

Cooling Towers

Cooling capacity: 109,0 kW - 2180,0 kW
25 - 500 RT

KCT



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1. General Description



Cooling Towers



Klimallco Cooling Towers KCT are used for heat selection from air conditioning, refrigeration or industrial water cooling systems. They are available in 16 models with capacities ranging from 109kW up to 2180kW, allowing to select the correct model for any application.

This Klimallco series is ideal in combination with existing or new water cooled chillers installations for the cooling of water for commercial and industrial applications.

Engineering Advantages

- Compact modular design from heavy gauge hot dip galvanised steel sheets, assembled exclusively using bolts avoiding welding.
- PVC water headers provide uniform water distribution.
- Exchanging surface made of corrugated PVC sheets, easily replaceable
- Centrifugal fans double inlet forward curved,
- Selected for low revolutions offering a quiet and vibration free operation.
- 4-pole IP55, 3-phase, induction motors.
- Drive system with taper bush pulleys and V-belts. Belt-guard protected.
- Hot-dip easily accessed galvanised drop eliminators.
- Bleed-off water system increases corrosion protection.
- Special open type plastic nozzles are equipped with a water spinning device and are easily removable requiring minimum maintenance.
- Easy maintenance
- Long life operation

2. Technical Description

General

Cooling towers are mainly used where it is necessary to reject large quantities of heat, by means of a simple and economical method.

Applications of this kind are Industrial installations where rejection of water is not desirable Air conditioning installations with water cooled condensers. KCT series cooling towers are manufactured and factory assembled by KLIMALCO in 16 different standard sizes covering a range from 25 up to 500 refrigerant tons (RT).

Principle of Operation

The operation of cooling towers is based on the principle of evaporative cooling. Water to be cooled is sprayed over a deck surface with air blown upwards simultaneously causing vaporization of a portion of the water quantity. The latent heat of vaporization is removed from the water remaining in the liquid state, thus cooling it down. The cooled water flows back to the pan and then back to the heat source.

Theoretically the leaving water temperature cannot become less than the wet-bulb temperature of the surrounding air entering the tower.

Design advantages

KCT cooling towers combine several advantages as:

- Exchange surface (wet deck) has been designed for maximum efficiency, easy cleaning and easy replacement.
- Low level of operation noise.
- Compact dimensions.
- Endurance to extreme weather conditions.
- Ease of installation and maintenance.

GENERAL DESCRIPTION

KCT series cooling towers utilize counter flow arrangement (blow through).

This arrangement allows for smaller dimensions compared to induced draft cooling towers and operation of fans with air free of droplets. It also increases the useful life of the tower and it prevents the creation of noisy drafts.

Fan section

One or more double width, double inlet, forward curved centrifugal fans, are used. The wheels of the fans are statically and dynamically balanced.

Fans are selected at low speed, for a given cooling capacity and combined with the low outlet air velocity they give a smooth and noiseless operation.

Fan shafts are made of high quality steel and are selected to achieve operation speed much lower than the first critical speed. Shaft bearings are self-aligning ball bearings for continuous heavy duty and maximum service life. Fans are driven by 3-phase IP55 protection, insulation class F, IE2 efficiency electric motors with V-belts. Motors are placed under the pan providing adequate protection and are mounted on adjustable base frame for required belts tension.

All moving parts are protected by removable screens and panels.

Pan section

It is fabricated from heavy gauge hot-dip galvanized steel sheets, completely bolted and covered with special anticorrosive paint. The inside surfaces are smooth thus preventing the formation of precipitates.

On the one side of the pan (for models 06-60) there are all tube connections. Water inlet on the top, overflow outlet, water outlet on the bottom with mesh-type water strainer, brass type make-up automatic valve with large plastic float arranged for easy adjustment, drain outlet and a watertight access door, allowing easy inspection of the interior of the pan. Between water inlet and overflow outlet is been installed waste water bleed off line with valve to control the bleed rate. **From models 72 and up, tube connections are in both cooling towersides.**

Wet-deck

The wet deck surface (Packing) is made of corrugated sheets of high quality PVC which are assembled with the direction of the corrugations inverted every other sheet and glued together

to form modules. Air and water pass through narrow channels which, due to their shape, promote air turbulence and increase efficiency, as air and water are uniformly mixed and remain in contact for a considerable period of time. The above fill type allows operation up to 52o c water inlet temperature.

