UNDERCOUNTER REFRIGERATOR/FREEZER

RT-MA series
FT-MA series

SERVICE MANUAL

T263-1055 (022125)

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I. GENERAL INFORMATION

1. SAFETY INSTRUCTIONS

The following instructions contain important safety precautions and should be strictly observed. The terms used here are defined as follows:

WARNING: There is a possibility of death or serious injury to the service person and a third party or the user due to improper service operations or defects in serviced products.

CAUTION: There is a possibility of injury to the service person and a third party or the user or damage to their property* due to improper service operations or defects in serviced products.

* The term “damage to their property” here refers to extensive damage to household effects, houses and pets.

WARNING

1. Always ask the user to keep children away from the work area. They may be injured by tools or disassembled products.

2. When there is no need to energize the unit during disassembly or cleaning, be sure to unplug the unit or disconnect the main power supply before servicing the unit to prevent electric shocks.

3. If the unit must be energized for inspection of the electric circuit, use rubber gloves to avoid contact with any live parts resulting in electric shocks.

4. Keep the following in mind when servicing the refrigeration circuit:

   (1) Be sure to recover the refrigerant. Do not discharge it into the atmosphere. It will affect the environment.

   (2) Check for any flames in the vicinity, and ensure good ventilation.

   (3) If the refrigerant should leak in servicing, immediately put out any fire used in the vicinity.

   (4) When unbrazing the refrigeration circuit connections, check that the circuit is completely evacuated. The refrigerant may produce a poisonous gas when coming in contact with an open flame.

   (5) Do not braze in an enclosed room to prevent carbon monoxide poisoning.

   (6) In case of a refrigerant leak, locate and repair the leaking part completely before recharging the refrigerant and checking for further leaks. If the leaking part

cannot be located, be sure to check again for further leaks after recharging the refrigerant. Leaked refrigerant may produce a poisonous gas when coming in contact with an open flame of a gas cooking stove or a fan heater.

(7) Before servicing, check the surface temperature of the refrigeration circuit to prevent a burn.

5. Keep the following in mind when making electrical connections:

(1) Check for proper earth connections, and repair if necessary to prevent electric shocks.

(2) Always use service parts intended for the applicable model for replacement of defective parts. Use proper tools to secure the wiring. Otherwise abnormal operation or trouble may occur and cause electric leaks or fire.

(3) Check for proper part installations, wiring conditions and soldered or solderless terminal connections to avoid fire, heat or electric shocks.

(4) Be sure to replace damaged or deteriorated power cords and lead wires to prevent fire, heat or electric shocks.

(5) Cut-off lead wires must be bound using closed end connectors or the like, with their closed ends up to avoid entrance of moisture that could lead to electric leaks or fire.

(6) After servicing, always use a megohmmeter (500V DC) to check for the insulation resistance of at least 1 megohm between the live part (attachment plug) and the dead metal part (earth terminal).

(7) Do not service the electrical parts with wet hands to prevent electric shocks.

(8) The capacitors used for the compressor and other components may be under high voltage and should be discharged properly before servicing.

CAUTION

1. After servicing, follow the instructions below:

(1) Always check the unit for proper operation before finishing services.

(2) Be sure to reassemble the parts completely. Loose assembly of such parts as control box cover may cause entrance of vermins resulting in a short circuit between terminals and possible ignition.

2. DIMENSIONS/SPECIFICATIONS

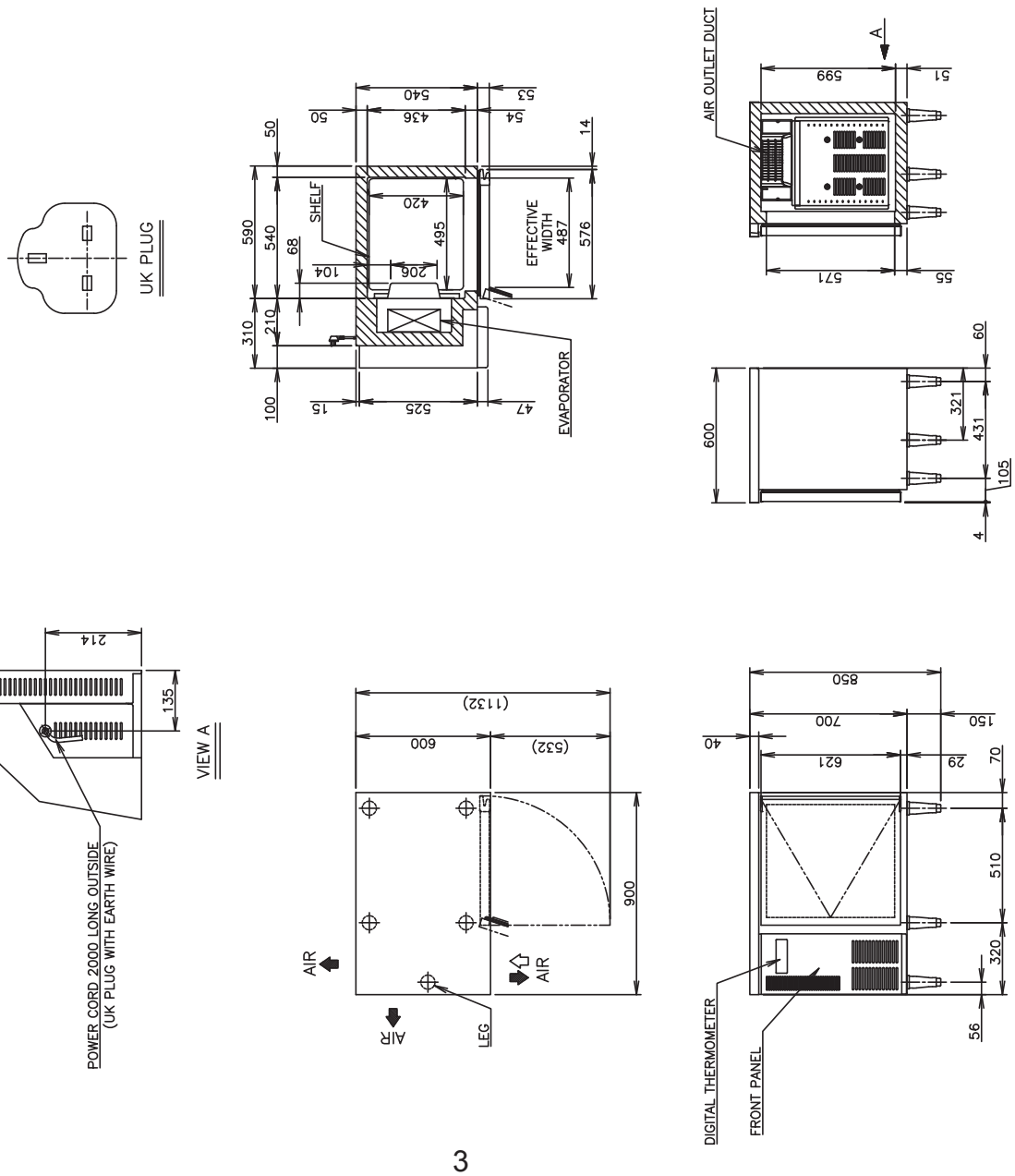
[a] RT-96MA

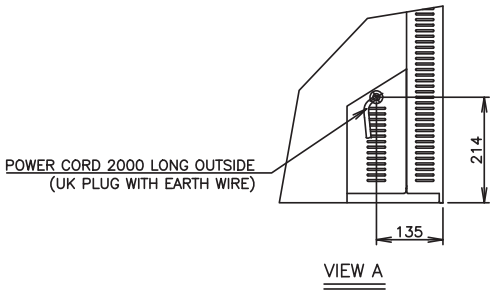
HOSHIZAKI

ITEM	Hoshizaki Undercounter Refrigerator
MODEL	RT-96MA-S
POWER SUPPLY	1 Phase 220-240V 50Hz Capacity 0.50KVA (2.5A)
AMPERAGE	Rated 1.7A
ELECTRIC CONSUMPTION	Motor 220W Heater 161W Refrigeration 235W Defrost 161W
HEAT REJECTION	*W
POWER CORD	2.0m (UK Plug with Earth Wire)
EFFECTIVE CAPACITY	151L
OUTSIDE DIMENSIONS	900mm (W) x 600mm (D) x 850(-880) mm (H)
INSIDE DIMENSIONS	540mm (W) x 436mm (D) x 599mm (H)
EXTERIOR	Stainless Steel, Galvanized Steel (Rear/Bottom) ABS Plastic (Top & Bottom on Door)
INTERIOR	Stainless Steel
INSULATION	Polyurethane Foam
INSULATION FOAM BLOWING AGENT	Cyclopentane
REFRIGERATION SYSTEM	Forced Air Circulation
DEFROST SYSTEM	Glass Tube Heater
COMPRESSOR	Hermetic
CONDENSER	Wire and Tube type, Air-cooled
EVAPORATOR	Fin and Tube Type
REFRIGERANT	R134a
TEMPERATURE CONTROL	Microprocessor controlled Adjustable from -6 to 12°C
DEFROST CONTROL	Microprocessor controlled
ELECTRIC CIRCUIT PROTECTION	Fuse, Earth Wire
COMPRESSOR PROTECTION	Motor Protector
LEG	Plastic Adjustable 150 to 180mm
SHELF	2pcs.
WEIGHT	Net: 55kg (Gross: Approx. 59kg)
PACKAGE	Carton 965mm (W) x 680mm (D) x 790mm (H)
ACCESSORIES	-
OPERATING CONDITIONS	Ambient Temperature:5-43°C Voltage Range:Rated Voltage±6%

*We reserve the right to make changes in specifications and design without prior notice.

1. Install the product properly in accordance with the instructions on location, electrical connections stated in the instruction manual provided. Allow 10mm extra space at the installation site to meet any installation requirements(additional spacing is also required for proper air flow and pipe connections).
2. The heat rejection is based on the reached pulldown temperature at ambient temperature of 35°C and power supply of 230V 50Hz. The amperage and electric consumption are based on measurements at ambient temperature of 38°C and power supply of 230V 50Hz.
3. The cabinet temperature range of -6 to 12°C is guaranteed at ambient temperature of 35°C.
4. Product code: T263-C100 (HS)





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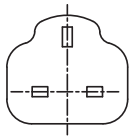

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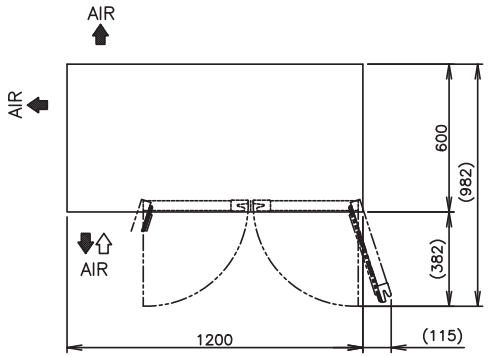
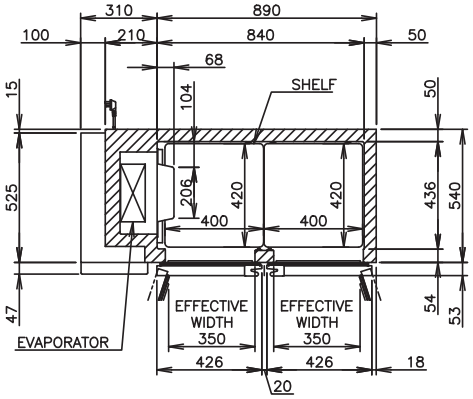
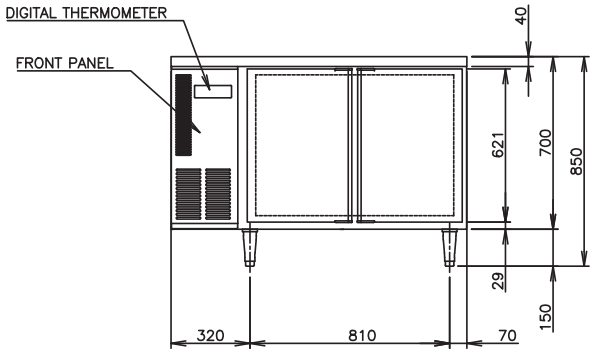
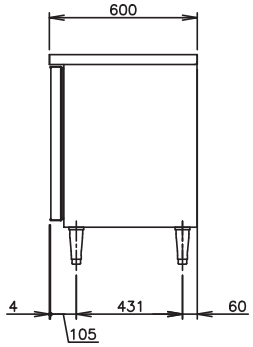
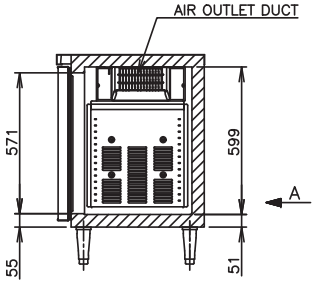






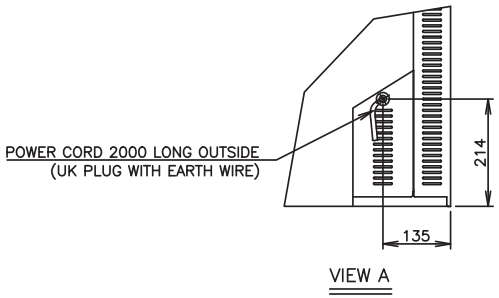




ITEM	Hoshizaki Undercounter Refrigerator
MODEL	RT−126MA−S
POWER SUPPLY	1 Phase 220−240V 50Hz Capacity: 0.5kVA (2.5A)
AMPERAGE	Rated 1.7A
ELECTRIC CONSUMPTION	Motor 240W Heater 173W Refrigeration 255W Defrost 173W
HEAT REJECTION	*W
POWER CORD	2.0m (UK Plug with Earth Wire)
EFFECTIVE CAPACITY	231L
OUTSIDE DIMENSIONS	1200mm (W) x 600mm (D) x 850(−880) mm (H)
INSIDE DIMENSIONS	840mm (W) x 436mm (D) x 599mm (H)
EXTERIOR	Stainless Steel, Galvanized Steel (Rear/Bottom) ABS Plastic (Top & Bottom on Door)
INTERIOR	Stainless Steel, ABS Plastic (Door)
INSULATION	Polyurethane Foam
INSULATION FOAM BLOWING AGENT	Cyclopentane
REFRIGERATION SYSTEM	Forced Air Circulation
DEFROST SYSTEM	Glass Tube Heater
COMPRESSOR	Hermetic
CONDENSER	Wire and Tube type, Air−cooled
EVAPORATOR	Fin and Tube Type
REFRIGERANT	R134a
TEMPERATURE CONTROL	Microprocessor (Digital Temp Indication) Adjustable from −6 to 12°C
DEFROST CONTROL	Microprocessor controlled
ELECTRIC CIRCUIT PROTECTION	Fuse, Earth Wire
COMPRESSOR PROTECTION	Motor Protector
LEG	Plastic Adjustable 150 to 180mm
SHELF	4pcs.
WEIGHT	Net: 67kg (Gross: Approx. 72kg)
PACKAGE	Carton 1265mm (W) x 680mm (D) x 790mm (H)
ACCESSORIES	−
OPERATING CONDITIONS	Ambient Temperature: 5−43°C Voltage Range: Rated Voltage±6%

*We reserve the right to make changes in specifications and design without prior notice.

1. Install the product properly in accordance with the instructions on location, electrical connections stated in the instruction manual provided.
   Allow 10mm extra space at the installation site to meet any installation requirements(additional spacing is also required for proper air flow and pipe connections).
2. The heat rejection is based on the reached pulldown temperature at ambient temperature of 38°C and power supply of 230V 50Hz.
   The amperage and electric consumption are based on measurements at ambient temperature of 38°C and power supply of 230V 50Hz.
3. The cabinet temperature range of −6 to 12°C is guaranteed at ambient temperature of 35°C.
4. Product code: T264−C100 (HS)



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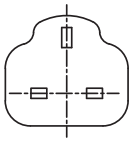
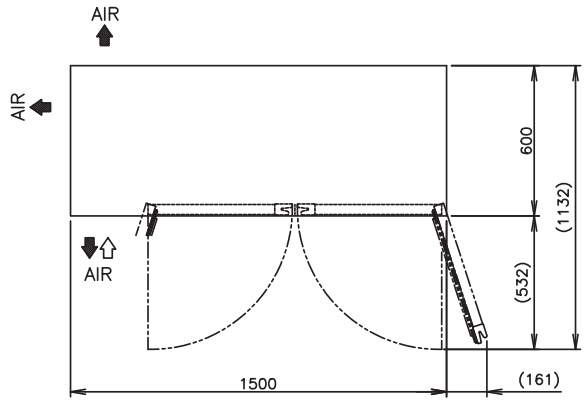
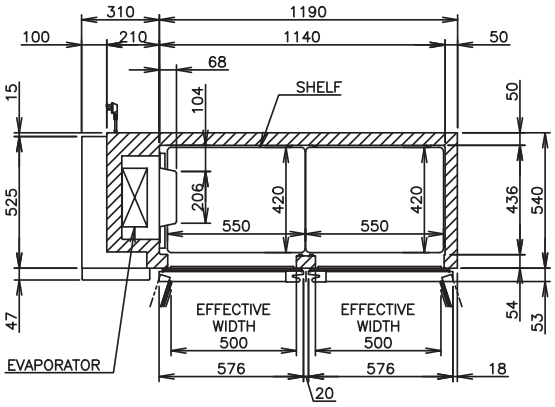
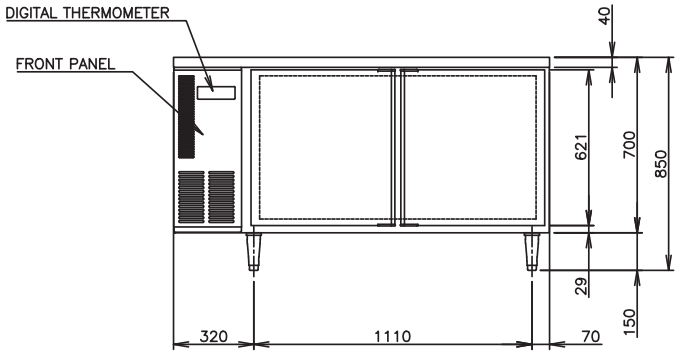
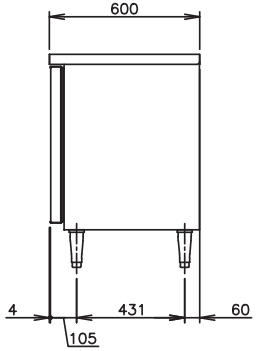


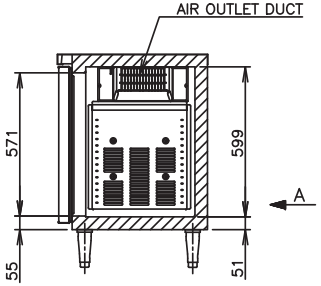
UK PLUG









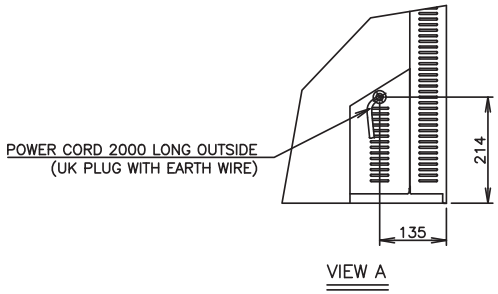


HOSHIZAKI

ITEM	Hoshizaki Undercounter Refrigerator
MODEL	RT−156MA−S
POWER SUPPLY	1 Phase 220−240V 50Hz Capacity: 0.5kVA (2.5A)
AMPERAGE	Rated 1.7A
ELECTRIC CONSUMPTION	Motor 260W Heater 175W Refrigeration 280W Defrost 175W
HEAT REJECTION	*W
POWER CORD	2.0m (UK Plug with Earth Wire)
EFFECTIVE CAPACITY	318L
OUTSIDE DIMENSIONS	1500mm (W) x 600mm (D) x 850(−880) mm (H)
INSIDE DIMENSIONS	1140mm (W) x 436mm (D) x 599mm (H)
EXTERIOR	Stainless Steel, Galvanized Steel (Rear/Bottom) ABS Plastic (Top & Bottom on Door)
INTERIOR	Stainless Steel, ABS Plastic (Door)
INSULATION	Polyurethane Foam
INSULATION FOAM BLOWING AGENT	Cyclopentane
REFRIGERATION SYSTEM	Forced Air Circulation
DEFROST SYSTEM	Glass Tube Heater
COMPRESSOR	Hermetic
CONDENSER	Wire and Tube type, Air−cooled
EVAPORATOR	Fin and Tube Type
REFRIGERANT	R134a
TEMPERATURE CONTROL	Microprocessor (Digital Temp Indication) Adjustable from −6 to 12°C
DEFROST CONTROL	Microprocessor controlled
ELECTRIC CIRCUIT PROTECTION	Fuse, Earth Wire
COMPRESSOR PROTECTION	Motor Protector
LEG	Plastic Adjustable 150 to 180mm
SHELF	4pcs.
WEIGHT	Net: 80kg (Gross: Approx. 85kg)
PACKAGE	Carton 1565mm (W) x 680mm (D) x 790mm (H)
ACCESSORIES	−
OPERATING CONDITIONS	Ambient Temperature: 5−43°C Voltage Range: Rated Voltage±6%

*We reserve the right to make changes in specifications and design without prior notice.

1. Install the product properly in accordance with the instructions on location, electrical connections stated in the instruction manual provided.
   Allow 10mm extra space at the installation site to meet any installation requirements (additional spacing is also required for proper air flow and pipe connections).
2. The heat rejection is based on the reached pulldown temperature at ambient temperature of 38°C and power supply of 230V 50Hz.
   The amperage and electric consumption are based on measurements at ambient temperature of 38°C and power supply of 230V 50Hz.
3. The cabinet temperature range of −6 to 12°C is guaranteed at ambient temperature of 35°C.
4. Product code: T265−C100 (HS)



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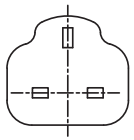
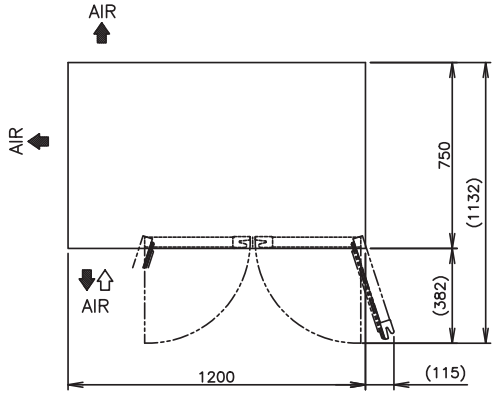
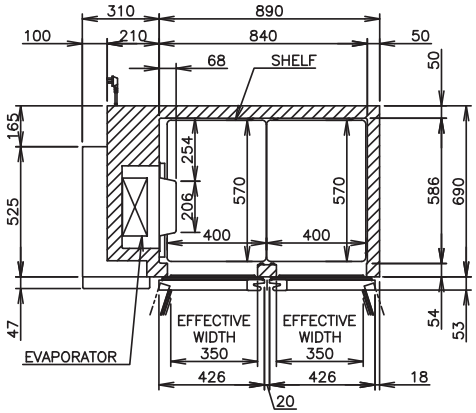
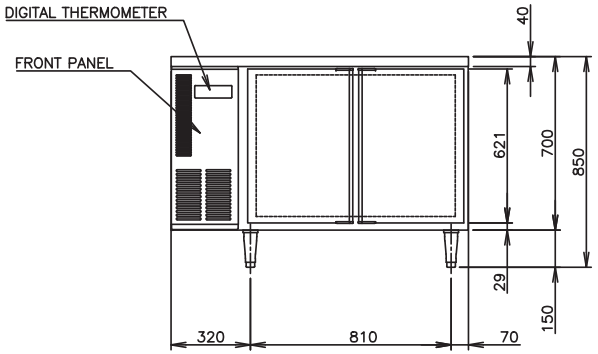
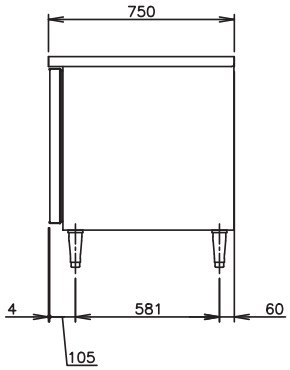


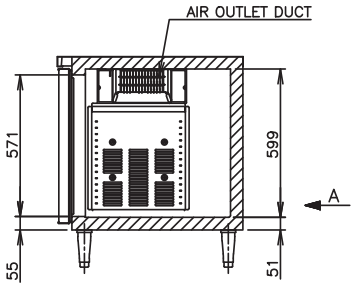
UK PLUG







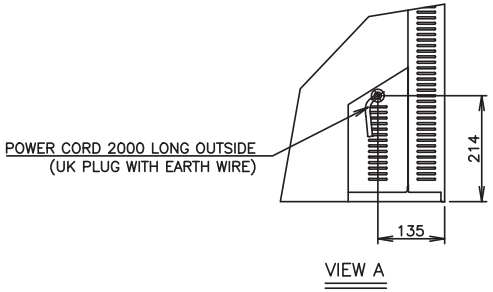




ITEM	Hoshizaki Undercounter Refrigerator
MODEL	RT−128MA−S
POWER SUPPLY	1 Phase 220−240V 50Hz Capacity: 0.5kVA (2.5A)
AMPERAGE	Rated 1.7A
ELECTRIC CONSUMPTION	Motor 240W Heater 173W Refrigeration 255W Defrost 173W
HEAT REJECTION	*W
POWER CORD	2.0m (UK Plug with Earth Wire)
EFFECTIVE CAPACITY	307L
OUTSIDE DIMENSIONS	1200mm (W) x 750mm (D) x 850(−880) mm (H)
INSIDE DIMENSIONS	840mm (W) x 586mm (D) x 599mm (H)
EXTERIOR	Stainless Steel, Galvanized Steel (Rear/Bottom) ABS Plastic (Top & Bottom on Door)
INTERIOR	Stainless Steel, ABS Plastic (Door)
INSULATION	Polyurethane Foam
INSULATION FOAM BLOWING AGENT	Cyclopentane
REFRIGERATION SYSTEM	Forced Air Circulation
DEFROST SYSTEM	Glass Tube Heater
COMPRESSOR	Hermetic
CONDENSER	Wire and Tube type, Air−cooled
EVAPORATOR	Fin and Tube Type
REFRIGERANT	R134a
TEMPERATURE CONTROL	Microprocessor (Digital Temp Indication) Adjustable from −2 to 12°C
DEFROST CONTROL	Microprocessor controlled
ELECTRIC CIRCUIT PROTECTION	Fuse, Earth Wire
COMPRESSOR PROTECTION	Motor Protector
LEG	Plastic Adjustable 150 to 180mm
SHELF	4pcs.
WEIGHT	Net:73kg (Gross: Approx. 78kg)
PACKAGE	Carton 1265mm (W) x 830mm (D) x 790mm (H)
ACCESSORIES	−
OPERATING CONDITIONS	Ambient Temperature: 5−43°C Voltage Range: Rated Voltage±6%

*We reserve the right to make changes in specifications and design without prior notice.

