

*Turbo air Speeds Up the Pace of Innovation*

REFRIGERATOR MANUFACTURER  
**Turbo air**

Part No. KUCST2901

**SMART 7**

# Refrigeration System Installation & Operation Manual

*Please read this manual completely before attempting to install or operate this equipment !*

Package Unit ( TOP MOUNT )



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## Safety Information

Be sure all power sources are turned off before checking the electric wiring or appliances to avoid electric shock.

Do not run fan if cover or case is removed. This is to avoid electric shock.

Keep finger away from moving parts.

Avoid touching refrigerant lines. Some parts are very hot and can cause burns.

Avoid contacting sharp edges or coil surface that are a potential injury hazard.

Avoid touching the units or electric box in wet hands to prevent electric shock.

Please call the specialized installation company or trained personnel when you installing, moving, operating of the unit.

Field wiring must confirm to the requirements of units' electric specification.

## Inspection

A person at the job site to receive material holds responsibility. Each shipment should be carefully inspected against the bill of lading. The shipping receipt should not be signed before careful inspection. Check carefully for concealed damage. Any shortage or damages should be reported to the delivering carrier. If damaged material becomes the delivering carrier's responsibility and it should not be returned to Turbo air unless prior approval is given to do so. Check the serial tag information with invoice. Report any discrepancies to Turbo air sales representatives.

Table 1. INDOOR UNIT – Medium Temperature (Air Defrost System)

Model	Ambient 95°F		Voltage	MCA	MOPD	Refrigerant.		Plug Supplied	Matching NEMA Receptacle	NET Weight (Lbs)	Fig.
	Capacity BTUH					Ref.	Wt oz				
	35°F	38°F									
STI050MR404A1	5026	5356	115/1/60	11.3	20	R404A	28	YES	5-20R	195	A
STI050MR404A2	5026	5356	208~230/1/60	4.7	15	R404A	28	YES	6-15R	195	A
STI075MR404A2	8059	8675	208~230/1/60	6.0	15	R404A	42	YES	6-15R	226	A
STI100MR404A2	11652	12556	208~230/1/60	14.0	20	R404A	53	YES	6-20R	311	B
STI100MR404A3	11652	12556	208~230/3/60	10.1	15	R404A	53	NO	-	318	B
STI130MR404A2	15092	16376	208~230/1/60	14	20	R404A	60	NO	-	320	B
STI130MR404A3	15092	16376	208~230/3/60	9.9	15	R404A	60	NO	-	317	B

Table 2. INDOOR UNIT – Low Temperature (Electric Defrost System)

Model	Ambient 95°F			Voltage	MCA	MOPD	Refrigerant.		Plug Supplied	Matching NEMA Receptacle	NET Weight (Lbs)	Fig.
	Capacity BTUH						Ref.	Wt oz				
	0°F	-10°F	-20°F									
STI022LR404A2	2849	2423	1643	208~230/1/60	8.0	15	R404A	28	YES	6-15R	195	A
STI045LR404A2	5957	4603	3514	208~230/1/60	16.4	25	R404A	42	YES	6-15R	226	A
STI055LR404A2	7395	5406	4002	208~230/1/60	19.5	30	R404A	53	YES	6-20R	311	B
STI055LR404A3	7395	5406	4002	208~230/3/60	13.3	20	R404A	53	NO	-	318	B
STI070LR404A2	9139	7520	5439	208~230/1/60	19.8	30	R404A	60	NO	-	320	B
STI070LR404A3	9139	7520	5439	208~230/3/60	13.9	20	R404A	60	NO	-	317	B

Table 3. OUTDOOR UNIT – Medium Temperature (Air Defrost System)

Model	Ambient 95°F		Voltage	MCA	MOPD	Refrigerant.		Plug Supplied	Matching NEMA Receptacle	NET Weight (Lbs)	Fig.
	Capacity BTUH					Ref.	Wt oz				
	35°F	38°F									
STX050MR404A2	5026	5356	208~230/1/60	4.7	15	R404A	24	NO	-	205	C
STX075MR404A2	8059	8675	208~230/1/60	6.0	15	R404A	28	NO	-	236	C
STX100MR404A2	11652	12556	208~230/1/60	14.0	20	R404A	46	NO	-	319	D
STX100MR404A3	11652	12556	208~230/3/60	10.1	15	R404A	46	NO	-	327	D
STX130MR404A2	15092	16376	208~230/1/60	14	20	R404A	46	NO	-	329	D
STX130MR404A3	15092	16376	208~230/3/60	9.9	15	R404A	46	NO	-	325	D

Table 4. OUTDOOR UNIT – Low Temperature (Electric Defrost System)

Model	Ambient 95°F			Voltage	MCA	MOPD	Refrigerant.		Plug Supplied	Matching NEMA Receptacle	NET Weight (Lbs)	Fig.
	Capacity BTUH						Ref.	Wt oz				
	0°F	-10°F	-20°F									
STX022LR404A2	2849	2423	1643	208~230/1/60	8.0	15	R404A	28	NO	-	213	C
STX045LR404A2	5957	4603	3514	208~230/1/60	16.4	25	R404A	42	NO	-	248	C
STX055LR404A2	7395	5406	4002	208~230/1/60	19.5	30	R404A	53	NO	-	320	D
STX055LR404A3	7395	5406	4002	208~230/3/60	13.3	20	R404A	53	NO	-	317	D
STX070LR404A2	9139	7520	5439	208~230/1/60	19.8	30	R404A	60	NO	-	328	D
STX070LR404A3	9139	7520	5439	208~230/3/60	13.9	20	R404A	60	NO	-	324	D

Figure A. INDOOR UNIT – Medium Cabinet (Opening Size : 25 inch x 25 inch)

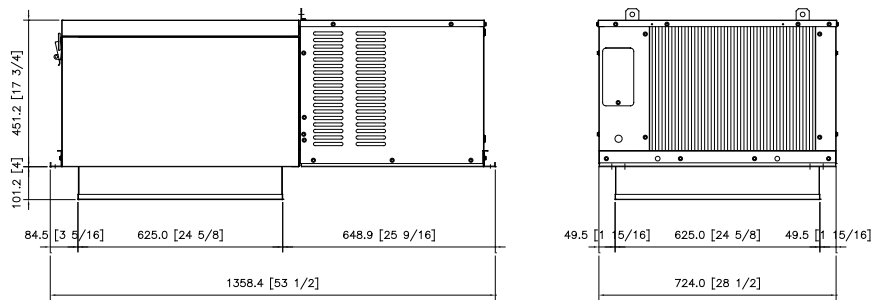


Figure B. INDOOR UNIT – Large Cabinet (Opening Size : 25 inch x 38.5 inch)

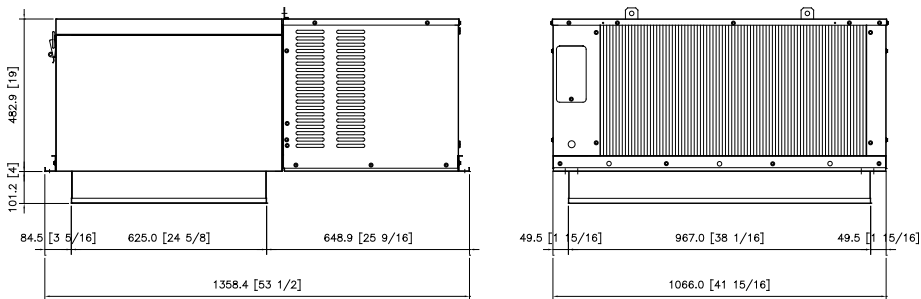


Figure C. OUTDOOR UNIT – Medium Cabinet (Opening Size : 25 inch x 25 inch)