The spray nozzles are open type, made of plastic material. Water is rotated in them, by means of a special device and is scattered evenly over the wet-deck surface. Nozzles have a low pressure drop that helps to reduce pumping costs as the pump can be selected for a lower head pressure. Another major advantage of the open type nozzles is that they do not need frequent cleaning.

The spray tree is of heavy type plastic pipes, so arranged as to insure even distribution of water over the wet deck. Nozzles are screwed to the plastic headers and are easily removable for maintenance.

Over the spray tree is the eliminator surface. Eliminators modules formed blades are from galvanized sheets powder coated. They are design to prevent water drops from getting out of the tower with the minimum air pressure drop.

Casing

The casing of series KCT cooling towers is constructed of heavy hot-dip galvanized steel sheets properly reinforced to provide maximum rigidity. The whole structure is covered with an anti-corrosive paint. For easier transportation and handling KCT cooling towers can be delivered dismantled in two separate parts that can be easily reassembled on site.

Optional accessories:

- Rubber-in-shear vibration isolators.
- Pan water heaters to prevent freezing of the pan water during winter period.
- Multi speed motors.
- Motors rain canopy.

3. Technical Specifications

Type	Cooling Tower	Cooling Capacity		Water flow	Air flow	Horse power	Weight (kg)	
	TR	Watt	Kcal/h	l/h	m ³ /h	Motor x kW	Shipping	Operat.
KCT-06	25,0	108.977	93.720	17.040	10.000	1x2,2	340	660
KCT-10	41,6	181.628	156.200	28.400	13.600	1x2,2	450	850
KCT-12	50,0	217.954	187.440	34.080	20.000	1x4	570	1.210
KCT-15	62,5	272.442	234.300	42.600	19.200	1x4	630	1.270
KCT-18	75,0	326.930	281.160	51.120	30.000	1x7,5	800	1.760
KCT-22	91,6	399.582	343.640	62.480	28.800	1x7,5	880	1.810
KCT-24	100,0	435.907	374.880	68.160	40.000	2x4	1.000	2.280
KCT-30	125,0	544.884	468.600	85.200	38.400	2x4	1.100	2.380
KCT-36	150,0	653.860	562.320	102.240	60.000	2x7,5	1.290	3.280
KCT-44	183,3	799.163	687.280	124.960	58.000	2x7,5	1.420	3.410
KCT-48	200,0	871.814	749.760	136.320	80.000	4x4	1.630	4.290
KCT-60	250,0	1.089.768	937.200	170.400	77.500	4x4	1.790	4.450
KCT-72	300,0	1.307.721	1.124.640	204.480	120.000	4x7,5	2.300	6.150
KCT-88	366,5	1.598.326	1.374.560	249.920	116.500	4x7,5	2.530	6.380
KCT-96	400,0	1.743.628	1.499.520	272.640	160.000	4x7,5+2x4	3.060	8.180
KCT-120	500,0	2.179.535	1.874.400	340.800	155.000	4x7,5+2x4	3.350	8.470

NOTES

- Nominal capacity is achieved for water outlet temperature 29,50°C, water inlet temperature 35°C and wet bulb temperature 25,5°C.
- The cooling tower ton (TR) is defined as 15000 BTU/h for typical air conditioning.

SELECTION EXAMPLE:

To cool 150 m³/h of water from 40°C to 30°C, when air wet bulb temperature is 23°C.

From diagram, find water flow factor f=2,7.

