THERMO KING

Specification Sheet



CBU-30

MANUFACTURED BY

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UNIT INFORMATION

Construction	CBU30 is a picture frame electrical refrigeration unit, designed for standard ISO containers. The unit is designed to freeze and maintain cargo in a temperature range from -20° to -60° C. The refrigeration system is a 2-step cascade refrigeration system, operating with one (1) high temperature system (2 compressors) on R134a, and one (1) low temperature system (1 compressor) operating on R23. The high temperature system is cooling the condenser for the low temperature system. The electrical system consists of an all relay control-system for fully automatic operation of all functions (temperature control, defrosting-etc.). The refrigeration frame is constructed of aluminum, treated to resist corrosion induced by salt spray atmosphere. All fasteners; bolts, screws, nuts, washers, hinges are stainless steel.
Equipment design	To withstand and operate satisfactorily under sea-going and environmental conditions including: Ocean environment: Salt-laden air, sea spray, high humidity and severe atmospheric conditions Rolling: Amplitude of 30 degrees on each side, period of 13 seconds Pitching: Amplitude of 6 degrees, period of 8 seconds Permanent list: 10 degrees on each side Shock: Acceleration of 2 G in all directions Vibrations: Of the type encountered on ships or land vehicles
Dimensions	Width: 2025.5 mm Height: 2235.2mm Depth: 1095 mm (in container, 1060mm)
Weight	1100 kg.
Power supply Main power Control Circuit	 50 Hz: 360 V min., 460 V max.; 60 Hz:400 V min., 500 V max. The nominal frequencies of 50 Hz sand 60 Hz shall have a tolerance of +/- 2.5%. AC, 20/24 Volts (from transformer)
Method of Defrost	Manual, on-demand and automatic timer back-up
Paint Color	Powder-coated white
Refrigerant	R134a / R23

UNIT CAPACITY

Unit capacity 60HZ	Net cooling capacity at **20°C** ambient temperature at **60 Hz** power		
	Return air temperature	**Capacity**	**Power Requirement**
	-60°C	10.3 kW	15 kW
	-50°C	15.8 kW	25 kW
	-40°C	24.9 kW	33 kW
	-30°C	25.0 kW	33 kW
	-20°C	27.4 kW	38 kW

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STANDARD INFORMATION

The CBU30 is a refrigeration unit designed for Freezing of Cargo down to –60°C.
Noise level does not exceed 85 dB (A in 250 Hz band), with unit installed in the container, when the unit is operating at 50 Hz. Measurement is taken in front of the unit 1.2 m from the bottom and 10 m distance from the system.
Machinery will be in full functional operation and work satisfactorily in ambient temperatures from -30°C to +52°C (-22°F to 125°F). Components are made to withstand ambient temperatures up to + 70°C (158°F). ARI - test method for rating refrigerated equipment. Machinery complies with International Customs Regulations for Containers. Machinery complies with relevant ISO Recommendations. Machinery complies with rules of B.V., ABS and Lloyds Regester, but is certified to ISO 1496-2. Unit complies with Australia and New Zealand Health Requirements.

UNIT INFORMATION, REFRIGERATION SYSTEM

Compressor/Condenser section			
Compressors (system 1. R134a, 2 pcs. system 2. R23, 1 pcs)	Copeland	**Type**	Scroll ZF 49
Refrigerant:	R-134a R-23	**Charge:**	5.6 kg 7.5kg
Condenser coil	Treated to resist corrosive atmosphere	**Tube- / Fin Material**	Copper (rifled) / Aluminum
Cond. fan motor (3 pcs.)	1.5 Hp	**Type**	1610 RPM.
Cond. fan (3 pcs.)	Ø 500	**Type**	Propeller
Blades	5	**Material**	Aluminum
Air Flow Total	22,500 m3/h		

Refrigeration system			
Heat Exchanger	Stainless steel	**Type**	B 45
Receiver	Copper		
Buffer tank R23	Copper		

Refrigeration safety controls			
High Pressure Switch (R134a system)			Cut-out 28bar Cut in 20bar
Low Pressure Switch (R134a system)			Cut-out –0.4bar Cut in 0.3bar
High Pressure Switch (R23 system)			Cut-out 28bar Cut in 20bar
Low Pressure Switch (R23 system)			Cut-out –0.4bar Cut in 0.3bar
Overheat sensor (On Discharge pipe, all systems)			Cut-out 125°C
Safety valve	Brass	**Type**	½" Blow-out