1. Install the product properly in accordance with the instructions on location, electrical connections stated in the instruction manual provided. Allow 10mm extra space at the installation site to meet any installation requirements(additional spacing is also required for proper air flow and pipe connections).
2. The heat rejection is based on the reached pulldown temperature at ambient temperature of 38°C and power supply of 230V 50Hz. The amperage and electric consumption are based on measurements at ambient temperature of 38°C and power supply of 230V 50Hz.
3. The cabinet temperature range of −6 to 12°C is guaranteed at ambient temperature of 35°C.
4. Product code: T268−C100 (HS)



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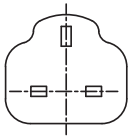
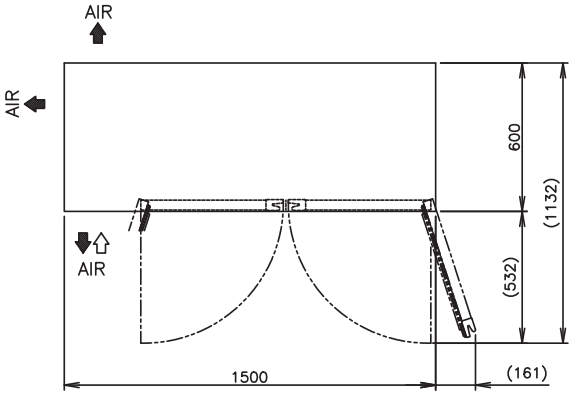
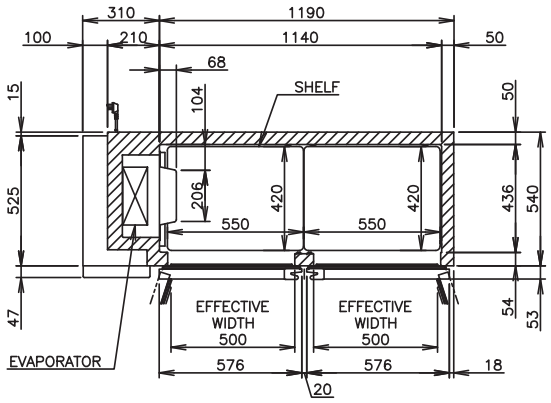


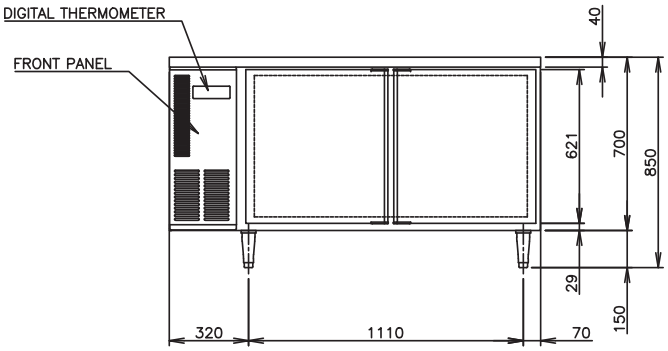
UK PLUG

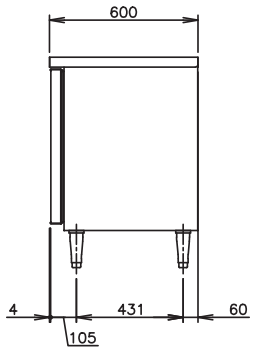


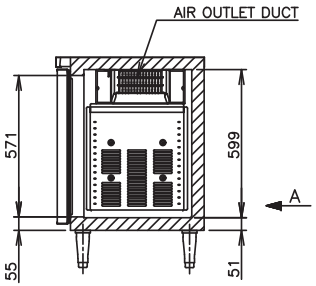


ITEM	Hoshizaki Undercounter Refrigerator
MODEL	RT−156MA−S
POWER SUPPLY	1 Phase 220−240V 50Hz Capacity: 0.5kVA (2.5A)
AMPERAGE	Rated 1.7A
ELECTRIC CONSUMPTION	Motor 260W Heater 175W Refrigeration 280W Defrost 175W
HEAT REJECTION	*W
POWER CORD	2.0m (UK Plug with Earth Wire)
EFFECTIVE CAPACITY	318L
OUTSIDE DIMENSIONS	1500mm (W) x 600mm (D) x 850(−880) mm (H)
INSIDE DIMENSIONS	1140mm (W) x 436mm (D) x 599mm (H)
EXTERIOR	Stainless Steel, Galvanized Steel (Rear/Bottom) ABS Plastic (Top & Bottom on Door)
INTERIOR	Stainless Steel, ABS Plastic (Door)
INSULATION	Polyurethane Foam
INSULATION FOAM BLOWING AGENT	Cyclopentane
REFRIGERATION SYSTEM	Forced Air Circulation
DEFROST SYSTEM	Glass Tube Heater
COMPRESSOR	Hermetic
CONDENSER	Wire and Tube type, Air−cooled
EVAPORATOR	Fin and Tube Type
REFRIGERANT	R134a
TEMPERATURE CONTROL	Microprocessor (Digital Temp Indication) Adjustable from −6 to 12°C
DEFROST CONTROL	Microprocessor controlled
ELECTRIC CIRCUIT PROTECTION	Fuse, Earth Wire
COMPRESSOR PROTECTION	Motor Protector
LEG	Plastic Adjustable 150 to 180mm
SHELF	4pcs.
WEIGHT	Net: 80kg (Gross: Approx. 85kg)
PACKAGE	Carton 1565mm (W) x 680mm (D) x 790mm (H)
ACCESSORIES	−
OPERATING CONDITIONS	Ambient Temperature: 5−43°C Voltage Range: Rated Voltage±6%

*We reserve the right to make changes in specifications and design without prior notice.







1. Install the product properly in accordance with the instructions on location, electrical connections stated in the instruction manual provided.
   Allow 10mm extra space at the installation site to meet any installation requirements (additional spacing is also required for proper air flow and pipe connections).
2. The heat rejection is based on the reached pulldown temperature at ambient temperature of 38°C and power supply of 230V 50Hz.
   The amperage and electric consumption are based on measurements at ambient temperature of 38°C and power supply of 230V 50Hz.
3. The cabinet temperature range of −6 to 12°C is guaranteed at ambient temperature of 35°C.
4. Product code: T265−C100 (HS)

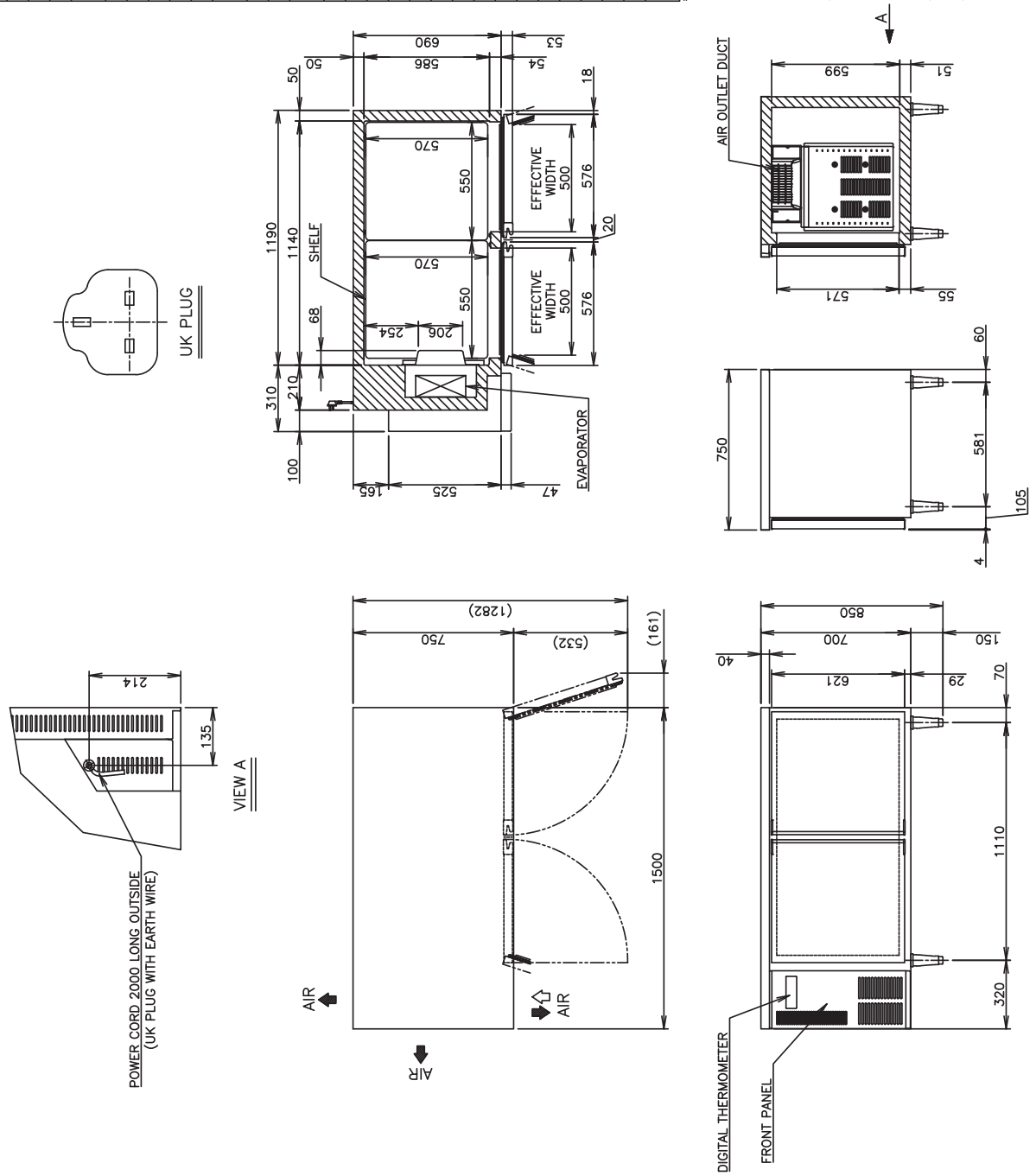
[f] RT-158MA

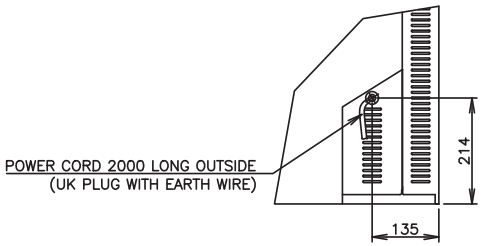
HOSHIZAKI

ITEM	Hoshizaki Undercounter Refrigerator
MODEL	RT-158MA-S
POWER SUPPLY	1 Phase 220-240V 50Hz Capacity: 0.5kVA (2.5A)
AMPERAGE	Rated 1.7A
ELECTRIC CONSUMPTION	Motor 260W Heater 175W Refrigeration 275W Defrost 175W
HEAT REJECTION	*W
POWER CORD	2.0m (UK Plug with Earth Wire)
EFFECTIVE CAPACITY	420L
OUTSIDE DIMENSIONS	1500mm (W) x 750mm (D) x 850(-880) mm (H)
INSIDE DIMENSIONS	1140mm (W) x 586mm (D) x 599mm (H)
EXTERIOR	Stainless Steel, Galvanized Steel (Rear/Bottom) ABS Plastic (Top & Bottom on Door)
INTERIOR	Stainless Steel, ABS Plastic (Door)
INSULATION	Polyurethane Foam
INSULATION FOAM BLOWING AGENT	Cyclopentane
REFRIGERATION SYSTEM	Forced Air Circulation
DEFROST SYSTEM	Glass Tube Heater
COMPRESSOR	Hermetic
CONDENSER	Wire and Tube type, Air-cooled
EVAPORATOR	Fin and Tube Type
REFRIGERANT	R134a
TEMPERATURE CONTROL	Microprocessor (Digital Temp Indication) Adjustable from -6 to 12°C
DEFROST CONTROL	Microprocessor controlled
ELECTRIC CIRCUIT PROTECTION	Fuse, Earth Wire
COMPRESSOR PROTECTION	Motor Protector
LEG	Plastic Adjustable 150 to 180mm
SHELF	4pcs.
WEIGHT	Net: 87kg (Gross: Approx. 92kg)
PACKAGE	Carton 1565mm (W) x 830mm (D) x 790mm (H)
ACCESSORIES	-
OPERATING CONDITIONS	Ambient Temperature: 5-43°C Voltage Range: Rated Voltage±6%

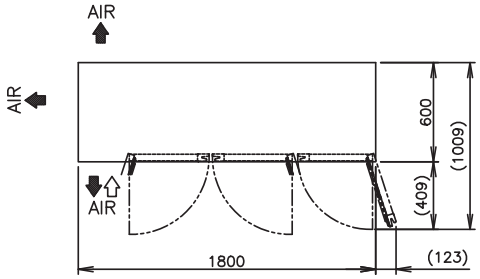
*We reserve the right to make changes in specifications and design without prior notice.

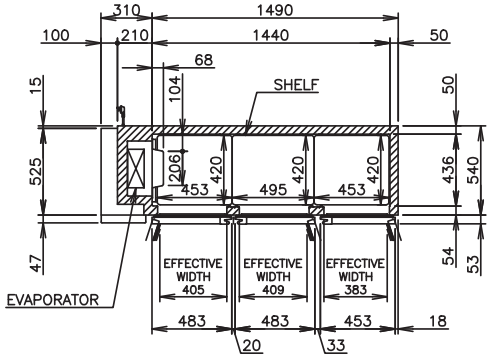
1. Install the product properly in accordance with the instructions on location, electrical connections stated in the instruction manual provided. Allow 10mm extra space at the installation site to meet any installation requirements (additional spacing is also required for proper air flow and pipe connections).
2. The heat rejection is based on the reached pulldown temperature at ambient temperature of 38°C and power supply of 230V 50Hz. The amperage and electric consumption are based on measurements at ambient temperature of 38°C and power supply of 230V 50Hz.
3. The cabinet temperature range of -6 to 12°C is guaranteed at ambient temperature of 35°C.
4. Product code: T269-C100 (HS)

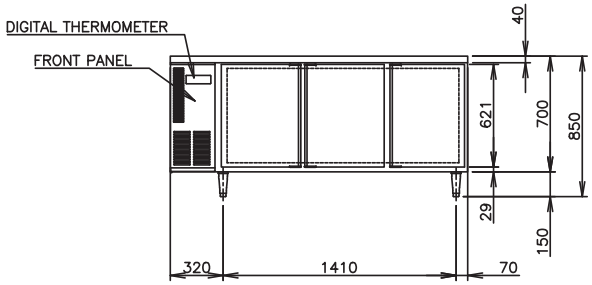


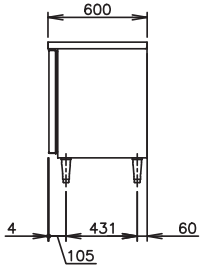


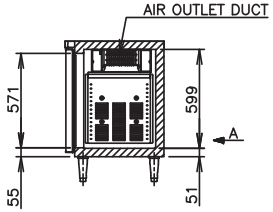
VIEW A(1/10)







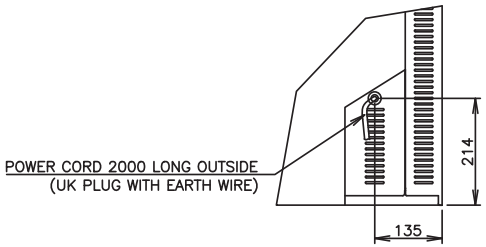




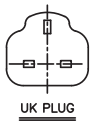
ITEM	Hoshizaki Undercounter Refrigerator
MODEL	RT−186MA−S
POWER SUPPLY	1 Phase 220−240V 50Hz Capacity: 0.67kVA (3.05A)
AMPERAGE	Rated 2.0A
ELECTRIC CONSUMPTION	Motor 270W Heater 187W Refrigeration 285W Defrost 187W
HEAT REJECTION	*W
POWER CORD	2.0m (UK Plug with Earth Wire)
EFFECTIVE CAPACITY	401L
OUTSIDE DIMENSIONS	1800mm (W) x 600mm (D) x 850(−880)mm (H)
INSIDE DIMENSIONS	1440mm (W) x 436mm (D) x 599mm (H)
EXTERIOR	Stainless Steel, Galvanized Steel (Rear / Bottom) ABS Plastic (Top & Bottom on Door)
INTERIOR	Stainless Steel, ABS Plastic (Door)
INSULATION	Polyurethane Foam
INSULATION FOAM BLOWING AGENT	Cyclopentane
REFRIGERATION SYSTEM	Forced Air Circulation
DEFROST SYSTEM	Glass Tube Heater
COMPRESSOR	Hermetic
CONDENSER	Wire and Tube type, Air−cooled
EVAPORATOR	Fin and Tube Type
REFRIGERANT	R134a
TEMPERATURE CONTROL	Microprocessor controlled Adjustable from −6 to 12°C
DEFROST CONTROL	Microprocessor controlled
ELECTRIC CIRCUIT PROTECTION	Fuse, Earth Wire
COMPRESSOR PROTECTION	Motor Protector
LEG	Plastic Adjustable 150 to 180mm
SHELF	3pcs.
WEIGHT	Net:93kg (Gross: Approx. 98kg)
PACKAGE	Carton 1865mm (W) x 680mm (D) x 790mm(H)
ACCESSORIES	−
OPERATING CONDITIONS	Ambient Temperature: 5−43°C Voltage Range: Rated Voltage±6%

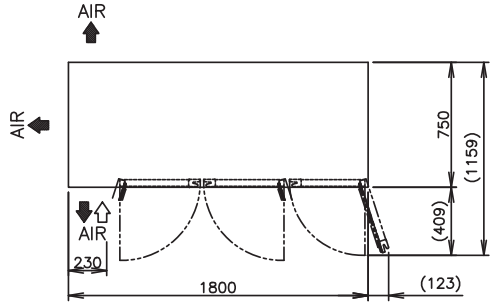
*We reserve the right to make changes in specifications and design without prior notice.

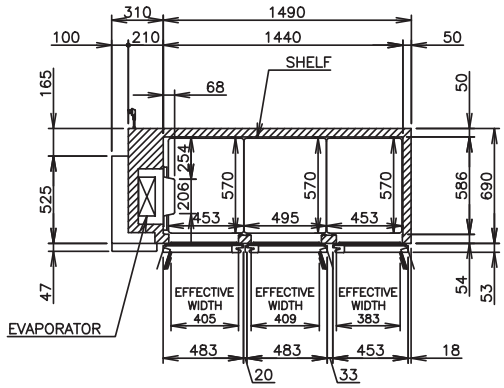
1. Install the product properly in accordance with the instructions on location, electrical connections stated in the instruction manual provided.
   Allow 10mm extra space at the installation site to meet any installation requirements (additional spacing is also required for proper air flow).
   pipe connections).
2. The heat rejection is based on the reached pulldown temperature at ambient temperature of 38°C and power supply of 230V 50Hz.
   The amperage and electric consumption are based on measurements at ambient temperature of 38°C and power supply of 230V 50Hz.
3. The cabinet temperature range of −6 to 12°C is guaranteed at ambient temperature of 35°C.
4. Product code: T266−C100 (HS)

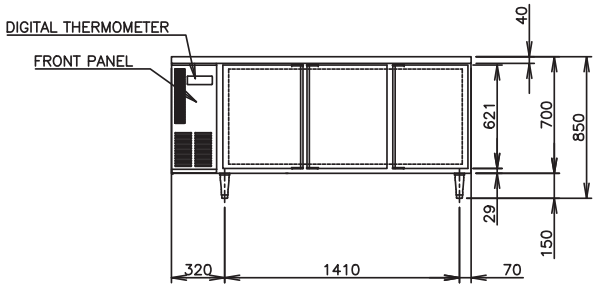


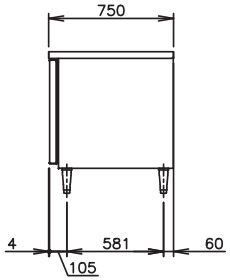
VIEW A(1/10)

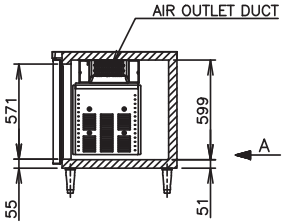








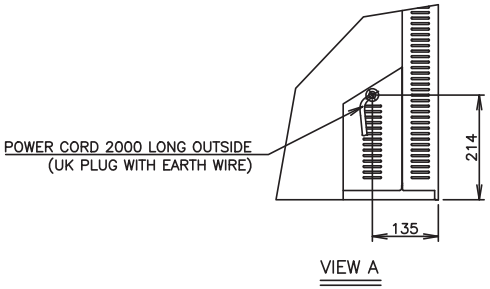


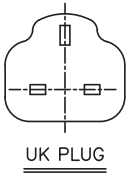


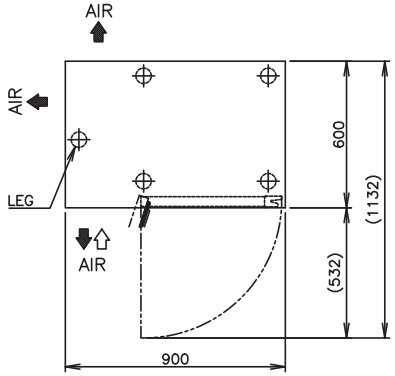
ITEM	Hoshizaki Undercounter Refrigerator
MODEL	RT−188MA−S
POWER SUPPLY	1 Phase 220−240V 50Hz Capacity: 0.67kVA (3.05A)
AMPERAGE	Rated 1.6A
ELECTRIC CONSUMPTION	Motor 270W Heater 180W Refrigeration 255W Defrost 180W
HEAT REJECTION	*W
POWER CORD	2.0m (UK Plug with Earth Wire)
EFFECTIVE CAPACITY	502L
OUTSIDE DIMENSIONS	1800mm (W) x 750mm (D) x 850(−880)mm (H)
INSIDE DIMENSIONS	1440mm (W) x 586mm (D) x 599mm (H)
EXTERIOR	Stainless Steel, Galvanized Steel (Rear / Bottom) ABS Plastic (Top & Bottom on Door)
INTERIOR	Stainless Steel, ABS Plastic (Door)
INSULATION	Polyurethane Foam
INSULATION FOAM BLOWING AGENT	Cyclopentane
REFRIGERATION SYSTEM	Forced Air Circulation
DEFROST SYSTEM	Glass Tube Heater
COMPRESSOR	Hermetic
CONDENSER	Fin and Tube type, Air−cooled
EVAPORATOR	Fin and Tube Type
REFRIGERANT	R134a
TEMPERATURE CONTROL	Microprocessor controlled Adjustable from −6 to 12°C
DEFROST CONTROL	Microprocessor controlled
ELECTRIC CIRCUIT PROTECTION	Fuse, Earth Wire
COMPRESSOR PROTECTION	Motor Protector
LEG	Plastic Adjustable 150 to 180mm
SHELF	6pcs.
WEIGHT	Net:102kg (Gross: Approx. 107kg)
PACKAGE	Carton 1865mm (W) x 830mm (D) x 790mm (H)
ACCESSORIES	−
OPERATING CONDITIONS	Ambient Temperature: 5−43°C Voltage Range: Rated Voltage±6%

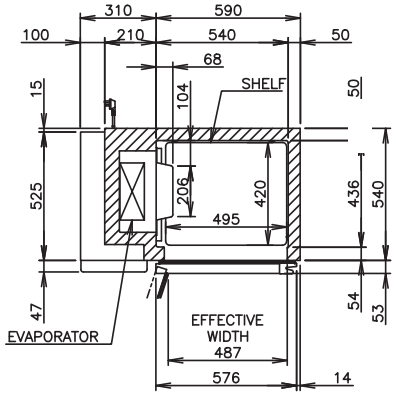
*We reserve the right to make changes in specifications and design without prior notice.