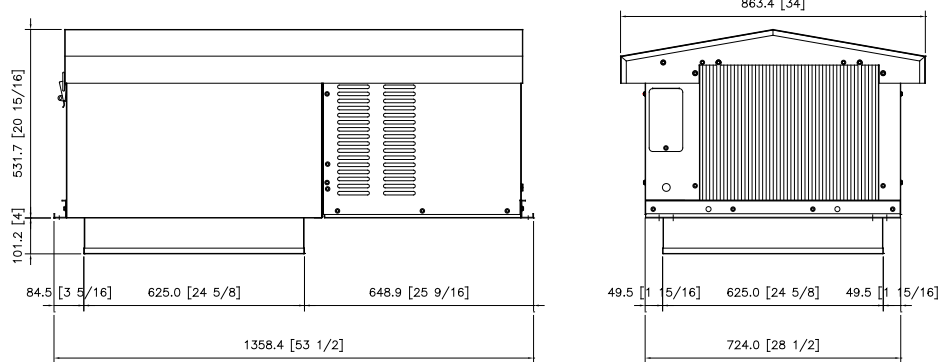
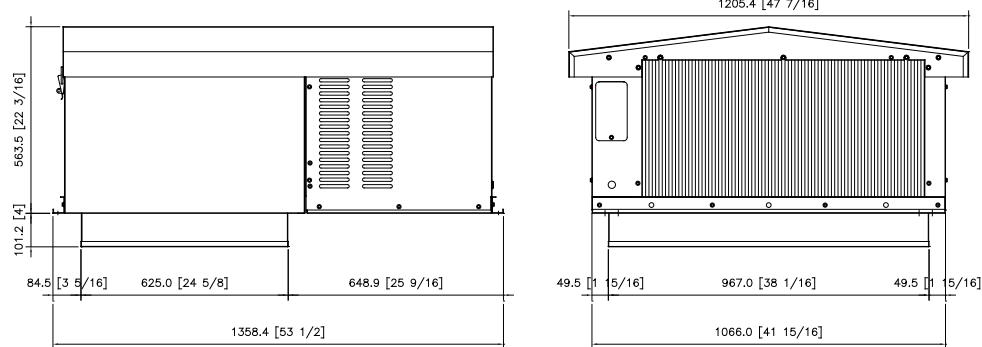


Figure D. OUTDOOR UNIT – Large Cabinet (Opening Size : 25 inch x 38.5 inch)



## **Locating SMART 7 Package Unit**

### **Unit Installation Requirements**

1. You must ensure before unit placement on the roof of box that the structural strength of the box can withstand the weight of SMART7 equipment
2. The unit should be installed away from noise sensitive site and must have proper support for noise and vibration not to be transmitted into the building.
3. Unit must be located away from steam, hot air or heat generator and placement should be selected in consideration of ventilation.
4. Indoor units are designed for indoor use only with ambient between 50°F~100°F and have no system control following ambient variation.
5. Evaporator section must not be located over doors.
6. Air circulation must cover completely inner space.
7. Installation, service and maintenance must be carried out by licensed contractor in conformity with the local standard construction code.

Ignoring above requirement will result in system fault, shorten life span and void the warranty,

### **Unit Transport Requirements.**

1. Do not remove shipping skid until ready to move it upon box rooftop.
2. Always watch out not to contact sharp edges and coil surfaces to avoid potential injury. Wear safety gears always during installation.
3. Use spreader bar to lift the unit upon roof of box not to damage on the cabinet.
4. Do not remove compartment cover of the compressor section, hood for outdoor unit.

### **Unit Installation location.**

1. Space between wall and air in/outlet must be secured at least 2inch.(refer to Fig. 1)
2. There must be 2 feet space secured at least above unit for service and removal of top case.(Refer to Fig. 1)
3. Single unit installation must be carried out following Fig. 2.
4. More than dual units installation must be carried out following Fig. 3.

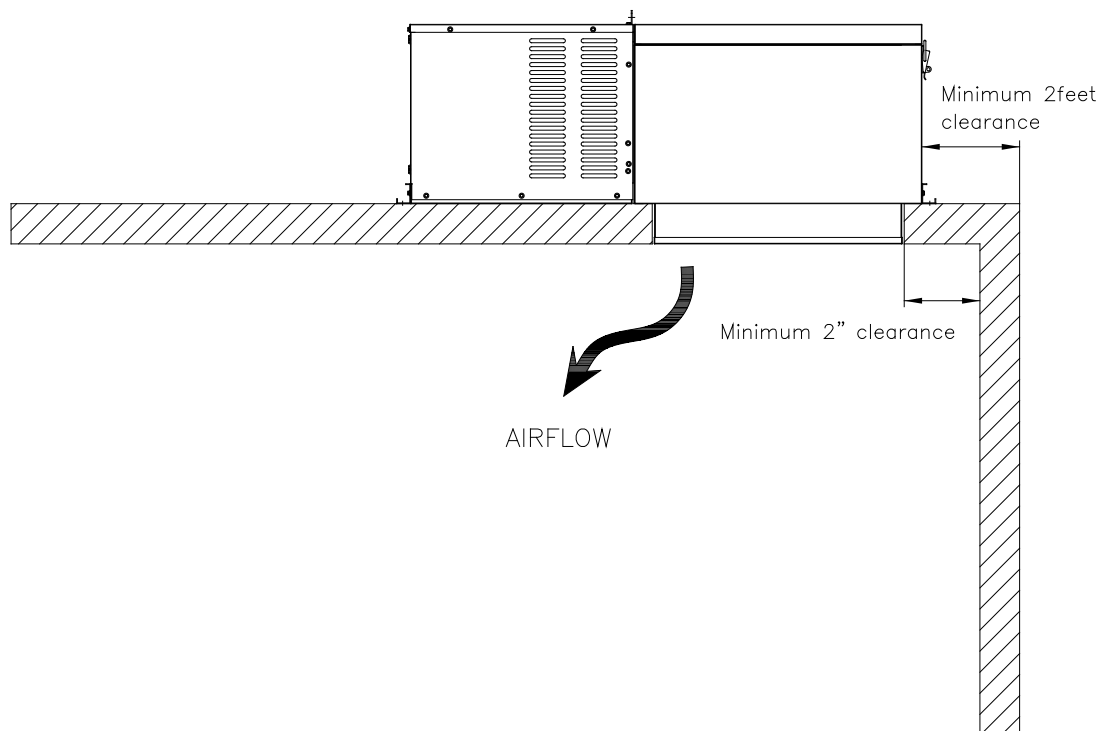
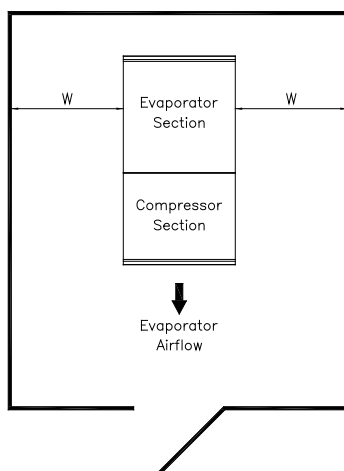
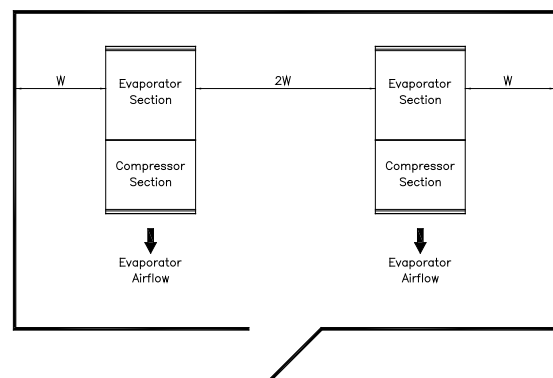


Figure 1. Minimum Clearance at Installation of Unit.