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(R134a/R23)			High pressure side 29bar Low pressure side 19 bar

Evaporator section			
Evaporator	Treated to resist corrosive atmosphere	**Tube / Fin Material**	Copper / Aluminum
Evaporator fan motor	4 Hp	**Type**	900/1100 RPM
Evaporator fan	Ø 710x 224	**Type**	Backward-curved wheel
Material	Aluminum	**Air Flow Total**	11,400 / 14,000 m3/h at 40mm (water column) cargo pressure drop
Air Flow in container	Top air supply		
Defrost	Hot gas	**Defrost drain**	Hot gas
		Drain	Drain complies with TIR requirements. Drains on both sides of the unit

UNIT INFORMATION, ELECTRICAL SYSTEM

Start switch	One common, ON/OFF	**Placement**	Unit at control box
Safety controls components			
Circuit Breaker	Control Circuit 1x10A and 1x6A Main Power 100A	**Type**	Manual reset
Overload device	Compressor motors, Condenser fan motors- and Evaporator fan motors.		
Electric panel components			
Contactors	Compressors, Condenser fans, Evaporator fans.	**Type**	Danfoss / or equivalent
Transformer	Primary 480 Volt, Secondary 28/24 Volt	**Type**	Primary/secondary wire
Display box panel components			
Switch	ON/OFF	**Keyboard**	Four arrow button
Display	LCD 10mm	**Type**	2-line, 16 Character
Lights	Green lamp: Unit on. Red lamp: Alarm on.	**Type**	Diode lamps 24V
Controller			
Range (Setting)	From -20°C to -65°C		
Sensor	Return air temp. Supply air temp. Evaporator temp. Cargo Evap. motor temp Compressor 1.temp. Compressor 2.temp. Compressor 3.temp.	**Type**	PT 1000

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	Ambient temp.		
Press. transmitter	R134a high press. R23 high press. R134a low press. R23 Evap press.	**Type**	Pressure Transducer
Power supply	24 volt 60Hz	**Relay out put**	16 pcs.
Data logger			
Logging intervals	Can be set from 6-to 60 min.	**Logging Data (Event-temp. log.)**	8000 Temp. log 2000 Event log
Log from Sensor (Mount on unit)	Return air temp. Supply air temp. Evaporator temp. Cargo temp. Evap motor temp. Compressor 1.temp. Compressor 2.temp. Compressor 3.temp. R23 Evap. press. R134a low press. R23 high press. R134a high press Ambient temp.		
Power supply	24 volt 60Hz	**Battery back-up**	120 log
Electric power			
Power cable to electrical box, 400/460V. 50/60 Hz.	Supply by end user	**Main fuse**	100 amp

CONTROL SYSTEM

CONTROL INFORMATION

The temperature controller is based on microprocessor technology.
The system is controlled by return air temperature.
Temperature settings are in increments of 0.1°C with an accuracy of +/- 0.5°C.
Defrost is controlled by timer and terminated by a probe mounted in the evaporator coil.
The controller consists of:

1. Microprocessor controller
2. Temperature display/keyboard
3. Temperature sensor
4. Pressure transmitter

All parts are mounted in the control box, except for the sensor and transmitters.

The microprocessor technology design provides permanent accuracy, reliability and increased flexibility in the functions. A permanent base program is built into the controller, but also a non-volatile memory for additions or changes in programming is available.
The accuracy is +/- 0.5°C, and temperature should be checked with an instrument with an equal or greater accuracy.

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MICROPROCESSOR CONTROLLER

This device contains all circuits necessary to select the required functions to maintain an accurate temperature. The selection is based on signals received from the sensor and the timer defrosting.

TEMPERATURE DISPLAY

The temperature setting can be set from -20°C to -65°C.
The accuracy of this switch is +/- 0.5°C throughout its range.

KEYBOARD

Four (4) arrow buttons will operate all setting and unit information, given in the display.

TEMPERATURE SENSOR

The temperature-sensing sensor is a thermistor placed in an epoxy filled metal tube, which is connected to a two-conductor cable by an electric connector. Temperature signal from the sensor is relayed to the controller through this cable.

