CLOSE CONTROL
Air Conditioners

P Series

G Series

R Series

ACC Series

TECNAIR LV
CLOSE CONTROL AIR CONDITIONERS

Techline

TECNAIR LV
CLOSE CONTROL AIR CONDITIONERS

LU-VE GROUP
leadership with passion

Contents

Technical characteristics

ECSurvey
Next Generation Controller

SURVEY MICROPROCESSOR

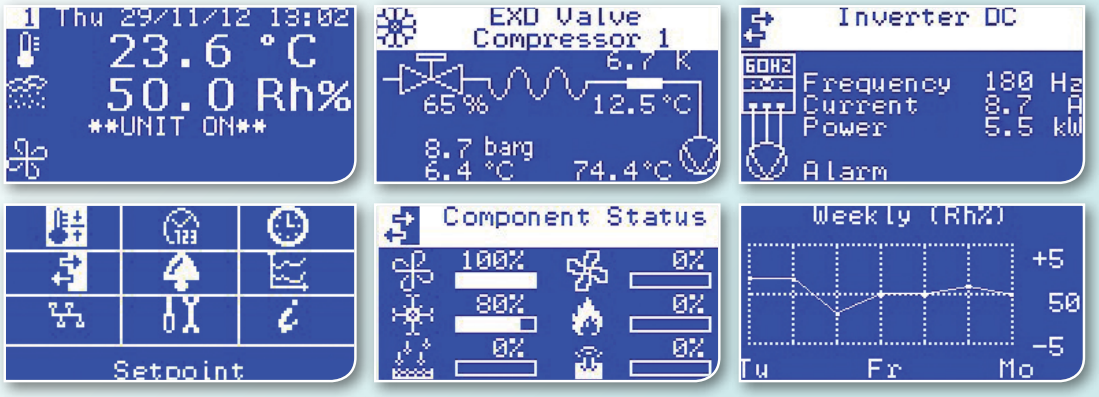
TECNAIR LV units are fitted with advanced SURVEY microprocessors which are designed to provide complete control of all the fundamental functions of close control air conditioning.

The microprocessor has a FULL GRAPHICS interface, with interactive icons and progress bars to make the controller user-friendly even for those who are not familiar with air conditioning equipment in either Data Centres or comfort cooling.

The SURVEY microprocessors can also:

- Guarantee enhanced operating continuity thanks to the self-diagnostic function and complete management of alarms.
- Manage in an integrated manner the operation of the EEV valve and the DC INVERTER with verification of the envelope of the compressors.
- Present active graphic displays of temperature and humidity, daily and weekly and permit the user a high degree of supervision of the general operation of the plant.
- Guarantee integration with supervision systems and BMS through the RS485 MODBUS RTU serial communication card.

The following examples illustrate some of the functions visualized on the display of the microprocessor:



NEW GENERATION OF ELECTRONIC FANS

The ever-growing necessity to save energy has made the use of high-performance EC Plug Fans indispensable in reducing plant costs.

The fans installed in TECNAIR LV close control air conditioners are fitted with BRUSHLESS EC *(Electronically Commutated)* MOTORS and a composite-material impeller to maximize performance.

Important advantages obtained as a result include:

- Power drawn by the fans is reduced by over 25% compared to fans using traditional AC technology.
- Power drawn by the fans is reduced by about 15% compared to the previous generation of EC fans.
- Noise levels are reduced by over 5 dB(A) at partial loads.
- Risk to the plant is reduced as the mechanical parts are subjected to less use.

Thanks to integration with the SURVEY microprocessor, the EC fans can be controlled to:

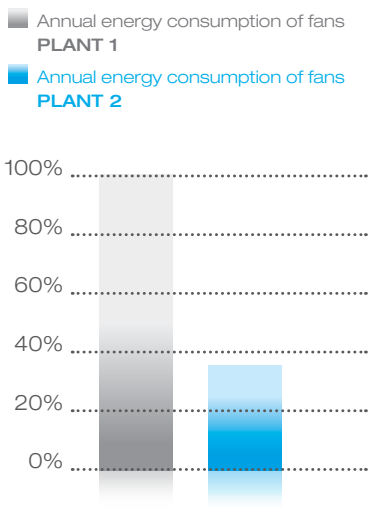
- Reduce rotation speed and therefore air quantity as the cooling capacity requirement decreases, thus making possible a 50% energy saving, operating at partial loads, compared to a constant velocity system.
- Maintain constant air quantity controlled in real time by differential pressure sensors, optimal control if F7 filters are installed.
- Maintain constant air pressure in the raised floor or in the compartmented areas in order to optimize air distribution avoiding hot spots and to guarantee maximum modularity of the plant.

PLANT NO. 1

1 x UPU 160 with constant velocity configuration
Total air quantity: 26400 m³/h (fan speed 84%)
Cooling capacity: 145,4 kW (at nominal conditions)
Annual average cooling capacity required: 100 kW
EER average: 18,25
Energy consumption of fans: 5,48 kW/h
Annual energy consumption of fans: 48.004,8 kW
Annual energy cost: 5.616,56 € (0,1170 € per kW/h)
Annual environmental impact: 36 t CO_2 (0,75 kg CO_2/kW electricity)

PLANT NO. 2

1 x UPU 160 with air quantity reduced depending on cooling capacity requirements
Total air quantity: Varying between 16500 and 26400 m³/h depending on the required cooling capacity
Cooling capacity: 145,4 kW (at nominal conditions)
Annual average cooling capacity required: 100 kW
EER average: **53,20**
Average energy consumption of fans: **1,88 kW**
Average annual energy consumption of fans: **16.468,8 kW**
Annual energy cost: **1.926,85 €** (0,1170 € per kW/h)
Annual environmental impact: **12,3 t CO_2** (0,75 kg CO_2/kW electricity)



TOTAL SAVING: -65,6%(-3.689,71 €)
23,6 tonnes of CO_2 not released into the atmosphere

Technical characteristics

SMARTnet
Advanced Network Management

ADVANCED LOCAL NETWORK

Thanks to constant efforts in the research and development of control processes, TECNAIR LV has implemented an innovative management system for air conditioners in a local network (LAN), called SMARTNET.

SMART NET, unlike normal networks n+1 or n+n (which are still available, however), can maintain all the air conditioners in the network active at the same time.

Thanks to a powerful control algorithm designed to maximise the advantages of the local network, SMARTNET permits:

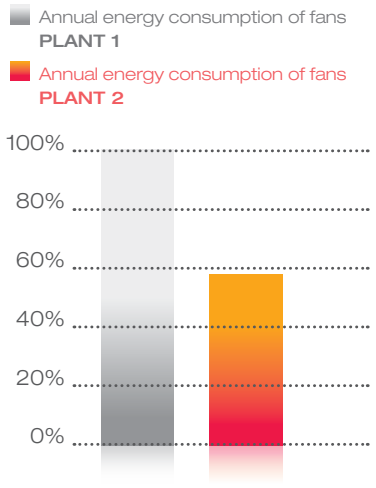
- Optimal and uniform distribution of the air and cooling capacity in the zones without air conditioners in standby state which could create hot spots.
- Average energy savings of over 60% due to the modulation of components at partial load (EC fans, DC inverter, etc.).
- Management of the AVERAGE READINGS of the temperature and humidity sensors fitted in the air conditioners, guaranteeing the best management of conditions in the areas.
- Management of the AVERAGE READINGS of the pressure sensors fitted in the air conditioners, guaranteeing optimal air distribution in the areas.

PLANT NO. 1

4 x UPU 160 with n+1 configuration
(3 air conditioners in operation + 1 in stand-by)
Total air quantity: 79.200 m^3/h (3 x 26.400 m^3/h) at constant velocity
Cooling capacity: 436,2 kW (3 x 145,4 kW at nominal conditions)
EER: 26,53
Energy consumption of fans: 16,44 kW (3 x 5,48 kW)
Annual energy consumption of fans: 144.014,4 kW
Annual energy cost: 16.849,68 € (0,1170 € per kW/h)
Annual environmental impact: 108 t CO_2 (0,75 kg CO_2/kW electricity)

PLANT NO. 2

4 x UPU 160 with SMARTNET configuration
(4 air conditioners operating in partialized mode)
Total air quantity: 75.600 m^3/h (4 x 18.900 m^3/h) at constant velocity
Cooling capacity: 451,6 kW (4 x 112,9 kW at nominal conditions)
EER: **47,24**
Energy consumption of fans: **9,56 kW** (4 x 2,39 kW)
Annual energy consumption of fans: **83.745,6 kW**
Annual energy cost: **9.798,23 €** (0,1170 € per kW/h)
Annual environmental impact: 62,8 t CO_2 (0,75 kg CO_2/kW electricity)



TOTAL SAVING: -41,8% (-7.051,45 €)
45,2 tonnes of CO_2 not released into the atmosphere

Ulterior characteristics:

- Very high EER *(Energy Efficiency Ratio)*
- Limited footprint
- Very quiet operation
- Dark grey metal structure
- Class 1 fire-resistant thermo-acoustic insulation panels
- Scroll compressors for R410A
- 2- or 3-way modulating valves to regulate cooling capacity of air conditioners with chilled water coils
- Electrical panel equipped with all regulation and safety devices; there is a phase sequencer for direct expansion air conditioners
- Large-surface G4 efficiency air filters fitted before the cooling coil

Quality guaranteed by:

Quality Certificate ISO 9001:2000 Vision: first obtained first ISO 9001 certification in 1995; ISO 9001:2000 Vision certification was obtained in 2004.

