1. General Instructions

This Booklet Contains Information on:

**RGD**: A narrow depth multi deck air curtain case designed to display pre-packaged Deli products. It can be placed at the end of gondolas or inline with gondola.

**Shipping Damage**

All equipment should be thoroughly examined for shipping damage before and during unloading.

This equipment has been carefully inspected at our factory and the carrier has assumed responsibility for safe arrival. If damaged, either apparent or concealed, claim must be made to the carrier.

**Apparent Loss or Damage**

If there is an obvious loss or damage, it must be noted on the freight bill or express receipt and signed by the carrier’s agent; otherwise, carrier may refuse claim. The carrier will supply necessary claim forms.

**Concealed Loss or Damage**

When loss or damage is not apparent until after equipment is uncrated, a claim for concealed damage is made. Make request in writing to carrier for inspection within 15 days, and retain all packaging. The carrier will supply inspection report and required claim forms.

**Shortages**

Check your shipment for any possible shortages of material. If a shortage should exist and is found to be the responsibility of Hussmann Chino, notify Hussmann Chino. If such a shortage involves the carrier, *notify the carrier immediately*, and request an inspection. Hussmann Chino will acknowledge shortages within ten days from receipt of equipment.

**Hussmann Chino Product Control**

The serial number and shipping date of all equipment has been recorded in Hussmann’s files for warranty and replacement part purposes. All correspondence pertaining to warranty or parts ordering must include the serial number of each piece of equipment involved, in order to provide the customer with the correct parts.

*Keep this booklet with the case at all times for future reference.*
<table>
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<th>2. Table of Contents</th>
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<td>18. Controller Instructions ...............................................................</td>
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</tbody>
</table>
3. Cut and Plan Views

RGD SC 24" PLAN VIEW

RGD-REM 24" PLAN VIEW

* NOTE END PANEL DEPTH NOT SHOWN SEE CROSS SECTION
Cut and Plan Views (Cont'd)

RGD SC 30” PLAN VIEW

RGD-REM 30” PLAN VIEW

* NOTE END PANEL DEPTH NOT SHOWN SEE CROSS SECTION
RDG S/C 24, 30 DEPTH CASE

RGD24 72-S\C

RGD30 72-S\C
Cut and Plan Views (Cont'd)

RGD REM 24 DEPTH CASE

RGD24 72-REM  RGD24 83-REM
Cut and Plan Views (Cont'd)

RGD30 REM HEIGHT CASE

RGD30 72-REM

RGD30 83-REM

Dimensions:
- 73 5/8" END PANEL
- 84 5/8" END PANEL
- 31" END PANEL
RGDC 24 HEIGHT CASE

RGDC24 72-REM

RGDC24 83-REM

BALLAST BOX

73 5/8" END PANEL

36 5/8" BUMP OUT

22 1/4" END PANEL

6 1/4"

47 7/8"
Cut and Plan Views (Cont'd)

* NOTE
- Maintain Min. Clearances As Shown In (Dotted Area) To Facilitate Air Intake and Discharge
- Clean Air Circulation i.e. No Air Entrapment Above Unit So As To Allow Fresh Air Circulation

RGDC24 72-S\C
4. Installation

Location
The refrigerated merchandisers have been designed for use only in air conditioned stores where temperature and humidity are maintained at or below 75°F and 55% relative humidity. DO NOT allow air conditioning, electric fans, ovens, open doors or windows (etc.) to create air currents around the merchandiser, as this will impair its correct operation.

NOTE: A. To avoid removing concrete flooring, begin lineup leveling from the highest point of the store floor.

B. When wedges are involved in a lineup, set them first. All cases were leveled and joined prior to shipment to insure the closest possible fit when cases are joined in the field. When joining, use a carpenters level and shim legs accordingly. Case must be raised correctly, under legs where support is best, to prevent damage to case.

1. Check level of floor where cases are to be set. Determine the highest point of the floor; cases will be set off this point.

2. Set first case, and adjust legs over the highest part of the floor so that case is level. Prevent damage - case must be raised under leg or by use of 2x6 or 2x4 leg brace. Remove side and back leg braces after case is set.

3. Set second case as close as possible to the first case, and level case to the first using the instructions in step one.

4. Apply masking tape 1/8” in from end of case on inside and outside rear mullion on both cases to be joined.

Method: RGD Alignment for Line Ups

1. Surface must be clean, dry, and free of debris. Apply Devan Sealant to RGD case sides along joint faces. (See Figure 1)

2. Identify Alignment/Bolting points provide as shown. (See Figure below)

3. Align and adjoin cases in line up configuration.

4. Bolt cases together at Alignment/Bolting points using provided hardware or equivalent hardware.

BOLT HEX HEAD 3/8-16 X 3/4”
NUT TOP LOCK 3/8-24 ZINC
Devan Sealant 255-2

5. Once bolting is complete. Apply silicone to wrapper case joints. (See Figure below)

Uncrating the Stand
Place the fixture as close to its permanent position as possible. Remove the top of the crate. Detach the walls from each other and remove from the skid. Unbolt the case from the skid. The fixture can now be lifted off the crate skid. Lift only at base of stand!

Exterior Loading
These models have not been structurally designed to support excessive external loading. Do not walk on their tops; This could cause serious personal injury and damage to the fixture.

Setting and Joining
The sectional construction of these models enable them to be joined in line to give the effect of one continuous display. A joint trim kit is supplied with each joint.

ATTENTION INSTALLER
It is the contractor’s responsibility to install case(s) according to local construction and health codes.

Leveling
IMPORTANT! IT IS IMPERATIVE THAT CASES BE LEVELED FROM FRONT TO BACK AND SIDE TO SIDE PRIOR TO JOINING. A LEVEL CASE IS NECESSARY TO INSURE PROPER OPERATION, WATER DRAINAGE, GLASS ALIGNMENT, AND OPERATION OF THE HINGES SUPPORTING THE GLASS. LEVELING THE CASE CORRECTLY WILL SOLVE MOST HINGE OPERATION PROBLEMS.
Mount Splashguard and Bracket

- Set bracket, align ¼ slot to set screw hole
- Screw bracket, loosely to a low to drop to floor
- Snap in splashguard by setting the top in first
- And push in firmly to snap in.
- See drawing above
Bumper Installation Instructions

Step 1: Starting on one end: while inserting the bumper, push it up against the end to prevent the bumper from shrinking after installation (when it gets cold).

Step 2: As you insert the bumper into the channel with one hand, pull the bumper toward you with the other to open the inside lips. Slowly apply pressure by rolling the bumper into the track.
5. Plumbing

Waste Outlet and P-TRAP
The waste outlet is located in the center, 8" from the front of the case.
A 3/4" OD P-TRAP and threaded adapter are supplied with each fixture. The P-TRAP must be installed to prevent air leakage and insect entrance into the fixture.

NOTE: PVC-DWV solvent cement is recommended. Follow the manufacturer’s instructions.

Installing Condensate Drain
Poorly or improperly installed condensate drains can seriously interfere with the operation of this refrigerator, and result in costly maintenance and product losses. Please follow the recommendations listed below when installing condensate drains to insure a proper installation:

1. Never use pipe for condensate drains smaller than the nominal diameter of the pipe or P-TRAP supplied with the case.
2. When connecting condensate drains, the P-TRAP must be used as part of the condensate drain to prevent air leakage or insect entrance. Store plumbing system floor drains should be at least 14" off the center of the case to allow use of the P-TRAP pipe section. Never use two water seals in series in any one line. Double P-TRAPS in series will cause a lock and prevent draining.
3. Always provide as much down hill slope (“fall”) as possible; 1/8” per foot is the preferred minimum. PVC pipe, when used, must be supported to maintain the 1/8” pitch and to prevent warping.
4. Avoid long runs of condensate drains. Long runs make it impossible to provide the “fall” necessary for good drainage.
5. Provide a suitable air break between the flood rim of the floor drain and outlet of condensate drain. 1” is ideal.
6. Prevent condensate drains from freezing:
   a. Do not install condensate drains in contact with non-insulated suction lines. Suction lines should be insulated with a non absorbent insulation material such as Armstrong’s Armaflex.
   b. Where condensate drains are located in dead air spaces (between refrigerators or between a refrigerator and a wall), provide means to prevent freezing. The water seal should be insulated to prevent condensation.

RGD (Self Contained)
The waste outlet and P-TRAP are the same as the remote except the case condensate drains to a pump assembly mounted to the bottom rear of the case. Condensate is pumped to the top of the water evap pan assembly. Hot air from the condenser is forced through the water evap assembly, evaporating the water. Any overflow from the water evap assembly is directed back to the pump assembly. It is critical that the case be level to keep the water evap assembly from overflowing!! The metal cover over the top of the condensing unit must be in place to force the hot condenser air through the water evap assembly.

The condensate pump can be accessed through the front of the closeoff panel.
6. Refrigeration

Refrigerant Type
The standard refrigerant will be R-404A unless otherwise specified on the customer order. Check the serial plate on the case for information.

Piping
The refrigerant line outlets are located under the deck pans. Insulate suction lines to prevent condensation drippage.

Access Panels
All electrical and drain access panels are clearly labeled on the deck of the Deli/Beverage case. The access for condensing units (in the self contained units) is located on the side of the stand, at the end. Ends of stand are fitted for removal, if condensing unit has to be taken out.

Refrigeration Lines

<table>
<thead>
<tr>
<th>Liquid</th>
<th>Suction</th>
</tr>
</thead>
<tbody>
<tr>
<td>3/8&quot; O.D.</td>
<td>5/8&quot; O.D.</td>
</tr>
</tbody>
</table>

NOTE: The standard coil is piped at 5/8" (suction); however, the store tie-in may vary depending on the number of coils and the draw the case has. Depending on the case setup, the connecting point in the store may be 5/8", 7/8", or 1 1/8". Refer to the particular case you are hooking up.

Refrigerant lines should be sized as shown on the refrigeration legend furnished by the store. Install P-TRAPS (oil traps) at the base of all suction line vertical risers.

Pressure drop can rob the system of capacity. To keep the pressure drop to a minimum, keep refrigerant line run as short as possible, using the minimum number of elbows. Where elbows are required, use long radius elbows only.

Control Settings
See RGD technical data sheet for the appropriate settings for your merchandiser. Maintain these parameters to achieve near constant product temperatures. Product temperature should be measured first thing in the morning, after having been refrigerated overnight. For all multiplexing, defrost should be time terminated. Defrost times should be as follows: OFF CYCLE - Six times daily for 25 minutes. The number of defrosts per day should never change. The duration of the defrost cycle may be adjusted to meet conditions present at your location.

Access to TX Valves and Drain Lines

Mechanical - Remove product from end of case. Remove product racks. Remove refrigeration and drain access panels (labeled). TX valve (mechanical only) and drain are located under each access panel at end of the case.

Electronic - The Electronic Expansion valve master and slave cylinder(s) are located within the electrical access panel(s).

Electronic Expansion Valve (Optional)
A wide variety of electronic expansion valves and case controllers can be utilized. Please refer to EEV and controller manufacturers information sheet. Sensors for electronic expansion valves will be installed on the coil outlet, and in the discharge air. (Some supermarkets require a 3rd sensor in the return air). Case controllers will be located in the electrical raceway or under the case.

Thermostatic Expansion Valve Location
An Alco balanced port expansion valve model is furnished as standard equipment, unless otherwise specified by customer. There is one expansion valve located on the left side of each evaporation coil under the bottom deck pans.

Expansion Valve Adjustment
Expansion valves must be adjusted to fully feed the evaporator. Before attempting any adjustments, make sure the evaporator is either clear or very lightly covered with frost, and that the fixture is within 10°F of its expected operating temperature.

Measuring the Operating Superheat
1. Determine the suction pressure with an accurate pressure gauge at the evaporator outlet.
2. From a refrigerant pressure temperature chart, determine the saturation temperature at the observed suction pressure.
3. Measure the temperature of the suction gas at the thermostatic remote bulb location.
4. Subtract the saturation temperature obtained in step No. 2 from the temperature measured in step No. 3.
5. The difference is superheat.
6. Set the superheat for 5°F - 7°F.

Condenser Ventilation
Be sure to supply adequate ventilation for the condenser in Self Contained units. Allow 212 square inches for units up to 1 h.p., and 260 for condenser units up to 1 1/2-1 3/4 h.p.

T-STAT Location
The T-STATS are located within the electrical raceway. The raceway's location will remain under the front fascia of the case. In all cases, the T-STAT is located on the same side of the case. If you are looking at the case from the front, it is the right-hand side.
Refrigeration (Cont'd)

T-stat Location

Start-up

Remote
After proper testing, evacuation and charging, set the coil or evaporation temperature to 20°F by the method engineered into your system. A thermostat is located on the top of the case for temperature control. Set the thermostat to cycle in and out as per the RGD technical data sheet.

Refrigeration Data 30" Depth
Note: This data is based on store temperature and humidity that does not exceed 75°F and 55% R.H.

<table>
<thead>
<tr>
<th>Discharge Air (F)</th>
<th>see spec sheets</th>
</tr>
</thead>
<tbody>
<tr>
<td>Evaporator (F)</td>
<td></td>
</tr>
</tbody>
</table>

Note: Not recommended to control temp by regulating coil temp allow T-STAT to cycle and control temp.

Btu/hr/ft*
Parallel 1500
Conventional 1725

Glycol Requirements

<table>
<thead>
<tr>
<th>GPM</th>
<th>PSI</th>
</tr>
</thead>
<tbody>
<tr>
<td>4ft</td>
<td></td>
</tr>
<tr>
<td>6ft</td>
<td></td>
</tr>
<tr>
<td>8ft</td>
<td></td>
</tr>
<tr>
<td>12ft</td>
<td></td>
</tr>
</tbody>
</table>

*For all refrigeration equipment other than Hussmann, use conventional Btu values.