The sensors measure:

- Return air temperature
- Supply air temperature
- Evaporator temperature
- Cargo temperature
- Evaporator motor temperature
- Compressor 1 temperature
- Compressor 2 temperature
- Compressor 3 temperature
- Ambient temperature

CONTROLLER SEQUENCE

The actual temperature control point is determined by the setting on the controller. The sequence of events or cycles of the unit are governed by the controller in conjunction with one of the temperature probes and the set point selected on the operator panel.

CONTROLLER SEQUENCE

Temperature falling	°C from set-point	Temperature rising
Cooling on	1.5	Cooling on
Cooling on	Set-point	Cooling off
Cooling off	-1.5	Cooling off

DEFROST CYCLE

The defrost cycle can be activated manually or automatically by the controller.

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1.By the Manual Defrost start from the keyboard.

2.By the timer function, from 6 to 24 compressor working hours.

3.By demand “return / evaporator” and “return / supply” delta temperature.

The defrost cycle is terminated by defrost sensor when the temperature in the evaporator coil rises to approx. +14°C.

ALARM

The system alarms show in the display as follows:

No alarm:	**Description**
Return air sensor, out of range A01	The sensor has an open (999°C) or short (-99,9°C) circuit.
Supply air sensor, out of range A02	The sensor has an open (999°C) or short (-99,9°C) circuit.
Defrost sensor, out of range A03	The sensor has an open (999°C) or short (-99,9°C) circuit.
Cargo sensor, out of range A04	The sensor has an open (999°C) or short (-99,9°C) circuit.
Evap.motor sensor,out of range A05	The sensor has an open (999°C) or short (-99,9°C) circuit.
Compr. 1 sensor. out of range A06	The sensor has an open (999°C) or short (-99,9°C) circuit.
Compr. 2 sensor. out of range A07	The sensor has an open (999°C) or short (-99,9°C) circuit.
Compr. 3 sensor. out of range A08	The sensor has an open (999°C) or short (-99,9°C) circuit.
R23 Low press. out of range A10	Pressure transducer, R23 low pressure, has an open (14.5bar) or short (-2.91bar) circuit.
R134a Low press. out of range A11	Pressure transducer, R134a low pressure has an open (14.5bar) or short (-2.91bar) circuit.
R23 High press. out of range A12	Pressure transducer, R23 high pressure, has an open (40bar) or short (-4.82bar) circuit.
R134a High press. out of range A13	Pressure transducer, R134a high pressure has an open (40bar) or short (-4.82bar) circuit.
Ambient air sensor out of range A16	The sensor has an open (-99.9°C) or short (999°C) circuit.
Reference error. Shutdown A17	Internal controller error
Evaporator temp. too low A18	Low or blocked airflow in chamber.
Comp. #1 temp. too high A22	Compressor 1, discharge line temp. above 120°C.
	Defective refrigerant system.
	Too high condensing temperature. (Max. 30°C above ambient)
	Defective liquid injection valve.
Comp. #2 temp. too high A23	Compressor 2, discharge line temp. above 120°C.
	Defective refrigerant system.
	Too high condensing temperature. Max. 30°C above ambient)

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	Defective liquid injection valve.
Comp. #3 temp. too high A24	Compressor 3, discharge line temp. above 130°C.
	Defective refrigerant system.
	Too high condensing temperature. (Heat ex-changer R134a/R23 not operated optimal.)
Drop of temperature is slow A26	The return air sensor shall be 5°C in range of set point. The average drop in temperature on return air sensor in 10min. must be lower than the temperature was for 10min. ago.
R23 High pressure Cut-out A33	Defective refrigerant R134a system.
	Defective compressor R134a system.
	Overload relay “OL, CFM” has tripped to "OFF" position.
	Defective refrigerant system.
R134a High pressure Cut-out A34	Too high condensing temperature. (Max. 30°C above ambient)
	Overload relay “OL, CFM” has tripped to "OFF" position.
	Defective refrigerant system.
Evap fan motor temp too high A37	Evaporator motor temp above 85°C.
Evap fan motor start fail A38	Evaporator motor has failed to start, motor may be frozen/stuck in fan blade.
Auto test error, amps too low A40	Current of one of the tested parts is too low.
	Overload relay has tripped to "OFF" position.
Auto test error, amps to high A41	Current of one of the tested parts is too high.
Auto test, delta amps to high A42	The difference in current of one of the tested parts is too high.
Emergency stop activated A46	Emergency switch in container is activated.

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REVISION RECORD

Rev	Description	Date	Approved
A	Updated cover image	5/8/2026	BES

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