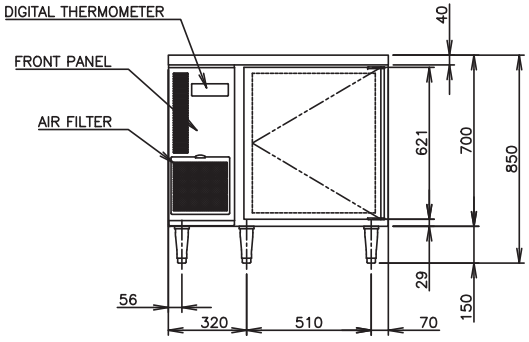
1. Install the product properly in accordance with the instructions on location, electrical connections stated in the instruction manual provided. Allow 10mm extra space at the installation site to meet any installation requirements (additional spacing is also required for proper air flow). pipe connections).
2. The heat rejection is based on the reached pulldown temperature at ambient temperature of 38°C and power supply of 230V 50Hz. The amperage and electric consumption are based on measurements at ambient temperature of 40°C and power supply of 230V 50Hz.
3. The cabinet temperature range of −6 to 12°C is guaranteed at ambient temperature of 35°C.
4. Product code: T270−C100 (HS)

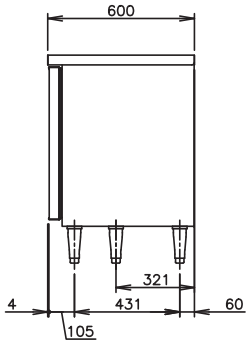


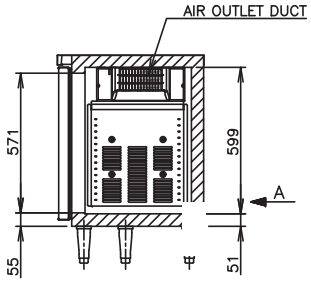










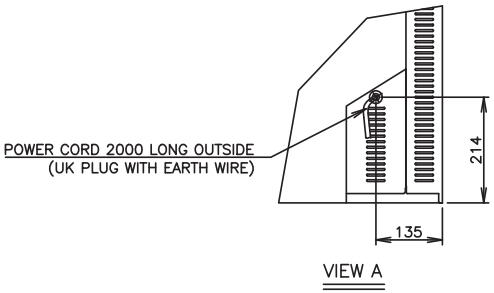


HOSHIZAKI

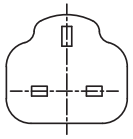
ITEM	Hoshizaki Undercounter Freezer
MODEL	FT−96MA−S
POWER SUPPLY	1 Phase 220−240V 50Hz Capacity: 0.9kVA (4.08A)
AMPERAGE	Rated 2.6A
ELECTRIC CONSUMPTION	Motor 415W Heater 349W Refrigeration 255W Defrost 349W
HEAT REJECTION	*W
POWER CORD	2.0m (UK Plug with Earth Wire)
EFFECTIVE CAPACITY	151L
OUTSIDE DIMENSIONS	900mm (W) x 600mm (D) x 850(−880) mm (H)
INSIDE DIMENSIONS	540mm (W) x 436mm (D) x 599mm (H)
EXTERIOR	Stainless Steel, Galvanized Steel (Rear/Bottom) ABS Plastic (Top & Bottom on Door)
INTERIOR	Stainless Steel
INSULATION	Polyurethane Foam
INSULATION FOAM BLOWING AGENT	Cyclopentane
REFRIGERATION SYSTEM	Forced Air Circulation
DEFROST SYSTEM	Glass Tube Heater
COMPRESSOR	Hermetic
CONDENSER	Fin and Tube type, Air−cooled
EVAPORATOR	Fin and Tube Type
REFRIGERANT	R404A
TEMPERATURE CONTROL	Microprocessor controlled Adjustable from −23 to −7°C
DEFROST CONTROL	Microprocessor controlled
ELECTRIC CIRCUIT PROTECTION	Fuse, Earth Wire
COMPRESSOR PROTECTION	Motor Protector
LEG	Plastic Adjustable 150 to 180mm
SHELF	2pcs.
WEIGHT	Net: 62kg (Gross: Approx. 67kg)
PACKAGE	Carton 965mm (W) x 680mm (D) x 790mm (H)
ACCESSORIES	−
OPERATING CONDITIONS	Ambient Temperature: 5−43°C Voltage Range: Rated Voltage±6%

*We reserve the right to make changes in specifications and design without prior notice.

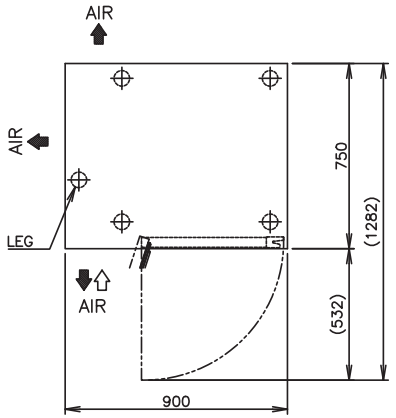
1. Install the product properly in accordance with the instructions on location, electrical connections stated in the instruction manual provided.
   Allow 10mm extra space at the installation site to meet any installation requirements(additional spacing is also required for proper air flow and pipe connections).
2. The heat rejection is based on the reached pulldown temperature at ambient temperature of 35°C and power supply of 230V 50Hz.
   The amperage and electric consumption are based on measurements at ambient temperature of 38°C and power supply of 230V 50Hz.
3. The cabinet temperature range of −23 to −7°C is guaranteed at ambient temperature of 35°C.
4. Product code: T271−C100 (HS)

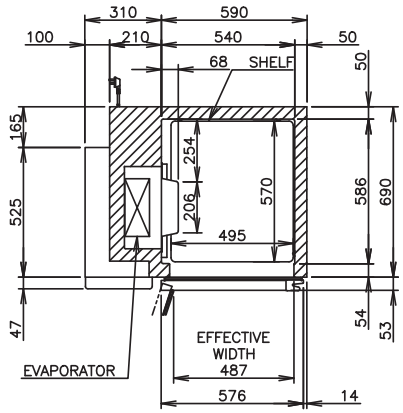


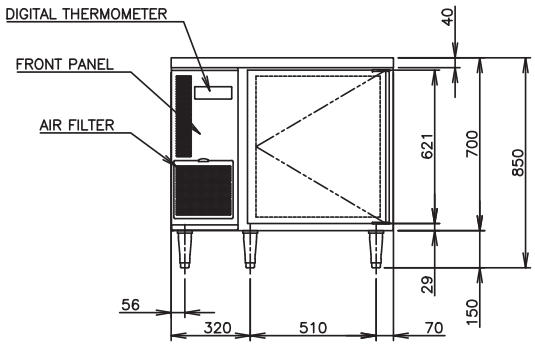
VIEW A

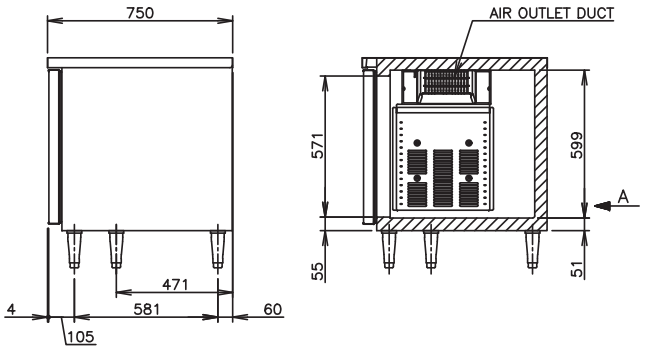


UK PLUG





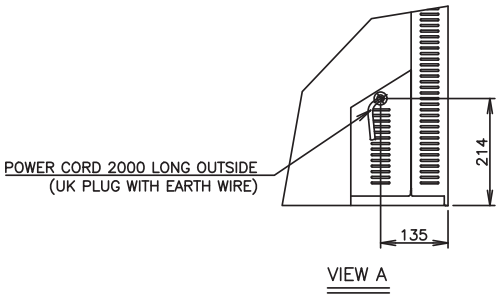




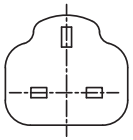
ITEM	Hoshizaki Undercounter Freezer
MODEL	FT−98MA−S
POWER SUPPLY	1 Phase 220−240V 50Hz Capacity: 0.9kVA (4.08A)
AMPERAGE	Rated 2.6A
ELECTRIC CONSUMPTION	Motor 420W Heater 349W Refrigeration 286W Defrost 349W
HEAT REJECTION	*W
POWER CORD	2.0m (UK Plug with Earth Wire)
EFFECTIVE CAPACITY	199L
OUTSIDE DIMENSIONS	900mm (W) x 750mm (D) x 850(−880) mm (H)
INSIDE DIMENSIONS	540mm (W) x 586mm (D) x 599mm (H)
EXTERIOR	Stainless Steel, Galvanized Steel (Rear/Bottom) ABS Plastic (Top & Bottom on Door)
INTERIOR	Stainless Steel
INSULATION	Polyurethane Foam
INSULATION FOAM BLOWING AGENT	Cyclopentane
REFRIGERATION SYSTEM	Forced Air Circulation
DEFROST SYSTEM	Glass Tube Heater
COMPRESSOR	Hermetic
CONDENSER	Fin and Tube type, Air−cooled
EVAPORATOR	Fin and Tube Type
REFRIGERANT	R404A
TEMPERATURE CONTROL	Microprocessor controlled Adjustable from −23 to −7°C
DEFROST CONTROL	Microprocessor controlled
ELECTRIC CIRCUIT PROTECTION	Fuse, Earth Wire
COMPRESSOR PROTECTION	Motor Protector
LEG	Plastic Adjustable 150 to 180mm
SHELF	2pcs.
WEIGHT	Net: 68kg (Gross: Approx. 73kg)
PACKAGE	Carton 965mm (W) x 830mm (D) x 790mm (H)
ACCESSORIES	−
OPERATING CONDITIONS	Ambient Temperature:5−43°C Voltage Range:Rated Voltage±6%

*We reserve the right to make changes in specifications and design without prior notice.

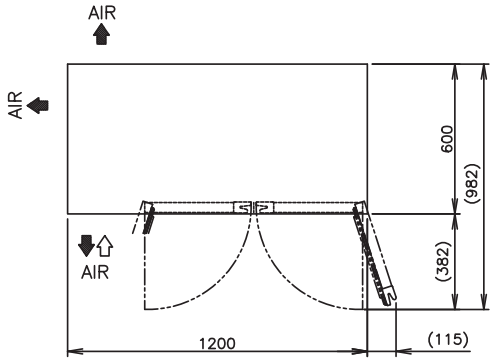
1. Install the product properly in accordance with the instructions on location, electrical connections stated in the instruction manual provided.
   Allow 10mm extra space at the installation site to meet any installation requirements(additional spacing is also required for proper air flow and pipe connections).
2. The heat rejection is based on the reached pulldown temperature at ambient temperature of 35°C and power supply of 230V 50Hz.
   The amperage and electric consumption are based on measurements at ambient temperature of 38°C and power supply of 230V 50Hz.
3. The cabinet temperature range of −23 to −7°C is guaranteed at ambient temperature of 35°C.
4. Product code: T275−C100 (HS)

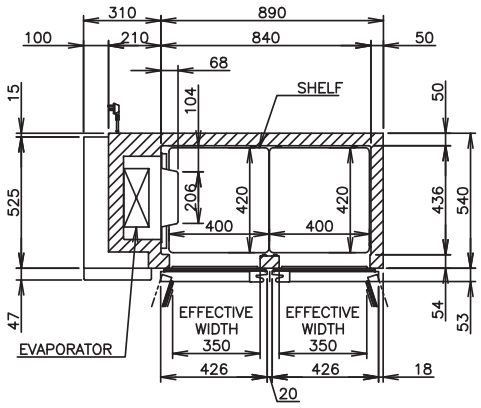


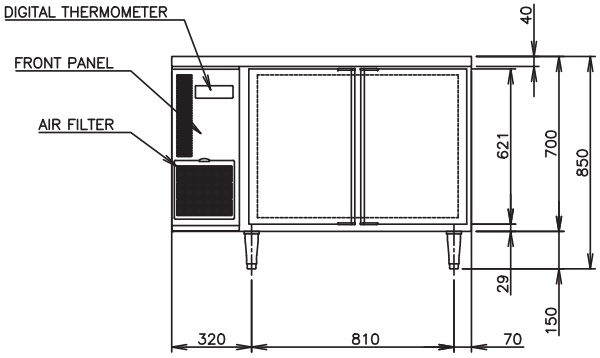
VIEW A

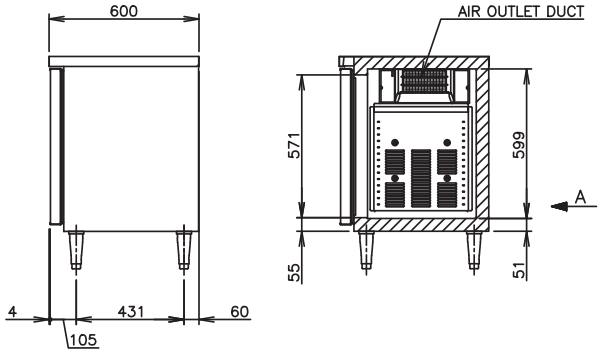


UK PLUG









HOSHIZAKI

ITEM	Hoshizaki Undercounter Freezer
MODEL	FT−126MA−S
POWER SUPPLY	1 Phase 220−240V 50Hz Capacity: 0.9kVA (4.08A)
AMPERAGE	Rated 2.6A
ELECTRIC CONSUMPTION	Motor 410W Heater 371W Refrigeration 342W Defrost 371W
HEAT REJECTION	*W
POWER CORD	2.0m (UK Plug with Earth Wire)
EFFECTIVE CAPACITY	231L
OUTSIDE DIMENSIONS	1200mm (W) x 600mm (D) x 850(−880) mm (H)
INSIDE DIMENSIONS	840mm (W) x 436mm (D) x 599mm (H)
EXTERIOR	Stainless Steel, Galvanized Steel (Rear/Bottom) ABS Plastic (Top & Bottom on Door)
INTERIOR	Stainless Steel, ABS Plastic (Door)
INSULATION	Polyurethane Foam
INSULATION FOAM BLOWING AGENT	Cyclopentane
REFRIGERATION SYSTEM	Forced Air Circulation
DEFROST SYSTEM	Glass Tube Heater
COMPRESSOR	Hermetic
CONDENSER	Fin and Tube type, Air−cooled
EVAPORATOR	Fin and Tube Type
REFRIGERANT	R404A
TEMPERATURE CONTROL	Microprocessor controlled Adjustable from −23 to −7°C
DEFROST CONTROL	Microprocessor controlled
ELECTRIC CIRCUIT PROTECTION	Fuse, Earth Wire
COMPRESSOR PROTECTION	Motor Protector
LEG	Plastic Adjustable 150 to 180mm
SHELF	4pcs.
WEIGHT	Net: 72kg (Gross: Approx. 77kg)
PACKAGE	Carton 1265mm (W) x 680mm (D) x 790mm (H)
ACCESSORIES	−
OPERATING CONDITIONS	Ambient Temperature: 5−43°C Voltage Range: Rated Voltage±6%

*We reserve the right to make changes in specifications and design without prior notice.

1. Install the product properly in accordance with the instructions on location, electrical connections stated in the instruction manual provided.
   Allow 10mm extra space at the installation site to meet any installation requirements (additional spacing is also required for proper air flow and pipe connections).
2. The heat rejection is based on the reached pulldown temperature at ambient temperature of 35°C and power supply of 230V 50Hz.
   The amperage and electric consumption are based on measurements at ambient temperature of 38°C and power supply of 230V 50Hz.
3. The cabinet temperature range of −23 to −7°C is guaranteed at ambient temperature of 35°C.
4. Product code: T272−C100 (HS)

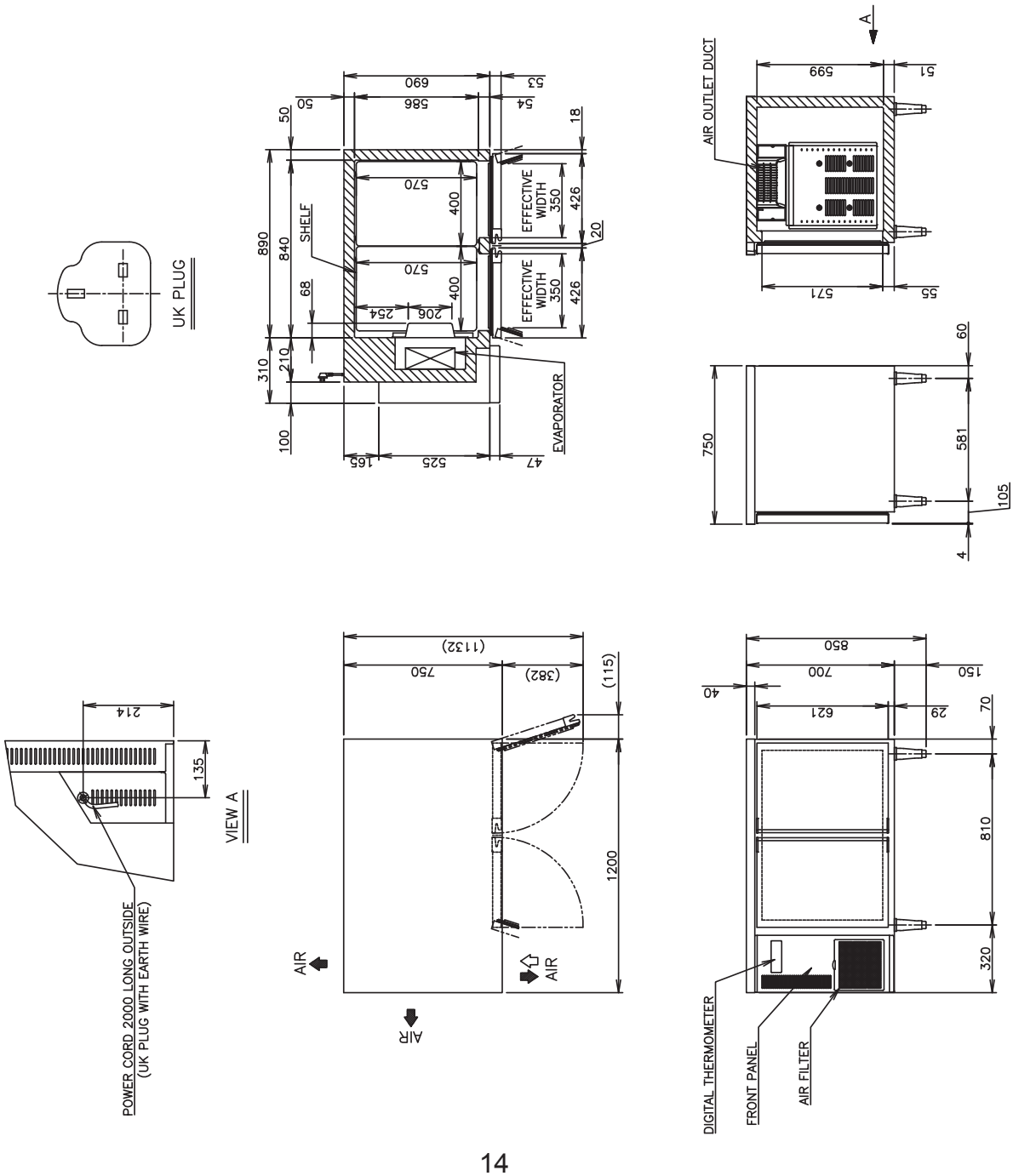
[l] FT-128MA

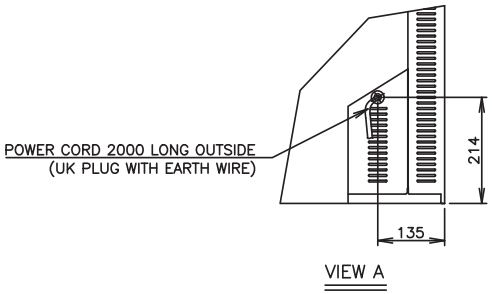
HOSHIZAKI

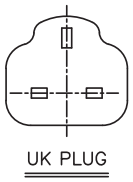
ITEM	Hoshizaki Undercounter Freezer
MODEL	FT-128MA-S
POWER SUPPLY	1 Phase 220-240V 50Hz Capacity:0.9kVA (4.08A)
AMPERAGE	Rated 2.6A
ELECTRIC CONSUMPTION	Motor 418W Heater 371W Refrigeration 354W Defrost 371W
HEAT REJECTION	*W
POWER CORD	2.0m (UK Plug with Earth Wire)
EFFECTIVE CAPACITY	307L
OUTSIDE DIMENSIONS	1200mm (W) x 750mm (D) x 850(-880) mm (H)
INSIDE DIMENSIONS	840mm (W) x 586mm (D) x 599mm (H)
EXTERIOR	Stainless Steel, Galvanized Steel (Rear/Bottom) ABS Plastic (Top & Bottom on Door)
INTERIOR	Stainless Steel, ABS Plastic (Door)
INSULATION	Polyurethane Foam
INSULATION FOAM BLOWING AGENT	Cyclopentane
REFRIGERATION SYSTEM	Forced Air Circulation
DEFROST SYSTEM	Glass Tube Heater
COMPRESSOR	Hermetic
CONDENSER	Fin and Tube type, Air-cooled
EVAPORATOR	Fin and Tube Type
REFRIGERANT	R404A
TEMPERATURE CONTROL	Microprocessor controlled Adjustable from -23 to -7°C
DEFROST CONTROL	Microprocessor controlled
ELECTRIC CIRCUIT PROTECTION	Fuse, Earth Wire
COMPRESSOR PROTECTION	Motor Protector
LEG	Plastic Adjustable 150 to 180mm
SHELF	4pcs.
WEIGHT	Net: 79kg (Gross: Approx. 84kg)
PACKAGE	Carton 1265mm (W) x 830mm (D) x 790mm (H)
ACCESSORIES	-
OPERATING CONDITIONS	Ambient Temperature: 5-43°C Voltage Range: Rated Voltage±6%

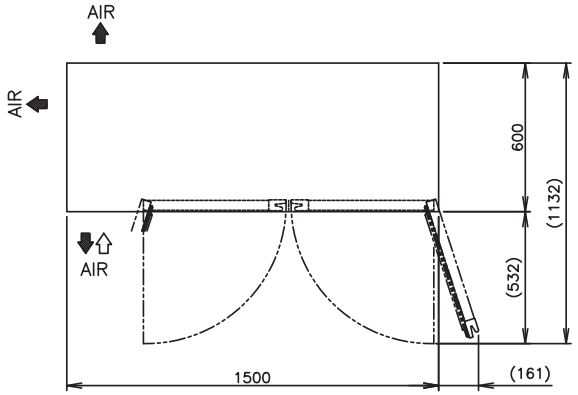
*We reserve the right to make changes in specifications and design without prior notice.

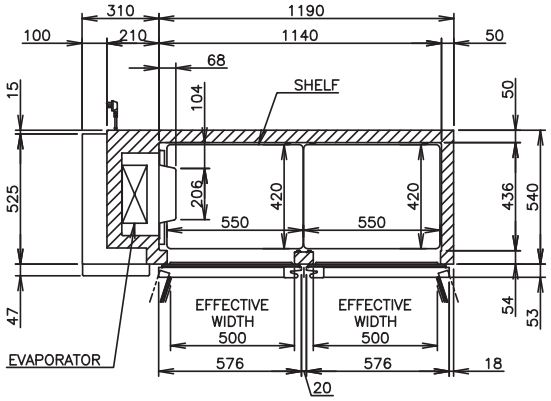
1. Install the product properly in accordance with the instructions on location, electrical connections stated in the instruction manual provided. Allow 10mm extra space at the installation site to meet any installation requirements (additional spacing is also required for proper air flow and pipe connections).
2. The heat rejection is based on the reached pulldown temperature at ambient temperature of 35°C and power supply of 230V 50Hz. The amperage and electric consumption are based on measurements at ambient temperature of 38°C and power supply of 230V 50Hz.
3. The cabinet temperature range of -23 to -7°C is guaranteed at ambient temperature of 35°C.
4. Product code: 1276-C100 (HS)

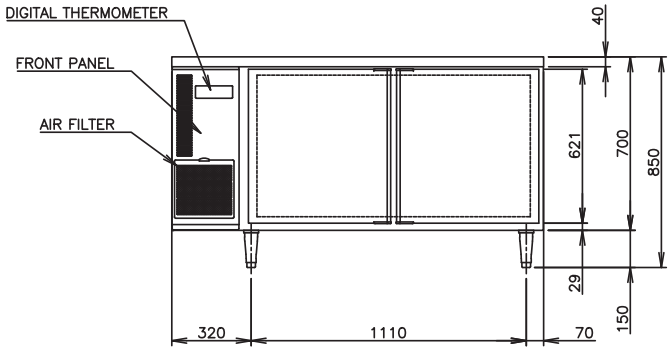


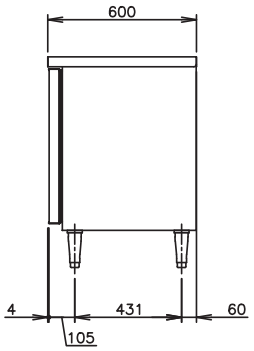


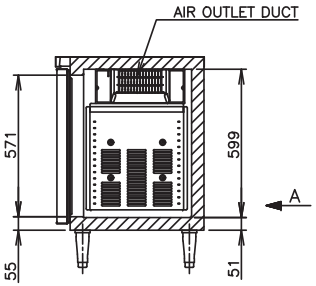












HOSHIZAKI

ITEM	Hoshizaki Undercounter Freezer
MODEL	FT−156MA−S
POWER SUPPLY	1 Phase 220−240V 50Hz Capacity: 0.9kVA (4.08A)
AMPERAGE	Rated 2.6A
ELECTRIC CONSUMPTION	Motor 415W Heater 375W Refrigeration 349W Defrost 375W
HEAT REJECTION	*W
POWER CORD	2.0m (UK Plug with Earth Wire)
EFFECTIVE CAPACITY	318L
OUTSIDE DIMENSIONS	1500mm (W) x 600mm (D) x 850(−880) mm (H)
INSIDE DIMENSIONS	1140mm (W) x 436mm (D) x 599mm (H)
EXTERIOR	Stainless Steel, Galvanized Steel (Rear/Bottom) ABS Plastic (Top & Bottom on Door)
INTERIOR	Stainless Steel, ABS Plastic (Door)
INSULATION	Polyurethane Foam
INSULATION FOAM BLOWING AGENT	Cyclopentane
REFRIGERATION SYSTEM	Forced Air Circulation
DEFROST SYSTEM	Glass Tube Heater
COMPRESSOR	Hermetic
CONDENSER	Fin and Tube type, Air−cooled
EVAPORATOR	Fin and Tube Type
REFRIGERANT	R404A
TEMPERATURE CONTROL	Microprocessor controlled Adjustable from −23 to −7°C
DEFROST CONTROL	Microprocessor controlled
ELECTRIC CIRCUIT PROTECTION	Fuse, Earth Wire
COMPRESSOR PROTECTION	Motor Protector
LEG	Plastic Adjustable 150 to 180mm
SHELF	4pcs.
WEIGHT	Net: 81kg (Gross: Approx. 86kg)
PACKAGE	Carton 1565mm (W) x 680mm (D) x 790mm (H)
ACCESSORIES	−
OPERATING CONDITIONS	Ambient Temperature: 5−43°C Voltage Range: Rated Voltage±6%

*We reserve the right to make changes in specifications and design without prior notice.