To find the right tower size, divide water flow by factor:

$$f: \text{size} = 150 / 2,7 = 55,5$$

Size selected: 60

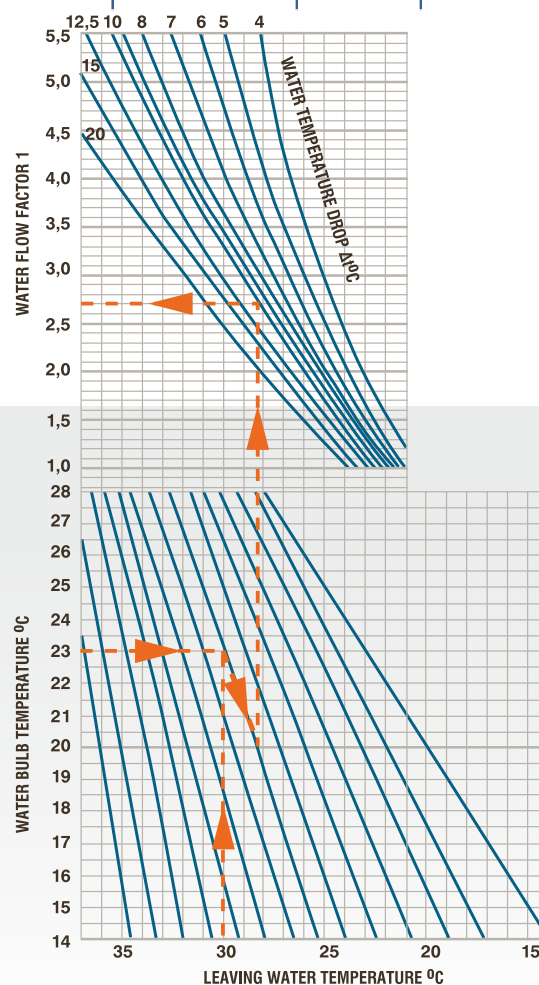
Under above operating conditions, cooling capacity is calculated as follows:

$$Q = 150 \times (40 - 30) \times 1.000 = 1.500.000 \text{ kcal/h.}$$

From nozzle pressure drop diagram $\Delta p = 2.2 \text{ m YΣ}$.

WATER EVAPORATION

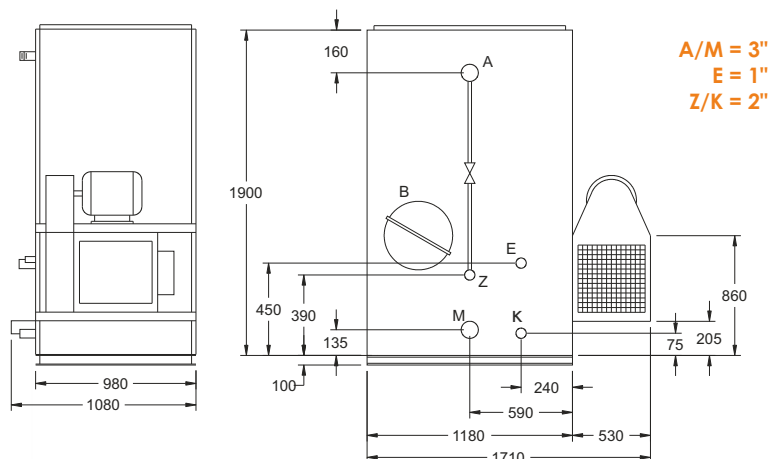
For needed water supplementation, should be considered that the evaporating water quantity is approx. 1% , the necessary water rejection through bleed off line is 1%, so the final necessary additional water filling quantity is approx. 2% of the nominal KCT model water flow circulation.