Defrost Data: See Spec sheets

Frequency Hrs
OFFTIME
Temp Term °F
Failsafe Minutes
ELECTRIC or GAS Not Recommended

Refrigeration Data 24" Depth
Note: This data is based on store temperature and humidity that does not exceed 75°F and 55% R.H.

<table>
<thead>
<tr>
<th>Discharge Air (F)</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Evaporator (F)</td>
<td></td>
</tr>
</tbody>
</table>

Note: Not recommended to control temp by regulating coil temp allow T-STAT to cycle and control temp.

72" High: See spec sheets

Btu/hr/ft*
Parallel
Conventional

Glycol Requirements

<table>
<thead>
<tr>
<th>GPM</th>
<th>PSI</th>
</tr>
</thead>
<tbody>
<tr>
<td>4ft</td>
<td></td>
</tr>
<tr>
<td>6ft</td>
<td></td>
</tr>
<tr>
<td>8ft</td>
<td></td>
</tr>
<tr>
<td>12ft</td>
<td></td>
</tr>
</tbody>
</table>

83" High: See spec sheets

Btu/hr/ft*
Parallel
Conventional

Glycol Requirements

<table>
<thead>
<tr>
<th>GPM</th>
<th>PSI</th>
</tr>
</thead>
<tbody>
<tr>
<td>4ft</td>
<td></td>
</tr>
<tr>
<td>6ft</td>
<td></td>
</tr>
<tr>
<td>8ft</td>
<td></td>
</tr>
<tr>
<td>12ft</td>
<td></td>
</tr>
</tbody>
</table>

*For all refrigeration equipment other than Hussmann, use conventional Btu values.
Defrost Data: See Spec sheets

Frequency Hrs
OFFTIME
Temp Term °F
Failsafe Minutes
ELECTRIC or GAS Not Recommended

*Sensor is located behind Discharge Honeycomb in the top air plenum.

---

Self Contained
On self contained cases the unit is completely charged and tested to the proper temperature. Switch on the compressor. Set the timeclock to the proper time of day by turning the dial in the direction of the arrow until the pointer and current time of day align.

Self Contained Refrigeration Data
Note: This data is based on store temperature and humidity that does not exceed 75°F and 55% R.H.
Discharge Air (F)
Evaporator (F)

Note: Not recommended to control temp by regulating coil temp allow T-STAT to cycle and control temp.

BTU/HR/FT*  24" Deep  30" Deep
Parallel
Conventional
*For all refrigeration equipment other than Hussmann use conventional BTU values

Defrost Data
Frequency Hrs
OFFTIME
Temp Term °F
Failsafe Minutes
Electric or Gas not recommended

Physical Data
Merchandiser Drip Pipe (in)  1 1/2"
Merchandiser Liquid Line (in)  3/8"
Merchandiser Suction Line (in)  5/8"
Estimated Charge (lb) ***
4ft  1.9
6ft  2.3
8ft  2.8
12ft  3.7
*Dependent on case length and refrigerant type.
### Refrigeration Data

<table>
<thead>
<tr>
<th>Case Length</th>
<th>Case Usage</th>
<th>Conventional Capacity ** (BTU/hr/ft)</th>
<th>Average Discharge Air* (°F)</th>
<th>Velocity (ft/min)</th>
</tr>
</thead>
<tbody>
<tr>
<td>3’, 3’9”, 4’, 5’, 6’, 8’</td>
<td>SS Deli</td>
<td>1900</td>
<td>29-30</td>
<td>150-200</td>
</tr>
</tbody>
</table>

*Front Discharge Air measured inside Air Curtain Honeycomb

**Refrigeration Notes:
1) Capacity for Reference Only.
2) All Cases Equipped with Night Curtains.
3) Use Dew Point for High Glide Refrigerants. Care should be taken to use the Dew Point in P/T Tables for measuring and adjusting Superheat. Adjust evaporator pressure as needed to maintain the discharge air temperature shown.
4) Rating Condition is NSF Type I, 75°F/55% RH

### Electrical Data

#### Standard Fans, Heaters, LED Lights (115 Volt)

<table>
<thead>
<tr>
<th>Case Length</th>
<th>Evaporator Fans</th>
<th>Canopy Lights</th>
<th>Optional LED Shelf Lights</th>
<th>Max. LED Load (W/ All Options)</th>
<th>Anti-Sweat Heaters</th>
<th>Convenience Outlets (Optional)</th>
</tr>
</thead>
</table>

#### Condensing Unit and Evaporative Pans

<table>
<thead>
<tr>
<th>Case Length</th>
<th>Condensing Unit</th>
<th>Evaporative PAN</th>
<th>Plug Type ***</th>
<th>Dist. Ref. Chrg. (lbs)</th>
</tr>
</thead>
</table>

*** Plug Type Includes Fans, Lights, Cond. Unit and Evap. Pan

### Optional High Output LED Lights (115 Volt)

<table>
<thead>
<tr>
<th>Case Length</th>
<th>Canopy Lights</th>
<th>Optional Shelf</th>
<th>Max. H.O. LED Load</th>
</tr>
</thead>
</table>

---

**Notes:**
- R-404A or R-448A refrigerant is used.
- Case dimensions are shown in the diagram.
### Refrigeration Data:

<table>
<thead>
<tr>
<th>Case Lengths</th>
<th>Case Usage</th>
<th>Rating Condition (BTU/Hr/FT)</th>
<th>Temperature (°F)</th>
<th>Velocity (Ft/Min)</th>
<th>Case Lengths</th>
</tr>
</thead>
<tbody>
<tr>
<td>3', 4', 5', 6', 8', 10', 12'</td>
<td>SS Deli</td>
<td>NSF 7</td>
<td>1450</td>
<td>1150</td>
<td>900</td>
</tr>
</tbody>
</table>

**Front Discharge Air Measured Inside Air Curtain Honeycomb**

### Refrigeration Notes:

1. BTU's include 1 row canopy LED lights and no shelf lights.
2. Add 10 BTU's per foot per shelf row for optional LED shelf lights.
3. Add 140 BTU/HR/FT to AHRI test for 30” depth option.
4. All cases equipped with night curtains.
5. For AHRI, night curtains are pulled down for 6 of 24 hours and all lights are turned off per AHRI 1200 test procedures.
6. For NSF 7, the load listed is without the night curtains pulled down.
7. AHRI 1200 rating condition is NSF Type I, 75°F/55% RH.

---

### Electrical Data:

#### Standard Fans, Heaters, LED Lights (115 VOLT)

<table>
<thead>
<tr>
<th>Case Length</th>
<th># of Evap. Fans</th>
<th>Blade Dia. (In.)</th>
<th>Blade Pitch (°)</th>
<th>Amps</th>
<th>Watts</th>
</tr>
</thead>
<tbody>
<tr>
<td>3'2&quot;-3&quot;</td>
<td>4</td>
<td>8</td>
<td>8</td>
<td>0.24</td>
<td>0.45</td>
</tr>
<tr>
<td>4'</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>0.21</td>
<td>0.46</td>
</tr>
<tr>
<td>6'</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>0.21</td>
<td>0.46</td>
</tr>
<tr>
<td>8'</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>0.21</td>
<td>0.46</td>
</tr>
<tr>
<td>10'</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>0.21</td>
<td>0.46</td>
</tr>
<tr>
<td>12'</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>0.21</td>
<td>0.46</td>
</tr>
</tbody>
</table>

#### Optional High Output LED Lights (110 VOLT)

<table>
<thead>
<tr>
<th>Case Length</th>
<th>Canopy Lights H.O. Load</th>
<th>Optional Shelf</th>
<th>Max. H.O. Led Load</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Amps</td>
<td>Watts</td>
<td>Amps</td>
</tr>
<tr>
<td>3'2&quot;-3&quot;</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>4'</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>6'</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>8'</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>10'</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>12'</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
</tbody>
</table>
SELF-SERVICE DELI
REFRIGERATION DATA:

**FRONT DISCHARGE AIR MEASURED INSIDE AIR CURTAIN HONEYCOMB**

**REFRIGERATION NOTES:**
1) BTU'S INCLUDE 1 ROW CANOPY LED LIGHTS AND NO SHELF LIGHTS
2) ADD 10 BTU'S PER FOOT/PER SHELF ROW FOR OPTIONAL LED SHELF LIGHTS
3) ADD 140 BTU/HR/FT TO AHRI TEST FOR 30" DEPTH OPTION
4) ALL CASES EQUIPPED WITH NIGHT CURTAINS
5) FOR AHRI TEST, NIGHT CURTAINS ARE PULLED DOWN FOR 6 HOURS AND ALL LIGHTS ARE TURNED OFF PER AHRI 1200 TEST PROCEDURE FOR MEASURING AND ADJUSTING SUPERHEAT. ADJUST EVAPORATOR PRESSURE AS NEEDED TO MAINTAIN THE DISCHARGE AIR TEMPERATURE SHOWN.
6) FOR NSF 7, THE LOAD LISTED IS WITHOUT THE NIGHT CURTAINS PULLED DOWN,
7) AHRI 1200 RATING POINT FOR ENERGY CONSUMPTION COMPARISON ONLY
8) USE DEW POINT FOR HIGH GLIDE REFRIGERANTS. CARE SHOULD BE TAKEN TO USE THE DEW POINT IN P/T TABLES FOR MEASURING AND ADJUSTING SUPERHEAT. ADJUST EVAPORATOR PRESSURE AS NEEDED TO MAINTAIN THE DISCHARGE AIR TEMPERATURE SHOWN.
9) RATING CONDITION IS NSF TYPE I, 75°F/55% RH

REFRIGERATION DATA CONTINUED:

ELEC. THERMOSTAT / AIR SENSOR SETTINGS

<table>
<thead>
<tr>
<th>USAGE</th>
<th>CUT IN (°)</th>
<th>CUT OUT (°)</th>
<th>DEFROST TIME (MIN)</th>
<th>DEFROST FREQUENCY (#/DAY)</th>
<th>TERM. TEMP (°F) COOL ONLY</th>
<th>DRIP TIME</th>
<th>DEFROST WATER (LBS/DAY/FT)</th>
</tr>
</thead>
<tbody>
<tr>
<td>SS DELI</td>
<td>31</td>
<td>28</td>
<td>OFF TIME 25</td>
<td>6</td>
<td>52</td>
<td>N/A</td>
<td>7.0</td>
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</table>

END PANEL WIDTH KEY

<table>
<thead>
<tr>
<th># OF END PNLs</th>
<th>END PNL WIDTH (IN.)</th>
<th>TOTAL ADDED LENGTH (IN.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1.125</td>
<td>1.125</td>
</tr>
<tr>
<td>2</td>
<td>1.125</td>
<td>2.25</td>
</tr>
</tbody>
</table>

ELECTRICAL DATA:

STANDARD FANS, HEATERS, LED LIGHTS (115VOLT)

<table>
<thead>
<tr>
<th>CASE LENGTH</th>
<th># OF EVAP FANS</th>
<th>BLADE DIA. (IN.)</th>
<th>BLADE PITCH (°)</th>
<th>AMPS</th>
<th>WATTS</th>
<th>AMPS</th>
<th>WATTS</th>
<th>AMPS</th>
<th>WATTS</th>
<th>AMPS</th>
<th>WATTS</th>
<th>AMPS</th>
<th>WATTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>3'9&quot;</td>
<td>1</td>
<td>8</td>
<td>37</td>
<td>0.3</td>
<td>8</td>
<td>0.2</td>
<td>18</td>
<td>0.5</td>
<td>54</td>
<td>0.6</td>
<td>73</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>4'</td>
<td>1</td>
<td>8</td>
<td>37</td>
<td>0.3</td>
<td>8</td>
<td>0.2</td>
<td>27</td>
<td>0.5</td>
<td>72</td>
<td>0.7</td>
<td>99</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>5'</td>
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<td>37</td>
<td>0.6</td>
<td>16</td>
<td>0.3</td>
<td>34</td>
<td>0.5</td>
<td>91</td>
<td>0.7</td>
<td>120</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>6'</td>
<td>2</td>
<td>8</td>
<td>37</td>
<td>0.6</td>
<td>16</td>
<td>0.3</td>
<td>39</td>
<td>0.5</td>
<td>108</td>
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<td>147</td>
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<td>8</td>
<td>37</td>
<td>0.6</td>
<td>16</td>
<td>0.3</td>
<td>54</td>
<td>1.5</td>
<td>144</td>
<td>1.7</td>
<td>186</td>
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<td>N/A</td>
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<tr>
<td>10'</td>
<td>4</td>
<td>8</td>
<td>37</td>
<td>0.9</td>
<td>24</td>
<td>0.7</td>
<td>81</td>
<td>1.8</td>
<td>216</td>
<td>2.8</td>
<td>297</td>
<td>N/A</td>
<td>N/A</td>
</tr>
</tbody>
</table>

OPTIONAL HIGH OUTPUT LED LIGHTS (115VOLT)

<table>
<thead>
<tr>
<th>CASE LENGTH</th>
<th>CANOPY LIGHTS H.O. LED</th>
<th>OPTIONAL SHELF</th>
<th>MAX. H.O. LED LOAD</th>
</tr>
</thead>
<tbody>
<tr>
<td>3'9&quot;</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>4'</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>5'</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>6'</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>8'</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>10'</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>12'</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
</tbody>
</table>
**REFRIGERATION DATA:**