1. Install the product properly in accordance with the instructions on location, electrical connections stated in the instruction manual provided. Allow 10mm extra space at the installation site to meet any installation requirements (additional spacing is also required for proper air flow and pipe connections).
2. The heat rejection is based on the reached pulldown temperature at ambient temperature of 35°C and power supply of 230V 50Hz. The amperage and electric consumption are based on measurements at ambient temperature of 38°C and power supply of 230V 50Hz.
3. The cabinet temperature range of −23 to −7°C is guaranteed at ambient temperature of 35°C.
4. Product code: T273−C100 (HS)

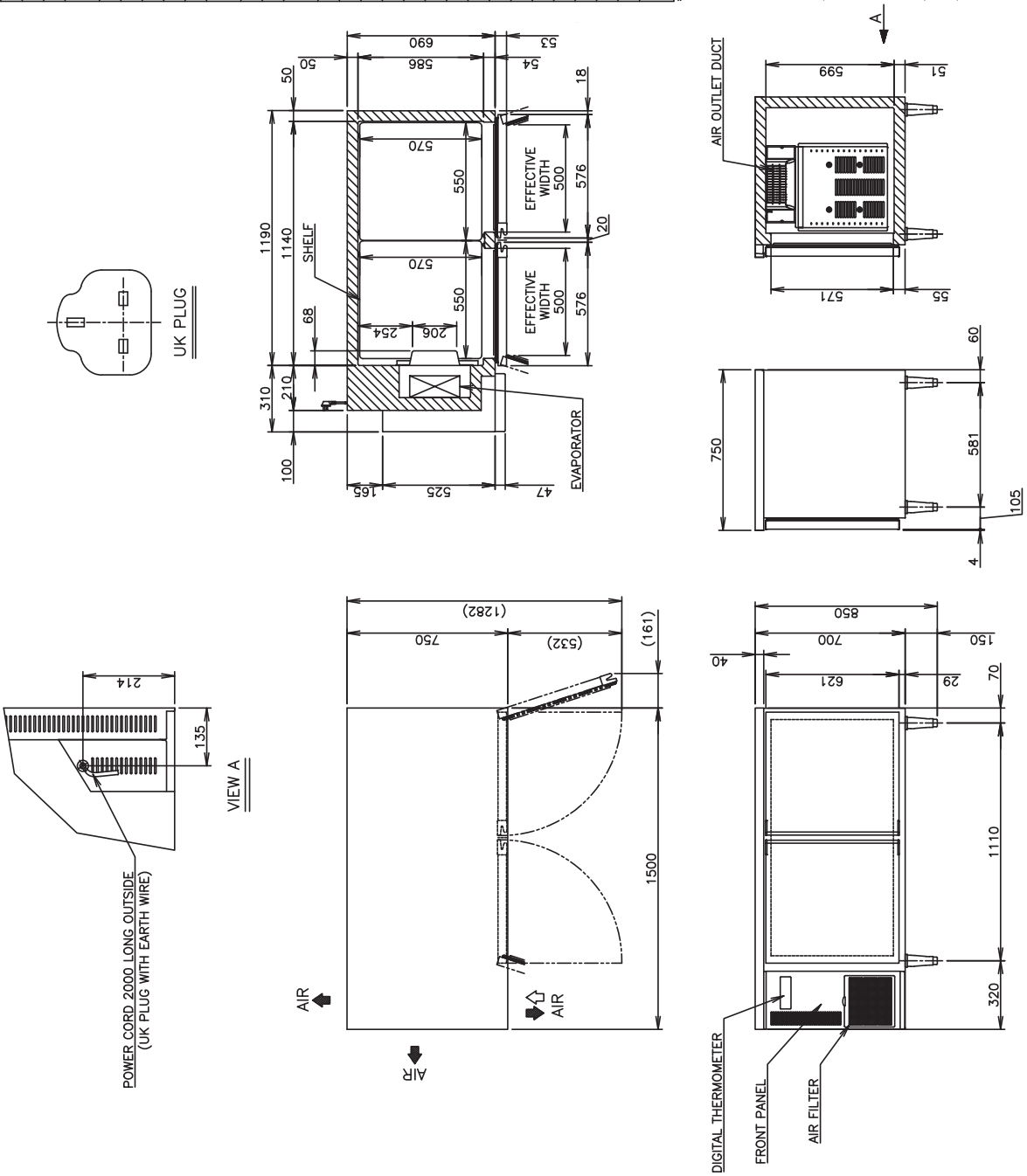
[n] FT-158MA

HOSHIZAKI

ITEM	Hoshizaki Undercounter Freezer
MODEL	FT-158MA-S
POWER SUPPLY	1 Phase 220-240V 50Hz Capacity: 0.9kVA (4.08A)
AMPERAGE	Rated 2.7A
ELECTRIC CONSUMPTION	Motor 415W Heater 375W Refrigeration 333W Defrost 375W
HEAT REJECTION	*W
POWER CORD	2.0m (UK Plug with Earth Wire)
EFFECTIVE CAPACITY	420L
OUTSIDE DIMENSIONS	1500mm (W) x 750mm (D) x 850(-880) mm (H)
INSIDE DIMENSIONS	1140mm (W) x 586mm (D) x 599mm (H)
EXTERIOR	Stainless Steel, Galvanized Steel (Rear/Bottom) ABS Plastic (Top & Bottom on Door)
INTERIOR	Stainless Steel, ABS Plastic (Door)
INSULATION	Polyurethane Foam
INSULATION FOAM BLOWING AGENT	Cyclopentane
REFRIGERATION SYSTEM	Forced Air Circulation
DEFROST SYSTEM	Glass Tube Heater
COMPRESSOR	Hermetic
CONDENSER	Fin and Tube type, Air-cooled
EVAPORATOR	Fin and Tube Type
REFRIGERANT	R404A
TEMPERATURE CONTROL	Microprocessor controlled Adjustable from -23 to -7°C
DEFROST CONTROL	Microprocessor controlled
ELECTRIC CIRCUIT PROTECTION	Fuse, Earth Wire
COMPRESSOR PROTECTION	Motor Protector
LEG	Plastic Adjustable 150 to 180mm
SHELF	4pcs.
WEIGHT	Net: 89kg (Gross: Approx. 94kg)
PACKAGE	Carton 1565mm (W) x 830mm (D) x 790mm (H)
ACCESSORIES	-
OPERATING CONDITIONS	Ambient Temperature: 5-43°C Voltage Range: Rated Voltage±6%

*We reserve the right to make changes in specifications and design without prior notice.

1. Install the product properly in accordance with the instructions on location, electrical connections stated in the instruction manual provided. Allow 10mm extra space at the installation site to meet any installation requirements (additional spacing is also required for proper air flow and pipe connections).
2. The heat rejection is based on the reached pulldown temperature at ambient temperature of 35°C and power supply of 230V 50Hz. The amperage and electric consumption are based on measurements at ambient temperature of 38°C and power supply of 230V 50Hz.
3. The cabinet temperature range of -23 to -7°C is guaranteed at ambient temperature of 35°C.
4. Product code: T277-C100 (HS)



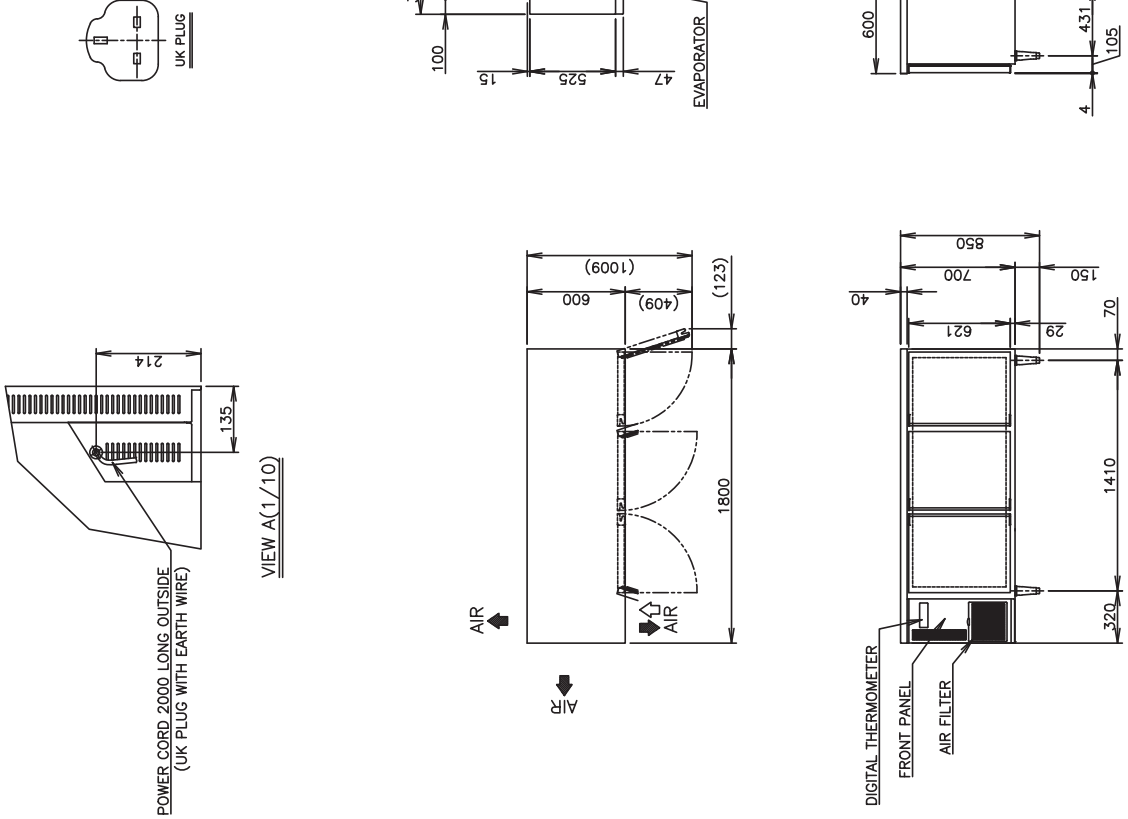
[o] FT-186MA

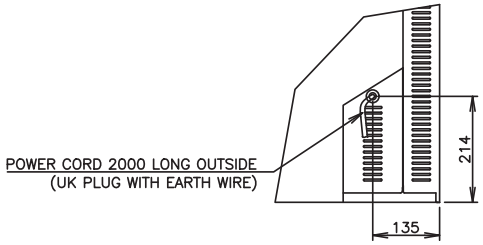
HOSHIZAKI

ITEM	Hoshizaki Undercounter Freezer
MODEL	FT-186MA-S
POWER SUPPLY	1 Phase 220-240V 50Hz Capacity: 0.65kVA (2.98A)
AMPERAGE	Rated 2.7A
ELECTRIC CONSUMPTION	Motor 400W Heater 397W Refrigeration 357W Defrost 397W
HEAT REJECTION	*W
POWER CORD	2.0m (UK Plug with Earth Wire)
EFFECTIVE CAPACITY	401L
OUTSIDE DIMENSIONS	1800mm (W) x 600mm (D) x 850(-880)mm (H)
INSIDE DIMENSIONS	1440mm (W) x 436mm (D) x 599mm (H)
EXTERIOR	Stainless Steel, Galvanized Steel (Rear / Bottom) ABS Plastic (Top & Bottom on Door)
INTERIOR	Stainless Steel, ABS Plastic (Door)
INSULATION	Polyurethane Foam
INSULATION FOAM BLOWING AGENT	Cyclopentane
REFRIGERATION SYSTEM	Forced Air Circulation
DEFROST SYSTEM	Glass Tube Heater
COMPRESSOR	Hermetic
CONDENSER	Fin and Tube type, Air-cooled
EVAPORATOR	Fin and Tube Type
REFRIGERANT	R404A
TEMPERATURE CONTROL	Microprocessor controlled Adjustable from -23 to -7°C
DEFROST CONTROL	Microprocessor controlled
ELECTRIC CIRCUIT PROTECTION	Fuse, Earth Wire
COMPRESSOR PROTECTION	Motor Protector
LEG	Plastic Adjustable 150 to 180mm
SHELF	6pcs.
WEIGHT	Net: 93kg (Gross: Approx. 98kg)
PACKAGE	Carton 1865mm (W) x 680mm (D) x 790mm (H)
ACCESSORIES	-
OPERATING CONDITIONS	Ambient Temperature: 5-43°C Voltage Range: Rated Voltage±6%

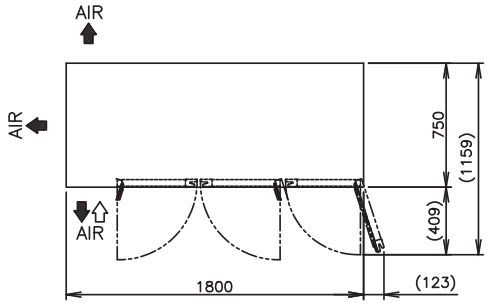
*We reserve the right to make changes in specifications and design without prior notice.

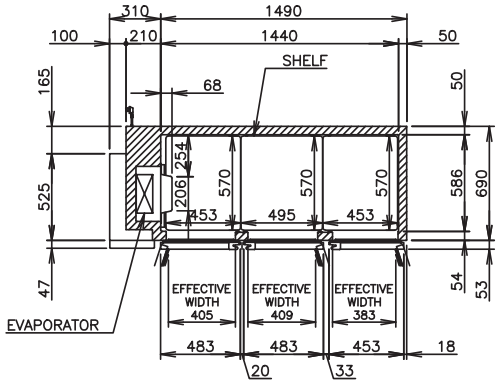
1. Install the product properly in accordance with the instructions on location, electrical connections stated in the instruction manual provided. Allow 10mm extra space at the installation site to meet any installation requirements (additional spacing is also required for proper air flow and pipe connections).
2. The heat rejection is based on the reached pulldown temperature at ambient temperature of 35°C and power supply of 230V 50Hz. The amperage and electric consumption are based on measurements at ambient temperature of 38°C and power supply of 230V 50Hz.
3. The cabinet temperature range of -23 to -7°C is guaranteed at ambient temperature of 35°C.
4. Product code: T274-C100 (HS)

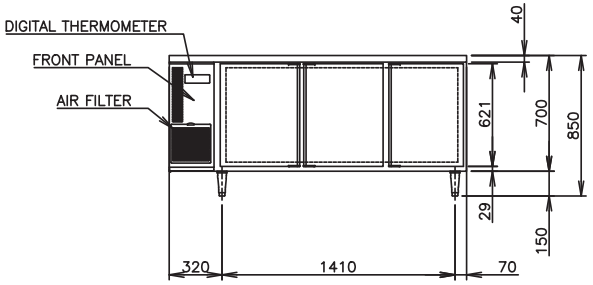


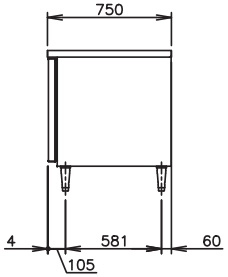


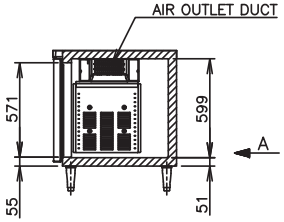
VIEW A(1/10)











ITEM	Hoshizaki Undercounter Freezer
MODEL	FT−188MA−S
POWER SUPPLY	1 Phase 220−240V 50Hz Capacity: 0.65kVA (2.98A)
AMPERAGE	Rated 2.7A
ELECTRIC CONSUMPTION	Motor 400W Heater 397W Refrigeration 399W Defrost 397W
HEAT REJECTION	*W
POWER CORD	2.0m (UK Plug with Earth Wire)
EFFECTIVE CAPACITY	502L
OUTSIDE DIMENSIONS	1800mm (W) x 750mm (D) x 850(−880)mm (H)
INSIDE DIMENSIONS	1440mm (W) x 586mm (D) x 599mm (D)
EXTERIOR	Stainless Steel, Galvanized Steel (Rear / Bottom) ABS Plastic (Top & Bottom on Door)
INTERIOR	Stainless Steel, ABS Plastic (Door)
INSULATION	Polyurethane Foam
INSULATION FOAM BLOWING AGENT	Cyclopentane
REFRIGERATION SYSTEM	Forced Air Circulation
DEFROST SYSTEM	Glass Tube Heater
COMPRESSOR	Hermetic
CONDENSER	Fin and Tube type, Air−cooled
EVAPORATOR	Fin and Tube Type
REFRIGERANT	R404A
TEMPERATURE CONTROL	Microprocessor controlled Adjustable from −23 to −7°C
DEFROST CONTROL	Microprocessor controlled
ELECTRIC CIRCUIT PROTECTION	Fuse, Earth Wire
COMPRESSOR PROTECTION	Motor Protector
LEG	Plastic Adjustable 150 to 180mm
SHELF	6pcs.
WEIGHT	Net: 102kg (Gross: Approx. 107kg)
PACKAGE	Carton 1865mm (W) x 830mm (D) x 790mm (H)
ACCESSORIES	−
OPERATING CONDITIONS	Ambient Temperature: 5−43°C Voltage Range: Rated Voltage±6%

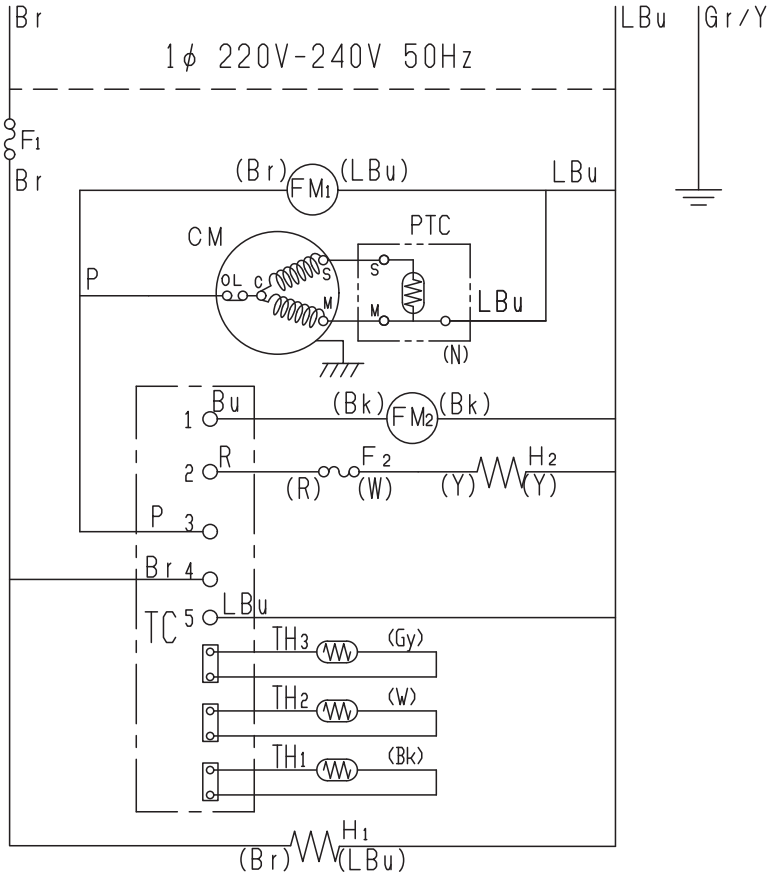
*We reserve the right to make changes in specifications and design without prior notice.

1. Install the product properly in accordance with the instructions on location, electrical connections stated in the instruction manual provided.
   Allow 10mm extra space at the installation site to meet any installation requirements (additional spacing is also required for proper air flow and pipe connections).
2. The heat rejection is based on the reached pulldown temperature at ambient temperature of 35°C and power supply of 230V 50Hz.
   The amperage and electric consumption are based on measurements at ambient temperature of 40°C and power supply of 230V 50Hz.
3. The cabinet temperature range of −23 to −7°C is guaranteed at ambient temperature of 35°C.
4. Product code: T278−C100 (HS)

II. TECHNICAL INFORMATION

1. WIRING DIAGRAM

[a] RT-96MA, RT-98MA



CODE	NAME
F_1	FUSE 10A
F_2	FUSE 94℃
TC	TEMPERATURE CONTROLLER
CM	COMPRESSOR
OL	OVER LOAD PROTECTOR
PTC	PTC RELAY
FM_1	FAN MOTOR(CONDENSER)
FM_2	FAN MOTOR(INTERIOR)
TH_1	THERMISTOR(INTERIOR)
TH_2	THERMISTOR(DEFROST)
TH_3	THERMISTOR (CONDENSER)
H_1	CORD HEATER(OUTER FRAME)
H_2	DEFROST HEATER

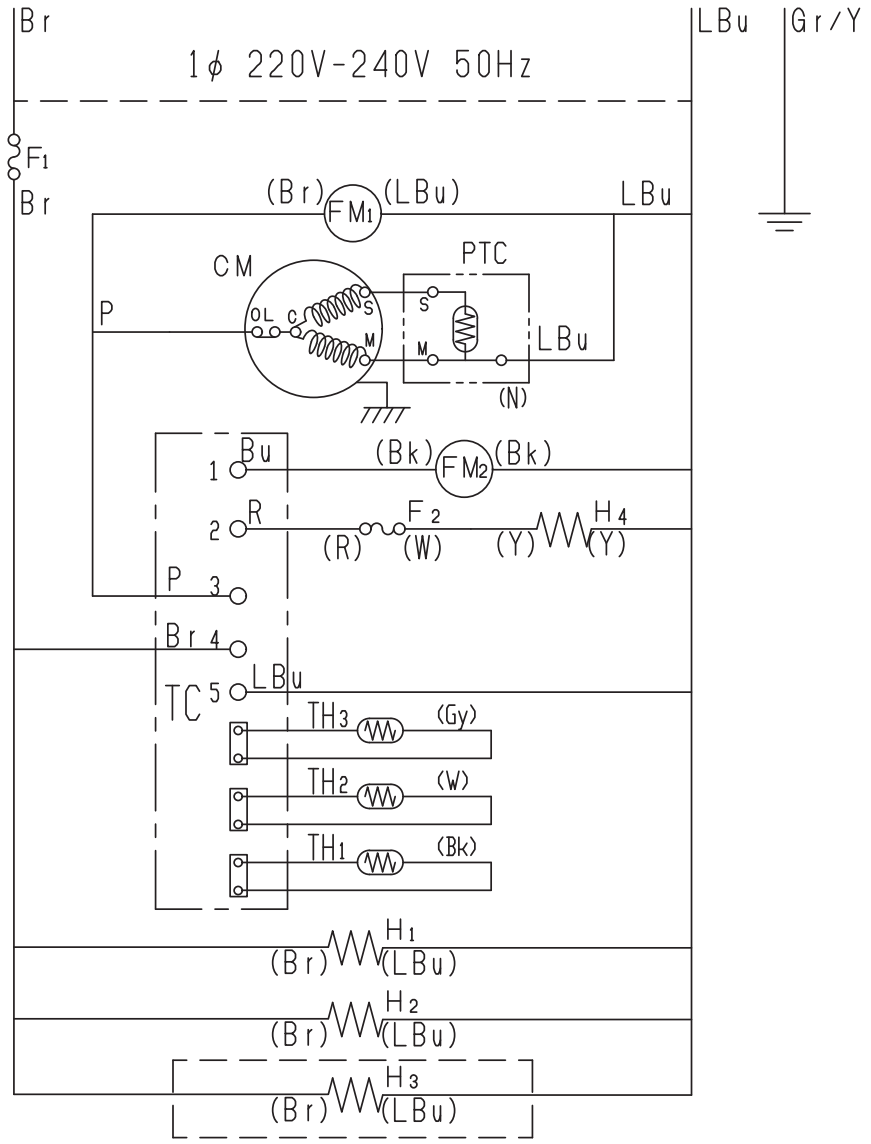
＊WIRE COLOR

PRIMARY SECONDARY (THIN)

WIRE COLOR CODE	
Br	BROWN
LBu	LIGHT BLUE
W	WHITE
P	PINK
R	RED
Bk	BLACK
O	ORANGE
Gy	GRAY
Gr	GREEN
Y	YELLOW
Bu	BLUE

390118L01A

[b] RT-126MA, RT-128MA,RT-156MA,RT-158MA, RT-186MA,RT-188MA



CODE	NAME
F_1	FUSE 10A
F_2	FUSE 94℃
TC	TEMPERATURE CONTROLLER
CM	COMPRESSOR
OL	OVER LOAD PROTECTOR
PTC	PTC RELAY
FM_1	FAN MOTOR(CONDENSER)
FM_2	FAN MOTOR(INTERIOR)
TH_1	THERMISTOR(INTERIOR)
TH_2	THERMISTOR(DEFROST)
TH_3	THERMISTOR (CONDENSER)
H_1	CORD HEATER(OUTER FRAME)
$H_{2,3}$	CORD HEATER(CENTER FRAME)
H_4	DEFROST HEATER

