

DRY COOLERS





Heat exchangers
for industrial and commercial refrigeration,
air conditioning
and industrial applications.



LU-VE S.p.A. is the holding company of **LU-VE** Group. In 1985 **LU-VE** S.p.A. acquired Contardo S.p.A., established in 1928. Production began in 1986.

LU-VE quickly made its mark thanks to high standards of quality, new solutions designed in its own laboratories and to the care taken with the appearance of its products. (Beautiful outside - Revolutionary inside).

LU-VE WAS THE FIRST COMPANY IN THE WORLD TO APPLY AVANT-GARDE SOLUTIONS TO COMMERCIAL AND INDUSTRIAL REFRIGERATION:

- GROOVED TUBE TECHNOLOGY
- SPECIALIZED HEAT EXCHANGE SURFACES
- CERTIFIED PERFORMANCE LEVELS
- INNOVATIVE MATERIALS AND COLOURS
- ADVANCED DESIGN.

The success of **LU-VE** in the international market stems from its research and development policy, its great respect for the environment and its rigorous ethical and commercial principles.

In 2000, **LU-VE** was the first company in Europe to attain the prestigious **Eurovent "Certify-All"** certification for the entire range of its products: unit coolers, condensers and dry coolers.

LU-VE and the Group have introduced new ways of conceiving and constructing products for refrigeration, air conditioning and industrial applications, creating new technologies which have then gone on to become the benchmark for the entire industry.



DRY COOLERS

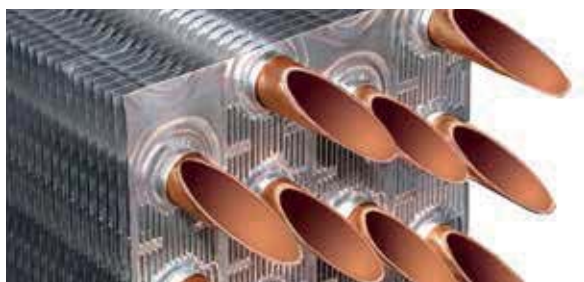
Dry coolers are used in industrial processes (to cool water or other fluids) and for air conditioning and refrigeration (water cooling and free cooling).

Thanks to the innovations developed, patented and tested by LU-VE, the dry coolers produced by the company:

- are economical to run
- function efficiently in all environmental conditions
- do not present risks of scaling and bacteriological contamination of the liquid to be cooled.

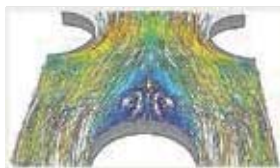
HEAT EXCHANGER

The extraordinary efficiency of the LU-VE heat exchanger stems from the optimum combination of special aluminium fins with copper tubes.



Advantages:

- High capacity with low air quantity.
- Low motor power draw.
- Quiet operation.



COIL SUSPENSION

SAFETUBES SYSTEM

The coil suspension system (SAFETUBES SYSTEM®, LU-VE patent) ensures that the tubes are completely protected during transportation, installation and operation of the dry cooler.

FAN MOTORS

Motors (3 ~ 400 V 50 Hz) feature:

- High efficiency and low consumption.
- Lifetime lubrication with incorporated heat protection.
- Dynamic and static balancing of motors and fans.

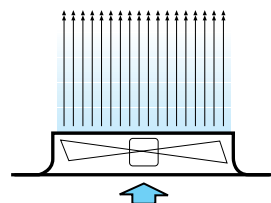


FAN SHROUD

The highly efficient design of the mouth of the fan shroud eliminates air recirculation and reduces noise.

Every fan section is separated from the others (only for SAL-XAL-EHL-EAL).

Fan guards conform to the most severe safety regulations in order to guarantee maximum protection.



STRUCTURE

SMART (only for EHL - XXLD)

The patented structure, extensively tested on vibrating tables, provides important advantages:

- Greater rigidity.
- Reduced unit weight.
- Better and more uniform air distribution.
- Minimum decrease in performance in the event of one fan stopping.

DESIGN AND MATERIALS

Casings are made of corrosion-resistant galvanized steel with an epoxy-polyester powder coating.

The headers, return bends and junction boxes are all protected.

CIRCUITS AND CONNECTIONS

All models are available with different circuits, to be selected according to refrigerant fluid flow rate and pressure drops.