<table>
<thead>
<tr>
<th>CASE LENGTHS</th>
<th>CASE USAGE</th>
<th>CAPACITY *** (BTU/HRT)</th>
<th>TEMPERATURE (°F)</th>
<th>VELOCITY (FT/Min)</th>
<th>CASE LENGTHS</th>
<th>EST. REFROG. CHRG. (R404A) (LBS)</th>
<th>20°F GLYCOL 6° RISE</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>EVAPORATOR</td>
<td>DISCHARGE AIR ** (°F)</td>
<td></td>
<td></td>
<td></td>
<td>GPM</td>
</tr>
<tr>
<td></td>
<td></td>
<td>NSF 7</td>
<td>AHRI 1200</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4', 6', 8', 12'</td>
<td>DELI / CHEESE</td>
<td>330</td>
<td>300</td>
<td>26</td>
<td>28</td>
<td>32~34</td>
<td>250</td>
</tr>
</tbody>
</table>

**FRONT DISCHARGE AIR MEASURED INSIDE AIR CURTAIN HONEYCOMB**

**REFRIGERATION NOTES:**
1) BTU'S INCLUDE 1 ROW CANOPY LED LIGHTS, TWO END MULLION LIGHTS, AND NO SHELF LIGHTS
2) AHRI 1200 RATING POINT FOR ENERGY CONSUMPTION COMPARISON ONLY
3) USE DEW POINT FOR HIGH GLIDE REFRIGERANTS. CARE SHOULD BE TAKEN TO USE THE DEW POINT IN P/T TABLES FOR MEASURING AND ADJUSTING SUPERHEAT. ADJUST EVAPORATOR PRESSURE AS NEEDED TO MAINTAIN THE DISCHARGE AIR TEMPERATURE SHOWN.
5) RATING CONDITION IS NSF TYPE I, 75°F/55% RH

**REFRIGERATION DATA CONTINUED:**

<table>
<thead>
<tr>
<th>ELEC. THERMOSTAT / AIR SENSOR SETTINGS</th>
<th>DEFROST TYPE TIME (MIN)</th>
<th>DEFROST FREQUENCY (#/DAY)</th>
<th>TERM TEMP (°F)</th>
<th>Drip TIME</th>
<th>DEFROST WATER (LBS/DAY/FT)</th>
</tr>
</thead>
<tbody>
<tr>
<td>DELI / CHEESE</td>
<td>34</td>
<td>55</td>
<td>1</td>
<td>48</td>
<td>N/A</td>
</tr>
</tbody>
</table>

**END PANEL WIDTH KEY:**

<table>
<thead>
<tr>
<th># OF END PNLs</th>
<th>END PNL WIDTH (IN)</th>
<th>TOTAL ADDED LENGTH (IN)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1.125</td>
<td>1.125</td>
</tr>
<tr>
<td>2</td>
<td>1.125</td>
<td>2.25</td>
</tr>
</tbody>
</table>

**ELECTRICAL DATA:**

**STANDARD FANS, HEATERS, LED LIGHTS (115 VOLT)**

<table>
<thead>
<tr>
<th>CASE LENGTH</th>
<th># OF EVAP FANS</th>
<th>BLADE DIA. (IN.)</th>
<th>BLADE PITCH (°)</th>
<th>AMPS</th>
<th>WATTS</th>
<th>AMPS</th>
<th>WATTS</th>
<th>AMPS</th>
<th>WATTS</th>
<th>AMPS</th>
<th>WATTS</th>
<th>AMPS</th>
<th>WATTS</th>
<th>AMPS</th>
<th>WATTS</th>
<th>AMPS</th>
<th>WATTS</th>
<th>AMPS</th>
<th>WATTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>4'</td>
<td>1</td>
<td>8.25</td>
<td>37°</td>
<td>0.3</td>
<td>6</td>
<td>0.2</td>
<td>27</td>
<td>0.2</td>
<td>21</td>
<td>0.4</td>
<td>48</td>
<td>N/A</td>
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<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>6'</td>
<td>2</td>
<td>8.25</td>
<td>37°</td>
<td>0.6</td>
<td>16</td>
<td>0.3</td>
<td>59</td>
<td>0.3</td>
<td>35</td>
<td>0.6</td>
<td>74</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>8'</td>
<td>2</td>
<td>8.25</td>
<td>20°</td>
<td>0.6</td>
<td>16</td>
<td>0.5</td>
<td>54</td>
<td>0.3</td>
<td>35</td>
<td>0.8</td>
<td>89</td>
<td>N/A</td>
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<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>12'</td>
<td>3</td>
<td>8.25</td>
<td>20°</td>
<td>0.9</td>
<td>24</td>
<td>0.7</td>
<td>61</td>
<td>0.4</td>
<td>49</td>
<td>1.1</td>
<td>130</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
</tbody>
</table>

**OPTIONAL HIGH OUTPUT LED LIGHTS (115 VOLT)**

<table>
<thead>
<tr>
<th>CASE LENGTH</th>
<th>CANOPY LIGHTS H.O. LED</th>
<th>OPTIONAL SHELF</th>
<th>MAX. H.O. LED LOAD</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>AMPS</td>
<td>WATTS</td>
<td>AMPS</td>
</tr>
<tr>
<td>4'</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>6'</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>8'</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>12'</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
</tbody>
</table>
SELF-SERVICE DELI TYPE I

REFRIGERATION DATA:

**FRONT DISCHARGE AIR MEASURED INSIDE AIR CURTAIN HONEYCOMB**

**REFRIGERATION NOTES:**

1. CAPACITY FOR REFERENCE ONLY.
2. ALL CASES EQUIPPED WITH NIGHT CURTAINS.
3. USE DEW POINT FOR HIGH GLIDE REFRIGERANTS. CARE SHOULD BE TAKEN TO USE THE DEW POINT IN P/T TABLES FOR MEASURING AND ADJUSTING SUPERHEAT. ADJUST EVAPORATOR PRESSURE AS NEEDED TO MAINTAIN THE DISCHARGE AIR TEMPERATURE SHOWN.
4. RATING CONDITION IS NSF TYPE I, 75°F/55% RH

**REFRIGERATION DATA CONTINUED:**

<table>
<thead>
<tr>
<th>CASE LENGTH</th>
<th>CASE USAGE</th>
<th>CONVENTIONAL CAPACITY ** (BTU/H/FT)</th>
<th>AVERAGE DISCHARGE AIR* (°F)</th>
<th>VELOCITY (FT/MIN)</th>
</tr>
</thead>
<tbody>
<tr>
<td>4', 5', 6', 8' SS DELI</td>
<td>2050</td>
<td>28–30</td>
<td>150–200</td>
<td></td>
</tr>
</tbody>
</table>

*FRONT DISCHARGE AIR MEASURED INSIDE AIR CURTAIN HONEYCOMB**

**REFRIGERATION NOTES:**

1. CAPACITY FOR REFERENCE ONLY.
2. ALL CASES EQUIPPED WITH NIGHT CURTAINS.
3. USE DEW POINT FOR HIGH GLIDE REFRIGERANTS. CARE SHOULD BE TAKEN TO USE THE DEW POINT IN P/T TABLES FOR MEASURING AND ADJUSTING SUPERHEAT. ADJUST EVAPORATOR PRESSURE AS NEEDED TO MAINTAIN THE DISCHARGE AIR TEMPERATURE SHOWN.
4. RATING CONDITION IS NSF TYPE I, 75°F/55% RH

**REFRIGERATION DATA CONTINUED:**

<table>
<thead>
<tr>
<th>USAGE</th>
<th>SET POINT (°F)</th>
<th>DIFFERENTIAL (°F)</th>
<th>DEFROST TYPE</th>
<th>FAILSAFE TIME (MIN)</th>
<th>DEFROST FREQUENCY (#/DAY)</th>
<th>TEMPERATURE (°F)</th>
<th>TIME (MIN)</th>
<th>WATER (LBS/DAY/FT)</th>
</tr>
</thead>
<tbody>
<tr>
<td>DELI</td>
<td>24</td>
<td>3</td>
<td>OFF TIME</td>
<td>25</td>
<td>4</td>
<td>48</td>
<td>NA</td>
<td>NA</td>
</tr>
</tbody>
</table>

**END PANEL WIDTH KEY**

- # OF END PANELS: 1
- END PANEL WIDTH (IN.): 1.125
- TOTAL ADDITIONAL LENGTH (IN.): 1.125

**ELECTRICAL DATA:**

**STANDARD FANS, HEATERS, LED LIGHTS (115 VOLT)**

<table>
<thead>
<tr>
<th>CASE LENGTH</th>
<th>BLADE DIAM. (IN.)</th>
<th>BLADE PITCH (°)</th>
<th>AMPS</th>
<th>WATTS</th>
<th>AMPS</th>
<th>WATTS</th>
<th>AMPS</th>
<th>WATTS</th>
<th>AMPS</th>
<th>WATTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>4'</td>
<td>3</td>
<td>6</td>
<td>0.23</td>
<td>27</td>
<td>0.45</td>
<td>61</td>
<td>0.60</td>
<td>75</td>
<td>NA</td>
<td>NA</td>
</tr>
<tr>
<td>5'</td>
<td>2</td>
<td>8</td>
<td>0.30</td>
<td>34</td>
<td>0.56</td>
<td>66</td>
<td>0.85</td>
<td>95</td>
<td>NA</td>
<td>NA</td>
</tr>
<tr>
<td>6'</td>
<td>2</td>
<td>8</td>
<td>0.34</td>
<td>39</td>
<td>0.59</td>
<td>81</td>
<td>1.07</td>
<td>116</td>
<td>NA</td>
<td>NA</td>
</tr>
<tr>
<td>8'</td>
<td>2</td>
<td>8</td>
<td>0.47</td>
<td>54</td>
<td>0.90</td>
<td>103</td>
<td>1.38</td>
<td>157</td>
<td>NA</td>
<td>NA</td>
</tr>
</tbody>
</table>

**CONVENIENCE OUTLETS (OPTIONAL)**

- # OF OUTLETS: 1
- VOLT: 120
- AMPS: 10.3
- WATTS: 1200

**CONDENSING UNIT AND EVAPORATIVE FANS**

<table>
<thead>
<tr>
<th>CASE LENGTH</th>
<th>NOM. HP</th>
<th>REF. R-404A</th>
<th>R-444A</th>
<th>SOFT-START</th>
<th>SOFT-START</th>
</tr>
</thead>
<tbody>
<tr>
<td>4'</td>
<td>1/4</td>
<td>60/7</td>
<td>240</td>
<td>10.0</td>
<td>230</td>
</tr>
<tr>
<td>5'</td>
<td>1/4</td>
<td>60/7</td>
<td>240</td>
<td>12.5</td>
<td>230</td>
</tr>
<tr>
<td>6'</td>
<td>1/4</td>
<td>60/7</td>
<td>240</td>
<td>12.5</td>
<td>230</td>
</tr>
<tr>
<td>8'</td>
<td>1/4</td>
<td>60/7</td>
<td>240</td>
<td>12.5</td>
<td>230</td>
</tr>
<tr>
<td>1 3/4</td>
<td>1/3</td>
<td>60/7</td>
<td>240</td>
<td>230</td>
<td>10.0</td>
</tr>
</tbody>
</table>

**OPTIONAL HIGH OUTPUT LED LIGHTS (115 VOLT)**

<table>
<thead>
<tr>
<th>CASE LENGTH</th>
<th>CANOPY LIGHTS H.O. LED</th>
<th>OPTIONAL SHELF</th>
<th>MAX. H.O. LED LOAD</th>
</tr>
</thead>
<tbody>
<tr>
<td>4'</td>
<td>0.88</td>
<td>1.28</td>
<td>108</td>
</tr>
<tr>
<td>5'</td>
<td>0.76</td>
<td>1.12</td>
<td>177</td>
</tr>
<tr>
<td>6'</td>
<td>0.56</td>
<td>1.32</td>
<td>216</td>
</tr>
<tr>
<td>8'</td>
<td>0.56</td>
<td>1.32</td>
<td>216</td>
</tr>
</tbody>
</table>
Wiring Color Code

### Standard Case Wire Color Code

<table>
<thead>
<tr>
<th>Color Description</th>
<th>Color</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ground</td>
<td>Green</td>
</tr>
<tr>
<td>Anti-Sweat</td>
<td>Purple</td>
</tr>
<tr>
<td>Lights</td>
<td>Orange</td>
</tr>
<tr>
<td>Receptacles</td>
<td>Yellow</td>
</tr>
<tr>
<td>T-Stat/Solenoid 230VAC</td>
<td>Red/Black</td>
</tr>
<tr>
<td>T-Stat/Solenoid 115VAC</td>
<td>White/Black</td>
</tr>
<tr>
<td>T-Stat/Solenoid 24VAC</td>
<td>Red/White</td>
</tr>
<tr>
<td>Fan Motors</td>
<td>Brown</td>
</tr>
<tr>
<td>Blue Condensing Unit</td>
<td></td>
</tr>
</tbody>
</table>

Use Copper Conductors Only
430-01-0338 R101003

**CASE MUST BE GROUNDED**

**NOTE:** Refer to label illustrated above that is affixed to case to determine the actual configuration as checked in the "TYPE INSTALLED" boxes.

### Electrical Circuit Identification

Standard lighting for all models will be full length fluorescent lamps located within the case at the top.

The switch controlling the lights, the plug provided for digital scale, and the thermometer are located at the rear of the case mullion.

The receptacle that is provided on the exterior back of these models is intended for computerized scales with a five amp maximum load, not for large motors or other high wattage appliances. It should be wired to a dedicated circuit.

### Field Wiring and Serial Plate Amperage

Field Wiring must be sized for component amperes printed on the serial plate. Actual ampere draw may be less than specified. Field wiring from the refrigeration control panel to the merchandisers is required for refrigeration thermostats. Case amperes are listed on the wiring diagram, but always check the serial plate.

### LED Driver Location

Drivers are located within the access panel that runs the length of the rear of the case. Refer to diagram on page 8.
8. Finishing Touches

If more than one RGD is being installed next to each other, the factory fitted continuous fascia may need to be installed. All fasciae rest on the top of their cases. The self contained fascia has a hook that needs to be slid through a gusset on the side of the case.