＊WIRE COLOR

PRIMARY SECONDARY (THIN)

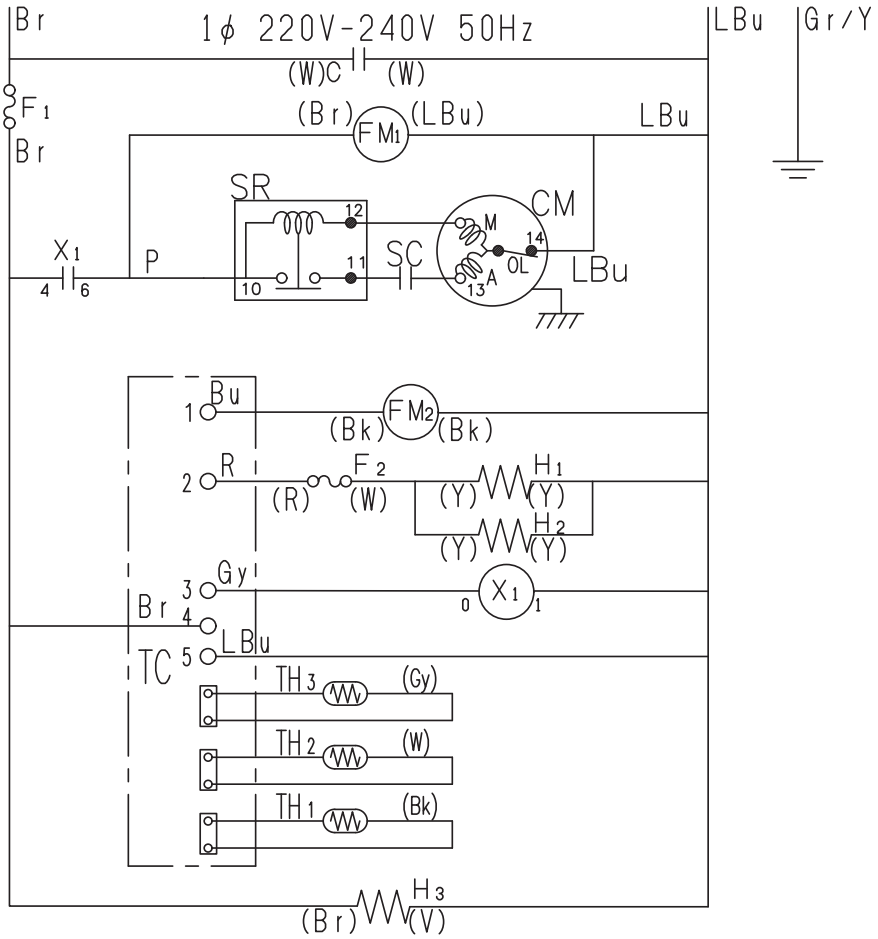
WIRE COLOR CODE

Br	BROWN
LBu	LIGHT BLUE
W	WHITE
P	PINK
R	RED
Bk	BLACK
O	ORANGE
Gy	GRAY
Gr	GREEN
Y	YELLOW
Bu	BLUE

: FOR 3 DOOR MODELS

390119L01A

[c] FT-96MA, FT-98MA



CODE	NAME
F_1	FUSE 10A
F_2	FUSE 94℃
TC	TEMPERATURE CONTROLLER
CM	COMPRESSOR
SR	START RELAY
SC	START CAPACITOR
OL	OVER LOAD PROTECTOR
X_1	POWER RELAY
FM_1	FAN MOTOR(CONDENSER)
FM_2	FAN MOTOR(INTERIOR)
TH_1	THERMISTOR(INTERIOR)
TH_2	THERMISTOR(DEFROST)
TH_3	THERMISTOR (CONDENSER)
$H_{1,2}$	DEFROST HEATER
H_3	CORD HEATER(OUTER FRAME)
C	CAPACITOR

＊WIRE COLOR

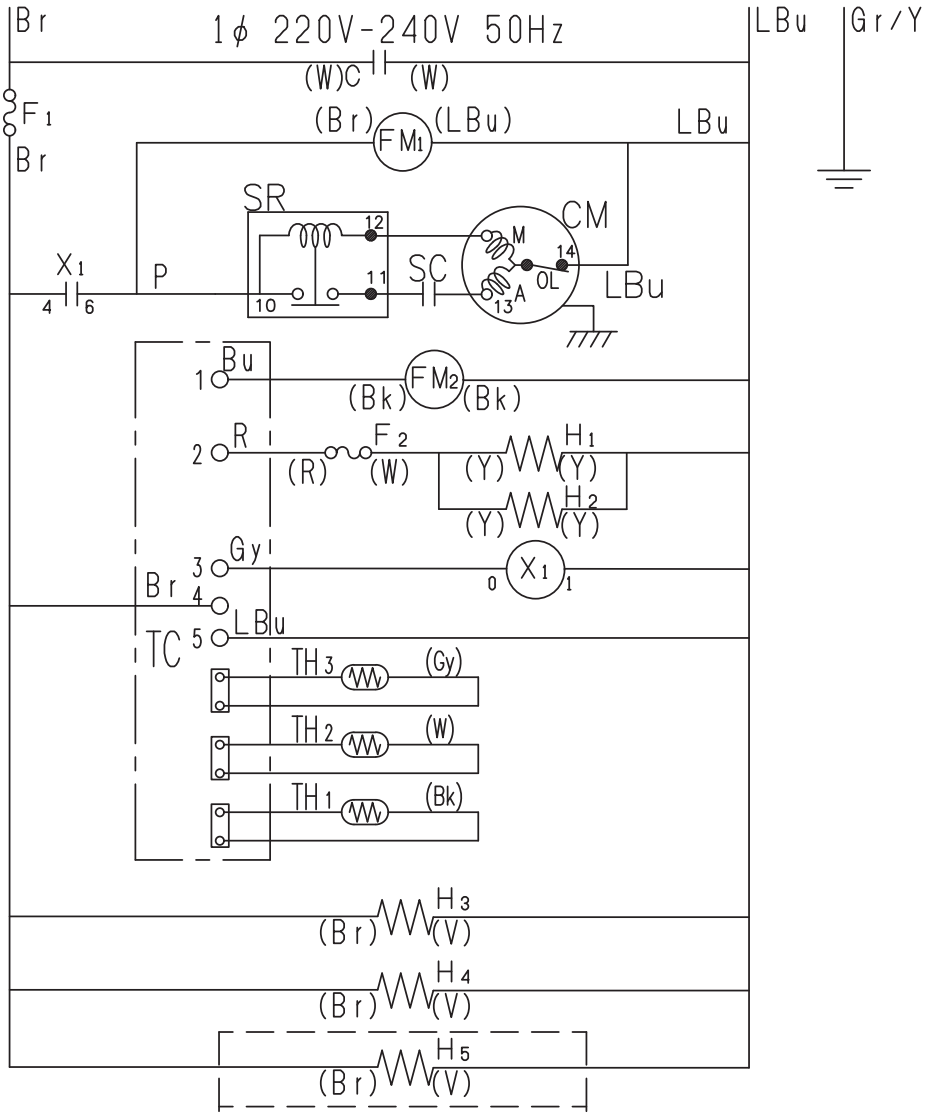
[ ] / [ ]

PRIMARY SECONDARY (THIN)

WIRE COLOR CODE	
Br	BROWN
LBu	LIGHT BLUE
W	WHITE
P	PINK
R	RED
Bk	BLACK
O	ORANGE
Gy	GRAY
Gr	GREEN
Y	YELLOW
Bu	BLUE

390120L01A

[c] FT-126MA, FT-128MA,FT-156MA



CODE	NAME
F_1	FUSE 10A
F_2	FUSE 94℃
TC	TEMPERATURE CONTROLLER
CM	COMPRESSOR
SR	START RELAY
SC	START CAPACITOR
OL	OVER LOAD PROTECTOR
X_1	POWER RELAY
FM_1	FAN MOTOR(CONDENSER)
FM_2	FAN MOTOR(INTERIOR)
TH_1	THERMISTOR(INTERIOR)
TH_2	THERMISTOR(DEFROST)
TH_3	THERMISTOR (CONDENSER)
$H_{1,2}$	DEFROST HEATER
H_3	CORD HEATER(OUTER FRAME)
$H_{4,5}$	CORD HEATER(CENTER FRAME)
C	CAPACITOR

＊WIRE COLOR

PRIMARY SECONDARY (THIN)

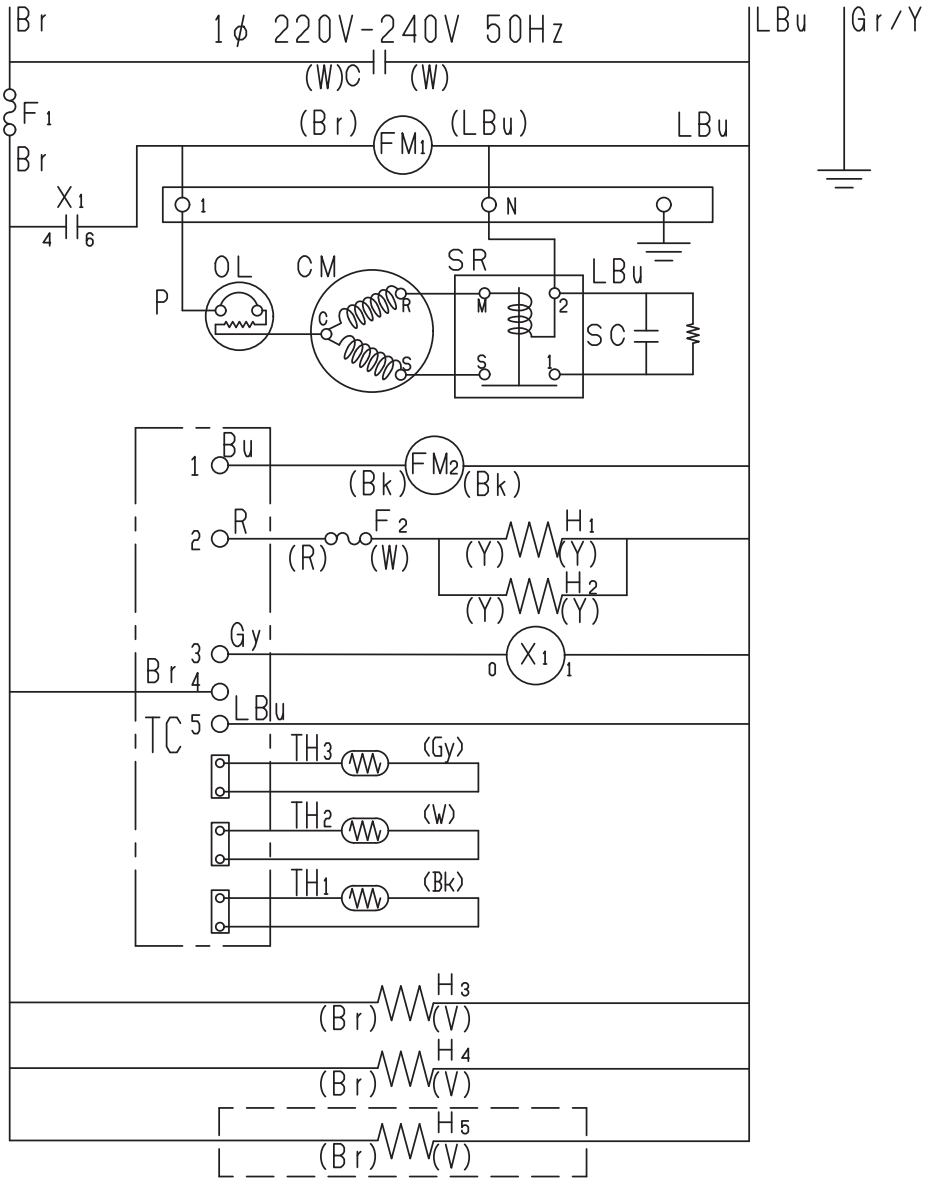
WIRE COLOR CODE

Br	BROWN
LBu	LIGHT BLUE
W	WHITE
P	PINK
R	RED
Bk	BLACK
O	ORANGE
Gy	GRAY
Gr	GREEN
Y	YELLOW
Bu	BLUE

⊏ ⊐ : FOR 3 DOOR MODELS

390121L01A

[c] FT-158MA, FT-186MA, FT-188MA



符号	名称
F_1	FUSE 10A
F_2	FUSE 94℃
TC	TEMPERATURE CONTROLLER
CM	COMPRESSOR
SR	START RELAY
SC	START CAPACITOR
OL	OVER LOAD PROTECTOR
X_1	POWER RELAY
FM_1	FAN MOTOR(CONDENSER)
FM_2	FAN MOTOR(INTERIOR)
TH_1	THERMISTOR(INTERIOR)
TH_2	THERMISTOR(DEFROST)
TH_3	THERMISTOR (CONDENSER)
$H_{1,2}$	DEFROST HEATER
H_3	CORD HEATER(OUTER FRAME)
$H_{4,5}$	CORD HEATER(CENTER FRAME)
C	CAPACITOR

＊WIRE COLOR

PRIMARY SECONDARY (THIN)

WIRE COLOR CODE

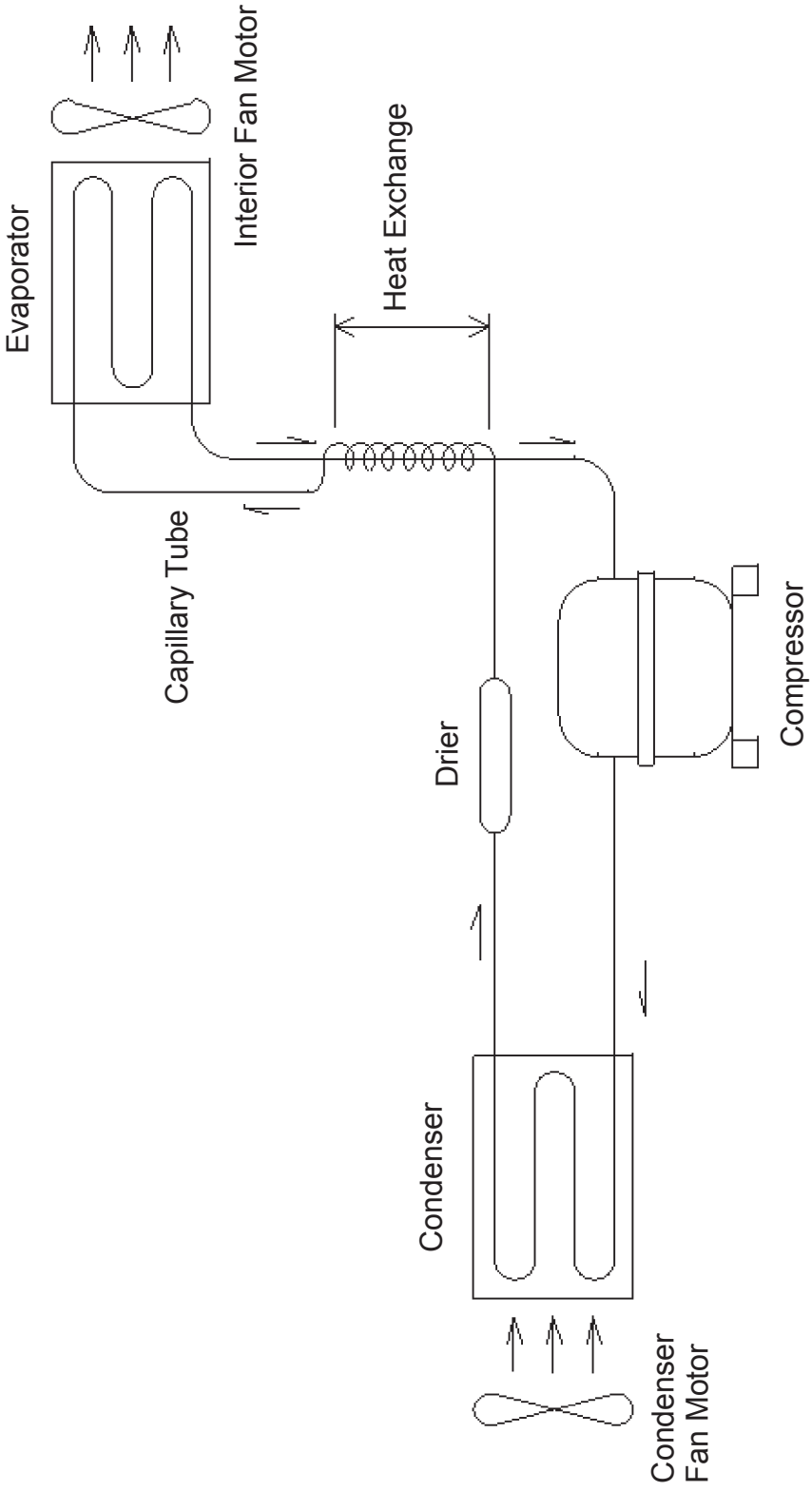
Br	BROWN
LBu	LIGHT BLUE
W	WHITE
P	PINK
R	RED
Bk	BLACK
O	ORANGE
Gy	GRAY
Gr	GREEN
Y	YELLOW
Bu	BLUE

: FOR 3 DOOR MODELS

390122L01A

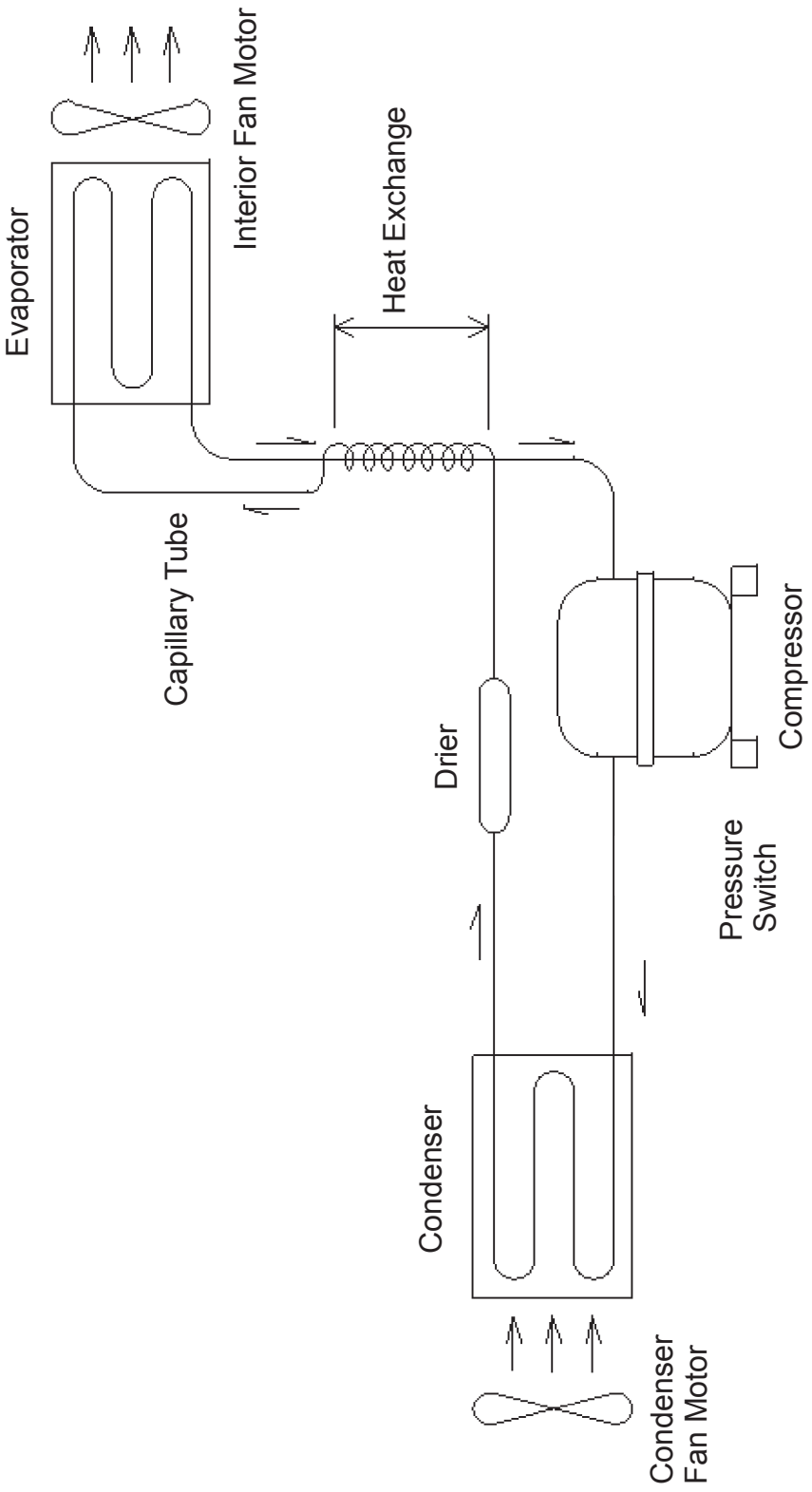
2. REFRIGERATION CIRCUIT

[a] RT SERIES



Refrigerant: HFC-134a

[b] FT SERIES

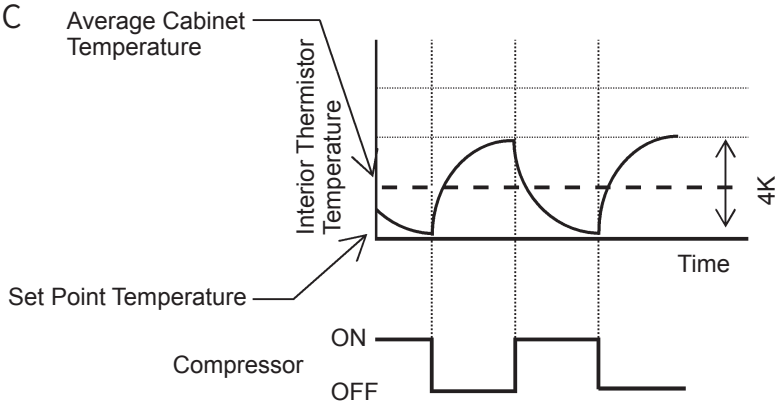


Refrigerant: HFC-404A

3. ELECTRONIC CONTROLS

[a] SET POINT TEMPERATURE (compressor OFF temperature)

Heater defrost (RT series): -6 to +12° C
Heater defrost (FT series): -23 to -7° C



[b] CABINET TEMPERATURE DIFFERENTIAL

4 K (from “set point temp” to “set point temp + 4 K”)

The compressor stops when the cabinet temperature reaches down to the set point temperature, and starts when the cabinet temperature rises to the set point temperature + 4° C. Accordingly, the average cabinet temperature will be around the set point temperature + 2° C.

[c] DEFROST CYCLE

The unit automatically defrosts the evaporator 6 hours after the refrigeration starts. The defrost indicator light on the operation panel comes on when the defrost cycle starts.

[d] DEFROST TERMINATION TEMPERATURE

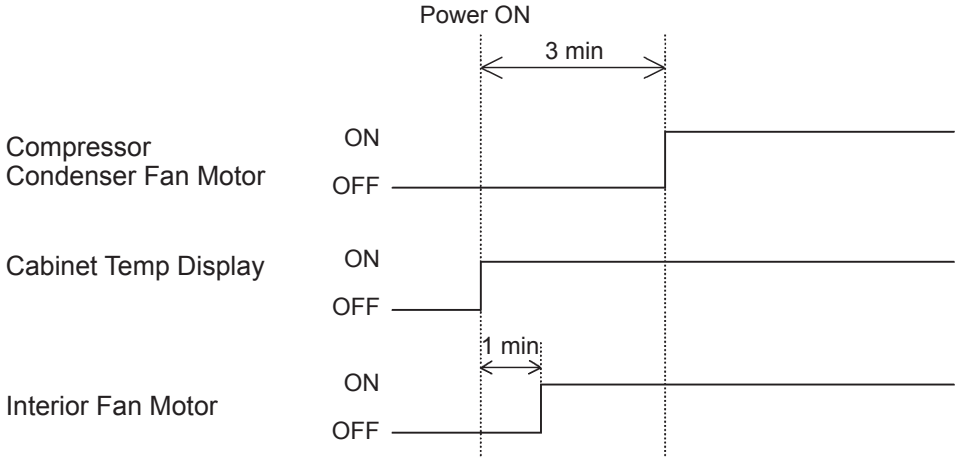
Heater defrost(RT series): +20° C
Heater defrost (FT series): +30° C

[e] TEMPERATURE DISPLAY

During a defrost cycle, the screen indicates “dEF” .

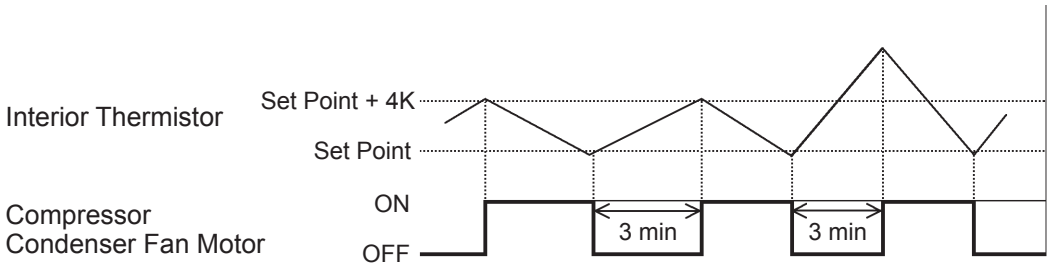
[f] COMPRESSOR SOFT START

1) Startup



When the power supply is turned on, the screen shows the cabinet temperature and the interior fan motor starts up with a 1 minute delay . The compressor and condenser fan motor start up with a 3 minute delay.
This delay is intended to minimize the difference between the high-side and low-side pressures and to reduce the load on the compressor so that it can start easily in case of a short (especially instantaneous) power failure.