CE Certification of the product: all TECNAIR LV air conditioners are in compliance with CE Directives.

GOST Certification: since 1995, all TECNAIR LV air conditioners have obtained the GOST-R Russia certification, in compliance with the "Gosudarstvennyj Standart" *(State Standards)*.

EUROVENT Certification: the P Series air conditioners obtained EUROVENT certification of performance in 2011 for the *"Close Control Air Conditioners (CC)"* OM-1-2011 program.

Main accessories

EDCompressor
Inverter Driven Technology

BRUSHLESS DC COMPRESSORS WITH INVERTER TECHNOLOGY

Adapting cooling capacity to the real requirements of the plant is one of the principal conditions of guaranteeing the flexibility required by the most advanced systems.

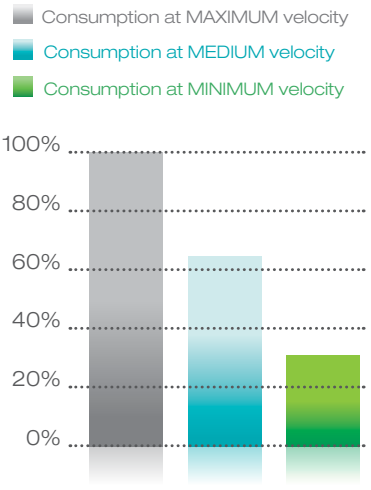
TECNAIRLV has adopted BRUSHLESS DC INVERTER technology in order to obtain this. Like the EC fans, also the compressors are fitted with BRUSHLESS motors driven by a special inverter designed to maximize the performance of the motor, especially at partial loads, control of which is integrated in the SURVEY microprocessor.

Thanks to the innovative BRUSHLESS DC technology, TECNAIR LV close control air conditioners can:

- Maintain the thermo-hygrometric conditions of the controlled areas at a constant level, guaranteeing that the set-point is respected even under partial loads.
- Modulate the cooling capacity of the units between 20% and 100% of maximum capacity.
- Reduce the annual energy consumption of the unit by over 70% (in partial load conditions).
- Obtain an increase in energy efficiency (EER), since the power drawn by a BRUSHLESS DC compressor driven by inverter reduces in proportion to the decrease in cooling capacity supplied (unlike other control systems which do not reduce the number of revolutions of the compressor).
- Increase the safety of the plant thanks to the innovative design of the compressors which guarantees perfect return of oil even at minimum speeds.
- Reduce noise levels.

OPA 211 with 7 hp DC INVERTER
Total air quantity: 7000 m^3/h at constant velocity
MAXIMUM cooling capacity: 22.0 kW (at nominal conditions)
MEDIUM cooling capacity: 15.8 kW (at nominal conditions)
MINIMUM cooling capacity: 7,4 kW (at nominal conditions)

EER at MAXIMUM velocity: 3,27
EER at MEDIUM velocity: 3,40
EER at MINIMUM velocity: 2,58
Energy consumption of the fans: 1,23 kW
Energy consumption of the compressor at MAXIMUM velocity: 5,5 kW
Energy consumption of the compressor at MEDIUM velocity: 3,42 kW
Energy consumption of the compressor at MINIMUM velocity: 1,64 kW



Saving at MEDIUM velocity: -37,8%
Saving at MINIMUM velocity: -70,2%

EEValve
Electronic Expansion Valve

EEV ELECTRONIC EXPANSION VALVE

An advanced control system is necessary to maximize the performance of direct expansion cooling circuits, especially in partialized conditions.

The EEV electronic expansion valves guarantee excellent control of the cooling cycle through the direct regulation of the main functional values.

Thanks to integration with the SURVEY microprocessor, the EEV electronic valves make it possible to:

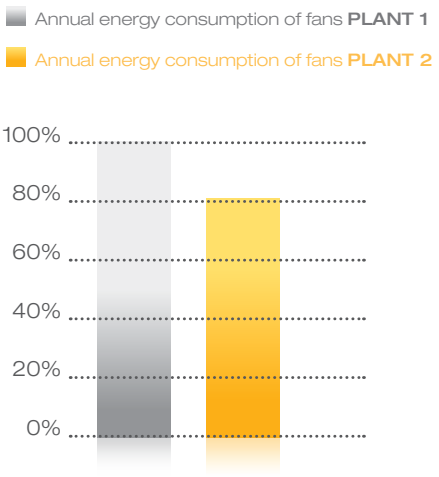
- Save energy, over the course of a year, by up to 25%, optimizing the performance of the cooling circuit compared to a traditional TEV thermostatic expansion valve.
- Visualize on the display the operating conditions of the cooling circuit in a simple and immediate way.
- Manage the lowest possible value of overheating for the cooling circuit, maximizing the heat transfer of the evaporating coil.
- Allow the condensing temperature, in winter or at night, to drop to 35°C with a great reduction in the compression ratio of the cooling circuit and therefore also of the power draw.

PLANT NO. 1

OPA 211 with standard TEV thermostatic expansion valve
Total air quantity: 7000 m³/h at constant velocity
Cooling capacity: 21,5 kW (at nominal conditions)
EER: 3,26
Energy consumption of the fans: 1,23 kW
Energy consumption of the compressor: 5,38 kW

PLANT NO. 2

OPA 211 with EEV electronic expansion valve
Total air quantity: 7000 m³/h at constant velocity
Cooling capacity: 24,5 kW (condensing temperature 35°C)
EER: 4,42
Energy consumption of the fans: 1,23 kW
Energy consumption of the compressor: 4,31 kW



TOTAL SAVING: -19,8%

Main accessories

ECFan Variable Air Flow

ELECTRONIC FANS IN THE ACC AIR-COOLED CONDENSERS

The demand for reduced energy consumption means that components with apparently limited consumption *(such as air-cooled condensers)* also require a substantial cut in the electricity they use.

For this reason, fans with BRUSHLESS EC motors can be selected also for ACC series air-cooled condensers.

Their use makes it possible to:

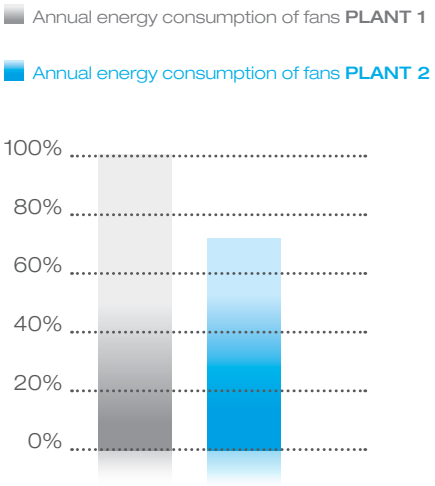
- Save energy, at partial loads, by over 45% compared to a normal condenser with AC motors.
- Reduce noise levels, at partial loads, by over 10% compared to a normal condenser with AC motors.
- Obtain a wide modulation range, from 0% to 100%, of the nominal velocity of the fan, without the usual problems relating to normal cut-phase controllers.
- Manage, when external conditions permit, very low condensing temperature set-points (35°C), while guaranteeing operation at high summer temperatures *(condensing temperature 60°C).*

PLANT NO. 1

4 x UPA 512 with 8 x ACC 42
32 fans; diameter 350; 4 poles
Total energy consumption of the condensers: 5,76 kW
Sound pressure level: 46 dB(A) for each condenser

PLANT NO. 2

4 x UPA 512 with 8 x ACC 42
32 electronic DC fans; diameter 350; 4 poles
Total energy consumption of the condensers: 4,16 kW
Sound pressure level: 44 dB(A) for each condenser



TOTAL ENERGY SAVING: -27,8%
NOISE REDUCTION: -4,3%

And also:


Immersed electrode humidifier


Electric reheating coil


Hot water reheating coil with 3 way valve *(only for models with lateral equipment enclosure)*

Free Windows based Supervision Software

F7 efficiency air filter on air suction instead of the standard G4


Water, smoke/fire and out-of-range discharge temperature alarms


Components for MASTER-SLAVE local network


Water condensers with or without pressure-actuated regulating valve


Sound damped discharge duct section


Duct section on air discharge with F7 filter


Sandwich panels *(on some models only)*


Discharge plenum with variable-direction grilles


Height-adjustable plinths


Condensate recirculation pump

Free Cooling
THE USE OF RENEWABLE ENERGY

The interest of the market in sources of renewable energy has led to the development of air conditioners with low environmental impact using the FREE COOLING function.