9. User Information

Stocking

Improper temperature and lighting will cause serious product loss. Discoloration, dehydration and spoilage can be controlled with proper use of the equipment and handling of product. Product temperature should always be maintained at a constant and proper temperature. This means that from the time the product is received, through storage, preparation and display, the temperature of the product must be controlled to maximize life of the product. Hussmann cases were not designed to “heat up” or “cool down” product - but rather to maintain an item’s proper temperature for maximum shelf life. To achieve the protection required always:

1. Minimize processing time to avoid damaging temperature rise to the product. Product should be at proper temperature.
2. Keep the air in and around the case area free of foreign gasses and fumes or food will rapidly deteriorate.
3. Maintain the display merchandisers temperature controls as outlined in the refrigerator section of this manual.
4. Do not place any product into these refrigerators until all controls have been adjusted and they are operating at the proper temperature. Allow merchandiser to operate a minimum of 6 hours before stocking with any product.
5. When stocking, never allow the product to extend beyond the recommended load limit. Air discharge and return air flow must be unobstructed at all times to provide proper refrigeration.
6. There are vents located at the base of the front of the glass, just above the front rail. These vents supply a continuous, gentle flow of air across the front glass which inhibits condensation. Do not place any signs or other restrictive objects on the front of the refrigerator that will block these vents.
7. Keep the service doors closed (when applicable). Refrigeration performance will be seriously affected if left open for a prolonged period of time.
8. Avoid the use of supplemental flood or spot lighting. Display light intensity has been designed for maximum visibility and product life at the factory. The use of higher output fluorescent lamps (H.O. and V.H.O.), will shorten the shelf life of the product.
9. In the Deli, Meat and Fish cases, completely cover the product each night with a clean damp cloth or butcher paper (never use plastic, as it does not allow for proper circulation). Make sure the cloth or paper is in direct contact with the product.
10. Turn and rotate the meat fairly often. The blood which gives the pink color works its way downward with time.
11. Cold coils remove heat and moisture from the case and deposit this as frost onto the coil. Thus, a defrost is required. Our humidity system induces moisture into the case and helps slow down the dehydration process. The only other moisture within the case is that in the product itself. A single level of meat will dry out faster than a fully loaded case of 3-4 levels of meat.

Important Steps

1. Do not set temperature too cold, as this causes product dehydration. Product Temperature: 33°F-35°F!
   Process the meat to enter case at 40°F or below. Product deterioration is very rapid above 400.
2. Temperature control should be by means of a T-STAT and Suction Stop Solenoid at each case. Do not use EPR valves, Liquid Line Solenoids or electronic control devices of any kind, as these allow temperature swings causing dehydration and excessive energy consumption.
3. Product should be worked and rotated on a regular basis, not to exceed a 4-hour period.
User Information (Cont'd)

4. At night, turn off case lights and cover the product with a damp (not wet) cloth similar to cheese cloth (etc.). This should be washed out in the morning and kept in a walk-in box during the day - so that it is cool and moist when covering the product.

5. Discharge air temperature should be approximately 26°F, with between 150-200 FPM air velocity. Do not display product directly within the air discharge.

6. Clean Humidity system a minimum of every 90 days for proper system operation.

Case Cleaning

Long life and satisfactory performance of any equipment are dependent upon the care given to it. To insure long life, proper sanitation and minimum maintenance costs, the refrigerator should be thoroughly cleaned frequently. SHUT OFF FAN DURING CLEANING PROCESS. It can be unplugged within the case, or shut off case at the source. The interior bottom may be cleaned with any domestic soap or detergent based cleaners. Sanitizing solutions will not harm the interior bottom, however, these solutions should always be used according to the manufacturer’s directions. It is essential to establish and regulate cleaning procedures. This will minimize bacteria causing discoloration which leads to degraded product appearance and significantly shortening product shelf life.

Soap and hot water are not enough to kill this bacteria. A sanitizing solution must be included with each cleaning process to eliminate this bacteria.

1. Scrub thoroughly, cleaning all surfaces, with soap and hot water.
2. Rinse with hot water, but do not flood.
3. Apply the sanitizing solution according to the manufacturer’s directions.
4. Rinse thoroughly.
5. Dry completely before resuming operation.

Cleaning Glass and Mirrors

Only use a soft cloth and mild glass cleaner for cleaning any glass or mirrored components. Be sure to rinse and/or dry completely. Never use hot water on cold glass surfaces! It may shatter and cause serious injury! Allow glass surfaces to warm first.

Plexiglass and Acrylic Care

Cleaning

Clean with plenty of nonabrasive soap (or detergent) and lukewarm water, using the bare hand to feel and dislodge any caked-on dirt. A soft, grit-free cloth, sponge or chamois may be used, but only as a means of carrying the water to the plastic. Hard, rough cloths or paper towels will scratch the acrylic and should not be used.

Waxing

If after removing dirt and grease, the acrylic can be waxed with a good grade commercial wax. This will improve the appearance of the surface by filling in most minor scratches. Wax should be applied in a thin even coat and brought to a high polish by rubbing lightly with a dry clean soft cloth, such as cotton flannel. Excessive rubbing may cause scratching and/or buildup an electrostatic charge which attracts dust and dirt to the surface. Blotting with a clean damp cloth is recommended to remove charge.

Antistatic Coatings

For acrylic used indoors, antistatic coatings successfully prevent the accumulation of an electrostatic charge for periods of several months - if the surface is not washed or wiped down with a wet cloth. Between applications of the antistatic coatings, the parts need only be dusted with a soft clean cloth to maintain a good appearance. In use, liquid antistatic coatings should be applied in a very thin even coat. If beads appear as it is applied, the coat is too thick and the excess should be removed with another cloth. Allow the coating to dry, then bring to a high gloss with a soft cloth.
LOADING BLIND SPRING

Night blinds are delivered pre-loaded. However, if it is necessary to load night blind spring, use a wrench (part number 0477098) to twist rectangular pin on right side of night blind. Twist clockwise 15 to 17 full revolutions.

*NOTE*
Keep arrow / dot / up pointed up while winding. Keep pointed down when installed.
10. Maintenance

Tips and Troubleshooting
Before calling for service, check the following:
1. Check electrical power supply to the equipment for connection.
2. Check fixture loading. Overstocking case will affect its proper operation.
3. If frost is collecting on fixture and/or product, check that Humidity Control is working properly, and that no outside doors or windows are open - allowing moisture to enter store.

Evaporator Fans
The evaporator fans are located at the center front of these merchandisers directly beneath the display pans. Should fans or blades need servicing, always replace fan blades with the raised embossed side of the blade TOWARD THE MOTOR.

Copper Coils
The copper coils used in Hussmann merchandisers may be repaired in the field. Materials are available from local refrigeration wholesalers.
Hussmann recommends using #15 Sil-Fos for repairs.

DANGER
BEFORE SERVICING
ALWAYS DISCONNECT ELECTRICAL POWER AT THE MAIN DISCONNECT WHEN SERVICING OR REPLACING ANY ELECTRICAL COMPONENT.
This includes (but not limited to) Fans, Heaters Thermostats, and Lights.

FOR PROMPT SERVICE
When contacting the factory, be sure to have the Case Model and Serial Number handy. This information is on a plate located on the case itself.
Stainless Steel Cleaning and Care

There are three basic things, which can break down your stainless steel’s passivity layer and allow corrosion.

1. **Mechanical Abrasion**
   Mechanical Abrasion means those things that will scratch the steel’s surface. Steel Pads, wire Brushes, and Scrapers are prime examples.

2. **Water**
   Water comes out of our tap in varying degrees of hardness. Depending on what part of the country you live in, you may have hard or soft water. Hard water may leave spots. Also, when heated, hard water leaves deposits behind that if left to sit, will break down the passive layer and rust your stainless steel. Other deposits from food preparation and service must be properly removed.

3. **Chlorides**
   Chlorides are found nearly everywhere. They are in water, food and table salt. One of the worst perpetrators of chlorides can come from household and industrial cleaners.

Don’t Despair! Here are a few steps that can help prevent stainless steel rust.

1. **Use the Proper Tools**
   When cleaning your stainless steel products, take care to use non-abrasive tools. Soft Clothes and plastic scouring pads will NOT harm the steel’s passive layer. Stainless steel pads can also be used but the scrubbing motion must be in the same direction of the manufacturer’s polishing marks.

2. **Clean With the Polish Lines**
   Some stainless steels come with visible polishing lines or “grain”. When visible lines are present, you should ALWAYS scrub in a motion that is parallel to them. When the grain cannot be seen, play it safe and use a soft cloth or plastic scouring pad.

3. **Use Alkaline, Alkaline Chlorinated or Non-chloride Containing Cleaners**
   While many traditional cleaners are loaded with chlorides, the industry is providing an ever increasing choice of non-chloride cleaners. If you are not sure of your cleaner’s chloride content contact your cleaner supplier. If they tell you that your present cleaner contains chlorides, ask for an alternative. Also, avoid cleaners containing quaternary salts as they also can attack stainless steel & cause pitting and rusting.

4. **Treat your Water**
   Though this is not always practical, softening hard water can do much to reduce deposits. There are certain filters that can be installed to remove distasteful and corrosive elements. Salts in a properly maintained water softener are your friends. If you are not sure of the proper water treatment, call a treatment specialist.

5. **Keep your Food Equipment Clean**
   Use alkaline, alkaline chlorinated or non-chlorinated cleaners at recommended strength. Clean frequently to avoid build-up of hard, stubborn stains. If you boil water in your stainless steel equipment, remember the single most likely cause of damage is chlorides in the water. Heating cleaners that contain chlorides has a similar effect.

6. **RINSE, RINSE, RINSE**
   If chlorinated cleaners are used you must rinse, rinse, rinse and wipe dry immediately. The sooner you wipe off standing water, especially when it contains cleaning agents, the better. After wiping the equipment down, allow it to air dry for the oxygen helps maintain the stainless steel’s passivity film.

7. **Never Use Hydrochloric Acid (Muriatic Acid) on Stainless Steel**

8. **Regularly Restore/Passivate Stainless Steel**
### 11. Controller Data

<table>
<thead>
<tr>
<th>Function</th>
<th>Codes</th>
<th>Min</th>
<th>Max</th>
<th>Factory Setting</th>
<th>RGD TYPE1</th>
<th>RGD TYPE 2</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Normal Operation</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Temperature (Set Point)</td>
<td>r01</td>
<td>0.1K</td>
<td>20K</td>
<td>2K</td>
<td>8</td>
<td>4</td>
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<tr>
<td><strong>Thermostat</strong></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Differential</td>
<td>r02</td>
<td>-49°C</td>
<td>50°C</td>
<td>50°C</td>
<td>32°F</td>
<td>32°F</td>
</tr>
<tr>
<td>Max. limitation of setpoint setting</td>
<td>r03</td>
<td>-50°C</td>
<td>49°C</td>
<td>-50°C</td>
<td>24°F</td>
<td>20°F</td>
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<tr>
<td>Min. limitation of setpoint setting</td>
<td>r05</td>
<td>°C</td>
<td>°F</td>
<td>°C</td>
<td>°F</td>
<td>°F</td>
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<tr>
<td>Temperature Unit (C/F)</td>
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<td></td>
<td></td>
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<tr>
<td>Manual Service (-1), Stop Regulation (0),</td>
<td>r12</td>
<td>-1</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>1</td>
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<tr>
<td>Start Regulation (1)</td>
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<td></td>
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<tr>
<td><strong>Alarm</strong></td>
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<tr>
<td><strong>Compressor</strong></td>
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<td></td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td><strong>Defrost</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Defrost Method (EL/Gas/Brine)</td>
<td>d01</td>
<td>no</td>
<td>Gas</td>
<td>EL</td>
<td>EL</td>
<td>EL</td>
</tr>
<tr>
<td>Defrost Stop Temperature</td>
<td>d02</td>
<td>0°C</td>
<td>25°C</td>
<td>6°C</td>
<td>48°F</td>
<td>48°F</td>
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<tr>
<td>Interval between defrost starts (Hours)</td>
<td>d03</td>
<td>0</td>
<td>48</td>
<td>8</td>
<td>6</td>
<td>2</td>
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<tr>
<td>Maximum Defrost duration (Minutes)</td>
<td>d04</td>
<td>0</td>
<td>180</td>
<td>45</td>
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<td>15</td>
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<tr>
<td>Defrost Sensor (0=Time, 1=S5, 2=S4)</td>
<td>d10</td>
<td>0</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

**Fans**

**HACCP**

**Real Time Clock**

**Miscellaneous**

**Service**
12. RGD Check List

- Check cases in and evaluate for missing or loose parts on each unit
- Create a list of any parts that are missing or damaged along with photos of damaged parts and submit PM to obtain parts (Aftermarket Parts)
- Ensure all lighting, including canopy and shelves, are fully functional
- Ensure that all case settings are intact by;
  1) Accessing the case controller

2) Check the Danfoss AKC-210-CC controller’s set point is 24 degrees
## 13. Electrical Wiring Diagrams

