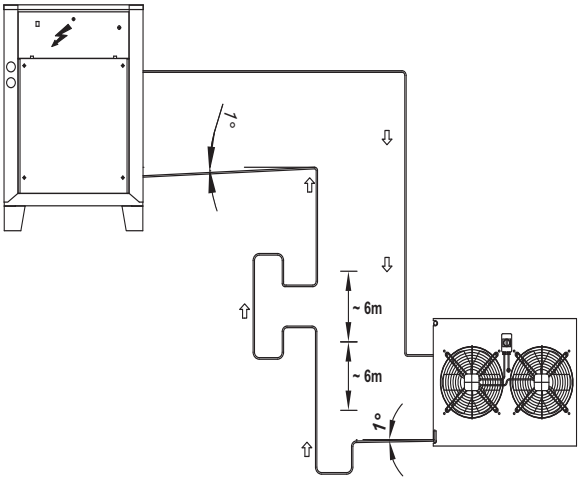
REFRIGERANT CONNECTIONS FOR Z VERSIONS

The Z version units are supplied of a remote condenser and they need to be connected with the dehumidifier through refrigerant lines.
The remote condenser is equipped of a main switch and a fan speed control. Please refer to the following paragraphers for the refrigerant connections and to the next chapter for the electrical ones.

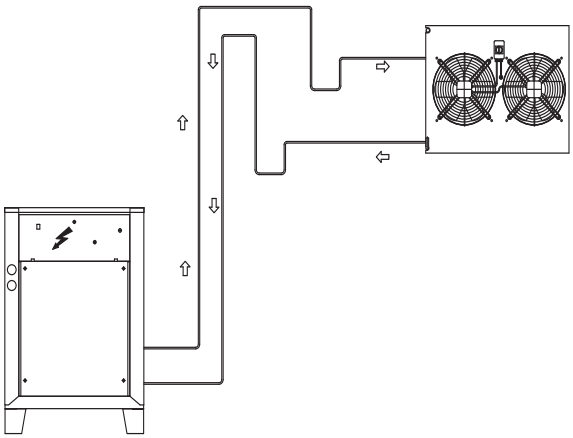
Line path and max. distance between the sections.
For the units in Z version with separate sections, the course of the refrigerant pipes is influenced by the location of the sections themselves and by the structure of the building. The pipes have to be in any case as short as possible, so that they can contain the charge lacks and reduce the quantity of refrigerant present in the refrigerant circuit. The connections must be isolated and their length must not exceed 30 m. Our Company is available for any information even in case of applications not included in the limits indicated above.

Dehumidifier lower than the condenser
Install a liquid trap on suction line at the evaporator outlet with the same height of the evaporator so that liquid refrigerant, when the system is not running, will not fall into compressor;
On horizontal suction pipelines a minimum 1% slope should be allowed in order to let the oil easily come back to compressor.

Dehumidifier higher than the condenser
On the rising vertical pipes, oil traps should be fitted every 6 metres to allow oil circulation in the system;
Install a collection pit immediately downstream from the bulb of the thermostatic valve; On horizontal suction pipelines a minimum 1% slope should be allowed in order to let the oil easily come back to compressor. Pipelines diameter can be read in Table II depending on the unit size and the length of refrigerant pipelines.all'1%.



Dehumidifier higher than the condenser



Dehumidifier lower than the condenser

Refrigerant diameters lines for version UTHZ						
Distace (m)	10		20		30	
Mod.	Gas (mm)	Liquid (mm)	Gas (mm)	Liquid (mm)	Gas (mm)	Liquid (mm)
015	15,8	7,94	15,8	7,94	---	---
020	15,8	7,94	15,8	7,94	---	---
028	15,8	7,94	15,8	7,94	15,8	7,94
035	15,8	7,94	15,8	7,94	15,8	7,94
042	15,8	7,94	18	9,52	18	9,52
052	22	15,88	22	18	28	18
062	28	15,88	28	18	28	22