4. Dimensions



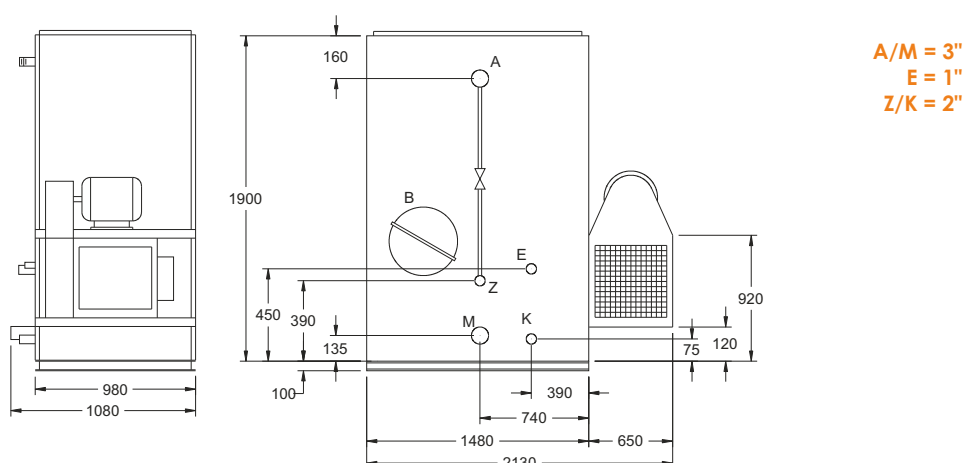
KCT-06



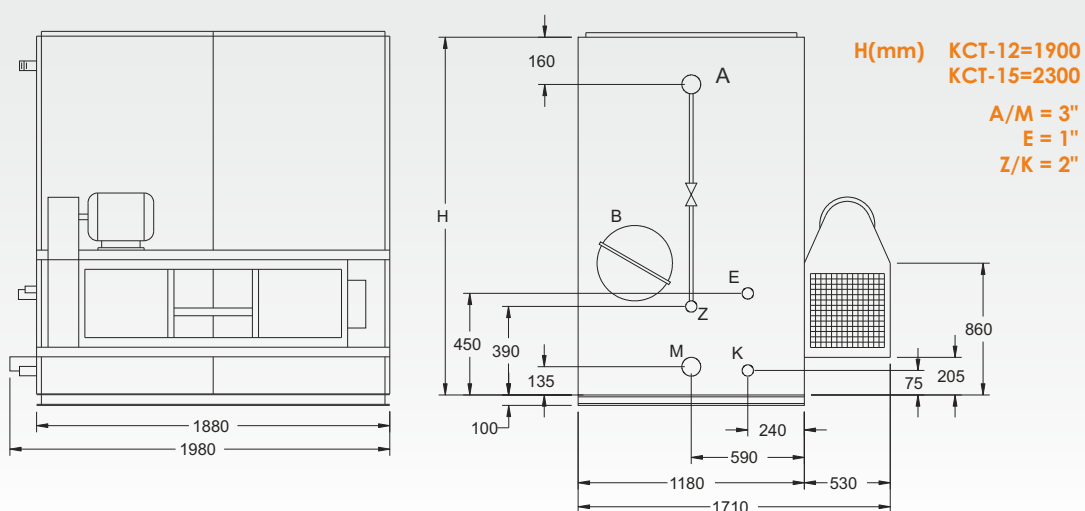
Notes

- A = Water Inlet
- M = Water Outlet
- Z = Overflow Outlet
- E = Water Front Valve
- K = Drain Outlet

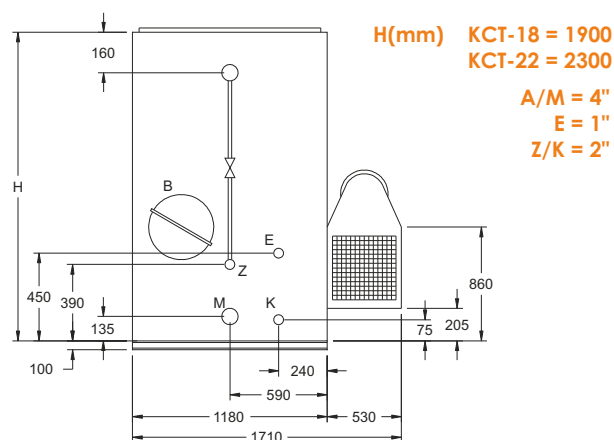
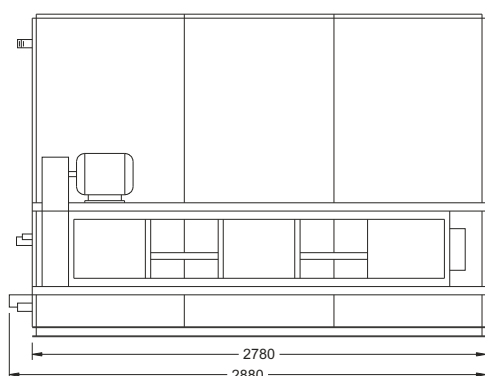
KCT-10