<table>
<thead>
<tr>
<th>Model</th>
<th>Description</th>
<th>Size</th>
<th>Diagram</th>
</tr>
</thead>
<tbody>
<tr>
<td>RGD-Remote</td>
<td>RGD-3'9-R 24 &amp; 30 X 72, 24 &amp; 30 X 83</td>
<td>3'9&quot;</td>
<td>3013101</td>
</tr>
<tr>
<td></td>
<td>RGD-4-R 24 &amp; 30 X 72, 24 &amp; 30 X 83</td>
<td>4'</td>
<td>3013100</td>
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<tr>
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<td>RGD-5-R 24 &amp; 30 X 72, 24 &amp; 30 X 83</td>
<td>5'</td>
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<td>RGD-6-R 24 &amp; 30 X 72, 24 &amp; 30 X 83</td>
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<td>RGD-8-R 24 &amp; 30 X 72, 24 &amp; 30 X 83</td>
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<td>RGD-10-R 24 &amp; 30 X 72, 24 &amp; 30 X 83</td>
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<td>RGD-12-R 24 &amp; 30 X 72, 24 &amp; 30 X 83</td>
<td>12'</td>
<td>3013095</td>
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<tr>
<td>RGD-SELF CONTAINED</td>
<td>R-404A 72 x 30 EE Fan DOE</td>
<td>3'</td>
<td>1H69741</td>
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<tr>
<td></td>
<td>R-404A 72 x 24 EE Fan DOE</td>
<td>3'</td>
<td>1H44123</td>
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<td></td>
<td>R-404A 72 x 24 EE Fan W/CORD DOE</td>
<td>3'</td>
<td>1H81040</td>
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<td></td>
<td>R-404A 72 x 24 EE Fan DOE</td>
<td>3'9&quot;</td>
<td>1H83392</td>
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<td></td>
<td>R-404A 72 X 30 DOE</td>
<td>4'</td>
<td>1H27729</td>
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<td></td>
<td>R-404A 72 X 30, L.E.D. Lights DOE</td>
<td>4'</td>
<td>1H63082</td>
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<tr>
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<td>R-404A 72 X 30 DOE</td>
<td>5'</td>
<td>1H24195</td>
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<td></td>
<td>72 X 30 With Ecoshine 3500K Lights DOE</td>
<td>5'</td>
<td>1H69704</td>
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<tr>
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<td>72 X 24 R-404A DOE</td>
<td>6'</td>
<td>1H36238</td>
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<td>R-404A 72 x 30 DOE</td>
<td>6'</td>
<td>1H39427</td>
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<td>R-404A 72 X 24 LED DOE</td>
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<td>R-404A with 3500K L.E.D. Lights 72 x 30 DOE</td>
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<td></td>
<td>R-404A 72 x 24 LED DOE</td>
<td>8'</td>
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</table>
NOTES:
CASE MUST BE GROUNDED
WHEN PASSING WIRES THROUGH METAL HOLES A GROMMET MUST BE USED
NOTES:
CASE MUST BE GROUNDED
WHEN PASSING WIRE THROUGH METAL HOLES A GROMMET MUST BE USED

CIRCUIT #1
LOADING 83" HIGH

CIRCUIT #1
LOADING 72" HIGH

LIGHT CIRCUIT (CONT'D)

Optimal for 83" High Case

---

Wiring Diagrams (Cont'd)
CIRCUIT #1
L1
LOADING 83" HIGH
120V

1.4

2ND ROW
3RD ROW
1ST ROW
4TH. ROW
5TH. ROW

BUNDLE COLOR
BLACK & WHITE

SUCTION
SOLENOID
LN
T-STAT
225-01-0707

BUNDLE
BROWN

BLACK#14
WHITE#14

~120 VAC - 60 Hz.
L1 N
MCA= 0.75A
MOP= 15A

EVAPORATOR FAN
12W 0.3A @ 120VAC

(2) 0477655

~120 VAC - 60 Hz.
CANOPY LIGHTS
LEDDRIVER
BUNDLE
ORANGE

MCA= 1.03A
MOP= 15A

LIGHT CIRCUIT
0.82A 89W @ 120V

5'L.E.D.LIGHT
RED+
BLUE-

LIGHT SWITCH
125-01-0307
BLK#14
WHT#14
LEDDRIVER
RED+
BLUE-

OPTIONAL FOR 83" HIGH CASE

5'L.E.D.LIGHT
5'L.E.D.LIGHT
5'L.E.D.LIGHT
5'L.E.D.LIGHT
5'L.E.D.LIGHT
5'L.E.D.LIGHT
5'L.E.D.LIGHT

CIRCUIT #1
LOADING 72" HIGH
1.2
120V

Wiring Diagrams (Cont'd)
NOTES:
CASE MUST BE GROUNDED
WHEN PASSING WIRES THROUGH METAL HOLES A GROMMET MUST BE USED
CIRCUIT #1
LOADING 83" HIGH

CIRCUIT #1
LOADING 72" HIGH

LIGHT CIRCUIT
120V 2.05 @ 120V

OPTIONAL FOR 83" high CASE

NOTES:
CASE MUST BE GROUNDED
WHEN PASSING WIRES THROUGH METAL HOLES A GROMMET MUST BE USED
NOTES:
CASE MUST BE GROUNDED
WHEN PASSING WIRES THROUGH METAL HOLES A GROMMET MUST BE USED
NOTE: WIRES AT CONTROL INPUTS/OUTPUTS 14GA MAX

LED DRIVER
- BLUE - RED +

3' LED LIGHT
- 3' LED LIGHT
- 3' LED LIGHT
- 3' LED LIGHT
- 3' LED LIGHT

NOTE: CASE MUST BE GROUNDED

NOTE: WIRING AT CONTROL INPUTS/OUTPUTS 14GA MAX
NOTE: WIRES AT CONTROL INPUTS/OUTPUTS 14GA MAX

COND. PUMPS BECKETT™
AK-CC 210 115V # 0648534
1H6602550

CONDENSING UNIT
RLA= 10.0A
LRA= 51.0A
MCC= 13.7A

COPELAND
208/230VAC, 60HZ
3094075500

NOTE: CASE MUST BE GROUNDED

LED DRIVER
BLUE - RED +

NOTE: 2ND DRIVER NEEDED
ONLY IF ESII CANOPY LIGHTS

NOTE: 2ND DRIVER NEEDED
ONLY IF ESII CANOPY LIGHTS

NOTE: 2ND DRIVER NEEDED
ONLY IF ESII CANOPY LIGHTS

NOTE: 2ND DRIVER NEEDED
ONLY IF ESII CANOPY LIGHTS
NOTE:
CASE MUST BE GROUNDED

~208/240 VAC - 60 Hz.
TOGGLE SWITCH

FUSE 125-01-8604
FUSE HOLDER 125-01-8605

F35T5-60” 125-03-1134

SAFE SWIT CH
FLOAT SWITCH
EVAPORATOR PAN
1500W @ ~ 240 VAC
1H95137550

CONDENSING UNIT
COPELAND
FFAP-017Z-CFV-07220
8/230VAC, 60HZ
1H96225

DUPLEX
(1) 125-01-0096
COND. PUMPS BECKETT™
CB151ULTZ 225-01-1661
1.7A @120VAc PLUG NEMA 5-15P

DUPLEX
W      G      BK

FAN MOTOR
(2)0477655
.3A 12W @120VAC

SWITCH
MOTOR START
SQ “D”
125-01-0271

RED #
10
BLK #
10
WHITE #
14
GREEN #
10

LIGHT CIRCUIT= 1.62A 175W

RELAY TYCO
T92P7A22-240
1804241

BALLAST 125-01-3267
FULHAM LH4-120-L

DANFOSS® CONTROLLER
AK-CC 210 115V # 084B8534
1H56892500

Danfoss
®  AK-CC 210

DEF.COMP.
120 VAC

SENSOR EKC-202C
DANFOSS® # 084N0027
1H26193500

NOTE:
WIRES AT CONTROL INPUTS/OUTPUTS
14GA MAX

NOTE:
CASE MUST BE GROUNDED

CIRCUIT #1
22.8
18.9
19.81
6.4
L2    L1
208V  240 V
LOADING
NOTE: CASE MUST BE GROUNDED

<table>
<thead>
<tr>
<th>CIRCUIT #1</th>
<th>LOADING</th>
<th>208V 240 V</th>
</tr>
</thead>
<tbody>
<tr>
<td>L1</td>
<td>16.0</td>
<td>18.5</td>
</tr>
<tr>
<td>L2</td>
<td>13.5</td>
<td>15.6</td>
</tr>
</tbody>
</table>

NOTE: WIRES AT INPUTS/OUTPUTS 14GA MAX

COND. PUMPS BECKETT™
CB151 ULTZ 225-01-1661
1.7A @120Vac

PLUG NEMA 5-15P
DUPLEX
(1) 125-01-0096

DANFOSS® CONTROLLER
AK-CC 210 115V # 084B8534
1H56892500

NOTE: CASE MUST BE GROUNDED

Hussmann Corporation, Int'l.
13770 Ramona Avenue
Chino, CA. 91710
(909)-590-4910     Lic.#: 644406

REVISIONS:
# DESCRIPTION:       DATE:      BY: CHECKED BY: DATE: 12/28/11
A. CIR196423 Changed Evap Pan, Relay Wiring 5/12/15 CB
B. EON CAP-0016801 Changed Cond. Unit 4/8/19 CB

FILE LOCATION:
DIAGRAM-RGD-24-72-5-SC  PAGE 1 OF 1
NOTE: CASE MUST BE GROUNDED

COND. PUMPS BECKETT™ CB15/UL/TT 225-01-1661 1.7A @ 120Vac

PLUG NEMA 5-15P

TOGGLE SWITCH 125-01-0307

DUPLEX (1) 125-01-0096

CONDENSER FAN DANFOSS® Controller AK-CC 210 # 084B8534 1H56892500

DANFOSS® SENSOR EHC-202C # 084N0027 1H26193500

FAN MOTOR #0477655 .30A 12W @120VAC

RELAY TYCO T92P7A22-240 1804241

FUSE 125-01-8604

FUSE HOLDER 125-01-8605

LIGHT CIRCUIT = 1.94A 210W

CIRCUIT #1

-208/240 VAC - 60 Hz.

NOTE: WIRES AT CONTROL INPUTS/OUTPUTS 14GA MAX

NOTE: CASE MUST BE GROUNDED

22.3 18.6 19.3 16.1

208V 240 V

L1  19.3  22.3

L2  16.1  18.6
NOTES
CASE MUST BE GROUNDED
## Troubleshooting

<table>
<thead>
<tr>
<th>Problem</th>
<th>Possible Cause</th>
<th>Possible Solution</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Case temperature is too warm.</strong></td>
<td>Ambient conditions may be affecting the case operation.</td>
<td>Check case position in store. Is the case located near an open door, window, electric fan or air conditioning vent that may cause air currents? Case must be located minimum 15 Ft away from doors or windows. Cases are designed to operate at 55% Relative humidity and a temperature of 75°F.</td>
</tr>
<tr>
<td><strong>Discharge air temp is out of spec.</strong></td>
<td></td>
<td>Check evaporator fan operation. Check electrical connections and input voltage. Fans are installed backwards. Check airflow direction. Fan blades are installed incorrectly. Make sure fan blades have correct pitch and are per specification. Check to see that fan plenum is installed correctly. It should not have any gaps. Check suction pressure and insure that it meets factory specifications.</td>
</tr>
<tr>
<td><strong>Case is in defrost.</strong></td>
<td></td>
<td>Check defrost settings. See Technical Specifications section.</td>
</tr>
<tr>
<td><strong>Product load may be over its limits blocking airflow.</strong></td>
<td>Redistribute product so it does not exceed load level. There is a sticker on the inside of the case indicating what the maximum load line is.</td>
<td></td>
</tr>
<tr>
<td><strong>Coil is freezing over.</strong></td>
<td>Return air is blocked, make sure debris is not blocking the intake section.</td>
<td>Coil close-offs are not installed. Inspect coil to make sure these parts are on the case.</td>
</tr>
<tr>
<td><strong>Condensing coil or evaporator coil is clogged or dirty.</strong></td>
<td></td>
<td>Clean coil.</td>
</tr>
<tr>
<td><strong>Case temperature is too cold.</strong></td>
<td>The t-stat temp is set too low.</td>
<td>Check settings. See Technical Specifications section.</td>
</tr>
<tr>
<td><strong>Ambient conditions may be affecting the case operation.</strong></td>
<td>Check case position in store. Is the case located near an open door, window, electric fan or air conditioning vent that may cause air currents? Case must be located minimum 15 Ft away from doors or windows. Cases are designed to operate at 55% Relative humidity and a temperature of 75°F.</td>
<td></td>
</tr>
<tr>
<td><strong>Condensation on glass.</strong></td>
<td>Ambient conditions may be affecting the case operation.</td>
<td>Check case position in store. Is the case located near an open door, window, electric fan or air conditioning vent that may cause air currents? Case must be located minimum 15 Ft away from doors or windows. Cases are designed to operate at 55% Relative humidity and a temperature of 75°F.</td>
</tr>
<tr>
<td><strong>Inadequate air circulation.</strong></td>
<td></td>
<td>Check if air sweep fans are functioning, check electrical connections.</td>
</tr>
<tr>
<td><strong>There is not enough heat provided in the airflow.</strong></td>
<td></td>
<td>Check if air sweep heater is functioning, check electrical connections.</td>
</tr>
<tr>
<td><strong>There are glass gaps on the side of the case.</strong></td>
<td></td>
<td>See glass adjustment section.</td>
</tr>
<tr>
<td><strong>Glass is not completely shut.</strong></td>
<td></td>
<td>Close glass correctly.</td>
</tr>
<tr>
<td>Problem</td>
<td>Possible Cause</td>
<td>Possible Solution</td>
</tr>
<tr>
<td>---------</td>
<td>----------------</td>
<td>-------------------</td>
</tr>
<tr>
<td>Water has pooled under case.</td>
<td>Case drain is clogged.</td>
<td>Clear drain.</td>
</tr>
<tr>
<td>PVC drains under case may have a leak.</td>
<td></td>
<td>Repair as needed.</td>
</tr>
<tr>
<td>Case tub has unsealed opening.</td>
<td></td>
<td>Seal as needed.</td>
</tr>
<tr>
<td>If the case is in a line-up, case to case joint is missing or unsealed.</td>
<td></td>
<td>Install case to case joint and seal as needed.</td>
</tr>
<tr>
<td>Evaporator pan is overflowing (if applicable).</td>
<td></td>
<td>Check electrical connection to evaporator pan. Check float assembly, it should move freely up and down the support stem. Clear any debris.</td>
</tr>
<tr>
<td>Case is not draining properly.</td>
<td>Case is not level.</td>
<td>Level the case.</td>
</tr>
<tr>
<td>Drain screen is plugged.</td>
<td></td>
<td>Clean drain screen and remove any debris.</td>
</tr>
<tr>
<td>Drain or P-trap is clogged.</td>
<td></td>
<td>Clear any debris.</td>
</tr>
<tr>
<td>Frost or ice on evaporator coil.</td>
<td>Evaporator fans are not functioning.</td>
<td>Check electrical connections.</td>
</tr>
<tr>
<td>Defrost clock is not functioning.</td>
<td></td>
<td>Case should be serviced by a qualified service technician.</td>
</tr>
<tr>
<td>Coil is freezing over.</td>
<td></td>
<td>Return air is blocked, make sure debris is not blocking the intake section.</td>
</tr>
<tr>
<td></td>
<td>Coil close-offs are not installed. Inspect coil to make sure these parts are on the case.</td>
<td></td>
</tr>
<tr>
<td>Large gap is visible on bottom of front glass or glass can't be opened because it is too low.</td>
<td>Glass Height adjusters need to be adjusted.</td>
<td>See Glass Adjustment section.</td>
</tr>
<tr>
<td>Large gaps are visible in between glass panels or glass rubs against end panel.</td>
<td>Glass/glass clamp assembly needs to be adjusted.</td>
<td>See Glass Adjustment section.</td>
</tr>
<tr>
<td>Front glass does not stay open and falls closed.</td>
<td>Glass shock/piston may need to be replaced.</td>
<td>Case should be serviced by a qualified service technician.</td>
</tr>
<tr>
<td>Lights do not come on.</td>
<td>LED Driver/light socket wiring.</td>
<td>Check electrical connections. See Electrical Section and check wiring diagram.</td>
</tr>
<tr>
<td>Driver needs to be replaced.</td>
<td></td>
<td>Case should be serviced by a qualified service technician.</td>
</tr>
<tr>
<td>Lamp socket needs to be replaced.</td>
<td></td>
<td>See Electrical Section.</td>
</tr>
<tr>
<td>Lamp needs to be replaced.</td>
<td></td>
<td>Case should be serviced by a qualified service technician.</td>
</tr>
<tr>
<td>Light Switch needs to be replaced.</td>
<td></td>
<td>See Maintenance Section.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Case should be serviced by a qualified service technician.</td>
</tr>
</tbody>
</table>
Appendices