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Liquid line refrigerant charge			
Line liquid diameter	Refrigerant charge g/m	Line liquid diameter	Refrigerant charge g/m
7,94 (mm)	30	9,52	50
15,88 (mm)	175	18 (mm)	220
22 (mm)	360	---	---

Cooling capacity correction factors				
Mod.	Refr. line 0 (m)	Refr. line 10 (m)	Refr. line 20 (m)	Refr. line 30 (m)
UTHZ	1	0,98	0,96	0,95

Water temperature	Room temperature / Relative Humidity											
	27 °C		28 °C		29 °C		30 °C		31 °C		32 °C	
	50 %	60 %	50 %	60 %	50 %	60 %	50 %	60 %	50 %	60 %	50 %	60 %
22 °C	0,108	0,057	0,092	0,041	0,075	0,023	0,059	0,008				
23 °C	0,134	0,080	0,117	0,062	0,099	0,044	0,083	0,026	0,065			
24 °C	0,161	0,105	0,144	0,086	0,126	0,068	0,108	0,048	0,090	0,029		
25 °C	0,191	0,134	0,173	0,114	0,155	0,093	0,135	0,074	0,117	0,053	0,098	
26 °C	0,222	0,164	0,204	0,143	0,186	0,122	0,167	0,101	0,147	0,080	0,126	0,057
27 °C	0,258	0,197	0,239	0,176	0,219	0,155	0,200	0,132	0,180	0,110	0,158	0,086
28 °C	0,296	0,233	0,276	0,212	0,257	0,189	0,236	0,165	0,215	0,143	0,194	0,117
29 °C	0,336	0,272	0,317	0,249	0,296	0,227	0,275	0,203	0,254	0,179	0,231	0,153
30 °C	0,378	0,314	0,359	0,291	0,339	0,267	0,317	0,243	0,296	0,218	0,272	0,191

The table reported here above, calculates the quantity of water for m^2 of pool. It's possible to estimate approximately the total pool evaporation multiplying this value for the surface of the pool. The values reported here are to be intended as pure indicative. In case of use in ambient with hydromassage, it's advisable to multiply the values obtained for 2,5-3.