W = UNIT WIDTH

Figure 2. One Unit



W = UNIT WIDTH

Figure 3. Two or more Unit

## Installation procedure

### Indoor use only ( STI Model )

1. Carefully check package for damages during transportation and unit after opening the package.
2. Requirements must be followed for installing location on the page of 6~7.
3. Ensure weights of units on the page of 4~5 and that structural strength of the box can withstand of the weight of the unit.
4. Clean the roof surface of box for close adhesion of unit gasket to the surface.
5. Consult to box manufacturer for any processes necessary to ensure the integrity of the exposed form in the panels is not compromised.
6. Check mounting surface as level of surface should be within 1/8inch per a feet.
7. Place carefully unit into the provided opening with the evaporator air flow directly forward the door and ensure the grill not to damage during installation.
8. Secure that the condenser airflow is not obstructed.
9. Drain is not needed as condensate is vaporized by hot gas lines in the drain panel from the compressor discharge.
10. Install trim pieces around the open on the ceiling of box.

### Outdoor use only ( STX Model )

Installation is the same as indoor models except as follows :

1. Units must be curb mounted ( Figure 4 ~ 5 ). Cabinet size refer to dimension size on page 5.
2. The condensate drain outlet pipe is located on the side of the unit. Field piping may be connected to the outlet provided it is adequately sloped and heated for freezing weather conditions.
3. After connecting electrical power, reinstall compressor compartment cover and weather hood.

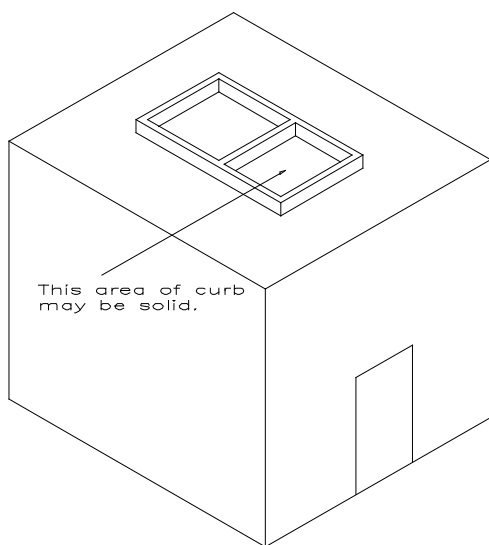


Figure 4. Curb placed on roof of box.

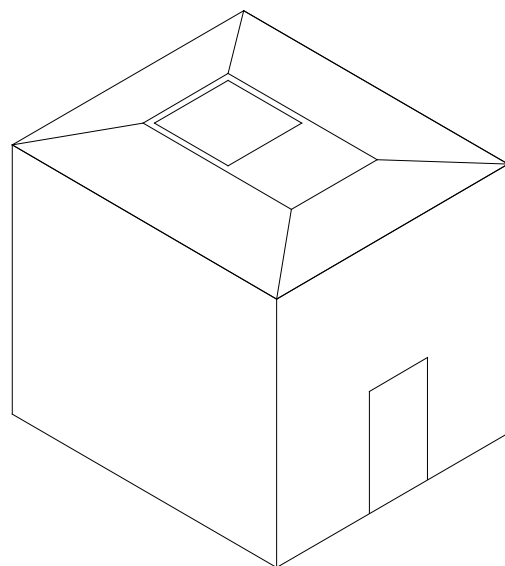


Figure 5. Roof membrane placed over curb.



## **Check before Unit Start-up.**

1. Check all electrical and refrigerant connections.
2. Observe all applicable building and electrical codes when wiring.
3. Make sure power supply has correct voltage and phase for unit and is fused properly.
4. If unit is connected with a power cord, use the cord with plug to connect to power supply.

If unit is not connected with a power cord, use hard wire to connect to power supply.

### **IMPORTANT**

Do not use extension cords to connect unit to power.

Plug-in to grounded three prong outlet.

Do not remove grounding prong.

Do not use a power adapter.

5. All medium temperature models are preset to factory default settings as :
  - a) 3 hours of compressor runtime between defrosts.
  - b) Defrost termination temperature = 38°F / 3.5°C
6. All low Temperature Models are preset to factory default settings at table 5.

## **Standard Maintenance Guideline.**

After first year of operation and under normal usage, maintenance should cover the following items at least once every six months.

1. Check all electrical and refrigerant connections.
2. Check all wiring and insulators.
3. Check contactors for proper operation and for state of contact points.
4. Check all fan motor. Tighten motor mount bolts, nuts and fan set screws.
5. Clean the heatexchanger (evaporator and condenser) coil surface.
6. Check the operation of the control system. Make sure all safety controls are operating properly.
7. Check the defrost control system. Make sure all defrost controls are operating properly.
8. Check the drain pan and drain line. If necessary, clean the drain pan and drain line.
9. Check the all heaters. Make sure the crankcase and drain line heaters are operating properly.

After installation of unit, it must be checked at least once for proper defrosting. The amount and pattern of frosting can vary considerably. It is dependent on the temperature of the room, the type of product being stored, how often new product is brought into the room and how often door is opened. Therefore, it may be necessary to periodically change the number of defrost cycles or adjust the duration of defrost.

## **Sequence of Operation.**

### **Operation of Refrigeration.**

1. When switch is turned on, power is provided to the temperature control, compressor, condenser and evaporator fan motor. And they will run until the box temperature setting is reached.
2. When the box temperature reaches a setting, the compressor and condenser fan motors shut off while evaporator fan motor is working.
3. When the box temperature rises above the set point and minimum off-time has elapsed, the compressor contactor will be re-energized and re-operated.