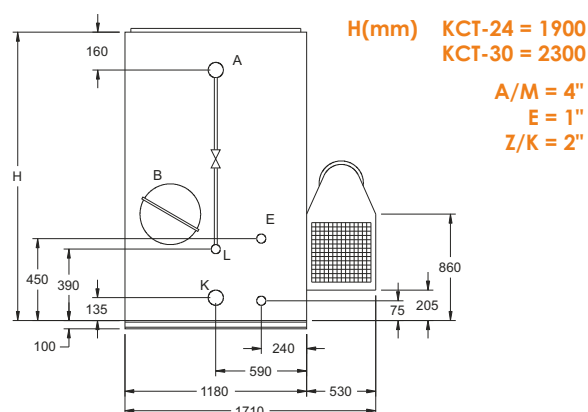
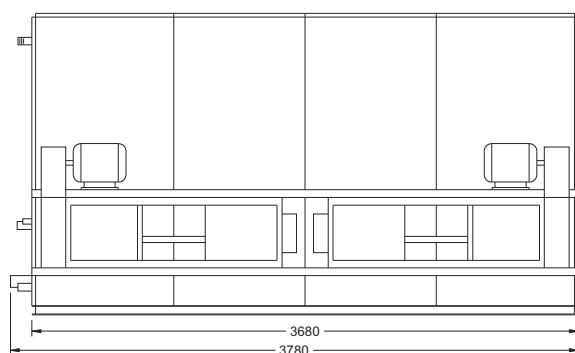
CT-12, 15



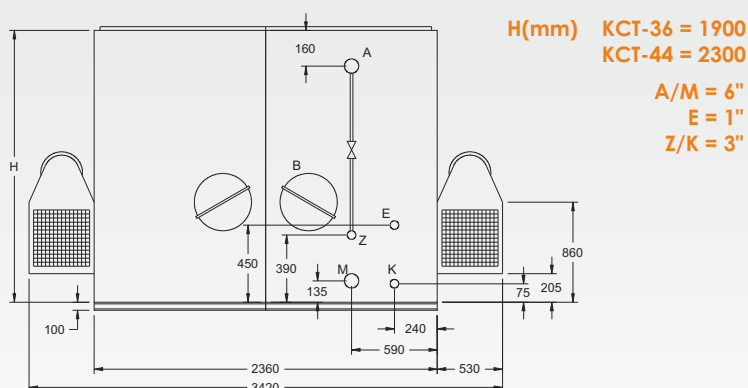
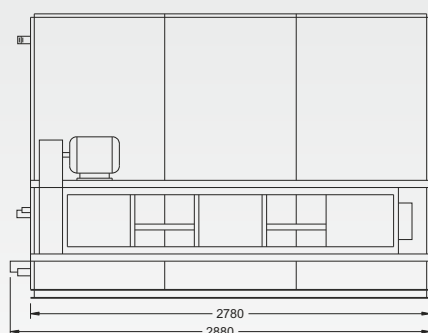
CT-18, 22