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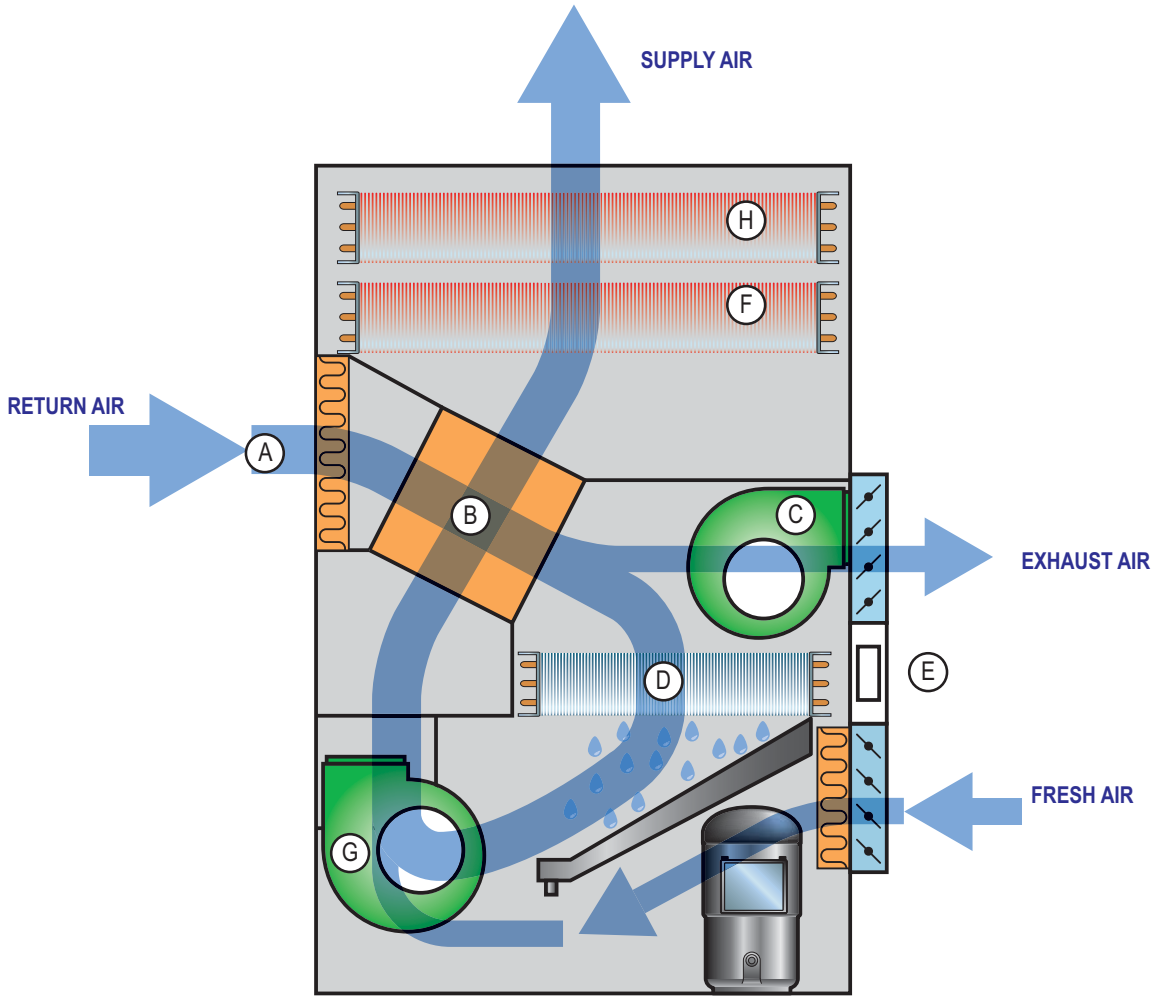
OPERATION PRINCIPLE

The hot and humid return airflow, moved by the fan (G), passes in the return filter (A), then across the first side of the energy recovery (B) where, crossing the cold air present on the other side, leaves part of its enthalpy. At this point part of the treated air (from 0% to 30%) is removed by the exhaust fan (C), while the remaining part passes across the cold evaporating coil (D) where it is dried at the required level. After the evaporator the cold and dried airflow is mixed with fresh air (from 0% to 30%) entered through the fresh air damper (E) and returned into the energy recovery for the second passage where, crossing the hot air present on the other side, it is warmed up. The airflow then passes across the condensing coil (F) where it is post heated and finally sent into the swimming pool. In case the air discharge temperature is still too cold, the hot water temperature coil H (accessory) will provide to increase it up to the required level.