2) Normal Control



When the compressor turns off during normal control, it has a mandatory 3 minute delay before startup. For example, if the compressor turns off by its thermistor and the door is opened immediately after (causing the cabinet temperature to immediately exceed the restart temperature), the compressor will still not start until 3 minutes have passed since its shutdown.

[h] CHECKING SET POINT TEMPERATURE

Note: See “5. CONTROLLER” for the operation panel key locations.

Press and hold the set key on the operation panel for 3 seconds to display “St” on the screen. Press the set key again to display the set point temperature on the screen. After 30 seconds, the screen displays the cabinet temperature again.

[i] MANUAL DEFROST

To start the manual defrost cycle, press the defrost/rest key for 3 seconds. The defrost indicator light on the operation panel comes on when the defrost cycle starts.

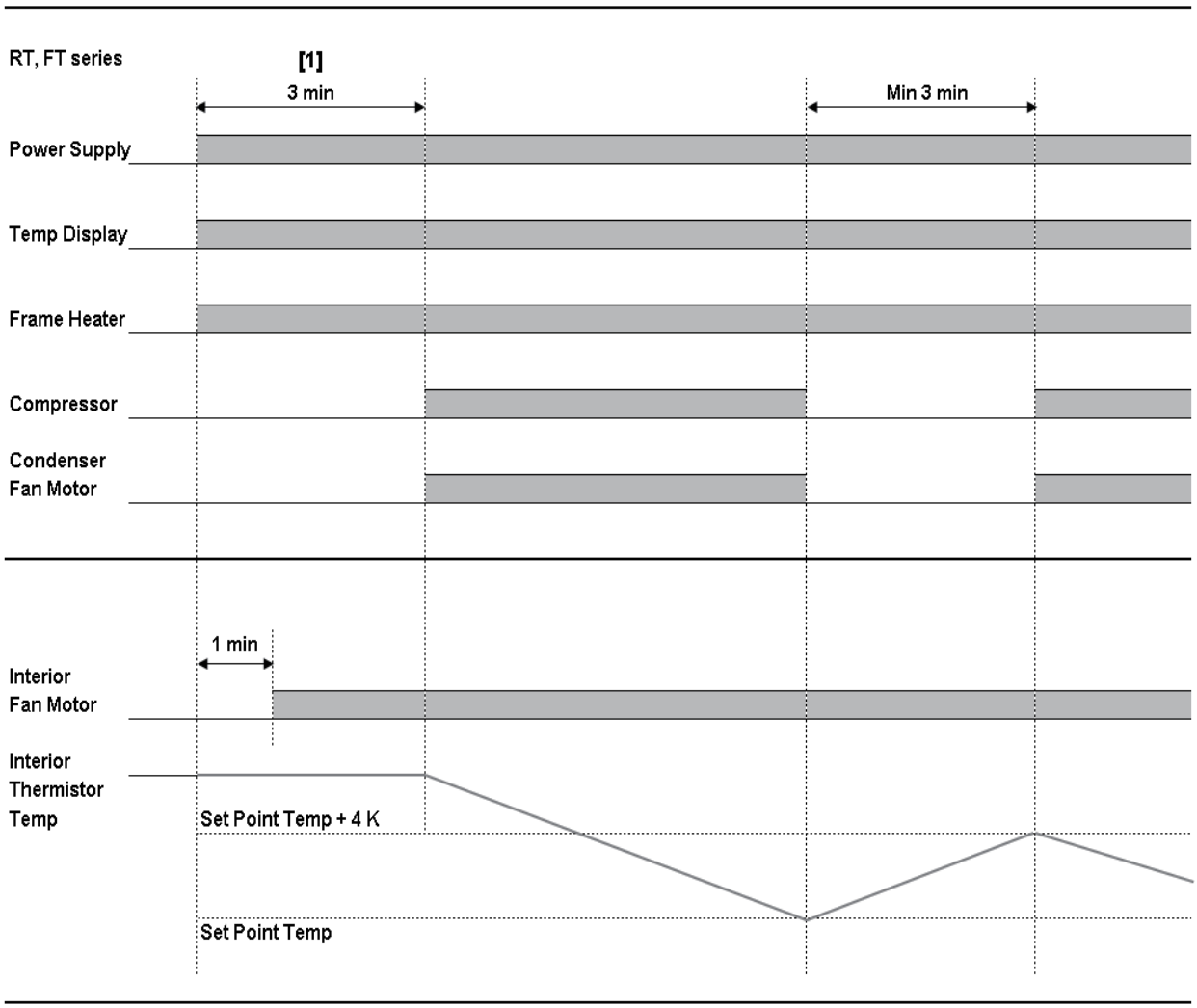
[j] ERROR CODES

Code	Possible Cause	Operation and Remedy
E1	Cabinet sensor (interior thermistor) error	Compressor cycles on for 45 minutes and off for 15 minutes. Check cabinet temperature. See “III. 1. ERROR CODES” for further details.
E2	Evaporator (defrost thermistor) error	Defrost termination temperature is invalid. Press any key to stop beep. See “III. 1. ERROR CODES” for further details.
E3	Condenser (defrost thermistor) error	See “III. 1. ERROR CODES” for further details.
cH	Condenser high temperature alarm	When the condenser temperature is too high, the temperature will fall down and the alarm will be released. See “III. 1. ERROR CODES” for further details.

* The code “dEF” is not an error code but indicates the unit is in defrost cycle.
* When the defrost thermistor is defective, error code will not be displayed without [7] down key being pressed. See “5. [b] ” for operation panel detail.

4. TIMING CHART

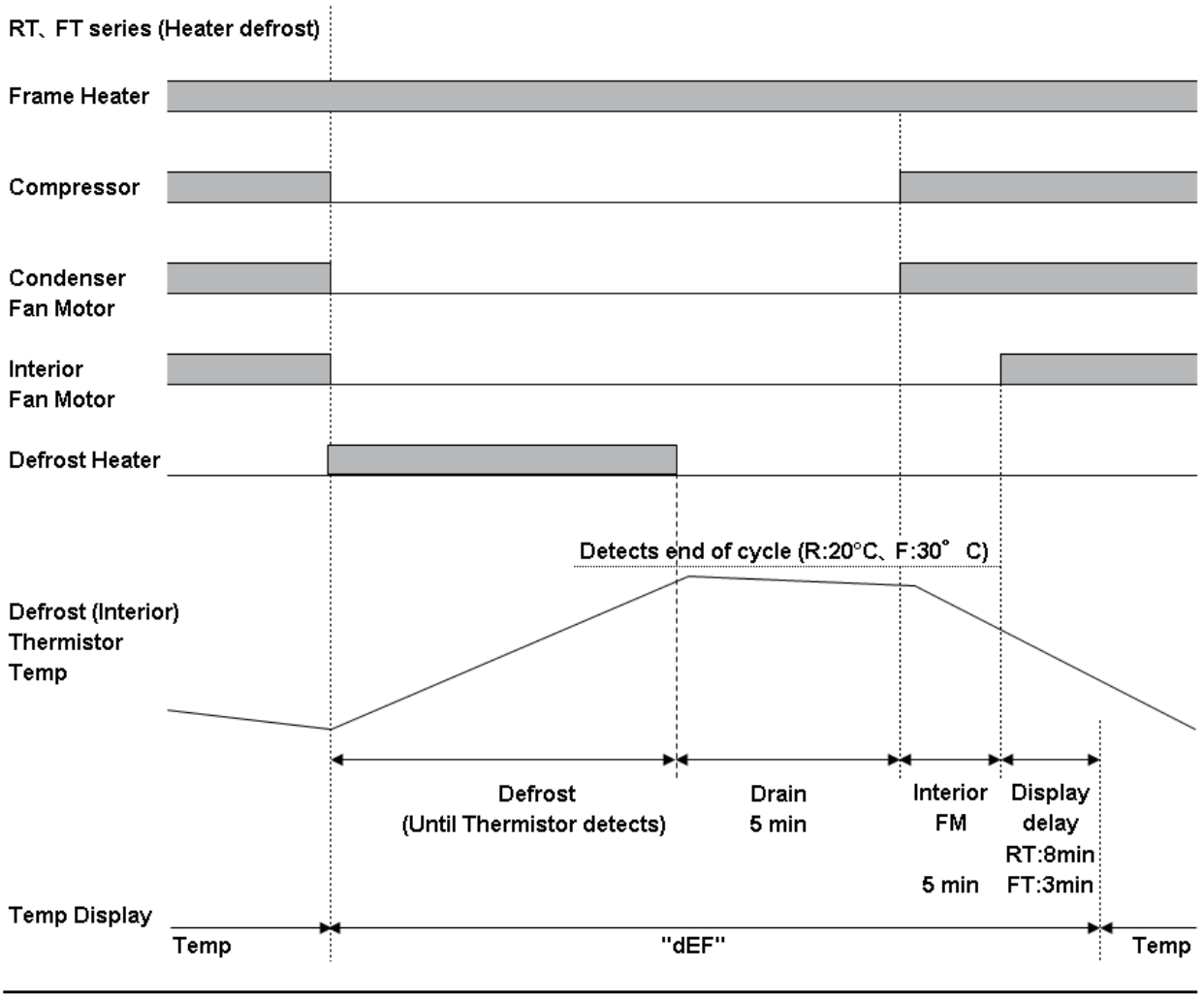
[a] STARTUP - CONTROL



[1] Standby at Startup

Only temperature indication is available for 3 min (not a sign of failure).

[b] DEFROST


RT、FT series (Heater defrost)
Frame Heater
Compressor
Condenser Fan Motor
Interior Fan Motor
Defrost Heater
Detects end of cycle (R:20°C、F:30° C)
Defrost (Interior) Thermistor Temp
Defrost (Until Thermistor detects)
Drain 5 min
Interior FM 5 min
Display delay RT:8min FT:3min
Temp Display
Temp
"dEF"
Temp

5. CONTROLLER

Operation Panel

[1] Refrigeration Indicator Light
[2] Defrost Indicator Light
[3] Fan Indicator Light
[4] Defrost dripping Indicator Light
[5] Set Indicator Light
[6] Defrost/Reset Key
[7] Down Key
[8] Up Key
[9] Set Key/Menu Key

Indicator Lights

Indicator Light	Symbol	Status	Meaning
Set	SET	On	Parameter setting
		Off	Measuring and controlling status
Refrigeration		On	Refrigerating
		Off	Refrigeration stopped
		Flash	Refrigeration delayed
Defrost		On	Defrosting
		Off	Defrost stopped
Fan		On	Fan running
		Off	Fan stopped
Defrost dripping	drip	On	Defrost dripping running
		Off	Defrost dripping stopped

Key Functions

Keys	Function	Key action
Set	Enter the status of parameter setting	Press down and hold for 3 seconds
	Switch between menu and parameter	Press down and hold for 3 seconds
	Adjust menu and parameters	Press down and response
	Open/close light(only valid for the model with light control	Press down and response
	Upload parameter to copy card	Press down and hold for 3 seconds
	Adjust menu and parameters	Press down and response
	Download parameter from copy card	Press down and hold for 3 seconds
Rst	View evaporator sensor temperature	Press down and response
	Exit from parameter setting	Press down and response
	Press 3s to forced switch between refrigeration, defrost/defrost delay, defrost dripping	Press down and hold for 3 seconds
Set+	Controller turn on/off*	Press down and hold for 3 seconds

*When turn off controller, the controller will display "---".

Parameters

Menu	Functions	Setting range		Setting		
			Default	FT	RT	Unit
St	Temperature set value	Upper limit ～ Lower limit	4°C	-20°C	1°C	°C / °F
Po	Administrator menu Password	password is 55 unmodified ）	0	55	55	/
C1	Hysteresis value	0.5°C～ 9.0°C 1 °F～ 20 °F	4.0°C	4.0°C	4.0°C	°C / °F
C2	Compressor start Min. interval	0 ～ 60	5	3	3	min
C3	Compressor initial start Min. interval	0 ～ 90	5	3	3	min
C4	Cabinet sensor calibration	-10.0°C～ 10.0°C -20 °F～ 20 °F	0.0°C	1°C	-1.5°C	°C / °F
C5	Temperature set lower limit	-50°C～ temperature set value -58 °F～ temperature set value	-6°C	-23°C	-6°C	°C / °F
C6	Temperature set upper limit	temperature set value ～ 85°C temperature set value ～ 185 °F	22°C	-7°C	12°C	°C / °F
C7	Max. standby time after finishing compressor start Min. interval	0 ～ 90 0:Max. standby time calculation is forbidden	9	0	0	min
C8	Refrigeration Min. running time	0 ～ 90 0:Refrigeration Min. running time calculation is forbidden	0	0	0	min
d1	Evaporator sensor selection	0:abled 1:Enabled	1	1	1	/
d2	Evaporator sensor calibration	-10.0°C～ 10.0°C -20 °F～ 20 °F	0.0°C	0	0	°C / °F
d3	Defrost cycle calculation	0:Accumulated refrigeration time 1:Natural time	1	1	1	/
d4	Defrost cycle	0 ～ 90 0:Defrost forbidden	2	6	6	hour
d5	Defrost status display	0:Display cabinet temperature 1:Display dEF during defrost and defrost time delay, display cabinet temperature after finishing defrost time delay. 2:Always display dEF during defrost and defrost dripping 3:Always display start-defrost cabinet temperature during defrost and defrost dripping Always display start-defrost cabinet temperature during defrost and defrost dripping	2	1	1	/
d6	The maximum time of defrost	1 ～ 90	25	60	60	min

d7	Defrost termination temperature	0°C～ 50°C 32 °F～ 122 °F	12°C	30°C	20°C	°C / °F
d8	Dripping time after defrost	0 ～ 60 0:Defrost dripping time forbidden	2	5	5	min
d9	Cabinet temperature display time delay after defrost	0 ～ 90	10	18	13	min
d10	Time delay after defrost start	0 ～ 30 0:Defrost start time delay is canceled	10	0	0	min
d11	Defrost type	0:Electric heating defrost. 1:Hot gas defrost.	0	0	0	/
F1	Fan running mode	0:Fan and compressor run or stop synchronically. Fan and compressor run or stop synchronically. 1:Fan runs continuously, stops during defrost. 2:Fan runs continuously, stops during defrost and defrost dripping. 3:Fan runs continuously, stops during defrost, fan time delay after defrost. 4:Controlled by defrost sensor, fan stops during defrost.	3	3	3	/
F2	Fan initial start time delay after electrified	0 ～ 60	4	1	1	min
F3	Fan start time delay after defrost	0 ～ 60 0:Fan time delay canceled	2	15	10	min
F4	Fan working lowest temp.	-50°C～ Fan working highest temp -58 °F～ Fan working highest temp	-12	-50	-50	°C / °F
F5	Fan working highest temp	Fan working highest temp ～ 85°C Fan working highest temp ～ 185 °F	-5	85	85	°C / °F
A1	Compressor run and stop in a proportional time after cabinet sensor failure	0:Cancel the mode of “Run/stop in a proportional time” 1:Start the mode of “Run/stop in a proportional time”	1	1	1	/
A2	Compressor stop time in the mode of “Run/stop in a proportional time”	1 ～ 60	5	15	15	min
A3	Compressor running time in the mode of “Run/stop in a proportional time”	1 ～ 60	30	45	45	min
A4	Buzzer alarm output switch	0:Buzzer output disabled 1:Buzzer output enabled	1	0	0	/
A5	Cabinet temperature upper limit alarm value	-50 °C ～ Cabinet temperature upper limit alarm value -58 °F ～ Cabinet temperature upper limit alarm value	-10°C	-50°C	-50°C	°C / °F
A6	Cabinet temperature upper limit alarm value	Cabinet temperature lower limit alarm value ～ 185 °F～ 85°C	24°C	85°C	85°C	°C / °F

A7	Cabinet over temperature alarm time delay	0 ～ 60	20	5	5	3min
A8	The initial cabinet over temperature alarm time delay after electrified	0 ～ 60	40	20	20	3min
A9	Over temperature alarm upper deviation	1°C～ 30°C 1 °F～ 60 °F	10°C	10°C	10°C	°C / °F
A10	Over temperature alarm lower deviation	1°C～ 30°C 1 °F～ 60 °F	5°C	5°C	5°C	°C / °F
A11	Over temperature alarm mode	0:Absolute temperature point 1:set value+ over temperature alarm deviation	0	0	0	/
A12	Light/Alarm relay selection	0:Light output 1:Alarm output	0	0	0	/
do1	Control output of door switch	0:Door switch is canceled 1:Close fan during door open 2:Turn on the light when door open, turn off the light when door closed 3:Close fan and turn on the light when door open, Turn off the light when door closed 4:When door is open, it is the synchronous signal input of defrost, defrost will start.	0	0	0	/
do2	Buzzer response when door open	0:NO 1:YES	0	0	0	/
cd1	Condenser sensor selection	0:Disabled 1:Enabled	0	1	1	/
cd2	Condenser high temperature alarm start value	30°C～ 90°C 86 °F～ 194 °F	55°C	65	65	°C / °F
cd3	Lower hysteresis of condenser high temperature alarm	1°C～ 15°C 2 °F～ 30 °F	5°C	5	5	°C / °F
u1	Celsius /Fahrenheit selection	Fahrenheit Celsius	1	1	1	/

1.Keys operation

1）Parameter Adjustment

In the status of temperature measuring and controlling, press Set key for three seconds to enter user menu, it displays the code St, then press Set key again, display the value of St. It could be modified by pressing the key or .

When it displays the code St，press the key ，display the code Po，then press Set key, display 00，at this time, press or to input the password of administrator menu.

Press Set key again to confirm the password input, and the controller will automatically verify the correctness of password. When it passes, it could select parameter items St. Po. C1. C2……Cd3 (that is, any parameter items both in the administrator menu and user manuals) by pressing the key or . Or else, only the parameters items St and Po available, others could not be displayed.

When the parameter item is selected, press Set key to enter to the setting of the current item, press or to modify the value, and then press Set key to return to the menu.

Under the status of parameter setting, press Rst key or no key operation within 30s, it will exit from parameter setting and automatically save the current parameter value.

Note: The password input of administrator menu only is valid for single entering. After exit from the parameter setting by pressing Rst , it needs to input the correct password again for next parameter adjustment.

2）Temperature viewing

In the status of temperature measuring and controlling, press to view the current evaporator sensor measured temperature value (note: evaporator sensor is enables and works properly).

3）Manually forced operation

In the status of temperature measuring and controlling, press for three seconds to force the switch between refrigeration, defrost/defrost delay, defrost dripping. Press to open or close the light (Only valid when Light/alarm relay is used as light and there is no linkage between light control and door switch.)

2.Copy card

2.1 Upload (Copy the parameters of controllers to copy card)

1）Set controller parameters by keys.

2）Insert copy card, hold and press key until it displays “uP” in the front panel.

3）Plug off copy card in 3 seconds, then power on controller gain.

2.2 Download (Copy the parameter of copy card to the controller)

1）Insert copy card, hold and press key until it display “do” in the front panel.

2）Plug off the copy card, and power on the controller again in 3 seconds.

Note: If it displays “Er” , it indicates the failure of programming. At this time, you need to check whether the copy card is reliably inserted, if yes, repeat the above steps again.

If it displays “EP” , it indicates inconsistent data between copy card and controller, programming fails. At this time, need to change to the right copy card and repeat the steps above; or upload the data of copy card again, and repeat the steps above.

(★ For copying process, it requires a reliable power supply and effective connection of copy card, and it is forbidden to plug off the copy card before finishing operation)

3.Control output

3.1Compressor

Normal status
When the cabinet temperature is higher than the set temperature (St) + hysteresis (C1), and finish the compressor start Min. interval, the compressors will start；
When the cabinet temperature is lower than the set temperature (St), and the continuous refrigeration running time is large than C8, the compressor will close.
When the cabinet temperature is between the set temperature(St) and the temperature of the set temperature(St) +hysteresis(C1), if the refrigeration is closed, then after finishing compressor start Min. interval and Max. standby time after finishing compressor start Min. interval (C7), the refrigeration will start.

Note: Compressor start Min. interval is calculated by Compressor initial start Min. interval (C3) after it is electrified for the first time, and it will be calculated by Compressor start Min. interval (C2) in the future.

Cabinet temperature sensor failure
A1=0, cancel the function of “Run/stop in a proportional time” , the compressor closes；
A1=1, open the function of “Run/stop in a proportional time” , the compressor will run in cycle according to the proportion (Refrigeration running time A3 and refrigeration stop time A2).

3.2Defrost
1）d4 = 0，Defrost is forbidden.
2）d4 ≠ 0，when it is not in the state of defrost nor defrost dripping：
① Evaporator sensor is enabled(d1 = 1)，and evaporator sensor temperature is higher than Defrost termination temperature(d7)，then defrost could not be started.
② Evaporator sensor is enabled(d1 = 1)and evaporator sensor temperature is lower than Defrost termination temperature(d7) or evaporator sensor is disabled(d1 = 0)(Any of the following conditions could start defrost)：
a、When defrost cycle(d4)finishes running，defrost is started；Note：Defrost cycle is calculated according to the selected natural time(d3 = 1)or accumulated refrigeration time (d3 = 0)；
b、Hold and press for three seconds，start defrost；
c、If the door switch is as synchronous signal input of defrost (d01 = 4),the door open is the external synchronous defrost signal, the defrost is started.
Note：When finish time delay after defrost start(d10)，there will be an output of defrost。
3）In the state of defrost (Any of the following condition could close defrost):
① Evaporator sensor is enabled(d1 = 1)，and evaporator sensor temperature is higher than defrost termination temperature(d7)，defrost is closed；
② When finish running the maximum time of defrost(d6)，defrost is closed；
③ Hold and press for three seconds，defrost is closed；
4）After defrost, it enters the state of defrost dripping, and within dripping time after defrost(d8), refrigeration output is forbidden. The dripping will be discharged during this time period. After finishing dripping time after defrost, it enters to the status of

refrigeration cycle.
Note: Defrost status display
d5=0: Display cabinet temperature
d5=1: Display dEF during defrost and defrost time delay, display cabinet temperature after finishing defrost time delay.
d5=2: Always display dEF during defrost and defrost dripping.
d5=3: Always display start-defrost cabinet temperature during defrost and defrost dripping.
Defrost type:
d11=0: Electric heating defrost.
d11=1: Hot gas defrosts.

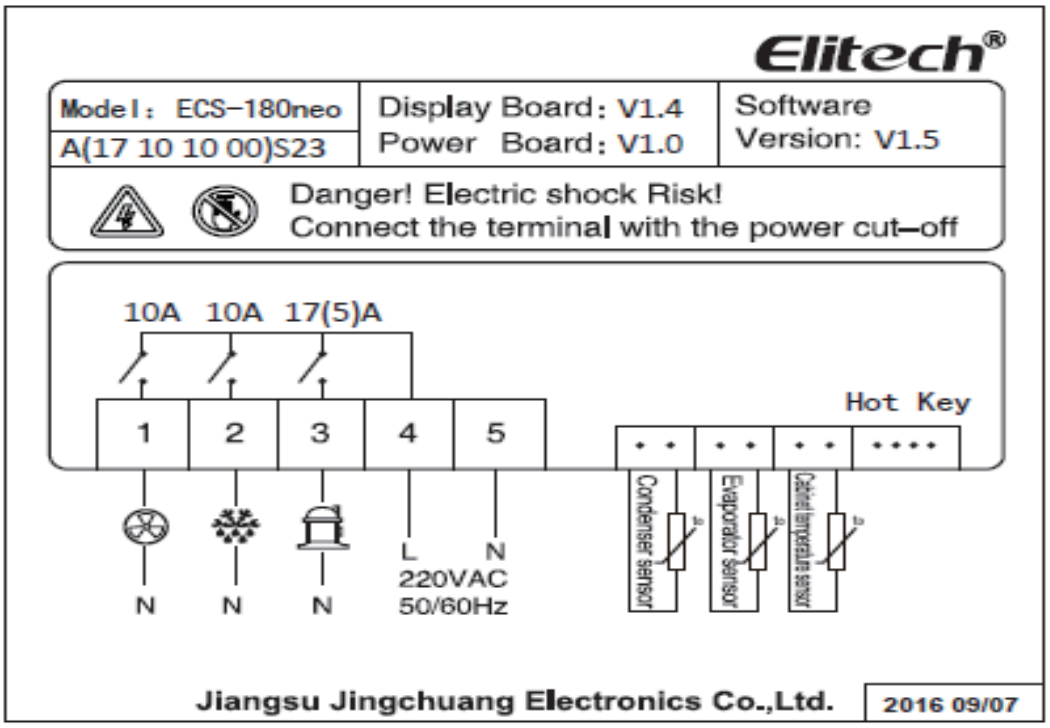
3.3Fan
Fan running mode
F1 = 0: Fan and compressor run or stop synchronically；
F1 = 1Fan runs continuously, stops during defrost；
F1 = 2Fan runs continuously, stops during defrost and defrost dripping；
F1 = 3Fan runs continuously, stops during defrost, fan starts when finish time delay after defrost(F3)；
F1 =4：Controlled by defrost sensor temperature, and it stops during defrosting (defrost sensor temperature >Fan working highest temperature(F5) . Defrost sensor temperature < Fan working lowest temperature (F4). Defrost sensor failure. Defrost sensor is forbidden (d1=0). Controller in the status of defrosting).
Note：Fan will not be permitted to run until finish Fan initial start time delay after electrified(F2).