FINAL TESTING

Final testing is carried out at appropriate pressure after the coils have been carefully degreased and dried with dry air. All dry coolers have a maximum operational pressure of 12 bar.

MAINTENANCE

Fan shrouds and side panels can easily be removed to provide complete access to motors, coil and junction box.

OPTIONS

- "EC" motors.
- Motors wired to the junction box.
- ALUPAINT® in painted aluminium.^(*)
- CU in copper.^(*)
- Flanges.
- Heat exchanger protection.
- Special configurations.
- Fan speed regulation (see pag. 13).
- Fan Isolator Switches (IS) .
- Whisperer® Silencer (see pag. 13).
- Dry and Spray (see pag. 14).
- Water Spray System (see pag. 15).

^(*) (Refer to the Refrigerer® program for capacities).



STANDARDS

The products are provided for incorporation in machines as defined in the EC Machine Directive 2006/42/CE and subsequent modifications.



- Directive 2014/29/CE and subsequent modifications, Electromagnetic Compatibility.
- Directive 2014/35/CE Low tension.
- PED 2014/68/CE.

EUROVENT CERTIFICATION

The entire range of dry coolers is EUROVENT certified.

- Capacity (ENV 1048).
- Air quantity.
- Fan motor power draw.
- External surfaces.
- Sound pressure and power levels (EN 13487).
- Pressure drops.
- Energy class.



STANDARD CAPACITY SPECIFICATIONS TO ENV 1048

The capacities of the dry coolers are tested under the following conditions:

Ambient temperature (TA)	25°C
Refrigerant fluid inlet temperature (TWE)	40°C
Refrigerant fluid outlet temperature (TWU)	35°C
Refrigerant fluid	water

ENERGY CLASS

Class	Energy consumption	R
A+	Extremely low	$R \geq 226$
A	Very low	$169 \leq R < 226$
B	Low	$109 \leq R < 169$
C	Medium	$69 \leq R < 109$
D	High	$37 \leq R < 69$
E	Very high	$R < 37$

R = Capacity (AT 15K) / motor power consumption.

CAUTION

- If water without glycol is used, the ambient temperature must always be above 0 °C.
- To prevent freezing during standstill, drain off the dry cooler by blowing air through several times and then introduce glycol.
- Refrigerant fluid inlet temperature ≤ 60 °C. (Special versions for temperature > 60 °C).

ENERGY MANAGEMENT SYSTEM

The LU-VE energy management system conforms to UNI CEI EN 50001:2011.



QUALITY ASSURANCE

LU-VE is a certificated company to UNI EN ISO 9001:2008, which is the most important Quality Assurance qualification, covering Development, Testing, Production method and Inspection procedures.



2 YEAR GUARANTEE












All our products are manufactured from high quality materials and undergo severe final tests.

They are therefore guaranteed against any construction defect for a period of two years.

Damage caused by corrosive agents is excluded. Components or units found to be defective must be returned to our factory with prepaid freight where they will be checked and, depending on our judgement, replaced or repaired. We take no responsibility for leaks or damage caused by the use or misuse of our products. No guarantee is granted in the event of misuse or incorrect installation of the products. We reserve the right to make modifications in order to improve the performance or appearance of our products at any time without notice and without any obligation to previous production.



LU-VE TECHNOLOGY

	<p><i>Steel Protected Best Technology</i></p>	<p>Galvanized steel casing with corrosion-resistant epoxy-polyester powder coating.</p>
	<p>SAFETUBES SYSTEM® by LU-VE</p>	<p>The LU-VE-patented coil suspension SAFETUBES SYSTEM® completely eliminates contact between tube and condenser or dry cooler structure, providing full protection for the coil tubes during transport, installation and operation.</p>
		<p>The patented SMART® structure, exhaustively tested on vibrating platforms, provides many advantages such as greater product rigidity, reduced unit weight, better and more uniform air circulation and minimum performance loss if one motor should stop.</p>
		<p>Air-cooled condensers and dry coolers can be fitted with new electronic fans developed using EC technology, dramatically reducing energy consumption.</p>
		<p>Air cooled condensers and dry coolers with low noise operation and low energy consumption.</p>
		<p>Dry and Spray is the most advanced solution to improve performance and minimize dimensions of large-capacity air-cooled condensers and dry coolers.</p>
		<p>Water Spray System is the solution to maximize performance and minimize dimensions of large-capacity air-cooled condensers and dry coolers.</p>

ELECTRONIC FAN SPEED CONTROLLERS

PURPOSE

The fan speed controller has the ability to maintain the condensing pressures of the air cooled condensers and to maintain the fluid outlet temperature of the dry coolers within prefixed values, for any given load on the unit, whilst at the same time reducing power consumption and noise levels of the fan motors.