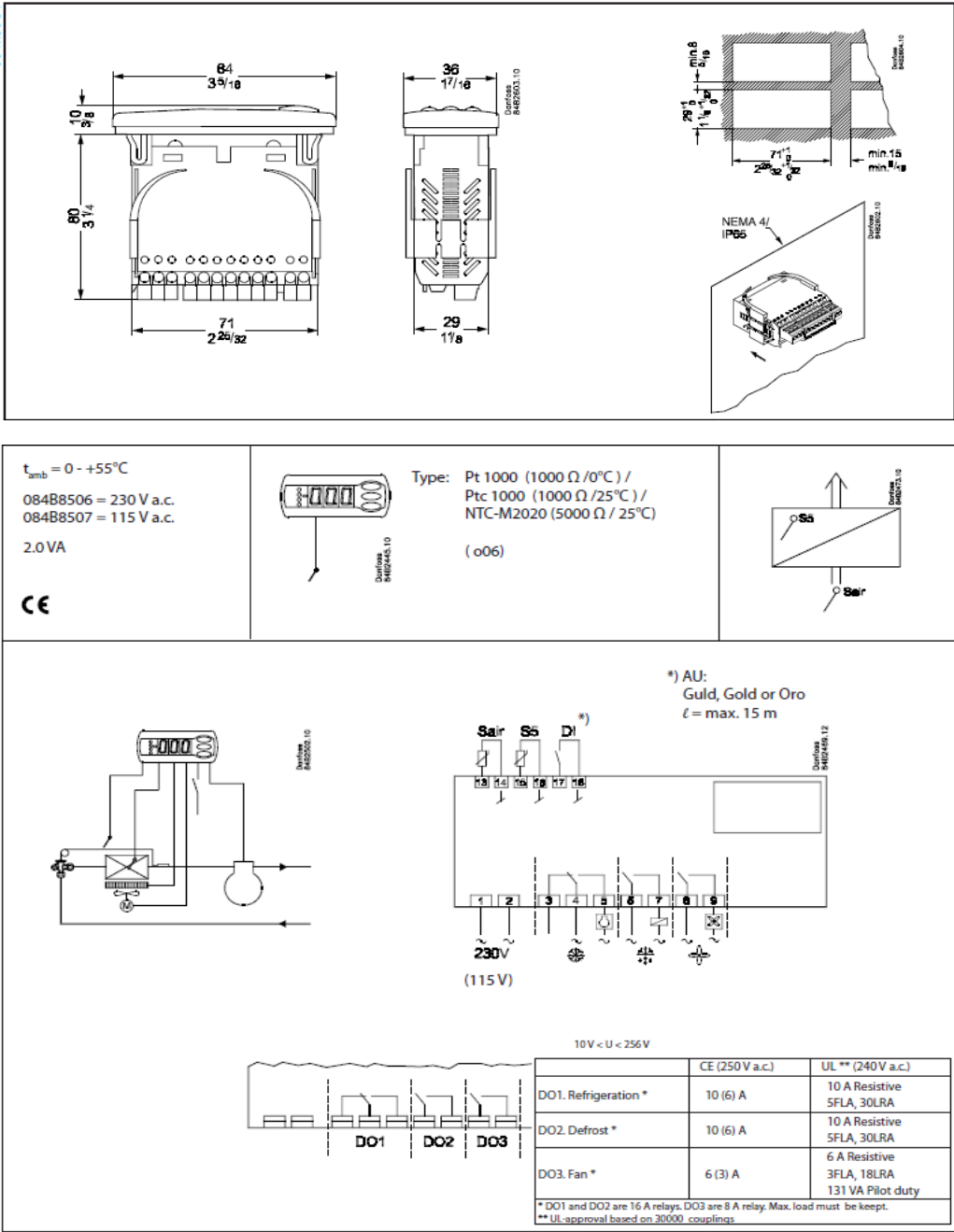
### **Operation of Defrost.**

1. Under normal electric defrost operation, the temperature/defrost control will de-energize the compressor contactor, evaporator fans and energize the defrost heaters. But under normal air defrost operation, the control will de-energize the compressor contactor and keep an evaporator fan motor working.
2. When the coil has defrosted completely and reached the preset coil sensor temperature, defrost heater cuts off and fan delay / drip sequences begin.
3. The control energizes the compressor and condenser fan motor and they restart.
4. When the coil temperature reaches 35°F or fan delay time has elapsed, the evaporator fans will be energized and started.

Controller Setting.

Danfoss EKC 102D Electronic Controller ( Low Temperature).

The EKC 102D is used for temperature control refrigeration appliances and cold room. It contains a temperature control where the signal can be received from one temperature sensor. The sensor is placed in the cold air flow after the evaporator or in the warm air flow just before the evaporator. The controller controls the defrost with either air defrost or electric defrost. Renewed cutin after defrost can be accomplished based on time or temperature.



## The buttons;

### Display

The values will be shown with three digits, and with a setting you can determine whether the temperature are to be shown in °C or °F.

### Set menu

1. Push the upper button until a parameter is shown
2. Push the upper or the lower button and find that parameter you want to change
3. Push the middle button until the parameter value is shown
4. Push the upper or the lower button and select the new value
5. Push the middle button again to enter the value.

### Set temperature

1. Push the middle button until the temperature value is shown
2. Push the upper or the lower button and select the new value
3. Push the middle button to select the setting.

### Reading the temperature at sensor S5

Push briefly the lower button

### Manuel start or stop of a defrost

Push the lower button for four seconds.

Light emitting diode



= refrigeration



= defrost



= fan running

Cutout alarm relay / receipt alarm / see alarm code.

Push briefly the upper button.

If there are several alarm codes they are found in a rolling stack. Push the uppermost or lowermost button to scan the rolling stack.

**Table 5. Electric Defrost Control Factory Default Settings.**

Temperature Set Point	Defrost Start Times	Defrost Duration	Drip Time	Fan Delay	Defrost Termination Set Point
-10°F	4/day	40 min	2 min	2 min	65°F

## Listing of Controller Parameters and Settings (Electric Defrost Control).

Parameters			Min.-	Max.-	Factory
Function	Description	Codes	value	value	setting
<b>Normal operation</b>					
Temperature (set point)		---	-58°F	122°F	-10°F
<b>Thermostat</b>					
Differential	When the temperature is higher than the reference + the set differential, the compressor relay will be cut in. It will cut out again when the temperature comes down to the set reference.	r01	0,1 K	36 K	3 K
Max. limitation of setpoint setting	The controller's setting range for the setpoint may be narrowed down, so that much too high or much too low values are not set accidentally-with resulting damages.	r02	-56°F	122°F	37°F
Min. limitation of setpoint setting		r03	-58°F	120°F	-23°F
Adjustment of temperature indication	If the temperature at the products and the temperature received by the controller are not identical, an offset adjustment of the shown display temperature can be carried out.	r04	-36 K	36 K	0.0 K
Temperature unit (°C/°F)	Set here if the controller is to show temperature values in °C or in °F.	r05	°C	°F	°F
Correction of the signal from Sair	Compensation possibility through long sensor cable.	r09	-18 K	18 K	0 K
Manual service(-1), stop regulation(0), start regulation (1)	With this setting refrigeration can be started, stopped or a manual override of the outputs can be allowed. 1 = regulation 0 = regulation is stopped -1 = regulation is stopped - override allowed. Stopped regulation will give a "Standby alarm".	r12	-1	1	1
Displacement of reference during night operation	The thermostat's reference will be the setpoint plus this value when the controller changes over to night operation. (Select a negative value if the function is used for "quick cooling".)	r13	-18 K	18 K	0 K
Activation of reference displacement r40	When the function is changed to ON the thermostat differential will be increased by the value in r40. Activation can also take place via input DI (defined in o02).	r39	OFF	on	OFF
Value of reference displacement (can be activated by r39 or DI)	The thermostat reference and the alarm values are shifted the following number of degrees when the displacement is activated. Activation can take place via r39 or input DI	r40	-90 K	90 K	0 K
<b>Alarm</b>					
Delay for temperature alarm	If one of the two limit values is exceeded, a timer function will commence. The alarm will not become active until the set time delay has been passed. The time delay is set in minutes.	A03	0 min	240 min	50 min
Delay for door alarm	The time delay is set in minutes. The function is defined in o02.	A04	0 min	240 min	60 min