This system uses external air - a source of renewable energy – to cool the water in the Free Cooling circuit through an external dry cooler.

The Free Cooling circuit works instead of or in addition to direct expansion mechanical cooling. Three different operating regimes are therefore possible:

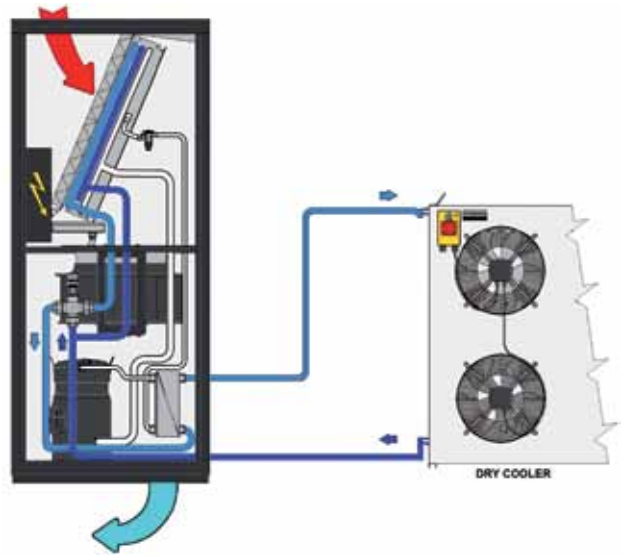
- **TOTAL FREE COOLING:** when the external air temperature is sufficiently low to bring the water to a value which fulfils the cooling requirements, the Free Cooling circuit functions without the intervention of mechanical cooling. This is the maximum energy-saving scenario as the compressors are never in service.
- **PARTIAL FREE COOLING:** when the external air temperature is insufficient to maintain the water at the desired temperature, in addition to the Free Cooling circuit function, mechanical cooling can intervene for the period strictly necessary to meet the cooling requirements. This too is an energy saving situation, even if the savings are not as high as the preceding example.
- **NO FREE COOLING:** when the temperature of the external air is too high for the water temperature to be sufficient to meet the cooling requirements, operation is completely given over to mechanical cooling, cutting out the Free Cooling circuit. Thanks to the head pressure control valve of the water-cooled condenser which allows regulation of the condensing temperature to 35°C, reducing the power draw of the compressor, it is still possible to obtain a reduction of energy consumption compared to a normal direct expansion system.

The Free Cooling air conditioners are fitted as standard with:

- An innovative control algorithm integrated into the **SURVEY** microprocessor permits energy savings of over 50% to be made compared to a normal direct expansion unit.
- An **AUTOADAPTIVE SETPOINT** function which in addition enables the regulation of the dry cooler fans serving the unit to obtain always the best set-point of the water temperature as the external temperature changes. This regulation also permits the energy saving to be increased by making the fans function at partial load for most of the time.
- An **EEV** electronic valve.
- A head pressure control valve of the water-cooled condenser which enables the water temperature to be regulated to 35°C, reducing the power draw of the compressor.
- A hot-gas injection, pressure-actuated regulating valve to prevent the simultaneous functioning of the two cooling sources from freezing the condensate.

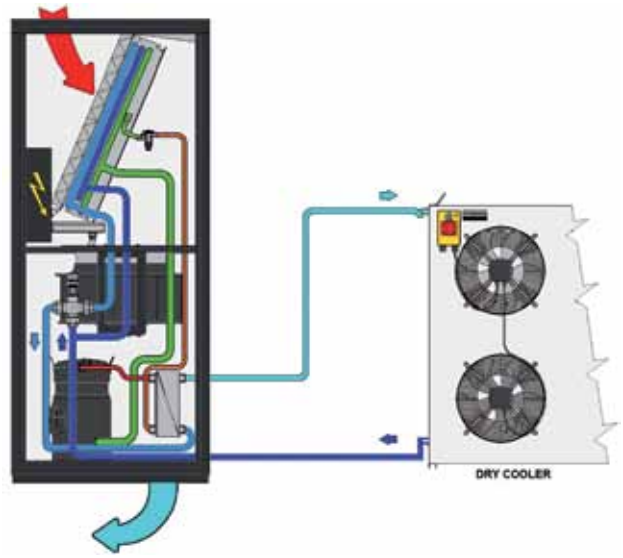
TOTAL FREE COOLING

"WINTER" operation
(100% Free Cooling)



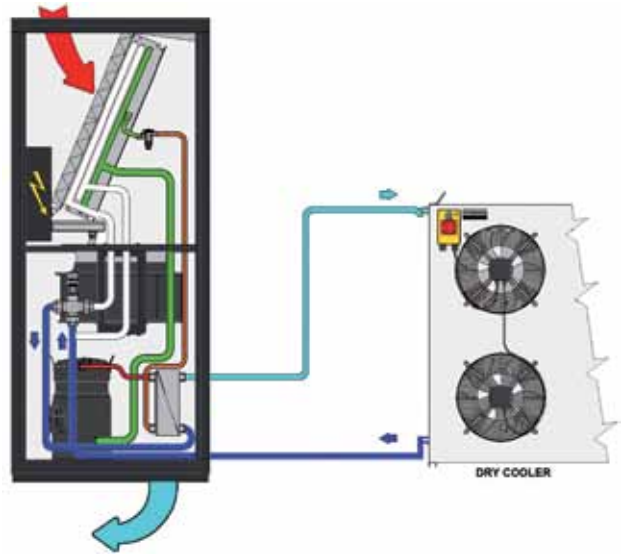
PARTIAL FREE COOLING

"SPRING-AUTUMN" operation
(Free Cooling + Direct expansion)



NO FREE COOLING

"SUMMER" operation
(100% Direct expansion)



Two Sources
GUARANTEED CONTINUITY OF OPERATION

Two Sources
Twin Safety Technology

The criticality of some types of plant, such as Data Centres, requires safety measures that prevent interruption of operation due to equipment problems.

The "Two Sources" system guarantees continuity of the cooling function if, for whatever reason, the primary source is not available: overload, maintenance, night-time/seasonal stoppage or for any type of emergency.

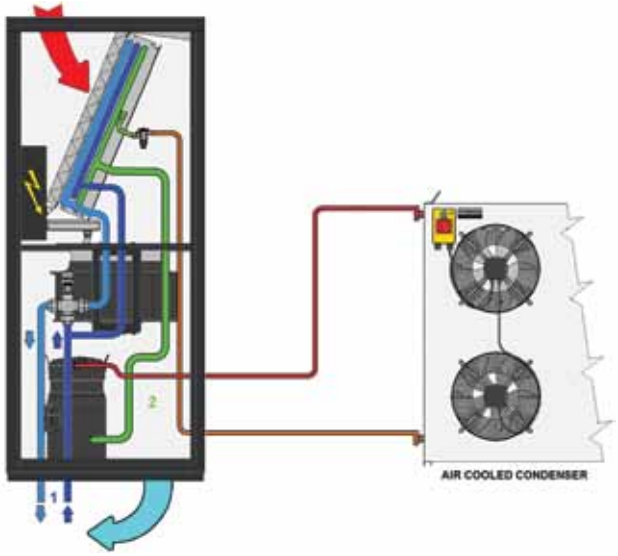
This system envisages the installation inside the machine of a second cooling source, complete with its own regulation and totally independent of the primary one. Only the aluminium fin pack is common to the two sources, thus enabling both to reach very high heat transfer efficiency levels.

The Two Sources system is extremely flexible and, depending on the sources chosen, permits various applications:

- **DX/TS:** in this application, the air conditioner has a direct expansion cooling source, with one or two compressors, and another with chilled water. The primary source is normally the chilled water one connected to the refrigeration plant of the building or to the district cooling system, and the emergency one is the direct expansion connected in its turn to a remote air - cooled or a built-in water- cooled condensers. Alternatively, the primary source can be direct expansion and the emergency one water - groundwater or aqueduct.
- **CW/TS:** in this application both cooling sources are chilled water coils. The primary source is normally connected to the refrigeration plant of the building or to the district cooling system. The emergency source can be connected to a dedicated water chiller or to water - groundwater or aqueduct.