SP-SCU*

Electronic fan speed controllers based on cut phase principle. They can be coupled with the main switch **SF** and allow low and medium capacity units to be controlled easily.

AURT*

Electronic fan speed controllers based on cut phase principle. They can be coupled with **AQE** electrical panel, allowing medium and high capacity units to be controlled effectively and precisely.

ARUS*

Electronic fan speed controllers based on voltage steps; this technology allows regulation which is completely free from electromagnetic noise.

AQE* Electrical panel - **SPR*** Pressure sensor - **STE*** Temperature sensor - **SF*** Main switch - **IS*** Isolator switch.
*See *Instruction Manual (www.luve.it)*.

SELECTION

See **REFRIGER®**.



FANS WITH "EC" MOTORS

(electronic commutation)

The air-cooled condensers and dry coolers can be fitted with the new electronic fans developed using EC technology, **dramatically reducing energy consumption**.

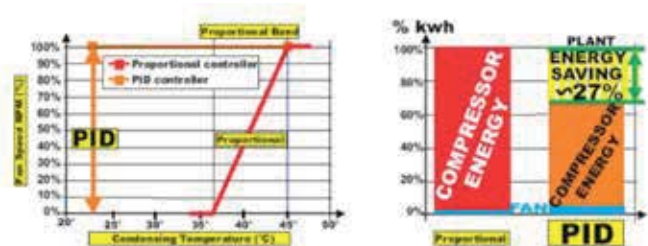
The fans are also fitted with a control system which can modulate the rotation speed depending on requirements, with **excellent acoustic performance**. The fans can be driven by a 0-10 Vdc signal or by BUS (RS 485). The fans are self-protected. These fans can also be combined with a series of **ESB** electrical panels which receive an external 0-10 Vdc signal and transfer it to the fans. Alternatively, **ESR** electrical panels can be used; these, thanks to the ECP controller, regulate the condensing pressure with the aid of a pressure sensor (SPR), or the liquid temperature by means of a temperature sensor (STE).

Functions of the ECP controller include:

- proportional or PID (proportional-integral-derivative) control
- master/slave function (cascade)
- management of two input signals
- night limit (reduced noise)
- rapid modification and setting of the set point
- remote control of start/stop
- connection through MODBUS protocol (on request).

The **ESJ** electrical panels are a further development. They manage the 0-10 Vdc signal in the same way as the ESB model and are fitted with (in addition to the main line switch) magneto-thermic protection switches which drive individual fans.

There is also terminal strip wiring for each individual alarm contact of the fans on the unit.



Even more precise regulation is available through the use of the **ESMC electrical panels**, based on **ESJ** technology and fitted with the highly advanced **WMC2** controller with additional useful functions to maximise the efficiency of the system:

- The fans are controlled via MODBUS protocol which makes possible the **complete management of the machine data** including function data for each fan, such as status, energy consumption, working temperature, alarms, working hours and maximum speed.
- The **WMC2** controller permits the activation of many important special functions for the **extremely precise management of condensers and dry coolers**: P or PID regulation, overspeed, by-pass, winter ON/OFF. The simplest control system for condensers is the **CBG** controller, for the regulation of working pressure of small condensers.

SILENCER - THE WHISPERER® PLUS

The new compact silencer, designed and tested in the **LU-VE** laboratories, dramatically reduces sound pressure level up to **6.5 dB(A)**.

Condensers and dry coolers with **THE WHISPERER® PLUS** provide the following benefits:

- energy savings up to 19%
- reduction of sound pressure level at equal capacity
- increase of capacity at equal sound pressure level
- smaller unit footprint at equal capacity and sound pressure level
- elimination of warm air recirculation.