Appendix A. - Temperature Guidelines

The refrigerators should be operated according to the manufacturer’s published engineering specifications for entering air temperatures for specific equipment applications. Table 1 shows the typical temperature of the air entering the food zone one hour before the start of defrost and one hour after defrost for various categories of refrigerators. Refer to Appendix C for Field Evaluation Guidelines.

<table>
<thead>
<tr>
<th>Type of Refrigerator</th>
<th>Typical Entering Air Temperature</th>
</tr>
</thead>
<tbody>
<tr>
<td>I. OPEN DISPLAY</td>
<td></td>
</tr>
<tr>
<td>A. Non frozen:</td>
<td></td>
</tr>
<tr>
<td>1) Meat</td>
<td>28°F</td>
</tr>
<tr>
<td>2) Dairy/Deli</td>
<td>32°F</td>
</tr>
<tr>
<td>3) Produce</td>
<td></td>
</tr>
<tr>
<td>a. Processed</td>
<td>36°F</td>
</tr>
<tr>
<td>b. Unprocessed</td>
<td>45°F</td>
</tr>
<tr>
<td>B. Frozen</td>
<td>0°F</td>
</tr>
<tr>
<td>C. Ice Cream</td>
<td>-5°F</td>
</tr>
<tr>
<td>II. CLOSED DISPLAY</td>
<td></td>
</tr>
<tr>
<td>A. Non frozen:</td>
<td></td>
</tr>
<tr>
<td>1) Meat</td>
<td>34°F</td>
</tr>
<tr>
<td>2) Dairy/Deli</td>
<td>34°F</td>
</tr>
<tr>
<td>3) Produce</td>
<td></td>
</tr>
<tr>
<td>a. Processed</td>
<td>36°F</td>
</tr>
<tr>
<td>b. Unprocessed</td>
<td>45°F</td>
</tr>
<tr>
<td>B. Frozen</td>
<td>0°F</td>
</tr>
<tr>
<td>C. Ice Cream</td>
<td>-5°F</td>
</tr>
</tbody>
</table>

Appendix B. - Application Recommendations

1.0 Temperature performance is critical for controlling bacteria growth. Therefore, the following recommendations are included in the standard. They are based on confirmed field experience over many years.

1.1 The installer is responsible for following the installation instructions and recommendations provided by Hussmann for the installation of each individual type refrigerator.

1.2 Refrigeration piping should be sized according to the equipment manufacturer’s recommendations and installed in accordance with normal refrigeration practices. Refrigeration piping should be insulated according to Hussmann’s recommendations.

1.3 A clogged waste outlet blocks refrigeration. The installer is responsible for the proper installation of the system which dispenses condensate waste through an air gap into the building indirect waste system.

1.4 The installer should perform a complete start-up evaluation prior to the loading of food into the refrigerator, which includes such items as:

a) Initial temperature performance, Coils should be properly fed with a refrigerant according to manufacturer’s recommendations.

b) Observation of outside influences such as drafts, radiant heating from the ceiling and from lamps. Such influence should be properly corrected or compensated for.

c) At the same time, checks should be made of the store dry-bulb and wet-bulb temperatures to ascertain that they are within the limits prescribed by Hussmann.

d) Complete start-up procedures should include checking through a defrost to make certain of its adequate frequency and length without substantially exceeding the actual needs. This should include checking the electrical or refrigerant circuits to make sure that defrosts are correctly programmed for all the refrigerators connected to each refrigeration system.

e) Recording instruments should be used to check performance.

Appendix C. - Field Recommendations

Recommendations for field evaluating the performance of retail food refrigerators and hot cases

1.0 The most consistent indicator of display refrigerator performance is temperature of the air entering the product zone (see Appendix A). In practical use, the precise determination of return air temperature is extremely difficult. Readings of return air temperatures will be variable and results will be inconsistent. The product temperature alone is not an indicator of refrigerator performance.
NOTE: Public Health will use the temperature of the product in determining if the refrigerator will be allowed to display potentially hazardous food. For the purpose of this evaluation, product temperature above the FDA Food Code 1993 temperature for potentially hazardous food will be the first indication that an evaluation should be performed. It is expected that all refrigerators will keep food at the FDA Food Code 1993 temperature for potentially hazardous food.

1.1 The following recommendations are made for the purpose of arriving at easily taken and understood data which, coupled with other observations, may be used to determine whether a display refrigerator is working as intended:

a) INSTRUMENT - A stainless steel stem-type thermometer is recommended and it should have a dial a minimum of 1 inch internal diameter. A test thermometer scaled only in Celsius or dually scaled in Celsius and Fahrenheit shall be accurate to 1°C (1.8°F). Temperature measuring devices that are scaled only in Fahrenheit shall be accurate to 2°F. The thermometer should be checked for proper calibration. (It should read 32°F when the stem is immersed in an ice water bath).

b) LOCATION - The probe or sensing element of the thermometer should be located in the airstream where the air first enters the display or storage area, and not more than 1 inch away from the surface and in the center of the discharge opening.

c) READING - It should first be determined that the refrigerator is refrigerating and has operated at least one hour since the end of the last defrost period. The thermometer reading should be made only after it has been allowed to stabilize, i.e., maintain a constant reading.

d) OTHER OBSERVATIONS - Other observations should be made which may indicate operating problems, such as unsatisfactory product, feel/appearance.

e) CONCLUSIONS - In the absence of any apparent undesirable conditions, the refrigerator should be judged to be operating properly. If it is determined that such condition is undesirable, i.e., the product is above proper temperature, checks should be made for the following:
1. Has the refrigerator been loaded with warm product?
2. Is the product loaded beyond the “Safe Load Line” markers?
3. Are the return air ducts blocked?
4. Are the entering air ducts blocked?
5. Is a dumped display causing turbulent airflow and mixing with room air?
6. Are spotlights or other high intensity lighting directed onto the product?
7. Are there unusual draft conditions (from heating/air-conditioning ducts, open doors, etc.)?
8. Is there exposure to direct sunlight?
9. Are display signs blocking or diverting airflow?
10. Are the coils of the refrigerator iced up?
11. Is the store ambient over 75°F, 55% RH as set forth in ASHRAE Standard 72 and ASHRAE Standard 117?
12. Are the shelf positions, number, and size other than recommended by Hussmann?
13. Is there an improper application or control system?
14. Is the evaporator fan motor/blade inoperative?
15. Is the defrost time excessive?
16. Is the defrost termination, thermostat (if used) set too high?
17. Are the refrigerant controls incorrectly adjusted?
18. Is the air entering the condenser above design conditions? Are the condenser fins clear of dirt, dust, etc.?
19. Is there a shortage of refrigerant?
20. Has the equipment been modified to use replacements for CFC-12, CFC-502 or other refrigerant? If so, have the modifications been made in accordance with the recommendations of the equipment manufacturer? Is the refrigerator charged with the proper refrigerant and lubricant? Does the system use the recommended compressor?

Appendix D. - Recommendations to User

1.0 Hussmann Corporation provides instructions and recommendations for proper periodic cleaning. The user will be responsible for such cleaning, including the cleaning of low temperature equipment within the compartment and the cooling coil area(s). Cleaning practices, particularly with respect to proper refrigerator unloading and warm-up, must be in accordance with applicable recommendations.
1.1 Cleaning of non frozen food equipment should include a weekly cleaning of the food compartment as a minimum to prevent bacteria growth from accumulating. Actual use and products may dictate more frequent cleaning. Circumstances of use and equipment design must also dictate the frequency of cleaning the display areas. Weekly washing down of the storage compartment is also recommended, especially for equipment subject to drippage of milk or other liquids, or the collection of vegetable, meat, crumbs, etc. or other debris or litter. Daily cleaning of the external areas surrounding the storage or display compartments with detergent and water will keep the equipment presentable and prevent grime buildup.

1.2 Load levels as defined by the manufacturer must be observed.

1.3 The best preservation is achieved by following these rules:
   a) Buy quality products.
   b) Receive perishables from transit equipment at the ideal temperature for the particular product.
   c) Expedite perishables to the store’s storage equipment to avoid unnecessary warm-up and prolonged temperature recovery. Food store refrigerators are not food chillers nor can they reclaim quality lost through previous mishandling.
   d) Care must be taken when cross merchandising products to ensure that potentially hazardous vegetable products are not placed in non refrigerated areas.
   e) Display and storage equipment doors should be kept closed during periods of inactivity.
   f) Minimize the transfer time of perishables from storage to display.
   g) Keep meat under refrigeration in meat cutting and processing area except for the few moments it is being handled in processing. When a cut or tray of meat is not to be worked on immediately, the procedure should call for returning it to refrigeration.
   h) Keep tools clean and sanitized. Since mechanical equipment is used for fresh meat processing, all such equipment should be cleaned at least daily and each time a different kind of meat product comes in contact with the tool or equipment.
   i) Make sure that all refrigeration equipment is installed and adjusted in strict accordance with the manufacturer’s recommendations.
   j) See that all storage and refrigeration equipment is kept in proper working order by routine maintenance.

For further technical information, please log on to http://www.hussmann.com/products/RGD.htm
## RGD Program Parameters

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Code</th>
<th>Min</th>
<th>Max</th>
<th>Default</th>
<th>Actual (°C)</th>
<th>Actual (°F)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Temperature (set point)</strong></td>
<td></td>
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<tr>
<td>Deli (Type I)</td>
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<tr>
<td>Max. limitation of setpoint setting</td>
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<td>Min. limitation of setpoint setting</td>
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<tr>
<td>Adjustment of temperature indication</td>
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<tr>
<td>Temperature unit (°C=0/°F=1)</td>
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<tr>
<td>Correction of the signal from S4</td>
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<tr>
<td>Manual service, stop regulation, start regulation (-1, 0, 1)</td>
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<tr>
<td>Displacement of reference during night operation</td>
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<tr>
<td>Definition and weighting, if applicable, of thermostat sensors - 54% (100%=S4, 0%=S3)</td>
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<tr>
<td>The heating function is started a number of degrees below the thermostats cutout temperature</td>
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<td>Activation of reference displacement r40</td>
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<tr>
<td>Value of reference displacement (activate via r39 or D1)</td>
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<tr>
<td><strong>Alarm</strong></td>
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<tr>
<td>Delay for temperature alarm</td>
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<tr>
<td>Delay for door alarm</td>
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<td>Delay for temperature alarm after defrost</td>
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<tr>
<td>High alarm limit</td>
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<tr>
<td>Low alarm limit</td>
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<td>Alarm delay D1</td>
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<td>Alarm delay D12</td>
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<td>Signal for alarm thermostat. 54% (100%=S4, 0%=S3)</td>
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<tr>
<td><strong>Compressor</strong></td>
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<tr>
<td>Min. ON-time</td>
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<tr>
<td>Min. OFF-time</td>
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<td>Time delay for cutin of comp. 2</td>
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<td>Compressor relay 1 must cutin and out inversely (NC-function)</td>
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<tr>
<td><strong>Defrost</strong></td>
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<td>Defrost method (none/EL/GAS/BRINE)</td>
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<tr>
<td>Defrost stop temperature</td>
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<tr>
<td>Interval between defrost starts</td>
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<td>Max. defrost duration</td>
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<td>Drip off time</td>
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<td>Delay for fan start after defrost</td>
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<td>Fan start temperature</td>
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<tr>
<td>Fan cutin during defrost</td>
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<tr>
<td>1: Stopped</td>
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<tr>
<td>2: Running</td>
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<tr>
<td>DeFrost Sensor (0=time, 1=5S, 2=54)</td>
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<tr>
<td>Pump down delay</td>
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<td>Drain delay</td>
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<tr>
<td>Max. aggregate refrigeration time between two defrosts</td>
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<tr>
<td>DeFrost on demand - SS temperature's permitted variation during frost build-up. On central plant choose 20 K (=off)</td>
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<td>Delay of hot gas defrost</td>
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<tr>
<td>Fan</td>
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<tr>
<td>Fan stop at cutout compressor</td>
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<tr>
<td>Delay of fan stop</td>
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<td>Fan stop temperature (55)</td>
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**STANDARD CASE REV C 8/18/17**