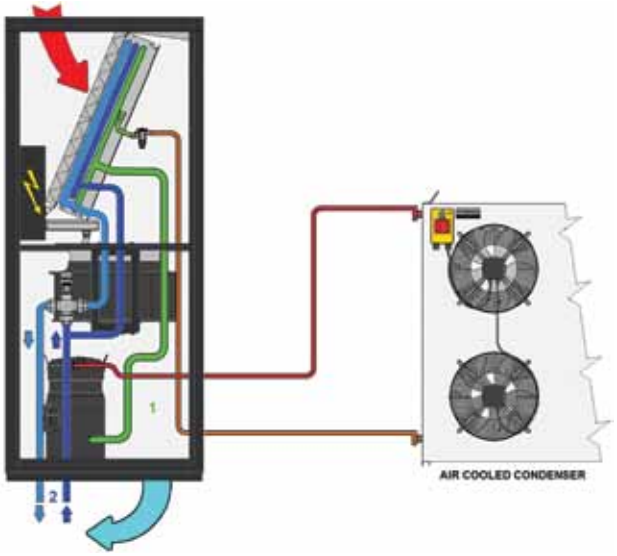
TWO SOURCES DX

1. Primary circuit operation:
   Chilled water
2. Secondary circuit operation:
   Direct expansion



TWO SOURCES DX

1. Primary circuit operation:
   Direct expansion
2. Secondary circuit operation:
   Chilled water



TWO SOURCES CW

1. Primary circuit operation:
   Chilled water
2. Secondary circuit operation:
   Chilled water/groundwater/aqueduct

P Series CLOSE CONTROL AIR CONDITIONERS

PERIMETRAL INSTALLATION

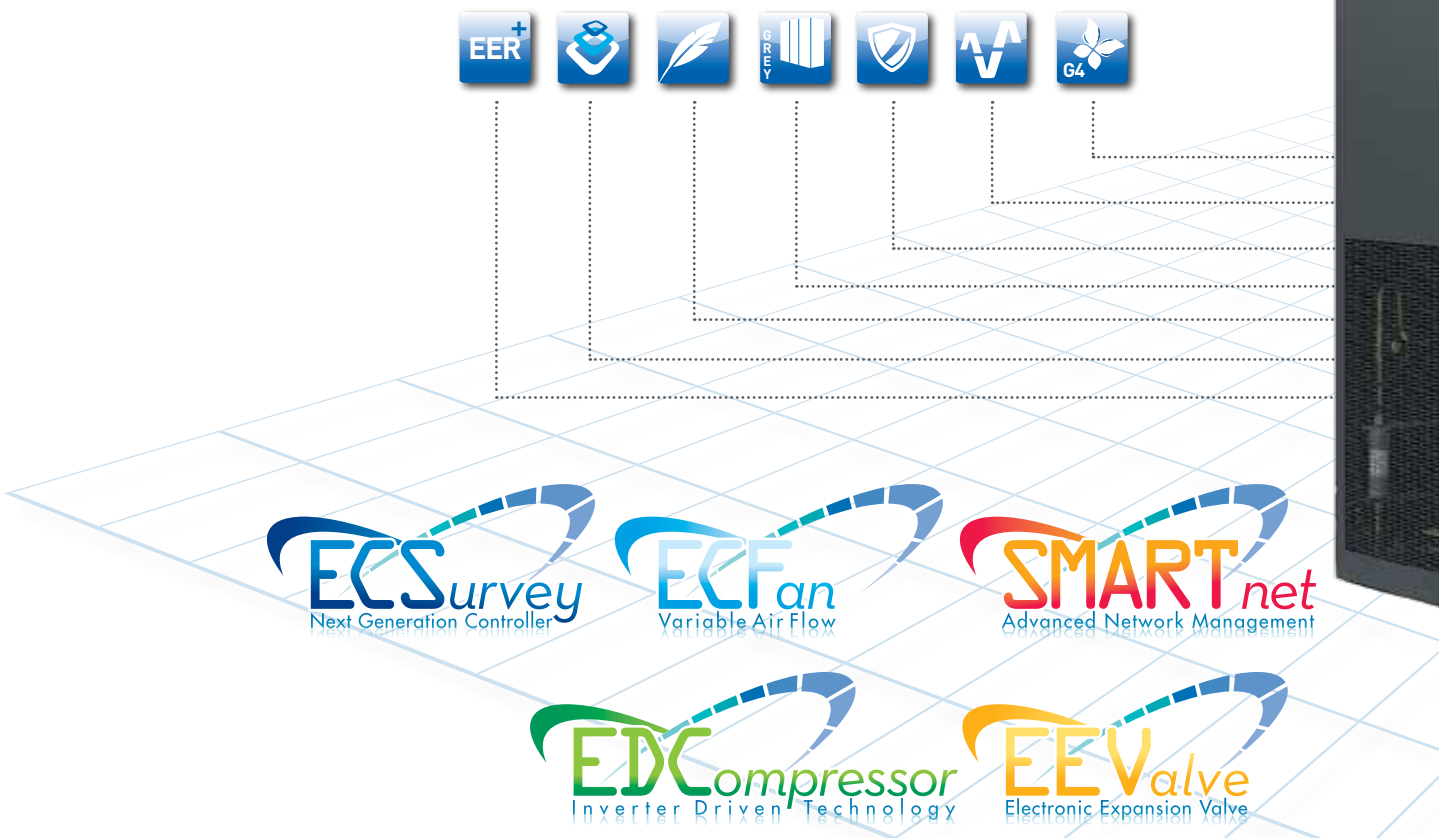
APPLICATIONS

TECNAIR LV close control air conditioners in the P Series consist of a family of units which are significantly different from normal climate control equipment due to their construction and operation characteristics.

Though optimized for use in data centres and telephone exchanges, they are equally valid in special applications such as metrology laboratories, TV recording studios, musical instrument storage areas, control rooms for electricity power stations and railway junctions and other areas in general where there are prevalent sensible thermal loads and crowding is negligible. Their application is also ideal in widely varied industrial sectors: optics, electronics, electro-medical equipment, electronic equipment production, musical instrument production etc.

The P series air conditioners offer:

- Rigorous control of room temperature and humidity.
- A very high ratio of cooling capacity to footprint area, which facilitates the designing of the areas to be climate controlled.
- Very high levels of energy efficiency, which translates into less CO_2 emitted into the environment and very contained running costs.
- Very flexible application thanks to the wide range of accessories which can be selected.



GENERAL CHARACTERISTICS

Direct expansion from 6 to 100 kW
OPA: upflow air supply
UPA: downflow air supply

Chilled water from 10 to 200 kW
OPU: upflow air supply
UPU: downflow air supply

ACCESSORIES

P Series CLOSE CONTROL AIR CONDITIONERS

PERIMETRAL INSTALLATION

UPFLOW AIR SUPPLY

Standard version with front air intake and upflow air supply.

Frontal air intake and front air supply with distribution plenum and grille.

Suction from below with plinth for raised floors, closed front panel and upflow air supply.

DOWNFLOW AIR SUPPLY

Standard version with suction from above and downflow air supply, with plinth for raised floors.

Suction from above and frontal air supply with distribution plenum and grille.

Suction from above and frontal air supply with grilled front panel.

