Specification Sheet



PFR-571-Z2

MANUFACTURED BY

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UNIT INFORMATION

Construction	PFR-571 Z2 is a picture frame electrical refrigeration unit, designed for standard ISO containers as well as DNV. The unit is designed for cooling, hot gas heating and defrost, to maintain cargo in a temperature range from -20° to 29°C. The electrical system consists of an all relay control-system for fully automatic operation of all functions (Temperature control, defrosting, etc.). The design consists of single piece condenser / evaporator unit with quality motors and components rated for hazardous location Zone 2, Group IIB. 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. The evaporator door is removable. Rear bulkhead panels are constructed of aluminum with a high inherent corrosion resistance. Between the evaporator and condenser section the unit is insulated with fire resistant (according to ISO 3582) and CFC-free polyurethane foam. The nominal density of the foam is 32 kg/m3. Average thickness is 52 mm. All aluminum material is 5052-H32. All operational components except the evaporator coil are replaceable from the front of the unit.
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 and rails
Dimensions	Width: 2025.5 mm Height: 2235.2mm Depth: 375 mm (365mm from back of flange)

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Weight	421 kg.
Power supply Main power Control Circuit	 50 Hz; 360VAC min. - 460VAC max. 60 Hz; 400VAC min. - 500VAC max. The nominal frequencies of 50Hz and 60 Hz shall have a tolerance of ± 2.5%. AC, 230/24/12 Volts (from transformer)
Method of Defrost	Manual, On-Demand and Automatic Timer Back-up
Paint	Powder coated White
Refrigerant / Charge	R-404A or R-452A / 3.6 Kg (8.0 lbs)

UNIT CAPACITY

Test method according to ARI standard.

Unit capacity 60 HZ	Net cooling capacity at **38°C** ambient temperature at **60 Hz** power	
Return air temperature	**Capacity**	**Power Requirement**
1.7°C	5920 W	8950 W
-17.8°C	2845 W	8100 W

Net heating capacity (including fan heat) at 60 Hz power: 3310 W

STANDARD INFORMATION

Machinery is designed for and suitable for transportation over long voyages of deep frozen, frozen, chilled, or heated cargoes.

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Machinery will be in full functional operation and work satisfactorily in ambient temperatures from -20°C to +50°C (-4°F to +122°F). Components are made to withstand temperatures up to + 70°C (158°F).
The unit is built to comply with standards and regulations of major Classification Societies such as: 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 Register, but is certified to ISO 1496-2. Unit complies with Australia and New Zealand Health Requirements. Unit complies with Zone 2, Group IIB Hazardous Location Standards

UNIT INFORMATION, REFRIGERATION SYSTEM

COMPRESSOR/CONDENSER SECTION			
Compressor	Copeland	**Type**	Hermetic scroll
		Displacement	727 CFH
		Oil	Mobile EAL Arctic 22 cc polyolester oil
		Protection	Automatic reset
Condenser coil	Air cooled	**Tube / Fin Material**	Copper / Copper
		Surface area	25 m^2
		Protection	Coil is constructed of copper which is resistant to corrosion induced by salt spray atmosphere
Condenser fan motor	Explosion proof	**Class**	Zone 1, Group IIB
		Nominal Hp	1-1/2

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		Speed	1800 rpm
		Bearing	Ball, sealed
		Protection	Internal thermal automatic reset
Condenser fan		**Type**	Propeller
		No. of blades	14
		Material	Plastic (anti-static)
		Air flow	1800 CFM
REFRIGERATION SYSTEM			
Heat Exchanger	Klinge	**TX valve**	Sporlan
Receiver	Klinge	**Filter Drier**	Sporlan
Moisture indicator	Sporlan	**Shut off valve**	Mueller
Suction pressure regulating valve		Sporlan	
Discharge pressure regulating valve		Danfoss	
Hot gas solenoid valve		Danfoss	
REFRIGERATION SAFETY CONTROLS			
High pressure switch		Cut-out 27.2 bar	
High temperature switch		Cut-out 98.9°C	

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Fusible plug (receiver)		221°C	
EVAPORATOR SECTION			
Evaporator coil	Air cooled	**Tube / Fin Material**	Copper / Aluminum
		Surface area	43.2 m^2
Evaporator fan motor (2)	Explosion proof	**Class**	Zone 1, Group IIB
		Nominal Hp	1/3
		Speed	1750 rpm
		Bearing	Ball, sealed
		Protection	Internal thermal automatic reset
Evaporator fan (2)		**Type**	Impeller
		Material	Injection molded high strength polyamide
		Max air flow per fan	2970 CFM
Air Flow in container		Bottom air discharge	
Defrost		Hot gas	