Parameters			Min.- value	Max.- value	Factory setting
Function	Description	Codes			
Delay for temperature alarm after defrost	This time delay is used during start-up (recovery time), during defrost, in the cooling phase after a defrost. There will be change-over to the normal time delay (A03) when the temperature has dropped below the set upper alarm limit. The time delay is set in minutes.	A12	0 min	240 min	180 min
High alarm limit	Here you set when the alarm for high temperature is to start. The limit value is set in °C (absolute value). The limit value will be raised during night operation. The value is the same as the one set for night setback, but will only be raised if the value is positive. The limit value will also be raised in connection with reference displacement r39.	A13	-58°F	122°F	38°F
Low alarm limit	Here you set when the alarm for low temperature is to start. The limit value is set in °C (absolute value). The limit value will also be raised in connection with reference displacement r39.	A14	-58°F	122°F	-25°F
Alarm delay DI1	A cut-out/cut-in input will result in alarm when the time delay is passed. The function is defined in o02.	A27	0 min	240 min	30 min
High alarm limit for condenser temperature (o70)	If the Saux (S5) sensor is used for monitoring the condenser's temperature you must set the value at which the alarm is to become activated. The value is set in °C. There is no alarm delay. The alarm disappears again when the temperature has dropped 10 degrees. Definition of Saux (S5) takes place in o69/o70.	A37	32°F	210°F	122°F
<b>Compressor</b>					
Min. ON-time	Min. ON-time (in minutes)	c01	0 min	30 min	0 min
Min. OFF-time	Min. OFF-time (in minutes)	c02	0 min	30 min	4 min
Compressor relay must cutin and out inversely (NC-function)	0: Normal function where the relay cuts in when refrigeration is demanded 1: Reversed function where the relay cuts out when refrigeration is demanded (this wiring produces the result that there will be refrigeration if the supply voltage to the controller fails). (When two compressors are cut in and out the two relays will operate in opposite directions).	c30	0 / OFF	1 / on	0 / OFF
<b>Defrost</b>					
Defrost method	"non" = No, "el" = EL, "Gas" =GAS	d01	no	gas	EL
Defrost stop temperature	The defrost is stopped at a given temperature which is measured with a sensor (the sensor is defined in d10). The temperature value is set.	d02	32°F	77°F	65°F
Interval between defrost starts	Determines the time interval between the beginning of two defrost cycles. The interval time is not active when set to 0.	d03	0 hours	48 hours	6 hours
Max. defrost duration	This setting is a safety time so that the defrost will be stopped if there has not already been a stop based on temperature. (The setting will be the defrost time if d10 is selected to be 0)	d04	0 min	180 min	40 min

Parameters			Min.- value	Max.- value	Factory setting
Function	Description	Codes			
Displacement of time on cutin of defrost at start-up	The function delays the interval time d03 by the set number of minutes, but it only does it once, and this at the very first defrost taking place when voltage is connected to the controller. The function will be active after each and every power failure.	d05	0 min	240 min	0 min
Drip off time	Here you set the time that is to elapse from a defrost and until the compressor is to start again. (The time when water drips off the evaporator).	d06	0 min	60 min	2 min
Delay for fan start after defrost	Here you set the time that is to elapse from compressor start after a defrost and until the fan may start again. (The time when water is "tied" to the evaporator).	d07	0 min	60 min	2 min
Fan start temperature	The fan may also be started a little earlier than mentioned under "Delay of fan start after defrost", if the defrost sensor S5 registers another allowable value than the one set here.	d08	5°F	32°F	23°F
Fan cutin during defrost	you can set whether fan is to operate during defrost.	d09	no	yes	no
Defrost sensor (0=time, 1=S5, 2=Sair)	Here you define the defrost sensor. 0: None, defrost is based on time 1=S5. 2=Sair	d10	0	2	0
Defrost at start-up	Here you can set if the controller is to start with a defrost if the power has been cut.	d13	no	yes	no
Max. aggregate refrigeration time between two defrosts	Set here is the refrigeration time allowed without defrosts. If the time is passed, a defrost will be started. With setting = 0 the function is cut out.	d18	0 hours	48 hours	0 hours
Defrost on demand - S5 temperature's permitted variation during frost build-up. On central plant choose 20 K (=off)	The controller will follow the effectivity of the evaporator, and via internal calculations and measurements of the S5 temperature it will be able to start a defrost when the variation of the S5 temperature becomes larger than required. Here you set how large a slide of the S5 temperature can be allowed. When the value is passed, a defrost will start. The function can only be used in 1:1 systems when the evaporating temperature will become lower to ensure that the air temperature will be maintained. In central systems the function must be cut out. With setting = 20 the function is cut out	d19	0 K	36 K	36 K
<b>Fans</b>					
Fan stop at cutout compressor	Here you can select whether the fan is to be stopped when the compressor is cut out	F01	no	yes	no
Delay of fan stop	If you have chosen to stop the fan when the compressor is cut out, you can delay the fan stop when the compressor has stopped. Here you can set the time delay.	F02	0 min	30 min	0 min
Fan stop temperature (S5)	The function stops the fans in an error situation, so that they will not provide power to the appliance. If the defrost sensor registers a higher temperature than the one set here, the fans will be stopped. There will be re-start at 2 K below the setting. The function is not active during a defrost or start-up after a defrost. With setting +50°C the function is interrupted.	F04	-58°F	122°F	35°F

Parameters			Min.-	Max.-	Factory
Function	Description	Codes	value	value	setting
<b>Miscellaneous</b>					
Delay of output signals after start-up	After start-up or a power failure the controller's functions can be delayed so that overloading of the electricity supply network is avoided. Here you can set the time delay.	o01	0 s	600 s	5 s
Input signal on DI1. Function:	0=not used. 1=status on DI1. 2=door function with alarm when open. 3=door alarm when open. 4=defrost start (pulse-pressure). 5=ext.main switch. 6=night operation 7=change reference (activate r40). 8=alarm function when closed. 9=alarm function when open. 10=case cleaning (pulse pressure). 11=Inject off when open.	o02	0	11	0
Access code 1 (all settings)	If the settings in the controller are to be protected with an access code you can set a numerical value between 0 and 100. If not, you can cancel the function with setting 0. (99 will always give you access).	o05	0	100	0
Used sensor type (Pt /PTC/NTC)	Normally a Pt 1000 sensor with great signal accuracy is used. But you can also use a sensor with another signal accuracy. That may either be a PTC sensor (1000 ohm at 25°C) or an NTC sensor (5000 Ohm at 25°C). All the mounted sensors must be of the same type.	o06	Pt	ntc	Ptc
Display step = 0.5 (normal 0.1 at Pt sensor)	Yes: Gives steps of 0.5° No: Gives steps of 0.1°	o15	no	yes	no
Case cleaning. 0=no case cleaning. 1=Fans only. 2=All output Off.	The status of the function can be followed here or the function can be started manually. 0 = Normal operation (no cleaning) 1 = Cleaning with fans operating. All other outputs are Off. 2 = Cleaning with stopped fans. All outputs are Off. If the function is controlled by a signal at the DI input, the relevant status can be seen here in the menu.	o46	0	2	0
Access code 2 (partly access)	There is access to adjustments of values, but not to configuration settings. If the settings in the controller are to be protected with an access code you can set a numerical value between 0 and 100. If not, you can cancel the function with setting 0. If the function is used, access code 1 (o05) must also be used.	o64	0	100	0
Replace the controllers factory settings with the present settings	With this setting you save the controller's actual settings as a new basic setting (the earlier factory settings are overwritten).	o67	OFF	On	OFF
Select application for S5 sensor (0=defrost sensor, 1= product sensor, 2=condenser sensor with alarm)	EKC 102A, B, C Here you define the application for the S5 sensor. 0: Defrost sensor 1: Product sensor	o70	0	2	0



## Operating Status

The controller goes through some regulating situations where it is just waiting for the next point of the regulation. To make these “why is nothing happening” situations visible, you can see an operating status on the display. Push briefly (1s) the upper button. If there is a status code, it will be shown on the display. The individual status codes have the following meanings:

Code	
S0	Regulating
S2	When the compressor is operating it must run for at least x minutes.
S3	When the compressor is stopped, it must remain stopped for at least x minutes.
S10	Refrigeration stopped by main switch. Either with r12 or a DI-input
S11	Refrigeration stopped by thermostat
S14	Defrost sequence. Defrost in progress
S15	Defrost sequence. Fan delay
S16	Refrigeration stopped because of open DI input
S17	Door is open. DI input is open
S20	Emergency cooling
S25	Manual control of outputs
S29	Case cleaning
S32	Delay on outputs during start-up
Other display	
Non	non: The defrost temperature cannot be displayed. There is no sensor
-d-	-d-: Defrost in progress. /First cooling after defrost
PS	PS: Password required. Set password

## Fault Message

In an error situation the LED's on the front will flash and the alarm relay will be activated. If you push the top button in this situation you can see the alarm report in the display. If there are several, you can continue pushing to see them.