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FRESH AIR TRATMENT

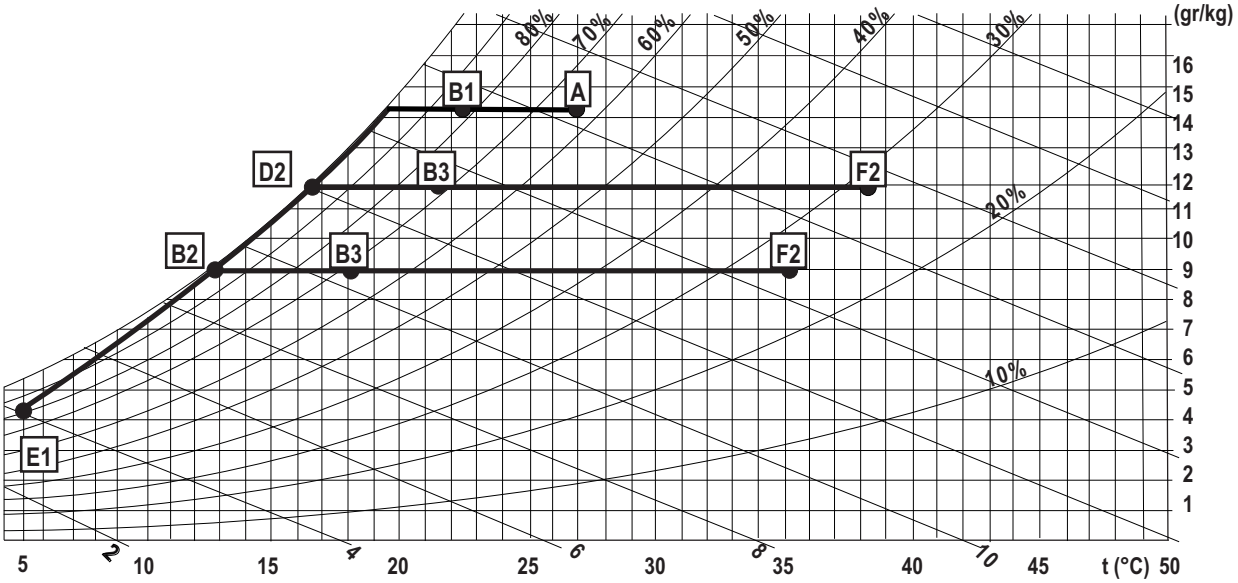
All units can operate with fresh air up to 30% of the total nominal airflow managed by the unit. The fresh air, winter season, has a humidity content that is extremely lower than the indoor air and its use can increase the dehumidification of the unit using the same airflow.

In the below diagram you may note that using fresh air we can supply in the room air with a lower dew point but, obviously, in this case the fresh air will have to be heated before to be supplied in the room with consequent higher thermal load of the heating coil.

A-B1	Sensible cooling made in the cross flow heat recovery	(27-65% / 23-80%)
B1-D2	Cooling with dehumidification in the evaporator of the unit	(23-80% / 17-95%)
D2-B3	Heating in the cross flow heat recovery (without fresh air)	(17-95% / 22-75%)
B3-F2	Post-heating in the condenser of the unit (without fresh air)	(22-75% / 38-28%)
D2-B2	Mixing with 30% fresh air	(17-95% / 13-100%)
B2-B3	Heating in the cross flow heat recovery (with 30% fresh air)	(13-100% / 18,5-70%)
B3-F2	Post-heating in the condenser of the unit (with 30% fresh air)	(18,5-70% / 35-26%)

The specific dehumidification capacity of the UTH, in total air recirculation (internal conditions 27°C, 65% R.H.) is about 2.5 gr/kg of treated air. In case of using 30% fresh air, at 5°C and 80% R.H., the specific dehumidification capacity of the unit will increase of about 3 gr/kg, doubling practically, the specific dehumidification capacity (5,5 gr/kg).

It is clear that, in case of use of fresh air, the air discharge temperature will be lower (35°C instead of 38°C) and will have to be heated before to be supplied in the room.