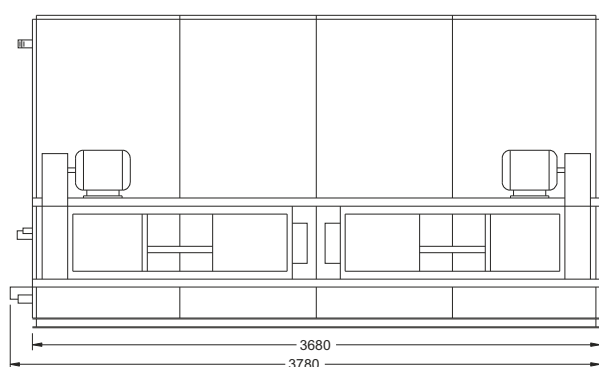
CT-24, 30



CT-36, 44

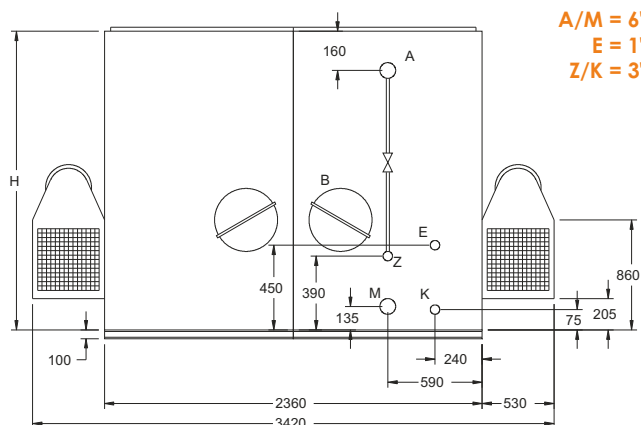


CT-48, 60



H(mm) KCT-48 = 1900
KCT-60 = 2300

A/M = 6"
E = 1"
Z/K = 3"

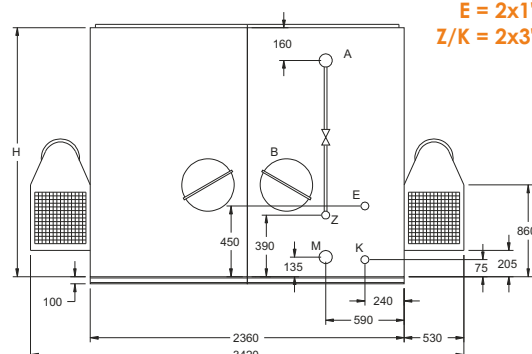


CT-72, 88

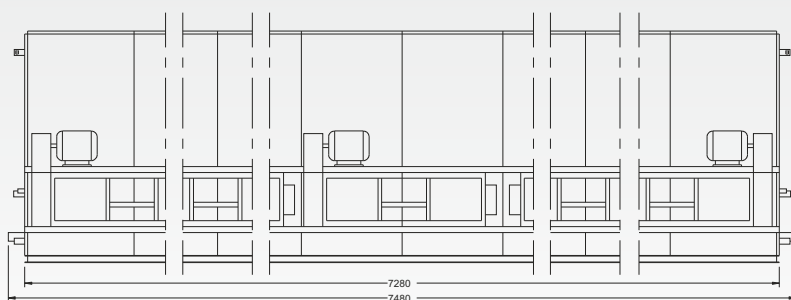


H(mm) KCT-72 = 1900
KCT-88 = 2300

A/M = 2x6"
E = 2x1"
Z/K = 2x3"

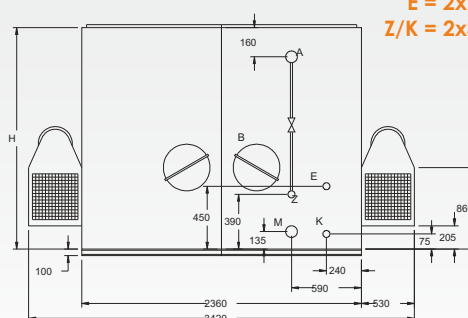


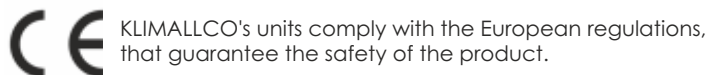
CT-96, 120



H(mm) KCT-96 = 1900
KCT-120 = 2300

A/M = 2x6"
E = 2x1"
Z/K = 2x3"





KCT

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Klimallco sa Air Treatment Experts



KLIMALLCO's quality management system is certified according to
ISO 9001:2015 and **ISO 14001:2015** for:
Design, manufacturing and trading of air conditioning equipment.

Technical Data
2019