There are two kinds of error reports - it can either be an alarm occurring during the daily operation, or there may be a defect in the installation.

A-alarms will not become visible until the set time delay has expired.

E-alarms, on the other hand, will become visible the moment the error occurs.

(An A alarm will not be visible as long as there is an active E alarm).

Here are the messages that may appear:

Code	
A1	High temperature alarm
A2	Low temperature alarm
A4	Door alarm
A15	Alarm. Signal from DI input
A45	Standby position (stopped refrigeration via r12 or DI input)
A59	Case cleaning. Signal from DI input
A61	Condenser temperature alarm
E1	Faults in the controller
E27	Sensor error on S5

E29	Sensor error on Sair
E30	Sensor error on Saux
	<p>When copying settings to or from a copying key with functions o65 or o66, the following information may appear:</p> <p>0: Copying concluded and OK</p> <p>4: Copying key not correctly mounted</p> <p>5: Copying was not correct. Repeat copying</p> <p>6: Copying to EKC incorrect. Repeat copying</p> <p>7: Copying to copying key incorrect. Repeat copying</p> <p>8: Copying not possible. Order number or SW version do not match</p> <p>9: Communication error and timeout</p> <p>10: Copying still going on</p> <p>(The information can be found in o65 or o66 a couple of seconds after copying has been started).</p>

### **Danfoss ETC 1H1 Controller (Medium Temperature).**

Cooler units utilize an electronic temperature control. The temperature may be adjusted by setting the dial. This control is preset to provide 3 hours of compressor run time between defrost cycles. Defrosts are temperature terminated and can not be reprogrammed. The temperature control is programmed for minimum on cycle of one minute and minimum off cycle of four minutes.

### **Air Defrost Sequence of Operation.**

Air defrost units are preprogrammed for 3 hours of compressor run time between defrosts. These periods are not reprogrammable. After 3 hours, the temperature control will turn the compressor off. When the coil temperature reaches 38°F the control will terminate the defrost cycle.

Room Thermostat Settings :

Settings	Warm position	Cold position	Minimum time(Sec)	Maximum time (Min)
Cut in [°F]	55	34	60	Not used
Cut out [°F]	52	43	240	Not used
Defrost Temperature[°F]	38	38		
Alarm on high temp [°F]	Not used	Not used		
Alarm on low temp [°F]	Not used	Not used		

0 = Unit off (not an electrical disconnect)

1 = 52°F (11°C)

2 = 49°F (9°C)

3 = 45°F (7°C)

4 = 41°F (5°C)

5 = 38°F (3°C)

6 = 34°F (1°C)

Note: If power is interrupted to the unit during the refrigeration off-cycle (system at temperature setpoint, compressor off), the thermostat will initiate an extra defrost period approximately one hour after power is restored.

## System troubleshooting.

Symptoms	Possible causes	Solution
Compressor not running	Main switch open	Close switch
	Blown fuse	Check electrical circuits and motor winding for shorts or grounds. Replace fuse after fault is corrected.
	Loose wiring	Check all wire junctions. Tighten all terminal screws.
	System cable shut down	Replace shutdown cable.
	Thermal overload tripped	Overloads are automatically reset. Check unit when unit come back on line.
	Defective contactor or contactor coil	Replace or repair
	System shut down by safety devices.	Check cause of shut down
	No cooling required.	Wait until calls for cooling
	Motor electrical trouble.	Check motor for open windings, short circuit or burn out.
Noisy Compressor	Flooding of liquid refrigerant into crankcase	Check expansion valve setting
	Worn compressor.	Replace compressor
High discharge pressure.	Non-condensable in system.	Remove non-condensable.
	Too much refrigerant	Remove excess refrigerant
	Fan not running	Check electrical circuit and fuse.
	Dirty condenser coil	Clean condenser coil
	Liquid line solenoid not open	Repair or replace coil
Low discharge pressure.	Insufficient refrigerant	Check leaks. Add charge.
	Low suction pressure	See corrective steps for low suction pressure.
High suction pressure	Excessive loads	Reduce load.
	Expansion valve overfeeding.	Check bulb location and clamping. Adjust superheat..
Low suction pressure.	Expansion valve malfunctioning.	Check and reset for proper superheat.
	Lack of refrigerant.	Check for leaks. Add charge.
	Evaporator dirty or iced.	Clean. Check defrost parameters and modify as required.
Compressor thermal protector switch open.	Evaporator dirty or iced	Clean and defrost.
	Condenser coil dirty.	Clean coil
	Too much refrigerant	Remove excess refrigerant
	Clogged liquid line filter drier.	Replace filter drier.
	Operating beyond design conditions	Add facilities so that conditions are within allowable limits.
Fan(s) will not operate	Main switch open.	Close switch.
	Blown fuses.	Replace fuses. Check for short circuits or overload conditions.
	Defective motor	Replace motor.
	Coil does not get cold enough to reset thermostat.	Adjust fan delay setting of control.
	Controller or sensor defective.	Replace defective component.
	Unit in defrost cycle.	Wait for completion of cycle.
Room temperature too high.	Controller temperature set too high.	Adjust control
	Superheat too high.	Check and reset for proper superheat
	Insufficient refrigerant	Check leaks. Add charge
	Evaporator coil iced	Manually defrost coil. Check defrost controls for malfunction.
Ice accumulating on ceiling around grill.	Defrost duration is too long.	Adjust defrost termination temperature.
	Fan delay not delaying fans after defrost period.	Adjust fan delay setting or replace sensor.
	Defective defrost control or sensor.	Replace defective component.
	Too many defrost.	Adjust number of defrosts.
Coil not clearing of frost during defrost cycle.	Coil temperature not getting above freezing point during defrost.	Check heater operation.
	Not enough defrost cycles per day.	Adjust control for more defrost cycles.
	Defrost cycle too short.	Adjust defrost control, defrost duration setting.
	Defective defrost control or sensor.	Replace defective component.
Ice accumulating in drain pan.	Defective heaters.	Replace heater.
	Unit not installed properly (out of level)	Check and adjust if necessary.
	Drain line plugged.	Clean drain line.
	Defective control.	Replace defective component.

# Electrical Wiring Diagram.

Diagram 1. Wiring diagram for SMART 7, Air Defrost 115V / 1Ph / 60Hz.