3.4Internal Alarm
Temperature sensor failure alarm：
When cabinet sensor fails，the digital tube display E1；
When evaporator sensor fails, the digital tube display E2；
When condenser sensor fails, the digital tube display E3；
Condenser high temperature alarm: If the condenser sensor is selected, when the condenser temperature is higher than the condenser high temperature alarm start value, it will alarm and display cH. While it will not have an effect on the control output. When the temperature falls back to (the condenser high temperature alarm value (cd2)-condenser high temperature alarm lower hysteresis(cd3)), the alarm is released.

Cabinet over temperature alarm: When A11=0, the over-temperature alarm mode uses absolute temperature point; when cabinet temperature is higher than the cabinet temperature upper limit alarm value(A6) and cabinet over temperature alarm time delay has been finished, the digital tube will display rH, and the alarm will not be released until the temperature is lower than the cabinet temperature upper limit alarm value(A6) and when the cabinet temperature is lower than the cabinet temperature lower limit alarm value(A5) and the cabinet over temperature alarm time delay has been finished, the digital tube will display rL and the alarm will not be released until the temperature is higher than the cabinet temperature lower limit alarm value. When A11=1, the over-temperature alarm mode uses set value+over temperature alarm upper deviation; When the cabinet temperature is higher than (set value (St)+ over temperature alarm upper deviation (A9)), and cabinet over temperature alarm time delay has been finished, the

digital tube will display rH, and the alarm will not be released until the temperature is lower than (set value (St)+ over temperature alarm upper deviation (A9)); When the cabinet temperature is lower than (set value (St)- over temperature alarm lower deviation(A10)) and cabinet over temperature alarm time delay has been finished, the digital tube will display rL and the alarm will not be released until the temperature is higher than (set value (St)- over temperature alarm upper deviation (A10)).
Note: the first time delay of cabinet over temperature alarm shall be calculated according to the initial time delay of cabinet over temperature alarm (A8) after power on and be calculated according to time delay of cabinet over temperature alarm (A7)

Wiring Diagram



III. SERVICE DIAGNOSIS

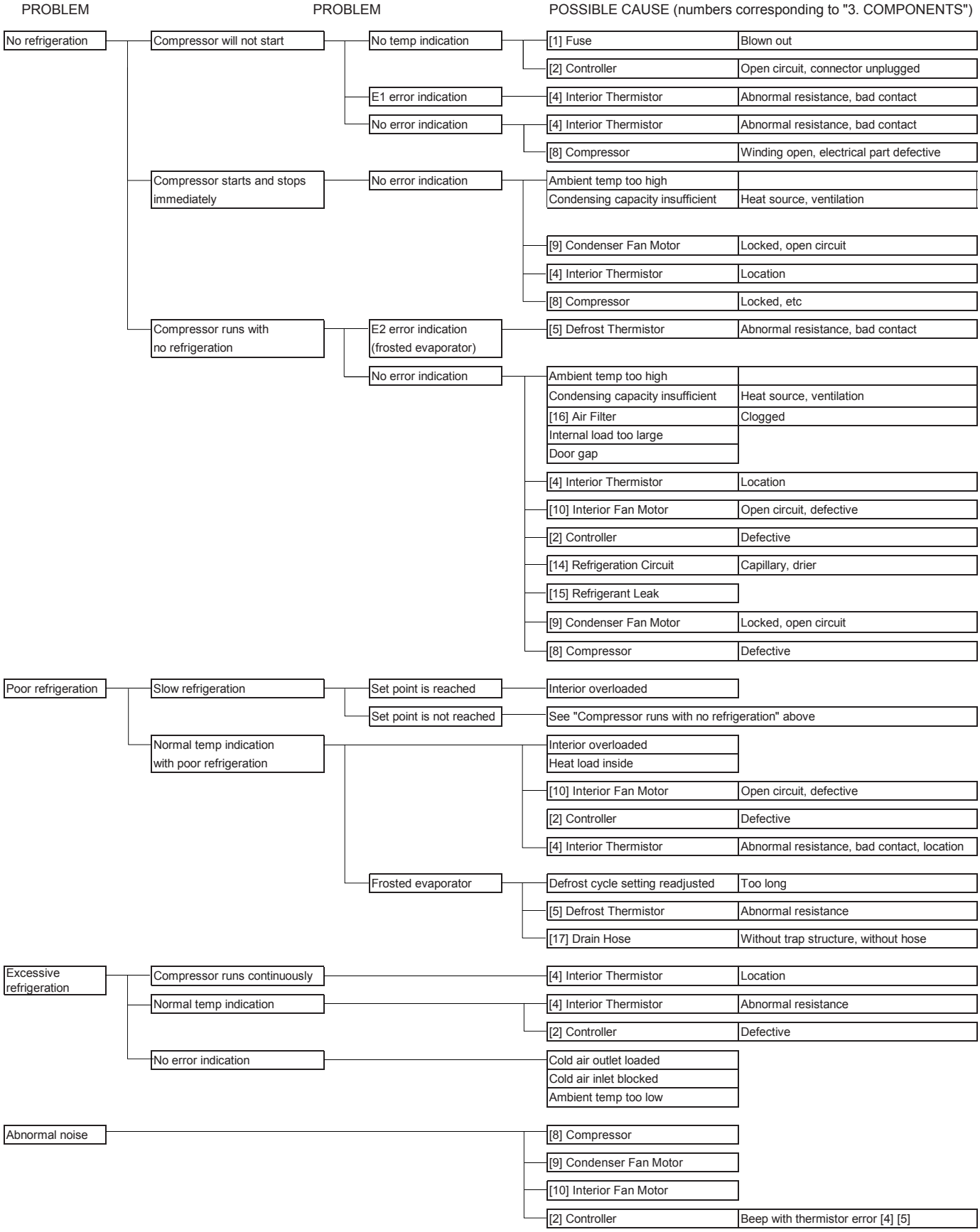
1. ERROR CODES

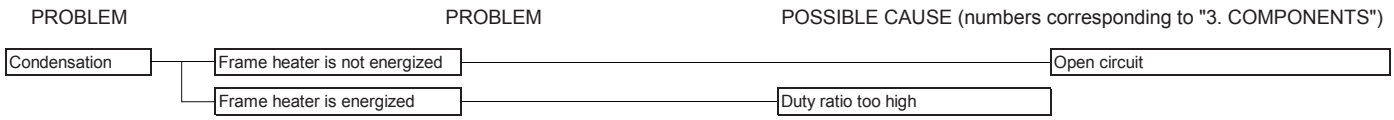
Display	Error	Possible Cause	Reset
E1	Interior thermistor defective	· Interior thermistor circuit shorted, dusty connector	· Automatically resets after cause is removed
E2	Defrost thermistor defective	· Defrost thermistor circuit shorted, dusty connector	· Automatically resets after cause is removed
E3	Condenser thermistor defective	· Condenser thermistor circuit shorted, dusty connector	· Automatically resets after cause is removed
cH	Condenser high temperature alarmdefective	· Dusty Condenser filter	· Automatically resets after cause is removed

* When the defrost thermistor is defective, error code will not be displayed without [7] down key being pressed. See “5. [b] ” for operation panel detail.

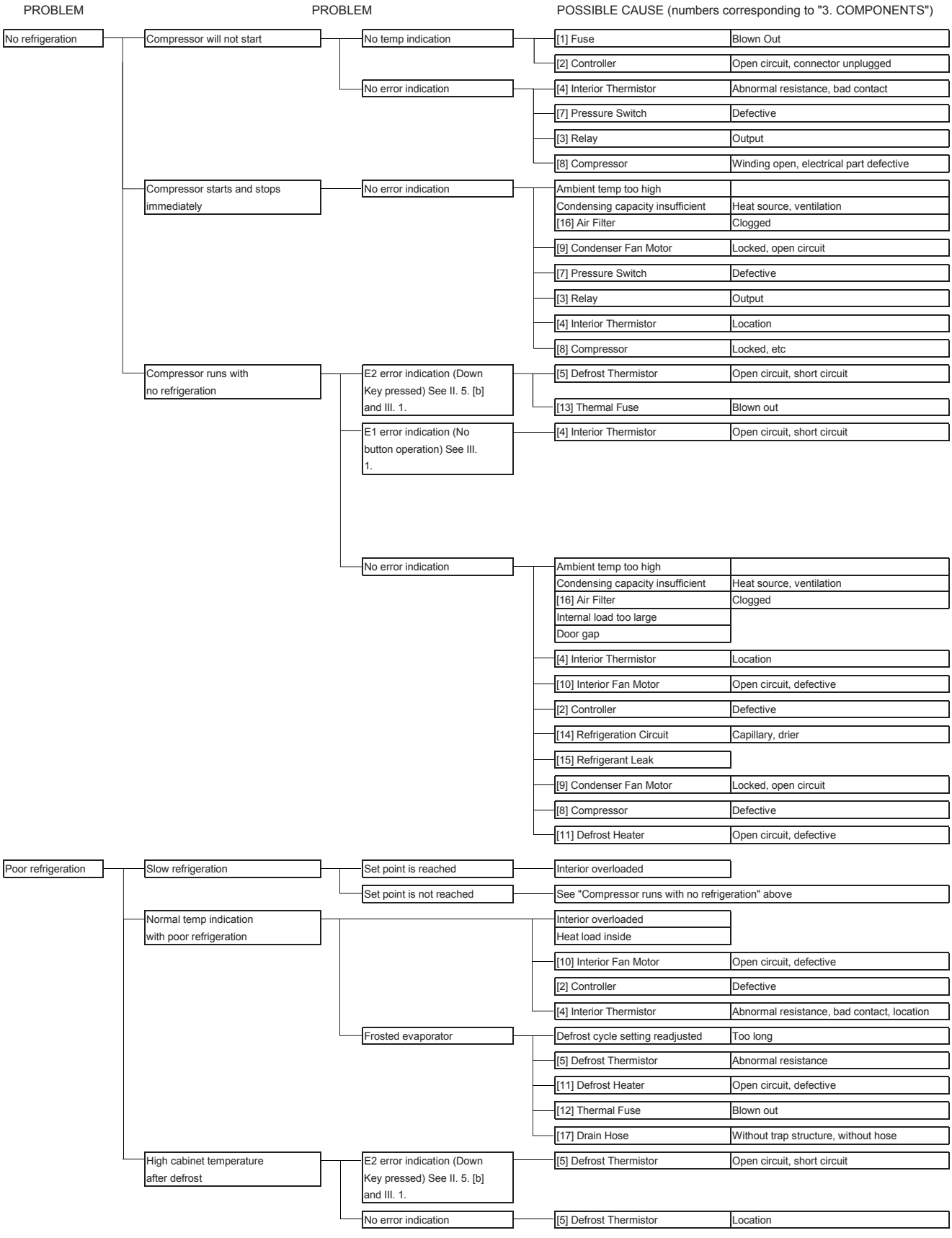
2. FLOWCHART

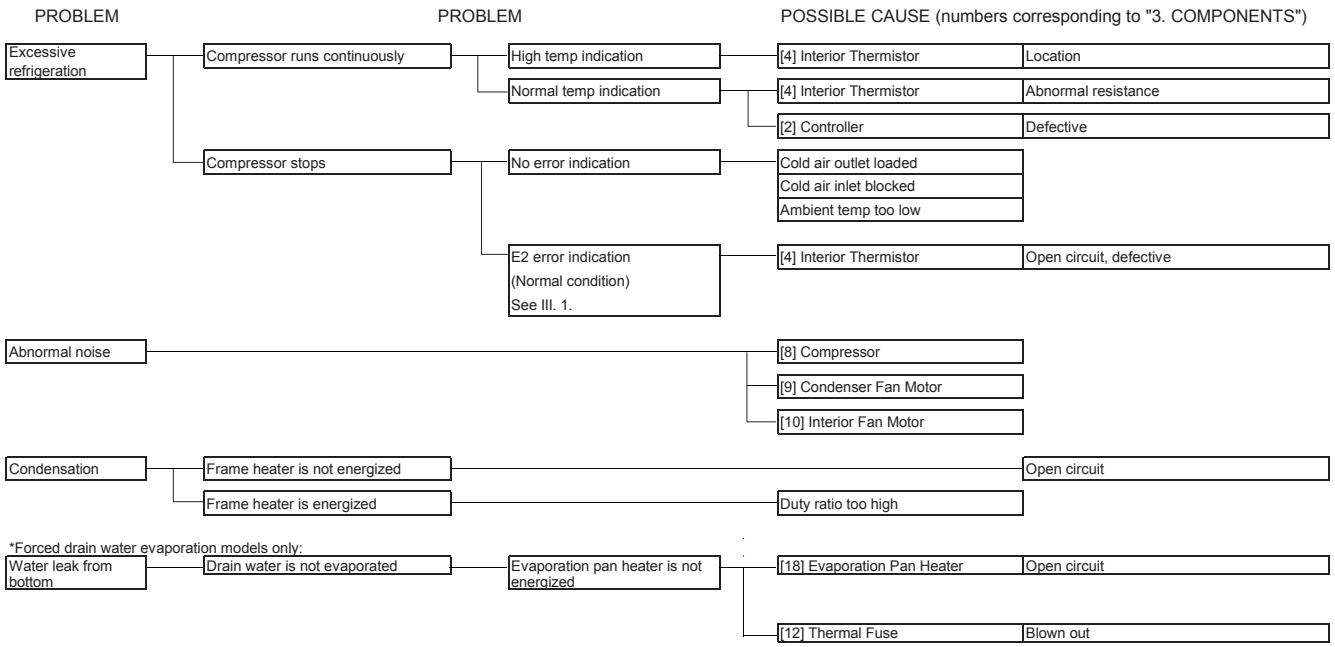
[a] RT SERIES




PROBLEM
PROBLEM
POSSIBLE CAUSE (numbers corresponding to "3. COMPONENTS")
Condensation
Frame heater is not energized
Open circuit
Frame heater is energized
Duty ratio too high

[b] FT SERIES


PROBLEM
PROBLEM
POSSIBLE CAUSE (numbers corresponding to "3. COMPONENTS")
No refrigeration
Compressor will not start
No temp indication
[1] Fuse
Blown Out
[2] Controller
Open circuit, connector unplugged
No error indication
[4] Interior Thermistor
Abnormal resistance, bad contact
[7] Pressure Switch
Defective
[3] Relay
Output
[8] Compressor
Winding open, electrical part defective
Compressor starts and stops immediately
No error indication
Ambient temp too high
Condensing capacity insufficient
Heat source, ventilation
[16] Air Filter
Clogged
[9] Condenser Fan Motor
Locked, open circuit
[7] Pressure Switch
Defective
[3] Relay
Output
[4] Interior Thermistor
Location
[8] Compressor
Locked, etc
Compressor runs with no refrigeration
E2 error indication (Down Key pressed) See II. 5. [b] and III. 1.
[5] Defrost Thermistor
Open circuit, short circuit
[13] Thermal Fuse
Blown out
E1 error indication (No button operation) See III. 1.
[4] Interior Thermistor
Open circuit, short circuit
No error indication
Ambient temp too high
Condensing capacity insufficient
Heat source, ventilation
[16] Air Filter
Clogged
Internal load too large
Door gap
[4] Interior Thermistor
Location
[10] Interior Fan Motor
Open circuit, defective
[2] Controller
Defective
[14] Refrigeration Circuit
Capillary, drier
[15] Refrigerant Leak
[9] Condenser Fan Motor
Locked, open circuit
[8] Compressor
Defective
[11] Defrost Heater
Open circuit, defective
Poor refrigeration
Slow refrigeration
Set point is reached
Interior overloaded
Set point is not reached
See "Compressor runs with no refrigeration" above
Normal temp indication with poor refrigeration
Interior overloaded
Heat load inside
[10] Interior Fan Motor
Open circuit, defective
[2] Controller
Defective
[4] Interior Thermistor
Abnormal resistance, bad contact, location
Frosted evaporator
Defrost cycle setting readjusted
Too long
[5] Defrost Thermistor
Abnormal resistance
[11] Defrost Heater
Open circuit, defective
[12] Thermal Fuse
Blown out
[17] Drain Hose
Without trap structure, without hose
High cabinet temperature after defrost
E2 error indication (Down Key pressed) See II. 5. [b] and III. 1.
[5] Defrost Thermistor
Open circuit, short circuit
No error indication
[5] Defrost Thermistor
Location


PROBLEM
PROBLEM
POSSIBLE CAUSE (numbers corresponding to "3. COMPONENTS")
Excessive refrigeration
Compressor runs continuously
High temp indication
[4] Interior Thermistor
Location
Normal temp indication
[4] Interior Thermistor
Abnormal resistance
[2] Controller
Defective
Compressor stops
No error indication
Cold air outlet loaded
Cold air inlet blocked
Ambient temp too low
E2 error indication
(Normal condition)
See III. 1.
[4] Interior Thermistor
Open circuit, defective
Abnormal noise
[8] Compressor
[9] Condenser Fan Motor
[10] Interior Fan Motor
Condensation
Frame heater is not energized
Open circuit
Frame heater is energized
Duty ratio too high
*Forced drain water evaporation models only:
Water leak from bottom
Drain water is not evaporated
Evaporation pan heater is not energized
[18] Evaporation Pan Heater
Open circuit
[12] Thermal Fuse
Blown out

3. COMPONENTS

CHART NO.	COMPONENT	CHECK	REMEDY
[1]	Fuse	Blown out	Replace
[2]	Controller	Open circuit	Correct or replace
		Input/output (interior fan motor) See wiring label	Replace
		Connector disconnected	Correct
		Connector dusty/dirty	Remove
		7 segment display partially/totally off	Replace
		Electronic parts defective/burnt out	
[3]	Relay	Fast-on terminal/pin disconnected	Correct
		Connector dusty/dirty	Remove
		Open circuit	Correct
		Output to each load Check with wiring diagram/timing chart	Replace
		Abnormal noise	
[4]	Interior Thermistor	Location (holder in front of evaporator) Disconnected, replaced with defrost thermistor, etc	Correct
		Incorrect temp indication	Immerse in ice water to check resistance (25 - 30k) Replace if necessary
		Short circuit (temp displayed as "E1")	Clean/dry connector Replace
		Open circuit (temp displayed as "E1")	Replace
[5]	Defrost Thermistor	Location (plug in from evaporator back) Disconnected, replaced with interior thermistor, etc	Correct
		Abnormal resistance	Immerse in ice water to check resistance (25 - 30k) Replace if necessary
		Short circuit (temp displayed as "E2")	Clean/dry connector Replace
		Open circuit (temp displayed as "E2")	Replace
[6]	Condenser Thermistor	Location (plug in from evaporator back) Disconnected, replaced with interior thermistor, etc	Correct
		Abnormal resistance	Immerse in ice water to check resistance (25 - 30k) Replace if necessary
		Short circuit (temp displayed as "E3")	Clean/dry connector Replace
		Open circuit (temp displayed as "E3")	Replace
[7]	Pressure Switch	Open circuit	Replace
[8]	Compressor	Resistance between terminals (at 25°C) Compressor / Winding resistance (Ω) Start / Run AZ0411Y 26.85 11.10 AE2416ZK 24.27 5.71 AE2420ZK-SR 17.70 6.10 AE2432ZK 8.56 3.26	Replace
		Abnormal noise	
		Insufficient compression (discharge temp too low)	Replace if no gas leaks
		Compressor electrical part defective - Run/start capacitor ruptured/deformed - Capacitor defective Check resistance between terminals Gradually reduces: No problem 0 from start: Defective - Starter defective Loose terminal, no conductivity, damaged - Overload relay defective Loose terminal, no conductivity, damaged	Replace
[9]	Condenser Fan Motor	Open circuit	Correct
		Locked (not rotating with voltage)	Replace
		Abnormal noise	
		Burning smell	
[10]	Interior Fan Motor	Open circuit	Correct
		Locked (not rotating with voltage)	Replace
		Abnormal noise	
		Burning smell	

CHART NO.	COMPONENT	CHECK	REMEDY
[11]	Defrost Heater	Open circuit	Correct
		Conductivity	
		Insulation resistance 1MΩ or more at 500V	Replace
[12]	Thermal Fuse	Conductivity	Replace
		Contact welding of relay	Replace relay
[3]	Supply Voltage	Check for ±6% of rated voltage	Increase power supply capacity Plug into a separate power receptacle
[14]	Refrigeration Circuit Clogged	Discharge pressure: High Suction pressure: Low (vacuum)	Replace capillary (Replace drier at same time)
[15]	Refrigerant Leak	Discharge pressure: Low Suction pressure: Low	Locate leakage and replace (Replace drier at same time)
		Compressor discharge pipe will not heat up	
		Compressor suction pipe will not cool down	Note: Low-side leak requires drying after welding
		Check with leak detector	
[16]	Air Filter Air-Cooled Condenser	Clogged Dirty fins	Clean
[17]	Drain Hose	Without trap structure, without hose	Connect drain hose with trap structure
[18]	Evaporation Pan Heater*	Open circuit	Correct or replace
		Conductivity	

*Forced drain water evaporation models only

4. CONTROLLER

[a] SERVICING CONTROLLER

1) When receiving a service call, ask the user to turn off the power supply and turn it back on after 30 seconds, while watching the unit. This will reset the controller, and in some cases normal operation will resume.

2) Keep the following in mind when servicing the controller:

* Check that the unit has been earthed properly. If not, the controller will not work properly.

* To get static free, always touch the cabinet (earth) before servicing. Electrostatic discharge will cause severe damage to the controller.

* The controller and thermistor can be replaced separately.

* Do not drop the controller on the floor.

* The thermistor and pressure switch leads have a thin coating and are potentially breakable. Do not tension the leads.

* The connectors must not be subjected to tension to prevent disconnection or breakage. After servicing the controller, check for disconnected connectors.

* The thermistor is provided with single-wire leads. Do not bend or stretch them.

* Do not pinch or weigh down the thermistor and thermistor leads. The coatings may be broken, resulting in a short circuit.

[b] CHECKING THERMISTOR

1) Remove the thermistor from the controller.

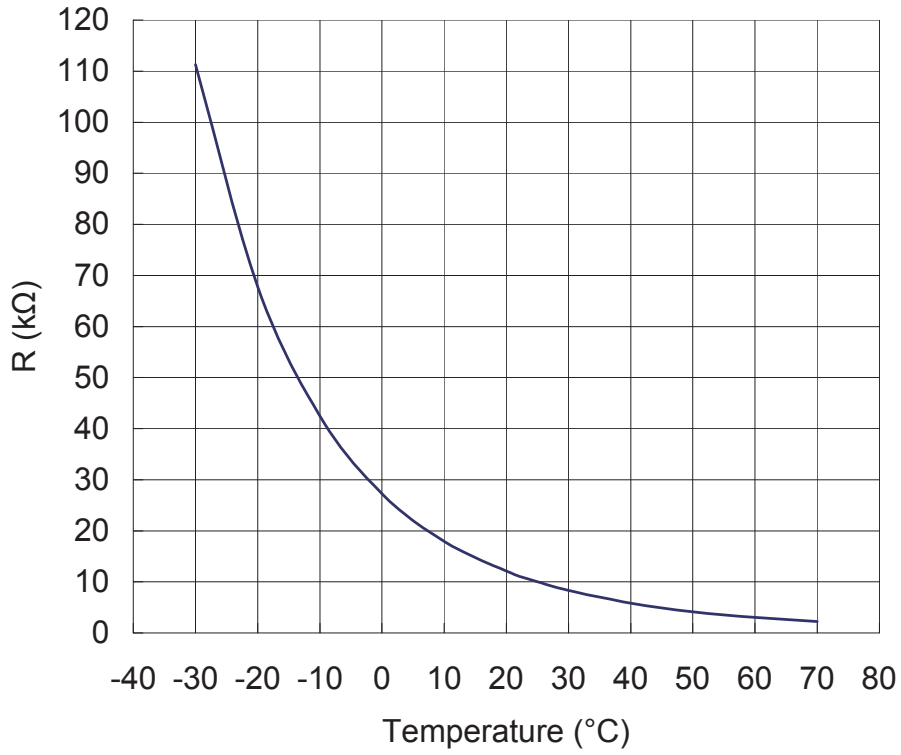
2) Put ice and water in a glass or other container to make 0° C water. Immerse the thermistor bulb in the water for 5 minutes (at the center of the container).

3) Use the Ω range of the tester to measure the resistance between the thermistors.

4) If the measured resistance is not within 25 - 30 kΩ (standard 27 kΩ), replace the thermistor (see the T-R curve below).

T-R Curve (Interior/Defrost Thermistor)

The graph shows reference values only and may differ from actual values.



IV. REMOVAL AND REPLACEMENT OF COMPONENTS

WARNING

Always unplug the unit or turn off the main power supply before replacing components.

1. REFRIGERATION CIRCUIT

[a] REFRIGERANT

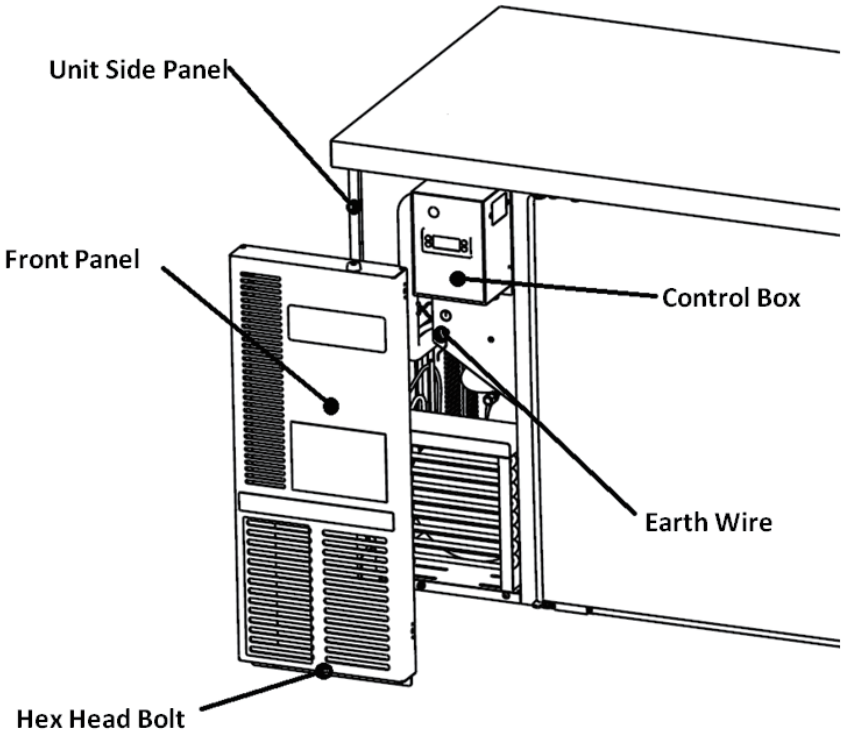
Refrigerant R134a used for this unit is not flammable or poisonous itself. It also provides remarkably lower pressure than ammonia or similar substances at the same condensing temperatures.