UNIT INFORMATION, ELECTRICAL SYSTEM

ELECTRIC SAFETY CONTROLS	
Control circuit breaker	4A
Lighting circuit breaker	1A
Main power circuit breaker	25A

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Condenser and evaporator motor	Internal thermal automatic reset
Main power disconnect switch	32A
Junction box	Equipped for connection of container lighting or container door switch
INTERNAL ELECTRIC PANEL COMPONENTS	
Contactors	Compressor, condenser fan, evaporator fan
Display panel lights (L.E.D.)	On, alarm on, defrost, cooling, unload, heating, probe failure, temp. failure
Circuit breakers	Main power, control, lighting
Transformer	Primary 480 VAC
	Secondary 230/24/12 VAC
EXTERNAL ELECTRIC PANEL COMPONENTS	
Switch	Unit ON - OFF
Circuit breaker	Control circuit

CONTROL SYSTEM

CONTROL INFORMATION

Temperature controller is based on microprocessor technology. System prevents discharge air from going below predetermined settings. Temperature settings are in 1oC increments from -29°C to 29°C.

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On demand defrost is controlled by a probe mounted on the suction line following the coil to measure the temperature of the coil, which measures the temperature of the refrigerant in the copper tubes.

The controller is based on microprocessor technology and consists of 3 parts:

1. Operator control panel
2. Printed circuit board (PCB)
3. Temperature probes (2 pcs)

All parts are mounted in the control box except for the probes, which are mounted in the return air and on the suction line following the evaporator coil. The microprocessor technology design provides permanent accuracy, reliability and increased flexibility in functions. There is a permanent base program built into the controller, but also a non-volatile memory for additions or changes in programming is available. The controller automatically locks out the heating cycle, when the temperature set point is below -6°C.

OPERATION

Compressor will cycle off at set point. Evaporator fan will continue to run. Compressor will cycle back on at 0.5°C above set point, running unloaded. When compressor cycles off there is a 60 second time delay before compressor can cycle back on. This has priority over the thermostat signal and prevents rapid cycling of the compressor.

If the temperature drops 1°C below set point the hot gas solenoid valve will be energized and remain energized until return air temperature reaches set point.

TEMPERATURE PROBES

Each temperature sensing probe is a thermistor based device placed within a flameproof enclosure, which is connected to a two conductor SO cable. Temperature signal from the probe is relayed to the controller through this cable. One probe is mounted on the suction line following the coil to measure the temperature of the coil. The second probe is mounted in the return air stream measuring the temperature coming back from the container.

DEFROST

1. Normally initiated when temperature difference between return air probe and coil temperature probe reach a predetermined value. Temperature difference to be measured when compressor has been running for at least (2) minutes and unit has initially reached set point.

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2. Evaporator fan, condenser fan and compressor off and heat on during defrost.
3. Defrost probe terminates defrost @ 21°C.
4. If compressor runs for 24 hours without defrost cycle, defrost will be initiated automatically. Timer is locked out if temperature is above 7.2°C.
5. If defrost probe is out of range (open or shorted) alarm light will be energized and defrost will occur automatically after compressor has run for 24 hours.
6. If defrost not terminated by probe it will terminate after (1) hour and give an alarm.
7. Defrost can be initiated by manual defrost input (hold momentary toggle switch closed for 5 sec.) and terminated as indicated above.
8. At initial start up defrost will occur after 6 continuous hours of compressor running time.
9. If defrost lasts for more than (1) hour, alarm light will light and defrost LED will flash.
10. If defrost cycle is initiated again in less than 1-1/2 hours, alarm light will light and defrost LED will flash**.**

MISCELLANEOUS FEATURES

- Full size removable evaporator door for ease of inspection and serviceability
- Manual resettable circuit breakers used in place of fuses
- Auto function tests and fault diagnostics
- Microprocessor and digital display
- Motor start sequence delay to avoid full load in-rush
- No wood used in the construction of the unit
- Only 365mm deep from back of flange
- Power saving "On demand" auto defrost system
- Adjustable fresh air vent is labeled to indicate percentage of opening.
- Bottom air discharge for better temperature distribution throughout load.
- Power supply for optional container lighting.
- Junction box provided for optional rear door contact.
- Main power cut-off (lockable).
- Prepared for easy addition of “Logshow” remote monitoring and operation (change set point etc.).

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REVISION RECORD

Rev	Description	Date	Approved
A	Added R-452A refrigerant	2018/07/18	BES
B	Added refrigerant charge	2021/01/25	BES
C	Updated ATEX string	2023/12/01	BES

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