Model : STI050MR404A1

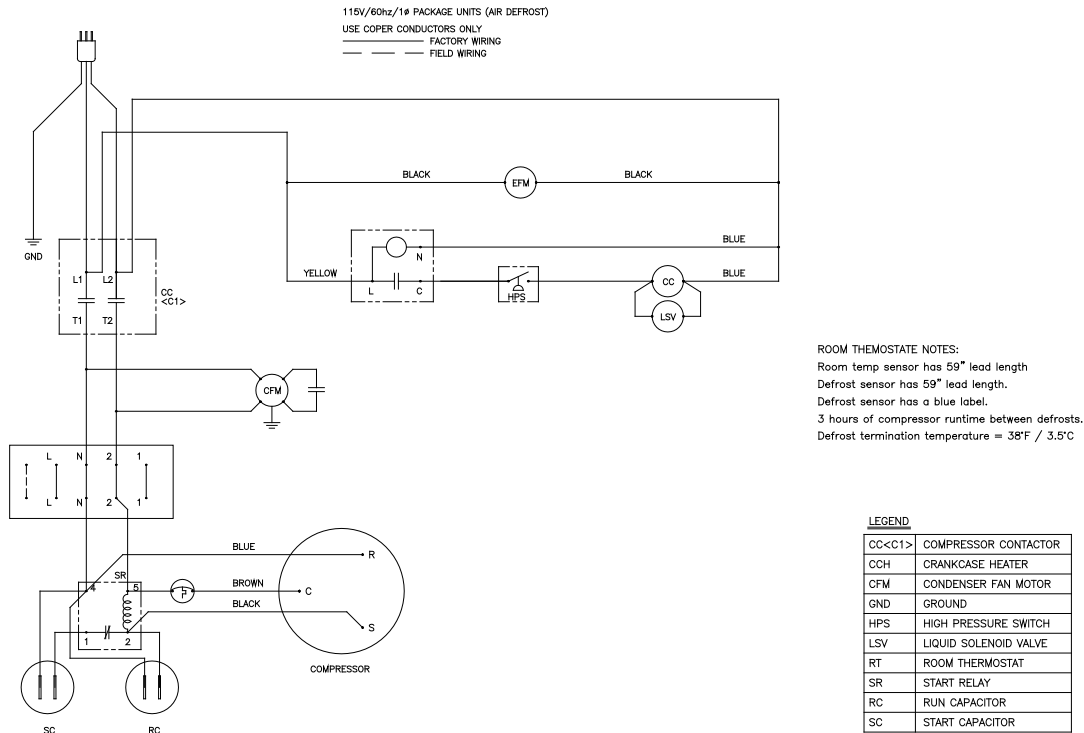


Diagram 2. Wiring diagram for SMART 7, Air Defrost 208~230V / 1Ph / 60Hz.

Model : STI050MR404A2, STX050MR404A2

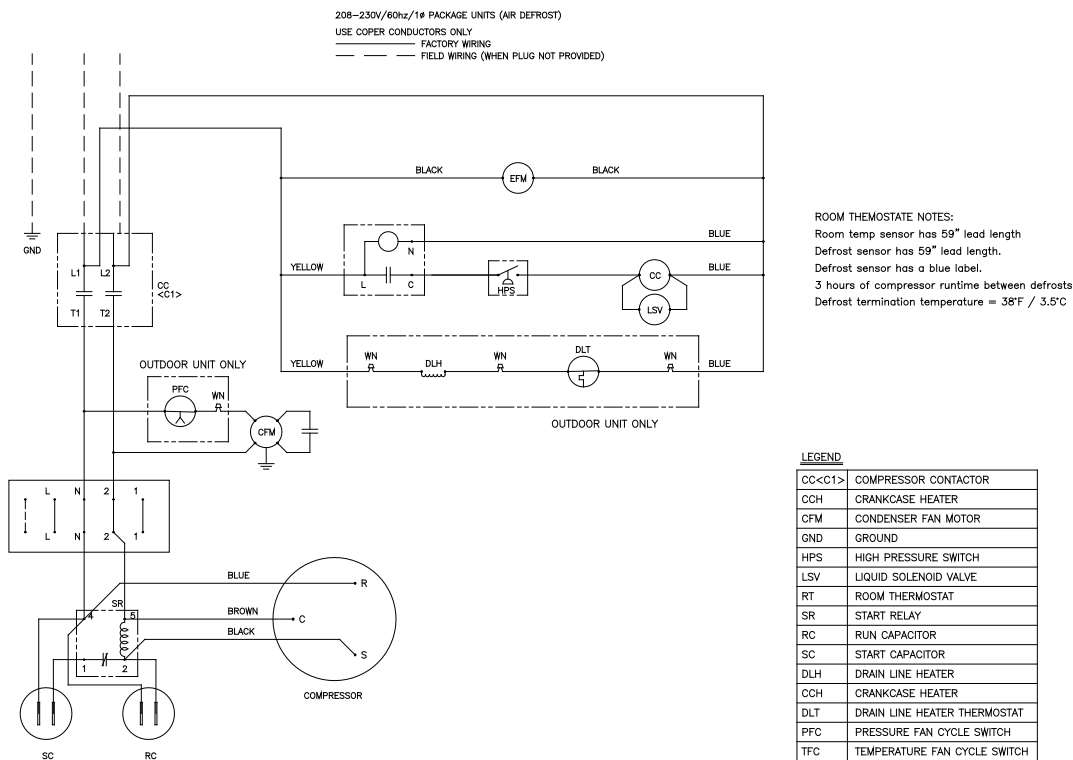


Diagram 3. Wiring diagram for SMART 7, Air Defrost 208~230V / 1Ph / 60Hz.

Model : STI075MR404A2, STI100MR404A2, STI130MR404A2

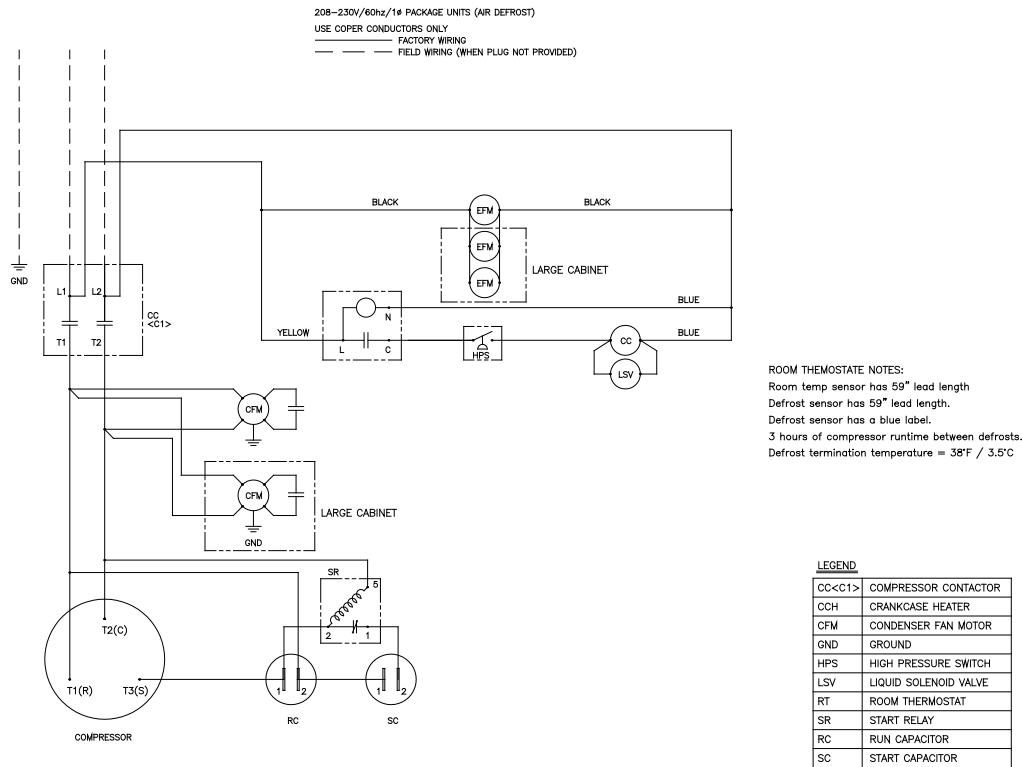


Diagram4. Wiring diagram for SMART 7, Air Defrost 208~230V / 1Ph / 60Hz.