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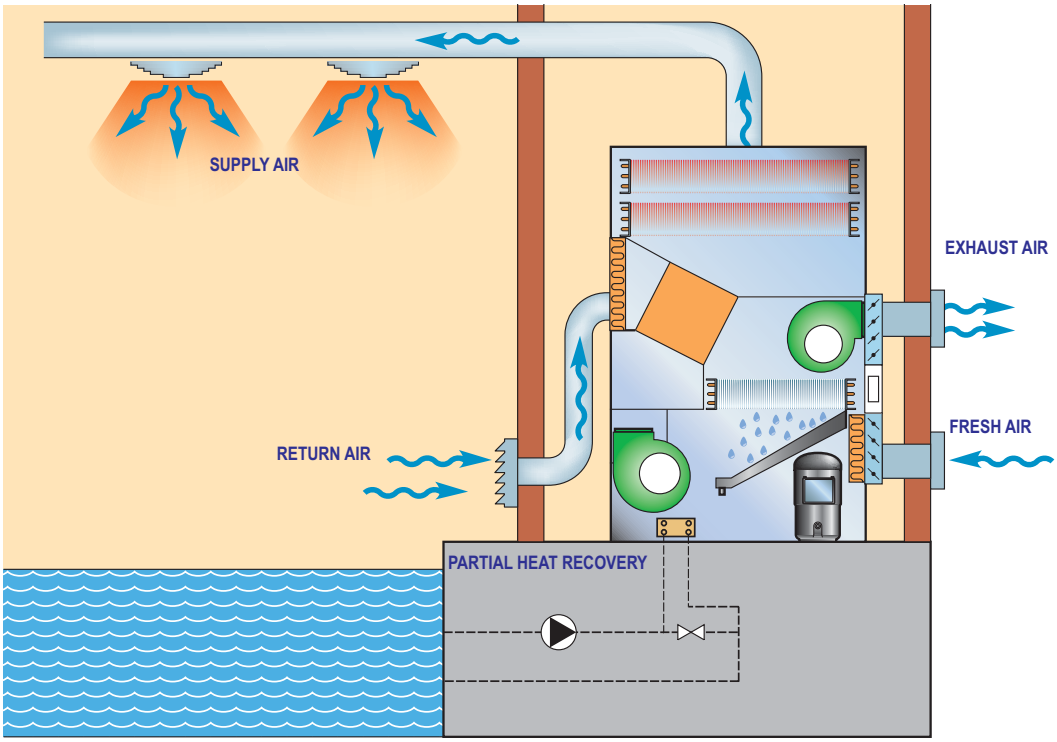
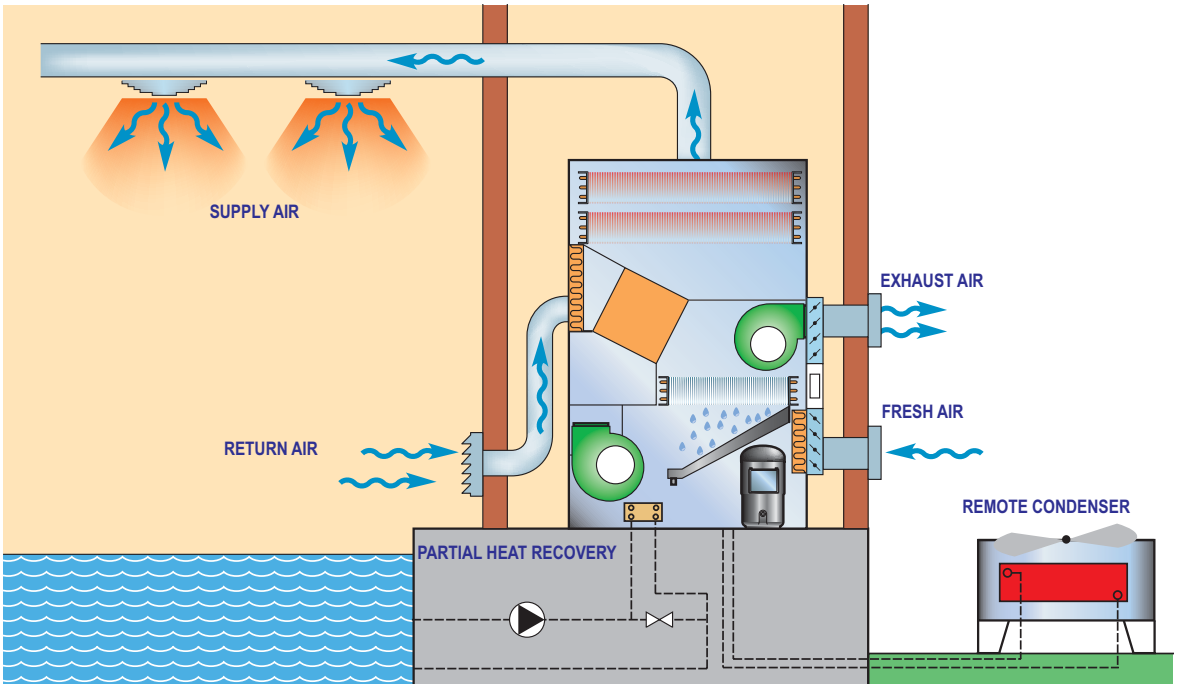
PLANT SCHEME WITH UTH