OPA: direct expansion air conditioners with air-cooled or water-cooled condensers and upflow air supply

Models		71a	111a	141a	211	251	301	302	361	372	422	461	491	512	612	662	852	932
Performance levels																		
Total cooling capacity (1)	kW	6,7	11,0	14,5	21,0	25,4	30,3	30,5	36,7	37,4	43,4	46,9	51,1	51,1	62,6	67,5	85,7	94,2
Sensible cooling capacity (1)	kW	6,7	10,9	12,3	20,5	22,3	29,0	28,8	36,7	31,8	43,2	44,1	51,5	46,0	59,2	61,5	69,8	85,6
Air quantity	m^3/h	2.200	3.200	3.200	7.000	7.000	8.700	8.700	14.500	8.700	14.500	14.500	17.900	14.500	17.900	17.900	17.900	22.500
EER (2)		2,91	3,18	3,30	3,18	3,11	3,13	3,27	3,41	2,97	3,29	3,40	3,51	3,13	3,27	3,24	3,28	3,46
Sound pressure level (3)	dB(A)	49	49	50	56	56	58	58	63	58	63	63	68	63	68	68	68	69
Dimensions and weights																		
Length	mm	750	750	750	860	860	1.410	1.410	1.750	1.410	1.750	1.750	2.300	1.750	2.300	2.300	2.300	2.640
Depth	mm	600	600	600	880	880	880	880	880	880	880	880	880	880	880	880	880	880
Height	mm	1.990	1.990	1.990	1.990	1.990	1.990	1.990	1.990	1.990	1.990	1.990	1.990	1.990	1.990	1.990	1.990	1.990
Net weight	kg	180	200	210	270	270	320	340	440	350	450	450	540	500	640	640	660	860

UPA: direct expansion air conditioners with air-cooled or water-cooled condensers with downflow air supply

Models		71a	111a	141a	211	251	301	302	361	372	422	461	491	512	612	662	852	932
Performance levels																		
Total cooling capacity (1)	kW	6,7	11,0	14,5	21,0	25,4	30,3	30,5	36,7	37,4	43,4	46,9	51,1	51,1	62,6	67,5	85,7	94,2
Sensible cooling capacity (1)	kW	6,7	10,9	12,3	20,5	22,3	29,0	28,8	36,7	31,8	43,2	44,1	51,5	46,0	59,2	61,5	69,8	85,6
Air quantity	m^3/h	2.200	3.200	3.200	7.000	7.000	8.700	8.700	14.500	8.700	14.500	14.500	17.900	14.500	17.900	17.900	17.900	22.500
EER (2)		2,90	3,17	3,31	3,20	3,12	3,15	3,29	3,29	2,98	3,29	3,40	3,53	3,13	3,28	3,25	3,29	3,49
Sound pressure level (3)	dB(A)	49	49	50	56	56	58	58	63	58	63	63	68	63	68	68	68	69
Dimensions and weights																		
Length	mm	750	750	750	860	860	1.410	1.410	1.750	1.410	1.750	1.750	2.300	1.750	2.300	2.300	2.300	2.640
Depth	mm	600	600	600	880	880	880	880	880	880	880	880	880	880	880	880	880	880
Height	mm	1.990	1.990	1.990	1.990	1.990	1.990	1.990	1.990	1.990	1.990	1.990	1.990	1.990	1.990	1.990	1.990	1.990
Net weight	kg	180	200	210	270	270	320	340	440	350	450	450	540	500	640	640	660	860

OPU: chilled water air conditioners with upflow air supply

Models		10a	20a	30	50	80	110	160	220
Performance levels									
Total cooling capacity (1)	kW	10,3	18,9	30,4	39,0	66,6	87,5	142,5	175,1
Sensible cooling capacity (1)	kW	9,1	16,0	28,6	35,4	60,0	76,2	120,3	152,4
Air quantity	m^3/h	2.200	3.500	7.800	8.500	15.400	17.400	26.400	34.800
EER (2)		32,15	24,23	20,21	20,97	24,34	24,73	26,01	24,74
Sound pressure level (3)	dB(A)	47	47	56	56	59	61	64	65
Dimensions and weights									
Length	mm	750	750	860	860	1.750	1.750	2.640	3.495
Depth	mm	600	600	880	880	880	880	880	880
Height	mm	1.990	1.990	1.990	1.990	1.990	1.990	1.990	1.990
Net weight	kg	155	160	220	240	340	360	540	700

UPU: chilled water air conditioners with downflow air supply

Models		10a	20a	30	50	80	110	160	220
Performance levels									
Total cooling capacity (1)	kW	10,3	18,9	30,4	39,0	66,6	87,5	142,5	175,1
Sensible cooling capacity (1)	kW	9,1	16,0	28,6	35,4	60,0	76,2	120,3	152,4
Air quantity	m^3/h	2.200	3.500	7.800	8.500	15.400	17.400	26.400	34.800
EER (2)		32,15	24,23	20,21	20,97	24,34	24,73	26,01	24,74
Sound pressure level (3)	dB(A)	47	47	54	54	56	58	62	64
Dimensions and weights									
Length	mm	750	750	860	860	1.750	1.750	2.640	3.495
Depth	mm	600	600	880	880	880	880	880	880
Height	mm	1.990	1.990	1.990	1.990	1.990	1.990	1.990	1.990
Net weight	kg	155	160	220	240	340	360	540	700

Note:

(1) Performance levels are in reference to: R410a refrigerant; condensing temperature: 45°C; inlet air: 24°C-45% UR; water: 7/12°C; available static pressure: 30 Pa. The declared performance levels do not take into account the heat generated by the fans which is added to the thermal load of the plant.

(2) EER = Energy Efficiency Ratio = total cooling capacity / power draw of the compressors + that of the fans (excluding air-cooled condensers).

(3) Sound pressure levels declared are at a distance of 2 metres, height 1.5 m, in free field and with supply air vent connected.

G Series AIR CONDITIONERS FOR LARGE DATA CENTRES

PERIMETRAL INSTALLATION

APPLICATIONS

TECNAIR LV air conditioners in the G Series consist of a family of units specially designed to exploit the plant characteristics of the latest generation of large Data Centres.

In the design of air conditioning equipment for large Data Centres, the necessities of cable housing and for the distribution of the enormous quantities of air required to cool the servers have made it necessary to raise the height of the false floor to now reach the current 600-800 millimetres. This creates an ample space below the air conditioner destined to the installation of the plinth. This large space under the raised floor was therefore considered as the housing for the discharge fans. The air conditioners are supplied in two separate sections: the under-base containing the discharge fans to be installed under the floating floor, and the treatment unit with the exchanger coil, filters and the electrical panel.

This large space under the raised floor is used to house the supply air fans. The air conditioners are therefore supplied in two separate sections:

- The treatment unit with enlarged heat exchanger coil, filters and electrical panel.
- The plinth containing the supply air fans, to be installed under the raised floor. The plinth with the fans is supplied to match the height indicated in the order from the customer.

The two sections, shipped separately, are easy to install on-site as they require only electrical connection of the two junction boxes in the air conditioner and the plinth.

Without increasing the footprint area but only using the available space, the following important advantages are gained:

- At equal footprint area of the air conditioner, the heat exchanger coil can be sized using also the internal space left free by the fans. The frontal section of the coil can thus be increased by about 40-50%, reducing the air side pressure drop and therefore the energy consumption of the fans.
- The increased size of the air filters, installed before the cold water coil, allows for a significant reduction in pressure drop and their less frequent replacement for maintenance.
- An increase in the energy efficiency of the fans which, installed in the plinth, expel air horizontally and completely free of obstacles.

ECSurvey Next Generation Controller

ECFan Variable Air Flow

SMART net Advanced Network Management

EDCompressor Inverter Driven Technology

EEValve Electronic Expansion Valve

GENERAL CHARACTERISTICS

Direct expansion from 60 to 180 kW
UGA: downflow air supply

Chilled water coil from 140 to 300 kW
UGU: downflow air supply

ACCESSORIES

G Series AIR CONDITIONERS FOR LARGE DATA CENTRES

PERIMETRAL INSTALLATION

DOWNFLOW SUPPLY

Standard version for perimetral installation inside the Data Centre: the height of the raised floor must be minimum 550 mm.

Version for perimetral installation inside the Data Centre with raised floor height less than 550 mm. In this case, the plinth with fixed height of 550 mm is supplied with lateral closure panels and must be installed above the floor. It is essential to check that the height of the ceiling is sufficient to ensure good air suction.

Version for installation outside the Data Centre, without raised floor, rear air supply. In this case the plinth (fixed height 550 mm) is supplied with side closure panels and rear supply air grilles. Installation of the plenum with rear re-intake system is optional, if there is no ductwork.