Model : STX075MR404A2 , STX100MR404A2 , STX130MR404A2

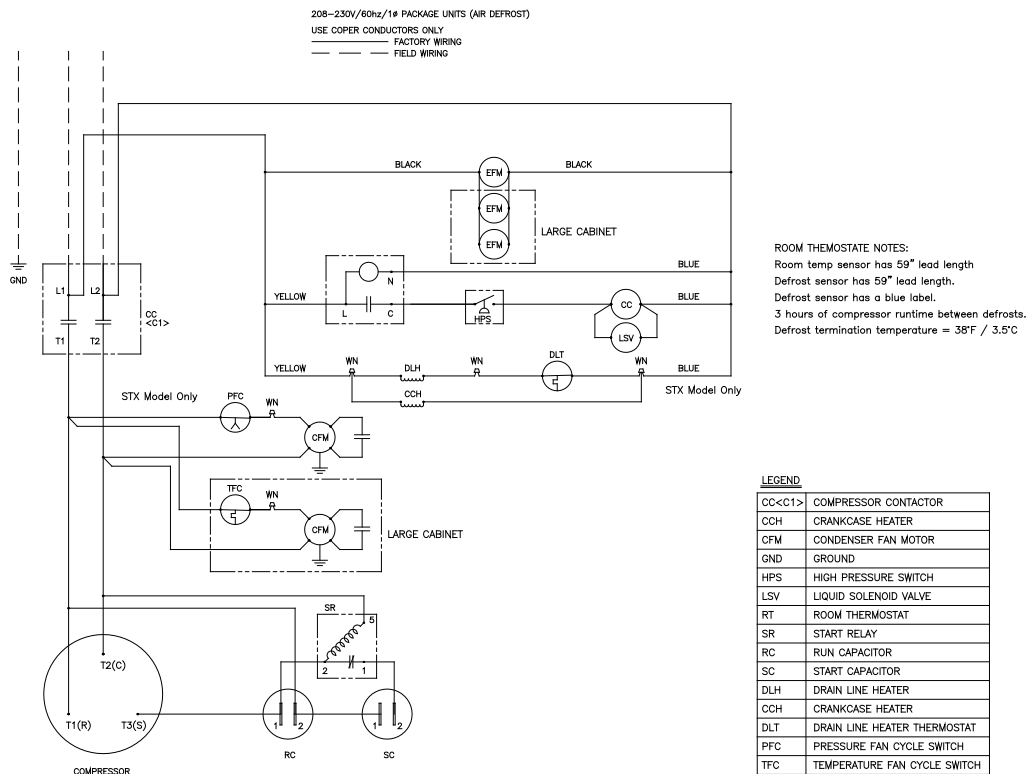


Diagram5. Wiring diagram for SMART 7, Air Defrost 208~230V / 3Ph / 60Hz.

Model : STI100MR404A3, STI130MR404A3, STX100MR404A3, STX130MR404A3

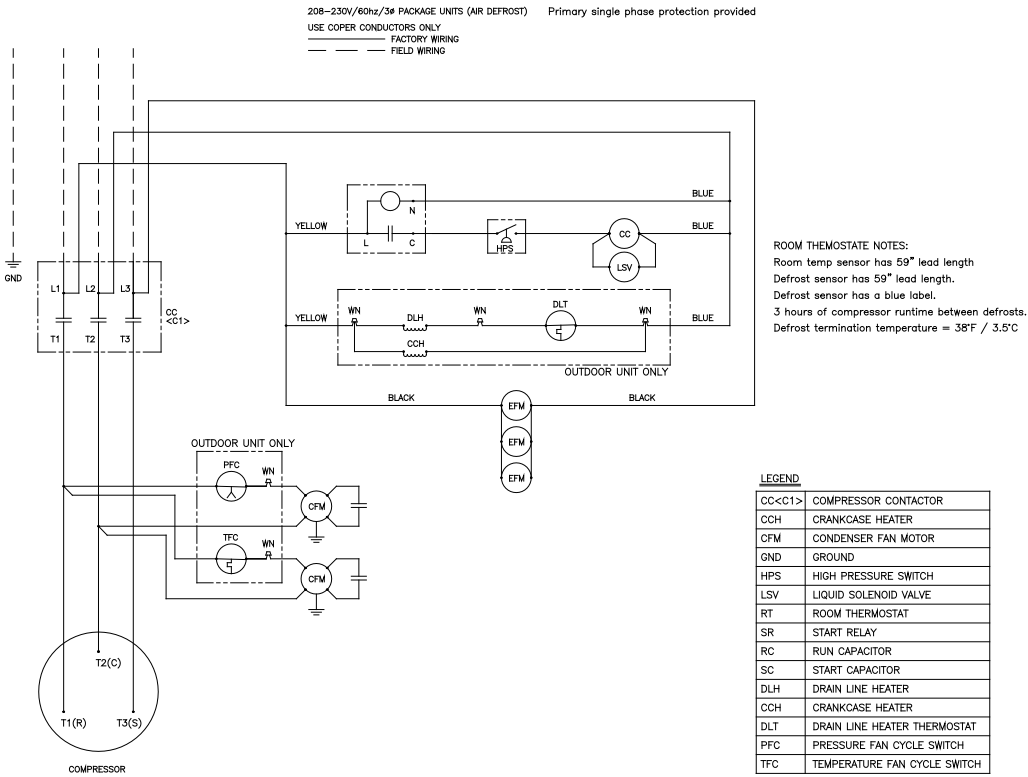
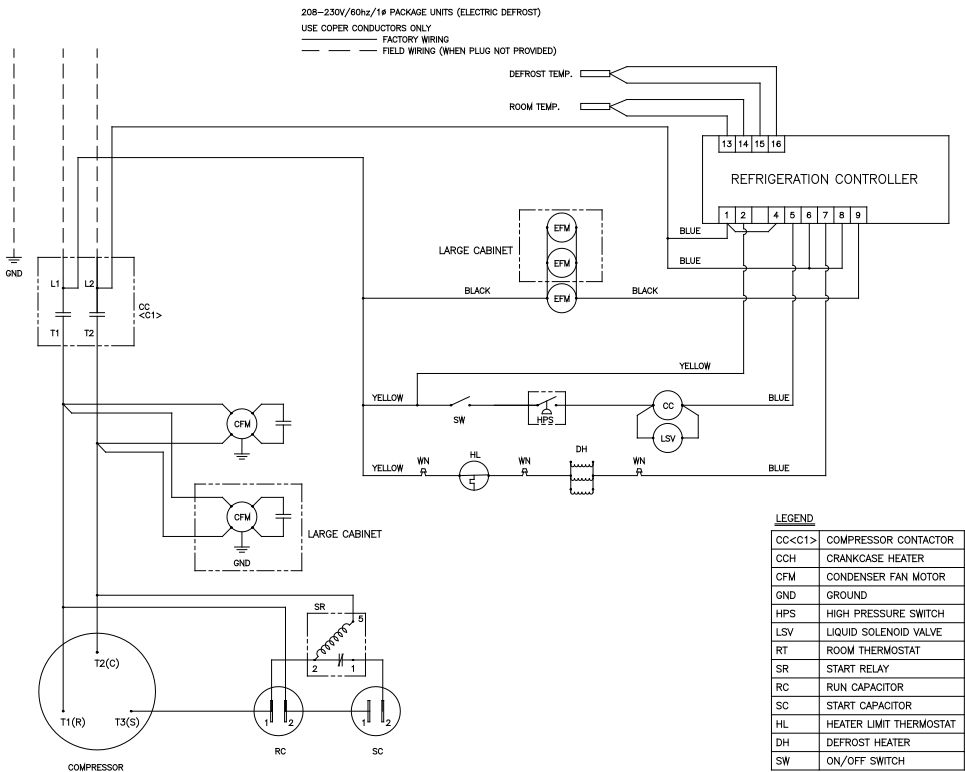
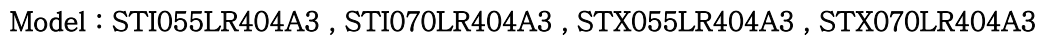


Diagram6. Wiring diagram for SMART 7, Electric Defrost 208~230V / 1Ph / 60Hz.

Model : STI022LR404A2, STI045LR404A2, STI055LR404A2, STI070LR404A2



Model : STX022LR404A2, STX045LR404A2, STX055LR404A2, STX070LR404A2





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