PLANT SCHEME WITH UTHZ



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FRAME
All UTH units are made from hot-galvanised thick sheet metal, painted with polyurethane powder enamel at 180°C to ensure the best resistance against the atmospheric agents and to operate in aggressive environments. The frame is self-supporting with removable panels. A stainless steel drip tray is installed on all units. The colour of the units is RAL 7035.

REFRIGERANT CIRCUIT
The refrigerant circuit is made by using international primary brands components and according to ISO 97/23 concerning welding procedures. The refrigerant gas used in these units is R407C. The refrigerant circuit includes:
sight glass, filter drier, thermal expansion valve with external equalizer, liquid line manual shut-off valve, Schrader valves form maintenance and control, pressure safety device (according to PED regulation).

COMPRESSOR
The compressor is scroll type, with crankcase heater and thermal overload protection by a klixon embedded in the motor winding. The compressor is mounted on rubber vibration dampers and, upon request, can be supplied with sound-proof cover to reduce noise emission (accessory). The crankcase heater,when present, is always powered when the compressor is in stand-by. The inspection is possible through the frontal panel of the unit that allows the maintenance of the compressor.

CONDENSER AND EVAPORATOR
Condensers and evaporators are made of copper pipes and aluminium fins. All coils are painted with epoxy powders toprevent corrosion problem due totheir use in aggressive environments.The diameter of the copper pipes is 3/8" and the thickness of the aluminium fins is 0,1 mm. The tubes are mechanically expanded into the aluminium fins to improve the heat exchange factor. The geometry of these condensers guarantees a low air side pressure drop and then the use of low rotation (and low noise emission) fans. All units are supplied, standard, with a stainless steel driptray and all evaporators are supplied with a temperature sensor used as automatic defrost probe.

HAET RECOVERY
The heat recovery is cross flow heat exchanger type, with painted aluminium plates; painted galvanised steel frame with additional tightnening of the heat echange pack, in order to operates in aggressive environments; it has a low pressure drop value and it is always supplied with stainless steel drip tray.

HOT WATER COIL
The hot water coil is made of copper pipes and aluminium fins. The diameter of the copper pipes is 3/8" and the thickness of the aluminium fins is 0,1 mm. The tubes are mechanically expanded into the aluminium fins to improve the heat exchange factor. All coils are supplied with a built-in 3 way modulating valve, directly managed by the microprocessor of the unit.

SUPPLY FAN
The supply fan is made of galvanized steel, centrifugal type, double inlet with forward curved blades. It is statically and dynamically balanced and supplied complete of the safety fan guard according to EN 294. It is mounted on the unit frame by interposition of rubber vibration dampers. The electric motors are 4 poles (about 1500 rpm), three-phase power supply. The motors are connected to the fans by pulleys and belts. The protection class of the motors is IP 54.

EXHAUST FAN
The exhaust fan is made of galvanized steel, centrifugal type, double inlet with forward curved blades. It is statically and dynamically balanced and supplied complete of the safety fan guard according to EN 294. It is mounted on the unit frame by interposition of rubber vibration dampers. The electric motors are directly connected to the fan; they are all at 3 speeds, with integrated thermal protection. The protection class of the motors is IP 54.

EXHAUST AND FRESH AIR DAMPERS
The exhaust and fresh air dampers are made of aluminium frame and fins, distance between the fins 150 mm. The BOCCOLE are in nylon; exhaust and fresh air dampers are connected each other and supplied already with servomotor managed by the microprocessorofthe unit.