UGA: direct expansion air conditioners with air-cooled or water-cooled condensers and downflow air supply

Models		461	612	932	1232	1342	1732
Performance levels							
Total cooling capacity (1)	kW	46,1	60,8	92,7	123,3	138,8	171,5
Sensible cooling capacity (1)	kW	42,3	49,9	82,9	98,0	127,6	143,4
EER (3)		3,52	3,08	3,57	3,18	3,43	3,36
Total cooling capacity (2)	kW	52,2	65,4	104,3	130,3	153,6	186,4
Sensible cooling capacity (2)	kW	52,2	64,5	104,3	124,9	153,6	186,4
EER (3)		3,97	3,34	4,01	3,39	3,78	3,66
Air quantity	m^3/h	12.000	13.000	23.000	24.000	37.500	37.500
Sound pressure level (4)	dB(A)	56	56	64	64	65	65
Dimensions and weights							
Length	mm	1.490	1.490	2.390	2.390	3.290	3.290
Depth	mm	921	921	921	921	921	921
Height	mm	1.990	1.990	1.990	1.990	1.990	1.990
Net weight	kg	630	680	870	940	1.160	1.250

UGU: chilled water coil air conditioners with downflow air supply

Models		70	150	230	300
Performance levels					
Total cooling capacity (1)	kW	60,6	130,9	198,1	261,7
Sensible cooling capacity (1)	kW	52,8	110,1	166,2	220,3
EER (3)		28,96	31,66	31,90	31,02
Total cooling capacity (2)	kW	47,7	101,0	152,5	202,0
Sensible cooling capacity (2)	kW	47,7	101,0	152,5	202,0
EER (3)		13,33	26,98	27,04	26,38
Air quantity	m^3/h	12.000	24.000	36.000	48.000
Sound pressure level (4)	dB(A)	54	58	64	64
Dimensions and weights					
Length	mm	1.320	2.220	3.120	4.020
Depth	mm	921	921	921	921
Height	mm	1.990	1.990	1.990	1.990
Net weight	kg	610	750	930	1.250

Note:

((1) Performance levels are in reference to: R410a refrigerant; condensing temperature: 45°C; inlet air: 24°C-45% UR; water: 7/12°C; available static pressure: 30 Pa. The declared performance levels do not take into account the heat generated by the fans which is added to the thermal load of the plant.

(2) Performance levels are in reference to: R410a refrigerant; condensing temperature: 45°C; inlet air: 30°C-30% UR; water: 14/20°C; available static pressure: 30 Pa. The declared performance levels do not take into account the heat generated by the fans which is added to the thermal load of the plant.

(3) EER = Energy Efficiency Ratio = total cooling capacity / power draw of the compressors + that of the fans (excluding air-cooled condensers).

(4) Sound pressure levels declared are at a distance of 2 metres, height 1.5 m, in free field and with supply air vent connected.

R Series AIR CONDITIONERS FOR LARGE DATA CENTRES

IN-ROW INSTALLATION

APPLICATIONS

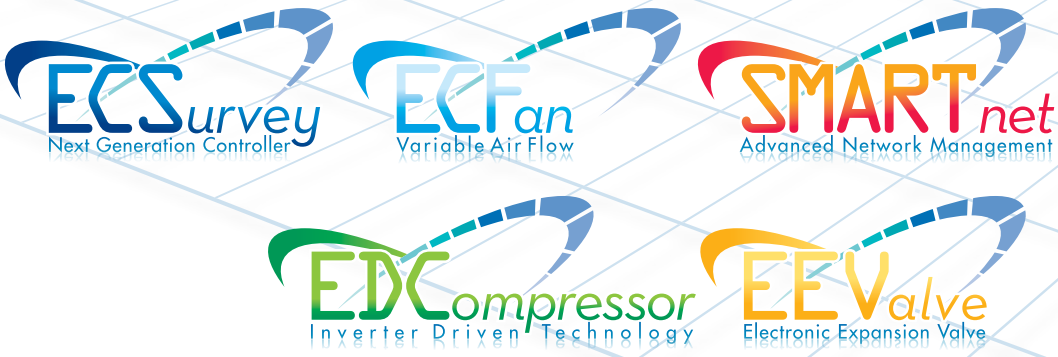
TECNAIR LV air conditioners in the R Series consist of a family of units specially designed and constructed to have the same dimensions as the racks.

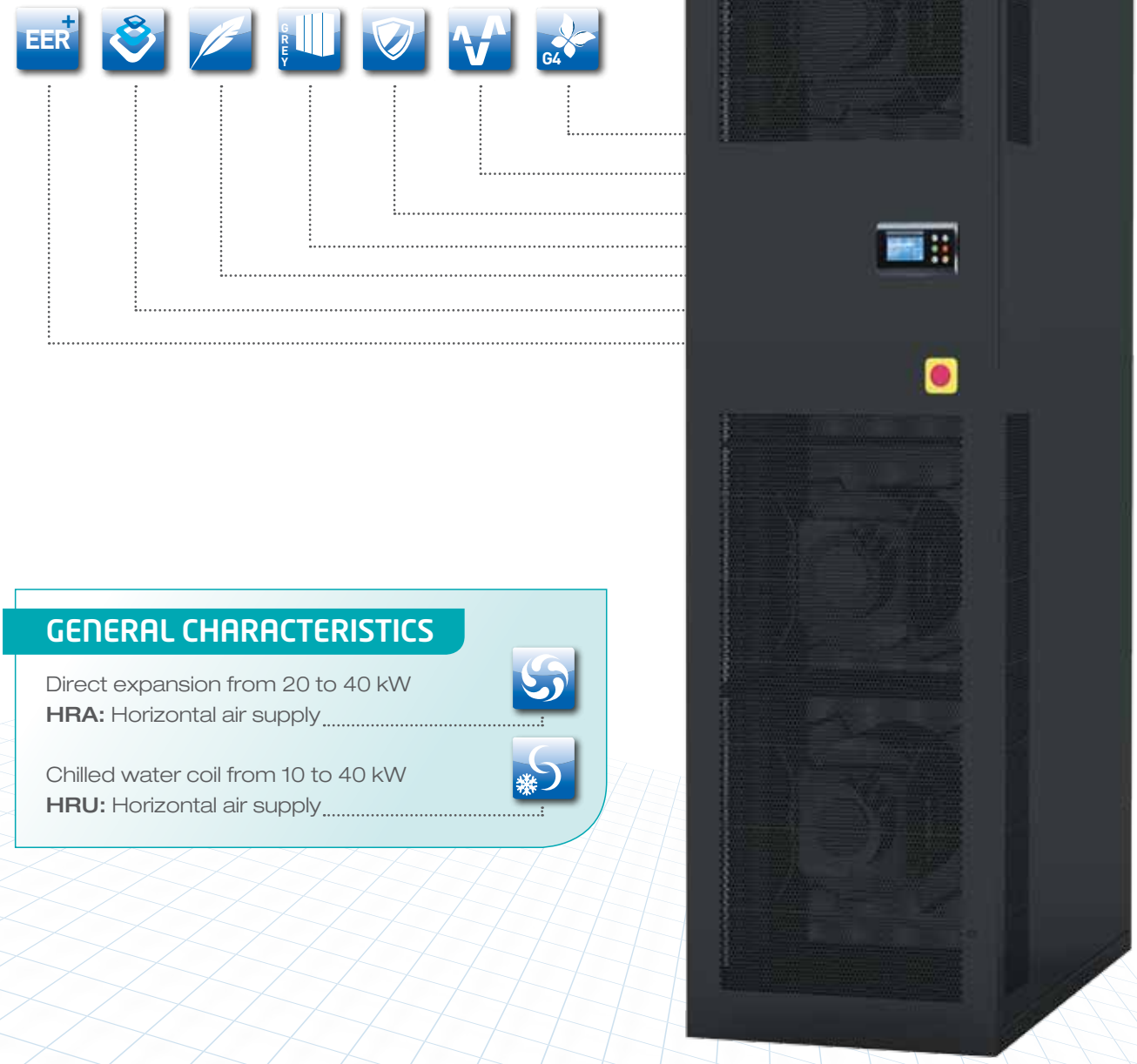
In the design of air conditioning plant for large Data Centres, the reduction of energy consumption is of ever increasing importance. For this reason the following concepts have become consolidated international standard practice:

- The racks containing the servers are more often positioned according to the "hot corridor aisle" and "cold corridor/aisle" layout.
- The working air temperatures are now allowed to go up to 30-35°C in the hot corridor and 20 25°C in the cold one, with very low humidity (never above 30%). Consequently, also the water temperature is allowed to rise up to 20-28°C, using the Free Cooling system to the best effect.
- Server capacities keep going up while their dimensions keep going down. This means that more servers can be installed in a rack so that some of these racks, remaining empty, can be removed. At the same time the heat dissipated rises and more capacity is required from the air conditioners.
- The servers work day and night albeit with a night time reduction of their capacity. It is therefore essential for the air conditioning installation to have an efficient modulating cooling capacity control and to be designed for minimum energy consumption and minimum environmental impact.

In order to satisfy these requirements, the R Series air conditioners have been designed and constructed to have the same dimensions as the racks, with rear suction from the hot corridor and front supply into the cold one, with the following advantages:

- Use of the space freed up in the racks and therefore cold air is distributed as close as possible to the server i.e. where the heat is generated.
- Horizontal air suction and also horizontal air supply: the air flow therefore does not change direction inside the machine, so avoiding the relative pressure drops and with an important consequent reduction of the power draw of the fans.
- Front and rear accessibility for easier maintenance.
- Cooling, hydraulic and electrical connections from above or from below.