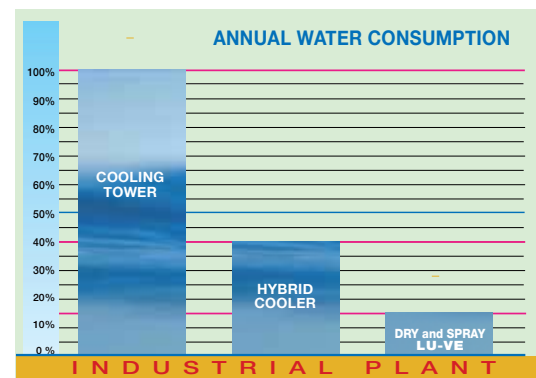
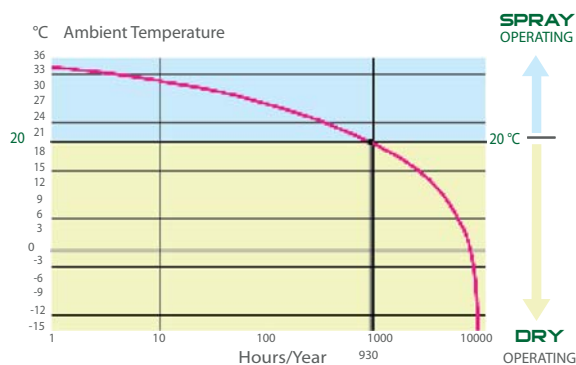
DRY and SPRAY

For large capacity air cooled condensers and dry coolers.

NO Health hazards (i.e. LEGIONELLA) related to open warm water reservoirs



LESS Water consumption!
Energy!
Noise!
Pollution!
Operating cost!



Annual water consumption for a generic industrial installation (on average from 3 to 10 times less than a traditional cooling tower)

After exhaustive research into increasing the spray system capacities, the new "Dry and Spray" range was created.

The extraordinary performance levels due to highly efficient water nebulization mean that this product is an alternative to traditional cooling towers with additional important advantages.

OPERATION

The "DRY and SPRAY" products work as traditional dry units until the ambient air temperature is low enough to maintain the cooling capacity and the coolant temperature (or condensing pressure) at the planned conditions (DRY operation).

The temperature passage from DRY to SPRAY operation is a planning choice and usually is about 20°C.

This innovative technology also enables, depending on the ambient air wet bulb temperature, a coolant temperature equal to or lower than the dry bulb temperature of ambient air with significant energy advantages.

A sophisticated control system adjusts the speed of the fans and the nebulised water capacity as required.

ADVANTAGES

The use of "DRY and SPRAY" liquid coolers and condenser instead of traditional "evaporative cooling towers" and "evaporative condensers" is characterized by the following important advantages:

- Water consumption in SPRAY operation mode is limited to short periods per year. For long periods of the year during DRY operation mode no water is used.
- There is no tray containing warm stagnant water under the coil, thus excluding any chance of impure water concentration and the general risk of environmental contamination (**NO Legionella**).
- Plant operating without water droplet drag-out to the environment and the formation of ugly vapour plumes.
- Low energy consumption.
- Low noise operation.
- Short plant redemption period.
- High thermal capacity can be obtained by free cooling.

Refer to specific catalogue for nebulised water quality.

WATER SPRAY SYSTEM

For condensers and dry coolers of great power.



NO Health hazards (i.e. *LEGIONELLA*) related to open warm water reservoirs



The best solution for maximizing performance and minimizing product dimensions.

GENERAL PRINCIPLE

Dry coolers and condensers are generally selected in order to perform correctly at the maximum load with the maximum ambient temperature.

These difficult conditions happen only for a very short period of the year, whereas in the rest of the year, under less difficult working conditions, the product is oversized.

For this reason we have designed a new product which can be selected for less difficult working conditions, but the performance levels increase in event of particularly difficult conditions.

The new product is made up of a water spray system mounted on standard condensers and dry coolers which sprays finely nebulized water in the opposite direction to the air flow crossing the coils.

In this way it is possible to cool the air entering the coils thus increasing the capacity of dry coolers and condensers.

Use of the spray should be limited to about 200 hours per year.

Refer to specific catalogue for nebulised water quality.



LESS Water consumption!
Energy!
Noise!
Pollution!
Operating cost!