**Type II CASE REV C 8/18/17**

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<tr>
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<th>Max</th>
<th>Default</th>
<th>Actual (°C)</th>
<th>Actual (°F)</th>
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<tbody>
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<td><strong>Temperature (set point)</strong></td>
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</tr>
<tr>
<td>Deli (Type I)</td>
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<td>Max. limitation of setpoint setting</td>
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<td>Min. limitation of setpoint setting</td>
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<tr>
<td>Adjustment of temperature indication</td>
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<tr>
<td>Temperature unit (°C=0/°F=1)</td>
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<tr>
<td>Correction of the signal from S4</td>
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<td>Manual service, stop regulation, start regulation (-1, 0, 1)</td>
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<tr>
<td>Displacement of reference during night operation</td>
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<tr>
<td>Definition and weighting, if applicable, of thermostat sensors - 54% (100%=S4, 0%=S3)</td>
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<tr>
<td>The heating function is started a number of degrees below the thermostats cutout temperature</td>
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<tr>
<td>Activation of reference displacement r40</td>
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<tr>
<td>Value of reference displacement (activate via r39 or D1)</td>
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<tr>
<td><strong>Alarm</strong></td>
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<tr>
<td>Delay for temperature alarm</td>
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<td>Delay for door alarm</td>
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<tr>
<td>Delay for temperature alarm after defrost</td>
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<tr>
<td>High alarm limit</td>
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<td>Low alarm limit</td>
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<td>Alarm delay D1</td>
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<td>Alarm delay D12</td>
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<tr>
<td>Signal for alarm thermostat. 54% (100%=S4, 0%=S3)</td>
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<tr>
<td><strong>Compressor</strong></td>
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<tr>
<td>Min. ON-time</td>
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<tr>
<td>Min. OFF-time</td>
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<tr>
<td>Time delay for cutin of comp. 2</td>
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<tr>
<td>Compressor relay 1 must cutin and out inversely (NC-function)</td>
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<tr>
<td><strong>Defrost</strong></td>
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<tr>
<td>Defrost method (none/EL/GAS/BRINE)</td>
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<tr>
<td>Defrost stop temperature</td>
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<tr>
<td>Interval between defrost starts</td>
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<tr>
<td>Max. defrost duration</td>
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<tr>
<td>Drip off time</td>
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<tr>
<td>Delay for fan start after defrost</td>
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<tr>
<td>Fan start temperature</td>
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<tr>
<td>Fan cutin during defrost</td>
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<tr>
<td>1: Stopped</td>
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<tr>
<td>2: Running</td>
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<tr>
<td>DeFrost Sensor (0=time, 1=5S, 2=54)</td>
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<tr>
<td>Pump down delay</td>
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<td>Drain delay</td>
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<tr>
<td>Max. aggregate refrigeration time between two defrosts</td>
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<tr>
<td>DeFrost on demand - SS temperature's permitted variation during frost build-up. On central plant choose 20 K (=off)</td>
<td></td>
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<tr>
<td>Delay of hot gas defrost</td>
<td></td>
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<tr>
<td>Fan</td>
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<tr>
<td>Fan stop at cutout compressor</td>
<td></td>
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<tr>
<td>Delay of fan stop</td>
<td></td>
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<tr>
<td>Fan stop temperature (55)</td>
<td></td>
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</table>
### HACCP

<table>
<thead>
<tr>
<th>Description</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Actual temperature measurement for the HACCP</td>
<td>h01</td>
</tr>
<tr>
<td>Last registered peak temperature</td>
<td>h10</td>
</tr>
<tr>
<td>Selection of function and sensor for the HACCP</td>
<td>h11</td>
</tr>
<tr>
<td>HACCP function. 1 = S4 used (maybe also S3), 2 = S5</td>
<td></td>
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<tr>
<td>Alarm limit for the HACCP function</td>
<td>h12</td>
</tr>
<tr>
<td>Last registered peak temperature</td>
<td>h13</td>
</tr>
<tr>
<td>Selection for the HACCP function. 54% (100% = S4, 94% = S1)</td>
<td>h14</td>
</tr>
<tr>
<td><strong>Real time clock</strong></td>
<td></td>
</tr>
<tr>
<td>Six start times for defrost.</td>
<td>t01-t06</td>
</tr>
<tr>
<td>Setting of hours. 0=OFF</td>
<td></td>
</tr>
<tr>
<td>Six start times for defrost.</td>
<td>t11-t16</td>
</tr>
<tr>
<td>Setting of minutes. 0=OFF</td>
<td></td>
</tr>
<tr>
<td>Clock - Setting of hours</td>
<td>t07</td>
</tr>
<tr>
<td>Clock - Setting of minute</td>
<td>t08</td>
</tr>
<tr>
<td>Clock - Setting of date</td>
<td>t45</td>
</tr>
<tr>
<td>Clock - Setting of month</td>
<td>t46</td>
</tr>
<tr>
<td>Clock - Setting of year</td>
<td>t47</td>
</tr>
<tr>
<td><strong>Miscellaneous</strong></td>
<td></td>
</tr>
<tr>
<td>Delay of output signals after start-up</td>
<td>o01</td>
</tr>
<tr>
<td>Input signal on DI1. Function</td>
<td>o02</td>
</tr>
<tr>
<td>Network address</td>
<td>o03</td>
</tr>
<tr>
<td>On/Off switch (Service Pin message)</td>
<td>o04</td>
</tr>
<tr>
<td>Access code 1 (all settings)</td>
<td>o05</td>
</tr>
<tr>
<td>Used sensor type (Pt/PTC/NTC)</td>
<td>o06</td>
</tr>
<tr>
<td>Display step = 0.5 (normal 0.1 at Pt sensor)</td>
<td>o15</td>
</tr>
<tr>
<td>Max hold time after coordinated defrost</td>
<td>o16</td>
</tr>
<tr>
<td>Select signal for display view. 54% (100% = S4)</td>
<td>o17</td>
</tr>
<tr>
<td>Input signal on DI2. Function</td>
<td>o37</td>
</tr>
<tr>
<td>Configuration of light function (relay 4)</td>
<td>o38</td>
</tr>
<tr>
<td>Activation of light relay (only if o38=2)</td>
<td>o39</td>
</tr>
<tr>
<td>Rail heat On Time during day operations</td>
<td>o41</td>
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<tr>
<td>Rail heat On Time during night operations</td>
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<tr>
<td>Rail heat period time (On time + Off time)</td>
<td>o43</td>
</tr>
<tr>
<td>Case cleaning. 0=no case cleaning. 1=Fan only. 2=All</td>
<td>o46</td>
</tr>
<tr>
<td>Selection of EL diagram. See overview page 6</td>
<td>o61</td>
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<tr>
<td>Download a set of predetermined settings. See</td>
<td>o62</td>
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<tr>
<td>Save the controllers present settings to the</td>
<td>o65</td>
</tr>
<tr>
<td>Load a set of settings from the programming key</td>
<td>o66</td>
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<tr>
<td>Replace the controllers factory settings with the</td>
<td>o67</td>
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<tr>
<td><strong>Service</strong></td>
<td></td>
</tr>
<tr>
<td>Status codes are shown on page 17</td>
<td>s0-s33</td>
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<tr>
<td>Temperature measured with S5 sensor</td>
<td>u09</td>
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<tr>
<td>Status on DI1 input. On/1=closed</td>
<td>u10</td>
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<tr>
<td>Temperature measured with S3 sensor</td>
<td>u12</td>
</tr>
<tr>
<td>Status on night operation. On/off 1=closed</td>
<td>u13</td>
</tr>
<tr>
<td>Temperature measured with S4 sensor</td>
<td>u16</td>
</tr>
<tr>
<td>Thermostat temperature</td>
<td>u17</td>
</tr>
<tr>
<td>Read the present regulation reference</td>
<td>u28</td>
</tr>
<tr>
<td>Status on DI2 output. On/1=closed</td>
<td>u37</td>
</tr>
<tr>
<td>Temperature shown on display</td>
<td>u56</td>
</tr>
<tr>
<td>Measured temperature for alarm thermostat</td>
<td>u57</td>
</tr>
<tr>
<td>Status on relay for cooling</td>
<td>u58</td>
</tr>
<tr>
<td>Status on relay for fan</td>
<td>u59</td>
</tr>
<tr>
<td>Status on relay for defrost</td>
<td>u60</td>
</tr>
<tr>
<td>Status on relay for railheat</td>
<td>u61</td>
</tr>
<tr>
<td>Status on relay for alarm</td>
<td>u62</td>
</tr>
<tr>
<td>Status on relay for light</td>
<td>u63</td>
</tr>
<tr>
<td>Status on relay for valve in suction line</td>
<td>u64</td>
</tr>
<tr>
<td>Status on relay for compressor 2</td>
<td>u67</td>
</tr>
</tbody>
</table>
Controller for temperature control
AK-CC 210

ADAP-KOOL® Refrigeration control systems
Introduction

Application
- The controller is used for temperature control refrigeration appliances in supermarkets
- With many predefined applications one unit will offer you many options. Flexibility has been planned both for new installations and for service in the refrigeration trade

Principle
The controller contains a temperature control where the signal can be received from one or two temperature sensors. The thermostat sensors are either placed in the cold air flow after the evaporator, in the warm air flow just before the evaporator, or both. A setting will determine how great an influence the two signals are to have on the control.

A measurement of the defrost temperature can be obtained directly through the use of an S5 sensor or indirectly through the use of the S4 measurement. Four relays will cut the required functions in and out – the application determines which. The options are the following:
- Refrigeration (compressor or relay)
- Fan
- Defrost
- Rail heat
- Alarm
- Light
- Fans for hotgas defrost
- Refrigeration 2 (compressor 2 or relay 2)

The different applications are described on page 6.

Advantages
- Many applications in the same unit
- The controller has integrated refrigeration-technical functions, so that it can replace a whole collection of thermostats and timers
- Buttons and seal imbedded in the front
- Can control two compressors
- Easy to remount data communication
- Quick setup
- Two temperature references
- Digital inputs for various functions
- Clock function with super cap backup
- HACCP (Hazard Analysis and Critical Control Points)
  - Temperature monitoring and registration of period with too high temperature (see also page 19)
  - Factory calibration that will guarantee a better measuring accuracy than stated in the standard EN 441-13 without subsequent calibration (Pt 1000 ohm sensor)
Operation

Sensors
Up to two thermostat sensors can be connected to the controller. The relevant application determines how.

A sensor in the air before the evaporator:
This connection is primarily used when control is based on area.

A sensor in the air after the evaporator:
This connection is primarily used when refrigeration is controlled and there is a risk of a too low temperature near the products.

A sensor before and after the evaporator:
This connection offers you the possibility of adapting the thermostat, the alarm thermostat and the display to the relevant application. The signal to the thermostat, the alarm thermostat and the display is set as a weighted value between the two temperatures, and 50% will for example give the same value from both sensors. The signal to the thermostat, the alarm thermostat and the display can be set independently of one another.

Defrost sensor
The best signal concerning the evaporator’s temperature is obtained from a defrost sensor mounted directly on the evaporator. Here the signal may be used by the defrost function, so that the shortest and most energy-saving defrost can take place.

If a defrost sensor is not required, defrost can be stopped based on time, or S4 can be selected.

Control of two compressors
This control is used for controlling two compressors of the same size. The principle for control is that one of the compressors connects at ½ the differential of the thermostat, and the other at the full differential. When the thermostat cuts in the compressor with the fewest operating hours is started. The other compressor will only start after a set time delay, so that the load will be divided between them. The time delay has a higher priority than the temperature. When the air temperature has dropped by half the differential the one compressor will stop, the other will continue working and not stop until the required temperature is achieved.

The compressors used must be of a type that is capable of starting up against a high pressure.

Change of temperature reference
In an impulse appliance, for example, used for various product groups. Here the temperature reference is changed easily with a contact signal on a digital input. The signal raises the normal thermostat value by a predefined amount. At the same time the alarm limits with the same value are displaced accordingly.
Digital inputs
There are two digital inputs both of which can be used for the following functions:
- Case cleaning
- Door contact function with alarm
- Starting a defrost
- Coordinated defrost
- Change-over between two temperature reference
- Retransmission of a contact’s position via data communication

Case cleaning function
This function makes it easy to steer the refrigeration appliance through a cleaning phase. Via three pushes on a switch you change from one phase to the next phase.
The first push stops the refrigeration – the fans keep working "Later": The next push stops the fans "Still later": The next push restarts refrigeration
The different situations can be followed on the display.

On the network a cleaning alarm is transmitted to the system unit. This alarm can be “logged” so that proof of the sequence of events is provided.

Door contact function
In cold rooms and frost rooms the door switch can switch the light on and off, start and stop the refrigeration and give alarm if the door has remained open for too long.