GENERAL CHARACTERISTICS

Direct expansion from 20 to 40 kW
HRA: Horizontal air supply

Chilled water coil from 10 to 40 kW
HRU: Horizontal air supply

ACCESSORIES

IN-ROW INSTALLATION

HORIZONTAL SUPPLY

Version for in-row installation with front and lateral air supply.

HRA: direct expansion air conditioners with air-cooled or water-cooled condensers and horizontal air supply

Models		231	361
Performance levels			
Total cooling capacity (1)	kW	23,3	28,5
Sensible cooling capacity (1)	kW	23,3	26,7
EER (3)		3,55	3,50
Total cooling capacity (2)	kW	25,0	31,6
Sensible cooling capacity (2)	kW	25,0	31,6
EER (3)		3,83	3,88
Air quantity	m^3/h	7200	7200
Sound pressure level (4)	dB(A)	69	69
Dimensions and weights			
Length	mm	600	600
Depth	mm	1180	1180
Height	mm	2000	2000
Net weight	kg	215	215

HRU: chilled water coil air conditioners with horizontal air supply

Models		40
Performance levels		
Total cooling capacity (1)	kW	43,3
Sensible cooling capacity (1)	kW	39,9
EER (3)		21,97
Total cooling capacity (2)	kW	35,4
Sensible cooling capacity (2)	kW	35,4
EER (3)		18,34
Air quantity	m^3/h	9600
Sound pressure level (4)	dB(A)	76
Dimensions and weights		
Length	mm	600
Depth	mm	1180
Height	mm	2000
Net weight	kg	190

Note:

(1) Performance levels are in reference to: R410a refrigerant; condensing temperature: 45°C; inlet air: 24°C-45% UR; water: 7/12°C; available static pressure: 30 Pa. The declared performance levels do not take into account the heat generated by the fans which is added to the thermal load of the plant.

(2) Performance levels are in reference to: R410a refrigerant; condensing temperature: 45°C; inlet air: 30°C-30% UR; water: 14/20°C; available static pressure: 30 Pa. The declared performance levels do not take into account the heat generated by the fans which is added to the thermal load of the plant.

(3) EER = Energy Efficiency Ratio = total cooling capacity / power draw of the compressors + that of the fans (excluding air-cooled condensers).

(4) Sound pressure levels declared are at a distance of 2 metres, height 1.5 m, in free field and with supply air vent connected.

ACC Series
AXIAL FAN AIR-COOLED CONDENSERS

APPLICATIONS

The axial fan air-cooled condensers in the ACC Series guarantee optimum performance in all ambient conditions (EUROVENT certified) with reduced dimensions and energy consumption. The main characteristics are:

- Casing in corrosion-resistant galvanized steel with RAL 9003 epoxy-polyester powder coating.
- Headers, return bends and main switch are all protected by the structure: the main switch is located in an IP54 enclosure.
- High-efficiency coil with SAFETUBES SYSTEM which totally excludes the tubes from coming into contact with the frame, thus avoiding damage due to vibration.
- New motors with high efficiency and low consumption, dynamically and statically balanced, with lifetime-lubricated bearings, incorporated heat protection and integrated protection grilles.

EUROVENT CERTIFIED PERFORMANCE

GENERAL CHARACTERISTICS

Air-cooled condensers from 8 to 84 kW:
ACC/H: for horizontal installation and vertical air supply
ACC/V: for vertical installation and horizontal air supply
ACC/LT: for low outside temperatures, vertical installation and horizontal air supply

ECFan Variable Air Flow

ACCESSORIES:

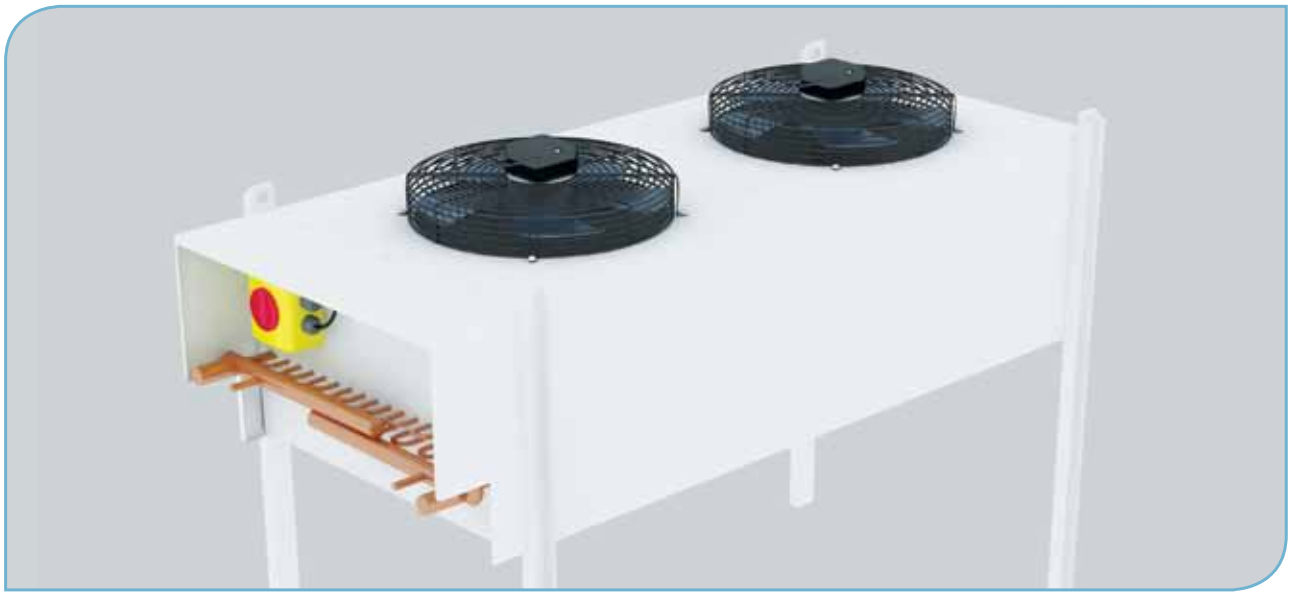
Latest-generation EC fans for high-level energy saving, reduced noise level and better fan speed control.

ALUPAINT coated fins for better protection of the aluminium from corrosion.

Low-temperature fresh air kit, to be installed in very severe climates with temperatures less than -20°C.

ACC Series
AXIAL FAN AIR-COOLED CONDENSERS

HORIZONTAL SUPPLY



Standard version for horizontal installation and vertical air supply.

VERTICAL SUPPLY

Standard installation for vertical installation and horizontal air supply (also LT version).

Axial fan air-cooled condensers

Models		8	11	16	19	21	25	29
Performance levels								
Nominal capacity (1)	kW	8,3	10,8	16,5	19,9	21,5	24,8	29,8
Air quantity	m^3/h	2.600	2.200	5.200	4.800	4.400	7.800	7.200
Number of fans	No.	1	1	2	2	2	3	3
Fan diameter	mm	350	350	350	350	350	350	350
Motor power consumption	W	180	180	360	360	360	540	540
Absorbed current	A	0,85	0,85	1,7	1,7	1,7	1,7	2,5
Sound pressure level (2)	dB(A)	40	40	43	43	43	45	45
Internal circuit volume	dm3	2,0	3,0	3,0	4,0	5,0	4,0	6,0
Dimensions and weights								
Length (installation H - V)	mm	743	743	1.298	1.298	1.298	1.853	1.853
Depth (installation H)	mm	610	610	610	610	610	610	610
Depth (installation V)	mm	510	510	510	510	510	510	510
Height (installation H)	mm	906	906	906	906	906	906	906
Height (installation V)	mm	578	578	578	578	578	578	578
Weight	kg	20	29	29	33	37	42	48

Models		32	42	50	55	61	74	83
Performance levels								
Nominal capacity (1)	kW	32,3	43,1	50,3	56,1	62,0	75,4	84,0
Air quantity	m^3/h	6.600	8.800	13.600	12.700	14.900	20.400	19.000
Number of fans	No.	3	4	2	2	2	3	3
Fan diameter	mm	350	350	500	500	500	500	500
Motor power consumption	W	540	720	1.250	1.250	1.160	1.880	1.880
Absorbed current	A	2,5	3,4	5,5	5,5	5,5	8,3	8,3
Sound pressure level (2)	dB(A)	45	46	50	50	51	51	51
Internal circuit volume	dm3	6,0	10,0	9,0	12,0	14,0	13,0	17,0
Dimensions and weights								
Length (installation H - V)	mm	1.853	2.408	1.895	1.895	2.393	2.705	2.705
Depth (installation H)	mm	610	610	905	905	1.110	905	905
Depth (installation V)	mm	510	510	470	470	705	470	470
Height (installation H)	mm	906	906	1.070	1.070	1.230	1.070	1.070
Height (installation V)	mm	578	578	830	830	1.040	830	830
Weight	kg	54	71	94	102	177	132	144

Note:
(1) Nominal capacity at ambient temperature of 35°C, condensing temperature 50°C and R410Aa refrigerant.
(2) Sound pressure level at 10 m in free field.