AIR FILTER
It is made of synthetic filtering media, ondulated type, without electro-static charge; theay are all removable for differential disposal. Efficiency class G3, accordino to EN 779:2002.

MICROPROCESSOR
All UTH units are supplied standard with microprocessor controls. The microprocessor controls the following functions: compressor timing, automatic defrost cycles, the management of fresh and exhaust air, post heating valve and alarms. An appropriate LCD display shows the opertion mode of the unit, set point and alarms.

TEMPERATURE / HUMIDITY ELECTRONIC PROBE
It is installed, standard, on all UTH units.It is installed on the return air side and allows the unit to operates in dehumidification or heating depending on the required parameters. The electronic probe allows the showing of temperature and humidity values with an operating range from 0-50°C, humidity from 10-90%.

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Mod.	UTHZ015	UTHZ020	UTHZ028	UTHZ035	UTHZ042	UTHZ052	UTHZ060
Partial heat recovery	O	O	O	O	O	O	O
Low ambient temperature device with heat recovery	O	O	O	O	O	O	O

● Standard, O Optional, – Not Available.

Mod.	UTHZ015	UTHZ020	UTHZ028	UTHZ035	UTHZ042	UTHZ052	UTHZ060
Partial heat recovery	O	O	O	O	O	O	O
Low ambient temperature device with heat recovery	–	–	–	–	–	–	–

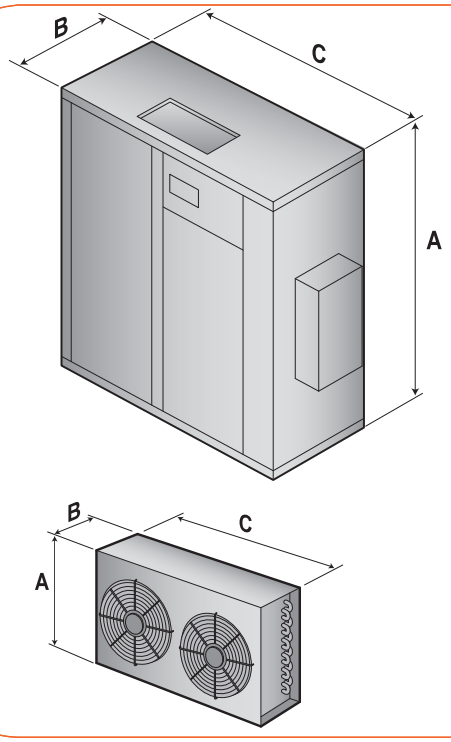
● Standard, O Optional, – Not Available.

ELECTRIC BOX

The electric switch board is made according to electromagnetic compatibility norms CEE 73/23 and 89/336. The accessibility to the board is possible after removing the front panel of the unit and the OFF positioning of the main switch. In all UTH units are installed, standard, the compressors sequence relay which disables the operation of the compressor in case the power supply phase sequence is not the correct one (scroll compressors in fact, can be damaged if they rotate reverse wise). The following components are also standard installed: main switch, magnetic-thermal switches (as a protection of pumps and fans), compressors fuses, control circuit automatic breakers, compressor contactors, fan contactors, pump contactors. The terminal board is also supplied with voltage free contacts for remote ON-OFF.

CONTROL AND PROTECTION DEVICES

All units are supplied with the following control and protection devices: defrost thermostat, which signals tothe microprocessor control that a defrost cycle is needed and controls its termination, high pressure switch with manual reset, low pressure switch with automatic reset, high pressure safety valve, compressor thermal overload protection, fans thermal overload protection.



Mod.	A (mm)	B (mm)	C (mm)
015	1770	640	1000
020	1770	640	1000
028	1850	750	1500
035	1850	750	1500
042	1950	1250	1950
052	1950	1250	1950
060	1950	1250	1950

Mod.	A (mm)	B (mm)	C (mm)
015	510	400	757
020	510	400	757
028	610	480	1292
035	610	480	1292
042	610	480	1292
052	810	480	1292
060	810	480	1292