[b] COMPRESSOR

1) Remove the hexagon head bolt at the bottom of the front panel, and take off the front panel.

2) Recover the refrigerant from the access valve, and store it in a proper container, if required by an applicable law.

3) Remove the screws securing the condenser to the refrigeration unit base and the shroud (condenser cover) to the cabinet, and pull out the condenser about 200 mm to the front.



4) Remove the hexagon head bolts with washers securing the condenser fan motor bracket to the base, and remove the condenser fan motor assembly.

5) Remove the screw securing the unit side panel, and take off the side panel.

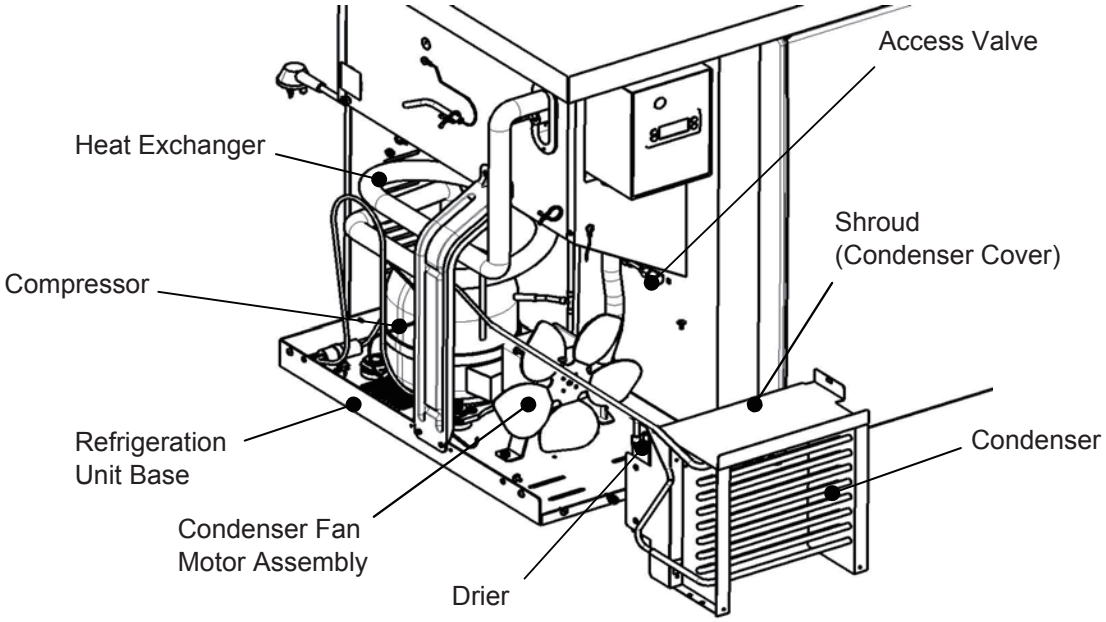
6) Remove the terminal cover enclosing the compressor electrical parts.

7) Remove the overload relay and start relay.

8) Disconnect the discharge and suction pipes using brazing equipment.

9) Remove the bolts securing the compressor.

10) To replace the removed parts, reverse the above removal procedure.



Note: 1. To recharge the refrigerant, install a stop valve in the access line.

2. Evacuation time must be at least 1 hour.

3. To prevent oxidation, braze the pipes with nitrogen gas flowing.

4. Check for gas leaks, remove flux and oxide film, and apply anti-corrosion treatment.

5. While brazing, use a wet towel to protect the plastic parts and electrical parts from burner flame.

6. Pleace use a vacuum cleaner or a soft brush to remove dust and stains from the condenser to prevent rust caused by the coating of the condenser peel off

[c] CONDENSER

1) Pull out the condenser according to steps 1) through 3) of “[b] COMPRESSOR”.

2) Remove the screws securing the shroud to the condenser, and disconnect the shroud.

3) Disconnect the condenser from the refrigeration circuit using brazing equipment. Use a wet towel to protect any flammable materials from burner flame.

4) To replace the removed parts, reverse the above removal procedure.

Note: See Notes 1 - 5 for “[b] COMPRESSOR”.

[d] DRIER

1) Pull out the condenser according to steps 1) through 3) of “[b] COMPRESSOR”.

2) Remove the wire tie securing the drier to the shroud.

3) Disconnect the drier from the refrigeration circuit using brazing equipment. Use a wet towel to protect any flammable materials from burner flame.

4) To replace the removed parts, reverse the above removal procedure.

Note: 1. See Notes 1 - 5 for “[b] COMPRESSOR”.

2. After brazing, wait for the drier to cool down before securing it to the shroud.

[e] EVAPORATOR

1) Remove the front panel.

2) Unscrew the top and bottom of the control box to remove the control box.

3) Remove the unit side panel.

4) Recover the refrigerant from the access valve, and store it in a proper container, if required by an applicable law.

5) Disconnect the evaporator from the heat exchanger (first from the suction pipe and then from the capillary tube) using brazing equipment. Use a wet towel to protect any flammable materials from burner flame.

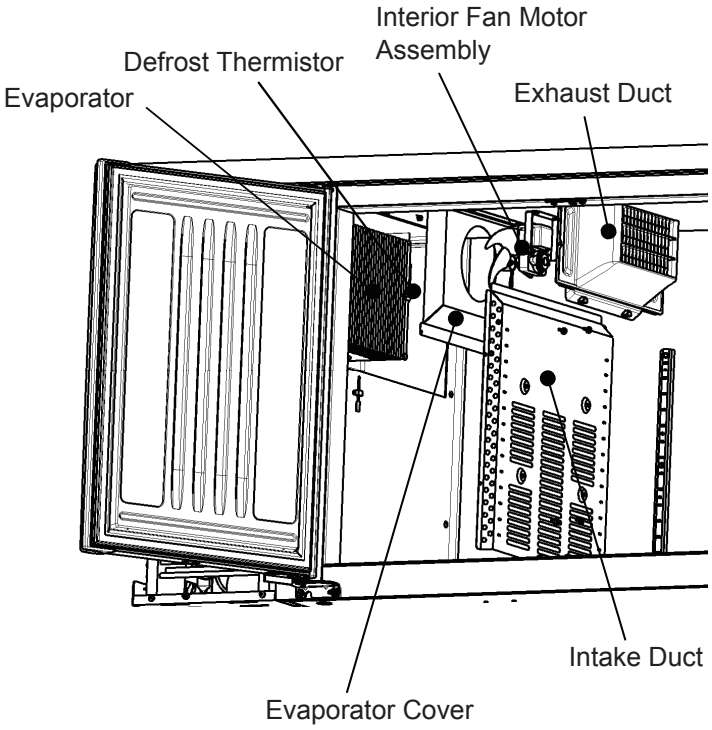
6) Remove the intake and exhaust ducts from inside the cabinet.

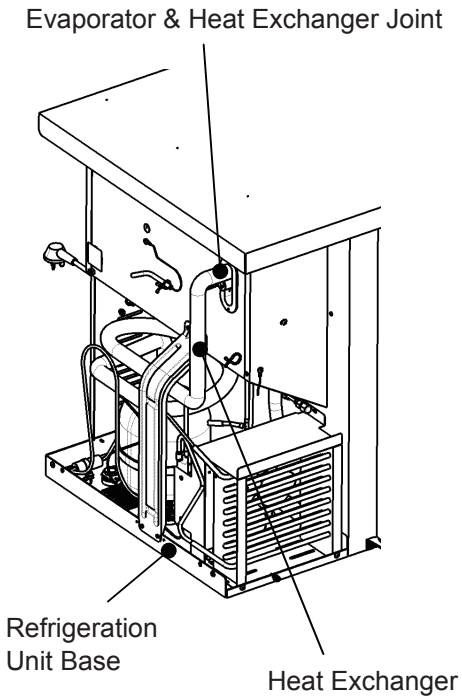
7) Remove the interior fan motor assembly.

8) Remove the evaporator cover (and the heater cover with the heater bracket).

9) Remove the defrost thermistor from the evaporator.

10) To replace the removed parts, reverse the above removal procedure.





Note: 1. See Notes 1 - 6 for “[b] COMPRESSOR” .

2. Be sure to replace the defrost thermistor in its correct position.

3. After servicing, use putty to seal the pipe through-hole in the cabinet.

4. When disconnecting the evaporator from the heat exchanger, use a wet towel to protect the wires from burner flame.

2. ELECTRICAL PARTS

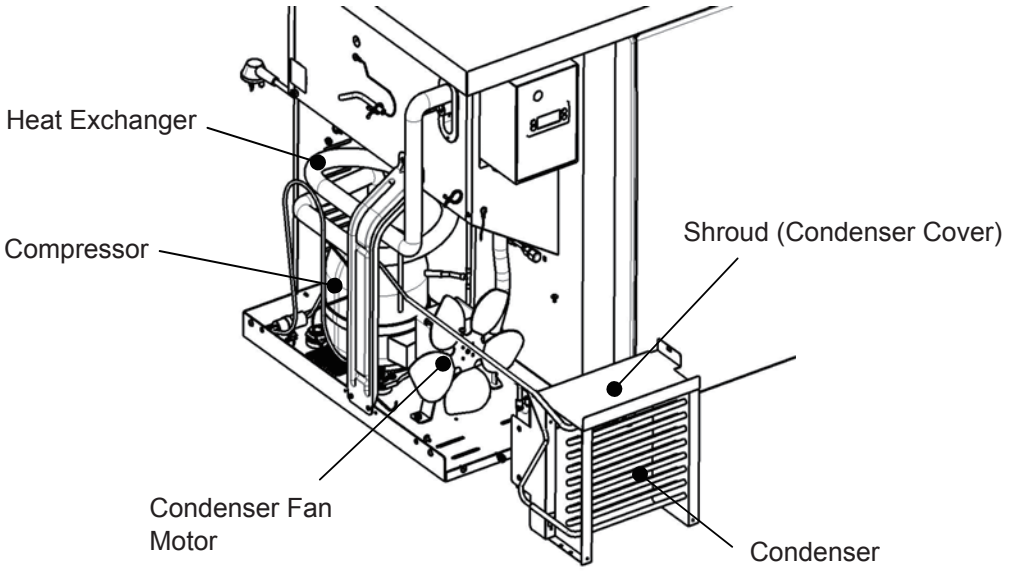
[a] CONDENSER FAN MOTOR

1) Pull out the condenser and condenser fan motor assembly according to steps 1) through 4) of “[b] COMPRESSOR” .

2) Disconnect the condenser fan motor leads.

3) Remove the screws securing the condenser fan motor to the bracket, and take off the condenser fan motor.

4) To replace the removed parts, reverse the above removal procedure.



[b] INTERIOR FAN MOTOR

1) Remove the front panel.

2) Disconnect the interior fan motor leads.

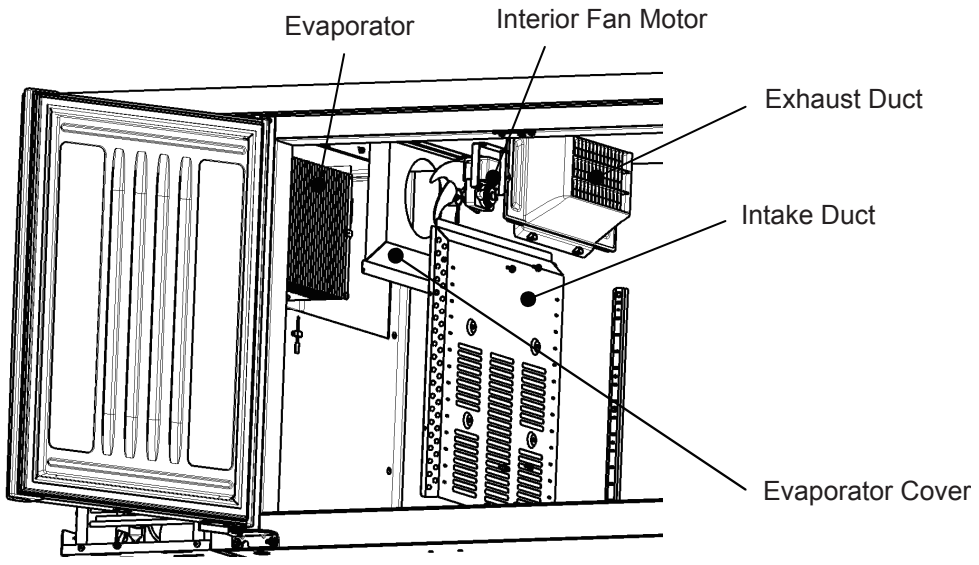
3) Remove the intake and exhaust ducts from inside the cabinet.

4) Remove the insulations in the wire through-hole from inside and outside the cabinet.

5) Remove the interior fan motor assembly.

6) Remove the screws securing the interior fan motor to the bracket, and take off the interior fan motor.

7) To replace the removed parts, reverse the above removal procedure.



Note: 1. After servicing, insert new insulations into the wire through-hole from inside and outside the cabinet. Do not reuse the removed insulations.

2. Be sure to install the interior fan motor in the proper direction as shown above.

[c] DEFROST HEATER, THERMAL FUSE

1) Remove the front panel.

2) Disconnect the defrost heater or thermal fuse leads.

3) Remove the intake duct and exhaust duct from inside the cabinet.

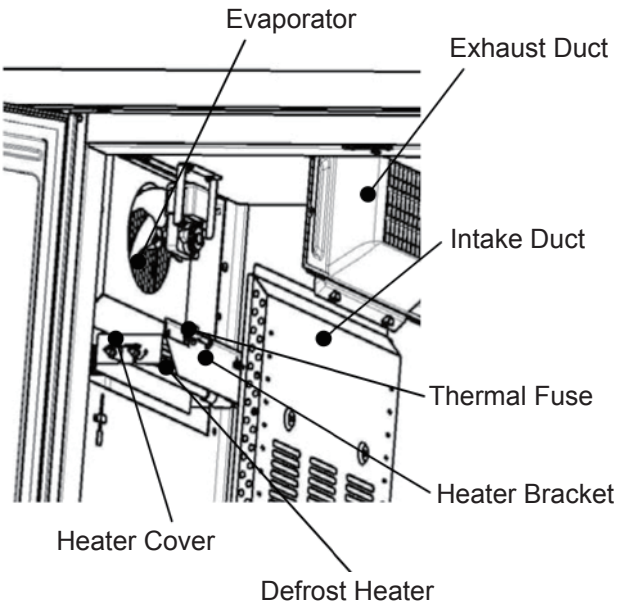
4) Remove the insulations in the wire through-hole from inside and outside the cabinet.

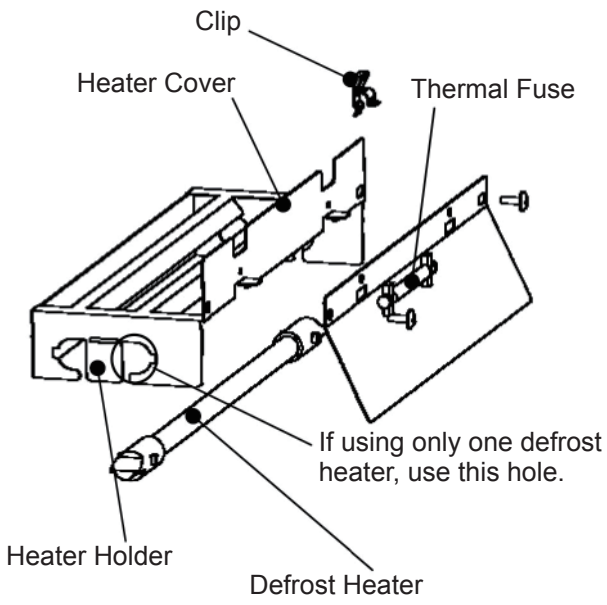
5) Remove the defrost heater and thermal fuse with the heater cover and bracket from the evaporator.

6) Bend the heater holder on the heater cover to remove the defrost heater from the heater cover. Take off the clip to remove the thermal fuse.

7) Pull the leads out of the wire through-hole to remove the defrost heater or thermal fuse.

8) To replace the removed parts, reverse the above removal procedure.





Note: 1. After servicing, insert new insulations into the wire through-hole from inside and outside the cabinet. Do not reuse the removed insulations.

2. If using two defrost heaters, mark the end of the heater leads to prevent miswiring.

3. If using only one defrost heater, install the heater in the hole on the cabinet side of the heater cover.

[d] INTERIOR THERMISTOR, DEFROST THERMISTOR

1) Remove the front panel.

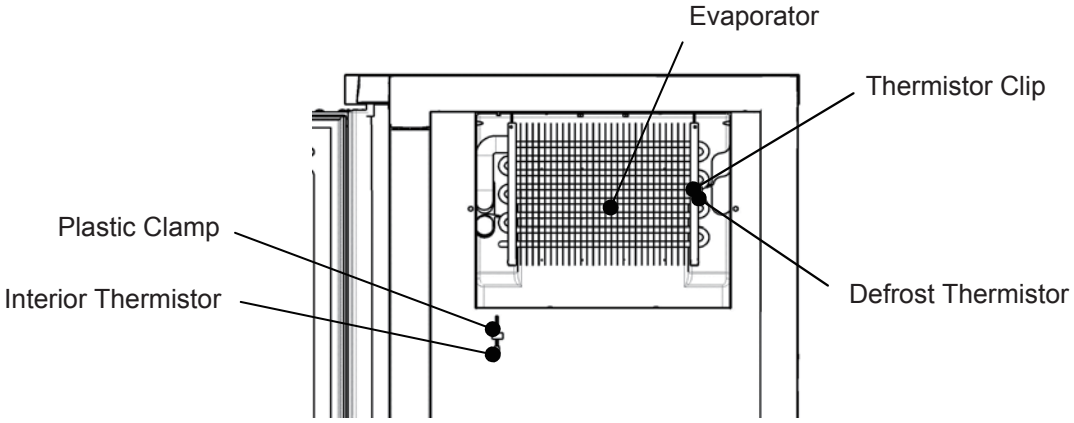
2) Disconnect the interior thermistor or defrost thermistor leads.

3) Remove the intake duct and exhaust duct from inside the cabinet.

4) Remove the insulations in the wire through-hole from inside and outside the cabinet.

5) Open the plastic clamp to remove the interior thermistor. Pull the thermistor clip off the evaporator to remove the defrost thermistor.

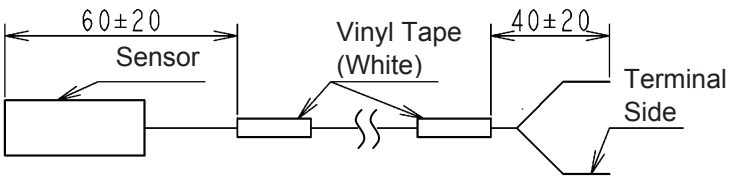
6) To replace the removed parts, reverse the above removal procedure.



Note: 1. After servicing, insert new insulations into the wire through-hole from inside and outside the cabinet. Do not reuse the removed insulations.

2. Be careful not to contact the interior thermistor bulb on the cabinet interior wall.

3. Route the defrost thermistor leads through the U-channel at the evaporator top out of the evaporator reed pipe side.



4. If the defrost thermistor color is not white, wind white vinyl tape around the thermistor as shown below for indication.

[e] CONTROLLER

1) Remove the front panel.

2) Unscrew the top and bottom of the control box to remove the control box.

3) Push the stoppers at both sides of the controller, and slide the stoppers to remove the controller.

4) Use a precision flat head screwdriver to loosen the screws and disconnect the wiring from the controller.

5) To replace the removed parts, reverse the above procedure.

[f] FUSE

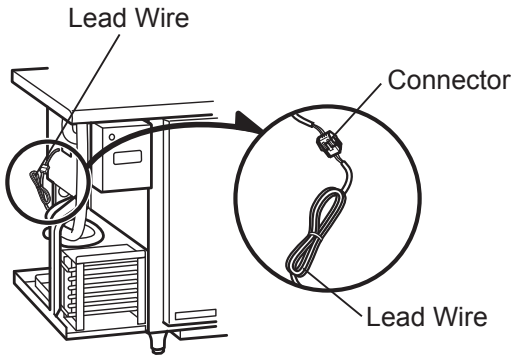
1) Open the window panel.

2) Apply a flat head screwdriver to the slot on the fuse holder and turn it counterclockwise.

3) Remove the fuse from the fuse holder.

4) To replace the removed parts, reverse the above procedure.

[g] FORCED DRAIN WATER EVAPORATION PAN (Forced drain water evaporation model only)



1) Remove the front panel.

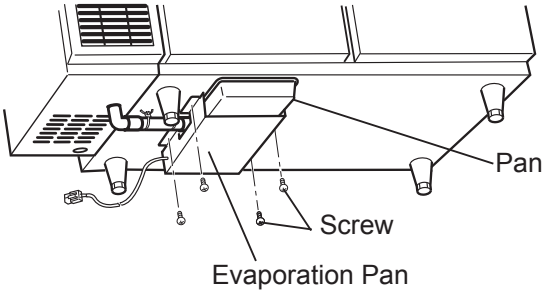
2) Remove the side panel of the refrigeration unit.

3) Disconnect the connector at the end of the evaporation pan lead wire.

4) Put the evaporation pan lead wire and connector through the wire hole to the outside of the machine compartment.

5) Remove the four screws at the bottom of the unit to take off the evaporation pan.

6) To replace the removed parts, reverse the above removal procedure.



3. DOOR GASKET

[a] REMOVAL

1) Open the door.

2) Detach the door gasket from the door liner.

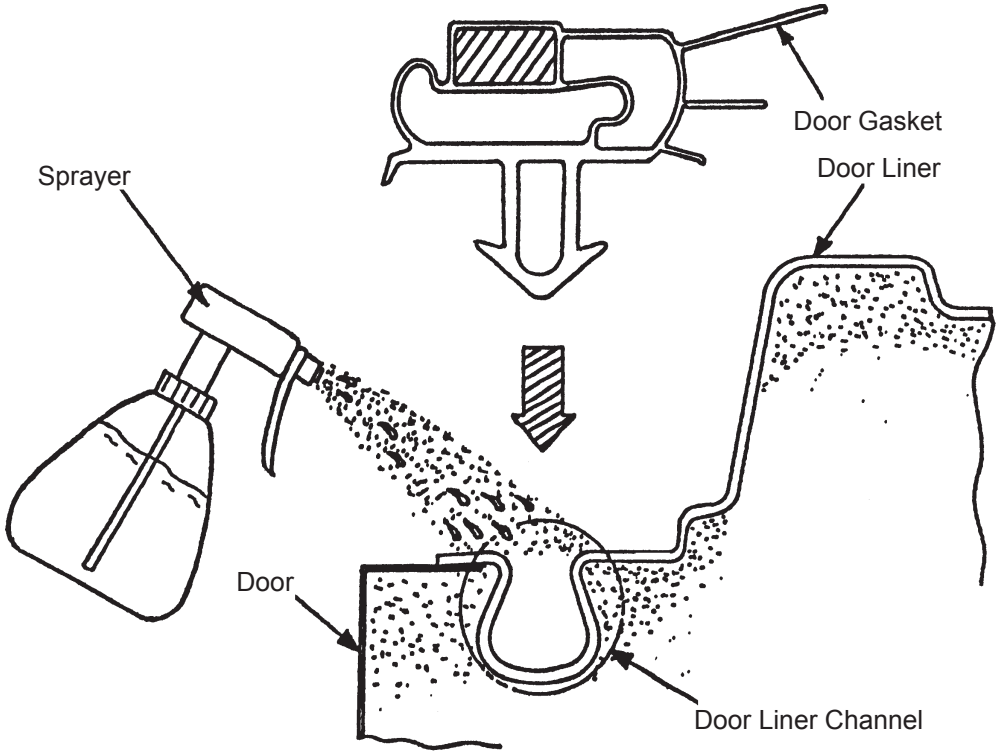
[b] REPLACEMENT

1) Spray water on the door liner channel with a sprayer.

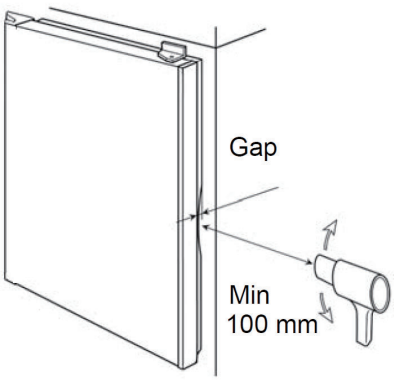
2) Fit the four corners of the door gasket into those of the door liner channel.

3) Push in each part of the door gasket from both sides.

Note: After fitting the door gasket, check every part for tightness and security.



Replacement of the door or door gasket may cause a gap between the cabinet and the gasket. To correct this gap, slightly heat the gasket with a drier. To avoid melting the gasket:



1) Keep the drier at least 100 mm away from the gasket.

2) Move the drier up and down to heat the entire gap.

Note: If the drier is too close or heats a paricular part intensively, the gasket may melt.