High Density Data Centres
Efficiency and energy saving

Evolving technology has created the necessity for ever greater exchange of data, increasing exponentially the concentration of electronic equipment inside Data Centres. Infrastructure limits and constantly increasing energy costs have therefore redefined the standards of design and development of Data Centres, making efficiency and energy saving the key concepts for the choice of Close Control air conditioners.

In order to better define the abstract concepts, four main indexes have been created:

CAPEX - INDEX OF INITIAL INVESTMENT

CAPEX *(CAPital EXpenditure)*, is the money used to buy fixed assets of an operational nature i.e. investment in capital assets. CAPEX is found on the cash flow statement and is obtained from the difference of the gross values of the materials capitalized *(noted as "Investment in Plant, Property, and Equipment")* in a given year and the preceding one.

OPEX - INDEX OF OPERATING COSTS

OpEx *(OPerating EXpenditure)* is the cost necessary for running a product, business or a system. The selection of an air conditioning plant with a high degree of efficiency and sustainability - which can optimize its own operation to suit the real requirements of the system thus maximising its efficiency and decreasing its CO_2 emissions to a minimum – enables very high OPEX index levels to be achieved.

PUE - INDEX OF ENERGY EFFICIENCY

PUE *(Power Usage Effectiveness)* is a measure of how efficiently a computer Data Centre uses its electrical energy. It is a parameter which explains how much electrical energy is used by IT equipment compared to other auxiliary services such as air conditioning, lighting or UPS losses. PUE is the ratio of total power used by the Data Centre facility *(PT)* to the power used only by IT equipment *(PIT)*. A PUE value approaching 1 indicates an optimal level of efficiency. An air conditioning plant with reduced energy consumption and, where possible, advanced energy saving systems such as Free Cooling, dramatically reduces the PUE index.

DCiE - INDEX OF IT EQUIPMENT EFFICIENCY

DCiE *(Data Centre Infrastructure Efficiency)* is the inverse of PUE. It is the percentage value derived by dividing information technology equipment power by total facility power. As with PUE, an increase in DCiE is directly related to the efficiency of the air conditioning plant.

The absolute reliability of TECNAIR LV air conditioners is guaranteed by design processes using computerized thermodynamic modelling, tests carried out in advanced R&D laboratories, the use of latest-generation materials and components, advanced production techniques in a modern facility and a certified Quality System which conforms to ISO 9001 standards.

Thanks to originality, design and attention to the requirements of the market, new solutions for application problems can be found by using TECNAIR LV air conditioners in order to:

OPTIMIZE INFRASTRUCTURE

The wide range of models and their combined accessories makes it possible to design modular air conditioning plant capable of being fully integrated into the Data Centre. The minimum footprint area of the units and the modulating operation features of the components enables solutions to be tailor-made to fulfil the effective requirements of the infrastructure, as well as guaranteeing the possibility of future expansion without high added costs and increasing the CAPEX index of the Data Centre.

REDUCE OPERATING COSTS

A fundamental requirement for an increase in the OPEX index of every Data Centre is the guarantee of continuous service and therefore the total reliability of the infrastructure. The combination of our investment in Research and Development, together with the highly reliable main components of the units and the simplified manufacturing processes, make TECNAIR LV air conditioners the perfect choice for new-generation Data Centres.

IMPROVE ENERGY EFFICIENCY AND SUSTAINABILITY

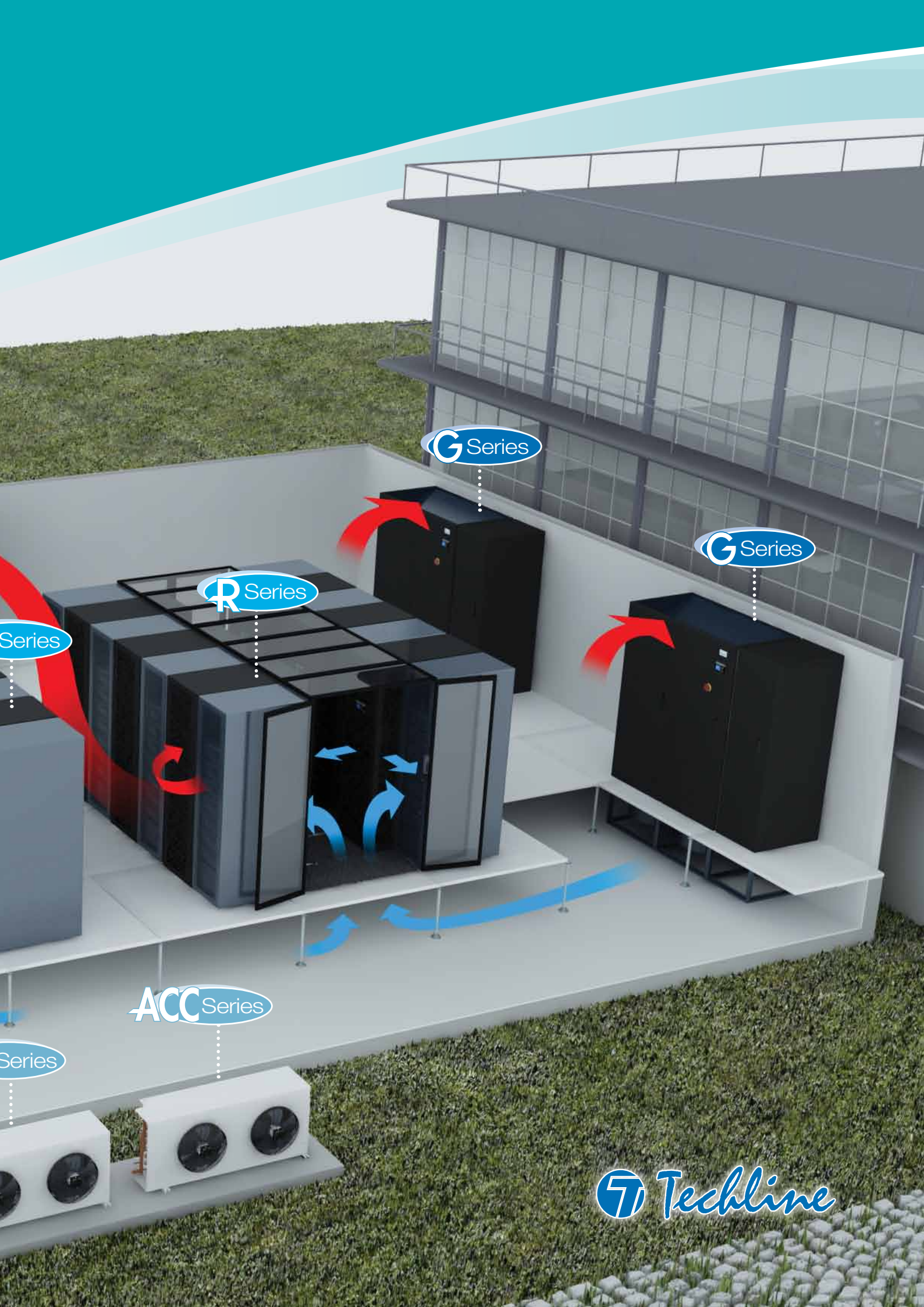
The constant increase in the amount of electrical power used as a result of the growth of the digital world, has made it necessary to improve the energy efficiency of the plant, in addition to reducing its impact on the environment. The ever-increasing use of renewable energy sources and low energy consumption components make TECNAIR LV air conditioners the most competitive choice for Data Centres in particular. The Free Cooling air conditioners, EC technology components and software specially designed to reduce power draw together enable savings of over 50% to be made compared to the previous generation of Data Centres.

OBTAIN THE BEST RESULTS WITH GUARANTEED PERFORMANCE

The first step in obtaining the best possible result with the minimum capital investment is the reassurance that the performance of the equipment used in the infrastructure conforms to the project. TECNAIR LV is therefore proud to present its qualifications in this area:

Quality Certification ISO 9001:2000 Vision
CE Product Certification
GOST Certification
EUROVENT Certification

Our solutions for Data Center


G Series
G Series
R Series
Series
ACC Series
Series
Techline

TECNAIR LV
CLOSE CONTROL AIR CONDITIONERS

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