Defrost
Depending on the application you may choose between the following defrost methods:
Natural: Here the fans are kept operating during the defrost
Electric: The heating element is activated
Brine: The valve is kept open so that the brine can flow through the evaporator
Hotgas: Here the solenoid valves are controlled so that the hotgas can flow through the evaporator

Start of defrost
A defrost can be started in different ways
Interval: Defrost is started at fixed time intervals, say, every eighth hour
Refrigeration time: Defrost is started at fixed refrigeration time intervals, in other words, a low need for refrigeration will “postpone” the coming defrost
Schedule: Here defrost can be started at fixed times of the day and night. However, max. 6 times
Contact: Defrost is started with a contact signal on a digital input
Network: The signal for defrost is received from a system unit via the data communication
SS temp: In 1:1 systems the efficiency of the evaporator can be followed. Icing-up will start a defrost
Manual: An extra defrost can be activated from the controller’s lower-most button. (Though not for application 4).

All the mentioned methods can be used at random – if just one them is activated a defrost will be started.
Coordinated defrost

There are two ways in which coordinated defrost can be arranged. Either with wire connections between the controllers or via data communication.

Wire connections

One of the controllers is defined to be the controlling unit and a battery module may be fitted in it so that the clock is ensured backup. When a defrost is started all the other controllers will follow suit and likewise start a defrost. After the defrost the individual controllers will move into waiting position. When all are in waiting position there will be a change-over to refrigeration. (If just one in the group demands defrost, the others will follow suit).

Defrost via data communication

All controllers are fitted with a data communication module, and via the override function from a gateway the defrost can be coordinated.

Defrost on demand

1 Based on refrigeration time

When the aggregate refrigeration time has passed a fixed time, a defrost will be started.

2 Based on temperature

The controller will constantly follow the temperature at S5. Between two defrosts the S5 temperature will become lower the more the evaporator ices up (the compressor operates for a longer time and pulls the S5 temperature further down). When the temperature passes a set allowed variation the defrost will be started. This function can only work in 1:1 systems.

Extra module

• The controller can afterwards be fitted with an insertion module if the application requires it. The controller has been prepared with plug, so the module simply has to be pushed in
  - Battery module
    The module guarantees voltage to the controller if the supply voltage should drop out for more than four hours. The clock function can thus be protected during a power failure.
  - Data communication
    If you require operation from a PC, a data communication module has to be placed in the controller.

• External display

If it is necessary to indicate the temperature on the front of refrigeration appliance, a display type EKA 163A can be mounted. The extra display will show the same information as the controller’s display, but does not incorporate buttons for operation. If operation from the external display is needed a display type EKA 164A must be mounted.
Applications
Here is a survey of the controller’s field of application.

A setting will define the relay outputs so that the controller’s interface will be targeted to the chosen application.

On page 20 you can see the relevant settings for the respective wiring diagrams.

Refrigeration control with one compressor
The functions are adapted to small refrigeration systems which either may be refrigeration appliances or cold rooms.
The three relays can control the refrigeration, the defrost and the fans, and the fourth relay can be used for either alarm function, light control or rail heat control
• The alarm function can be linked up with a contact function from a door switch. If the door remains open longer than allowed there will be an alarm.
• The light control can also be linked up with a contact function from a door switch. An open door will switch on the light and it will remain lit for two minutes after the door has been closed again.
• The rail heat function can be used in refrigeration or freezing appliances or on the door’s heating element for frost rooms.

The fans can be stopped during defrost and they may also follow a door switch’s open/close situation.

There are several other functions for the alarm function as well as the light control, rail heat control and fans. Please refer to the respective settings.

S3 and S4 are temperature sensors. The application will determine whether either one or the other or both sensors are to be used. S3 is placed in the air flow before the evaporator. S4 after the evaporator.
A percentage setting will determine according to what the control is to be based. S5 is a defrost sensor and is placed on the evaporator.

D11 and D12 are contact functions that can be used for one of the following functions: door function, alarm function, defrost start, external main switch, night operation, change of thermostat reference, appliance cleaning, forced refrigeration or coordinated defrost. See the functions in settings o02 and o37.

Hot gas defrost
This type of connection can be used on systems with hotgas defrost, but only in small systems in, say, supermarkets – the functional content has not been adapted to systems with large charges. Relay 1’s change-over function can be used by the bypass valve and/or the hotgas valve. Relay 2 is used for refrigeration.
Refrigeration control with two compressors

This group of applications can be used if the controller is to cut two compressors in and out. The functions can be compared with wiring diagrams 1 to 3, but instead of controlling fans the relay is here used for compressor 2.

The two compressors must be of the same size. When the controller demands refrigeration it will first cut in the compressor with the shortest operating time. After the time delay the second compressor will be cut in.

When the temperature has dropped to “the middle of the differential”, the compressor with the longest operation time will be cut out.

If the running compressor does not manage to reduce the temperature to the cutout point, the other compressor will be cut in again. This happens when the temperature reaches the top part of the differential. If the temperature is instead “stuck” in the differential for two hours, there will be a change-over between the two compressors so that the operating time can be equalised. The two compressors must be of a type that can start up against a high pressure.

The compressor's settings for “Min On time” and “Min Off time” will always have top priority during normal regulation. But if one of the override functions is activated, the “Min On time” will be disregarded.

If the controller is to cut 2 compressor and 1 fan in and out, relay 4 must cut the fan in and out.

This function is activated in application 10.

Simple refrigeration with defrost

This application can be used where there is only regulation of refrigeration and defrost.

Heating function

This application is the same as under 1, but a heating function has been added which protects the unit against too low temperature. The defrost function's heating element is here used for heating.

This application is used where the temperature can go below the set cutout temperature for the refrigeration. To ensure that the temperature will not become too low the heating element is activated x degrees below the reference value. The S3 sensor must be mounted. It supplies the signal when there is heating.
## Survey of functions

<table>
<thead>
<tr>
<th>Function</th>
<th>Parameter</th>
<th>Parameter by operation via data communication</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Normal display</strong></td>
<td></td>
<td>Display air (u56)</td>
</tr>
<tr>
<td>Normally the temperature value from one of the two thermostat sensors S3 or S4 or a mixture of the two measurements is displayed. In o17 the ratio is determined.</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Thermostat</strong></td>
<td></td>
<td>Thermostat control</td>
</tr>
<tr>
<td><strong>Set point</strong></td>
<td></td>
<td>Cutout °C</td>
</tr>
<tr>
<td>Regulation is based on the set value plus a displacement, if applicable. The value is set via a push on the centre button. The set value can be locked or limited to a range with the settings in r02 and r 03. The reference at any time can be seen in “u28 Temp. ref”</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Differential</strong></td>
<td>r01</td>
<td>Differential</td>
</tr>
<tr>
<td>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.</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Setpoint limitation</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>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.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>To avoid a too high setting of the setpoint, the max. allowable reference value must be lowered.</td>
<td>r02</td>
<td>Max cutout °C</td>
</tr>
<tr>
<td>To avoid a too low setting of the setpoint, the min. allowable reference value must be increased.</td>
<td>r03</td>
<td>Min cutout °C</td>
</tr>
<tr>
<td><strong>Correction of the display’s temperature showing</strong></td>
<td>r04</td>
<td>Disp. Adj. K</td>
</tr>
<tr>
<td>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.</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Temperature unit</strong></td>
<td>r05</td>
<td>Temp. unit °C=0, °F=1 (Only °C on AKM, whatever the setting)</td>
</tr>
<tr>
<td>Set here if the controller is to show temperature values in °C or in °F.</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Correction of signal from S4</strong></td>
<td>r09</td>
<td>Adjust S4</td>
</tr>
<tr>
<td>Compensation possibility through long sensor cable</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Correction of signal from S3</strong></td>
<td>r10</td>
<td>Adjust S3</td>
</tr>
<tr>
<td>Compensation possibility through long sensor cable</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Start / stop of refrigeration</strong></td>
<td>r12</td>
<td>Main Switch</td>
</tr>
<tr>
<td>With this setting refrigeration can be started, stopped or a manual override of the outputs can be allowed. Start / stop of refrigeration can also be accomplished with the external switch function connected to a DI input. Stopped refrigeration will give a “Standby alarm”.</td>
<td>1: Start</td>
<td></td>
</tr>
<tr>
<td></td>
<td>0: Stop</td>
<td></td>
</tr>
<tr>
<td></td>
<td>-1: Manual control of outputs allowed</td>
<td></td>
</tr>
<tr>
<td><strong>Night setback value</strong></td>
<td>r13</td>
<td>Night offset</td>
</tr>
<tr>
<td>The thermostat’s reference will be the setpoint plus this value when the controller changes over to night operation. (Select a negative value if there is to be cold accumulation.)</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Selection of thermostat sensor</strong></td>
<td>r15</td>
<td>Ther. S4 %</td>
</tr>
<tr>
<td>Here you define the sensor the thermostat is to use for its control function. S3, S4, or a combination of them. With the setting 0%, only S3 is used (Sin). With 100%, only S4. (For application 9 an S3 sensor must be used)</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Heating function</strong></td>
<td>r36</td>
<td>HeatStartRel</td>
</tr>
<tr>
<td>The function uses the defrost function's heating element for raising the temperature. The function enters into force a number of degrees (r36) below the actual reference and cuts out again with a differential of 2 degrees. Regulation is carried out with 100% signal from the S3 sensor. The fans will be operating when there is heating. The fans and the heating function will stop if door function has been selected and the door is opened. Where this function is used an external safety cutout should also be installed, so that superheating of the heating element cannot take place. Remember to set D01 to electrical defrosting.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### Activation of reference displacement
When the function is changed to ON the thermostat reference will be displaced by the value in r40. Activation can also take place via input DI1 or DI2 (defined in o02 or o37).

<table>
<thead>
<tr>
<th>r39</th>
<th>Th. offset</th>
</tr>
</thead>
</table>

### Value of reference displacement
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

<table>
<thead>
<tr>
<th>r40</th>
<th>Th. offset K</th>
</tr>
</thead>
</table>

### Alarm
The controller can give alarm in different situations. When there is an alarm all the light-emitting diodes (LED) will flash on the controller front panel, and the alarm relay will cut in.

<table>
<thead>
<tr>
<th>Alarm settings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Night setbck (start of night signal)</td>
</tr>
<tr>
<td>Forced cool. (start of forced cooling)</td>
</tr>
</tbody>
</table>

### Alarm settings
With data communication the importance of the individual alarms can be defined. Setting is carried out in the "Alarm destinations" menu.

<table>
<thead>
<tr>
<th>A03</th>
<th>Alarm delay</th>
</tr>
</thead>
</table>

### Alarm delay (short alarm delay)
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.

<table>
<thead>
<tr>
<th>Time delay for door alarm</th>
</tr>
</thead>
<tbody>
<tr>
<td>The time delay is set in minutes. The function is defined in o02 or o37.</td>
</tr>
</tbody>
</table>

| A04 | DoorOpen del |

### Time delay for cooling (long alarm delay)
This time delay is used during start-up, during defrost, immediately 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.

<table>
<thead>
<tr>
<th>Time delay for cooling</th>
</tr>
</thead>
<tbody>
<tr>
<td>The time delay is set in minutes.</td>
</tr>
</tbody>
</table>

| A12 | Pulldown del |

### Upper 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 | HighLim Air |

### Lower 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 | LowLim Air |

### Delay of a DI1 alarm
A cut-out/cut-in input will result in alarm when the time delay has been passed. The function is defined in o02.

| A27 | Al.Delay DI1 |

### Delay of a DI2 alarm
A cut-out/cut-in input will result in alarm when the time delay has been passed. The function is defined in o37.

| A28 | Al.Delay DI2 |

### Signal to the alarm thermostat
Here you have to define the ratio between the sensors which the alarm thermostat has to use. S3, S4 or a combination of the two. With setting 0% only S3 is used. With 100% only S4 is used

| A36 | Alarm S4% |

### Compressor
The compressor relay works in conjunction with the thermostat. When the thermostat calls for refrigeration the compressor relay will be operated.

<table>
<thead>
<tr>
<th>Compressor control</th>
</tr>
</thead>
<tbody>
<tr>
<td>Min. ON-time (in minutes)</td>
</tr>
<tr>
<td>Min. OFF-time (in minutes)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>c01</th>
<th>Min. On time</th>
</tr>
</thead>
<tbody>
<tr>
<td>c02</td>
<td>Min. Off time</td>
</tr>
</tbody>
</table>
**Time delay for couplings of two compressors**

Settings indicate the time that has to elapse from the first relay cuts in and until the next relay has to cut in.

| c05 | Step delay |

**Reversed relay function for D01**

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).

The LED on the controller's front will show whether refrigeration is in progress.

| c30 | Cmp relay NC |

**Defrost**

The controller contains a timer function that is zero set after each defrost start.

The timer function will start a defrost if/when the interval time is passed.

The controller also contains a real-time clock. By means of settings of this clock and times for the required defrost times, defrost can be started at fixed times of the day.

If there is a risk of power failure for periods longer than four hours, a battery module should be mounted in the controller.

Defrost start can also be accomplished via data communication, via contact signals or manual start-up.

All starting methods will function in the controller. The different functions have to be set, so that defrosts do not "come tumbling" one after the other.

Defrost can be accomplished with electricity, hotgas or brine.

The actual defrost will be stopped based on time or temperature with a signal from a temperature sensor.

**Defrost method**

Here you set whether defrost is to be accomplished with electricity, gas, brine or "non".

During defrost the defrost relay will be cut in.

(With brine the "refrigeration control valve" will be kept open during defrost)

| d01 | Def. method |
|     | 0 = non     |
|     | 1 = El      |
|     | 2 = Gas     |
|     | 3 = Brine   |

**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 | Def. Stop Temp |

**Interval between defrost starts**

The function is zero set and will start the timer function at each defrost start. When the time has expired the function will start a defrost.

The function is used as a simple defrost start, or it may be used as a safeguard if the normal signal fails to appear.

If master/slave defrost without clock function or without data communication is used, the interval time will be used as max. time between defrosts.

If a defrost start via data communication does not take place, the interval time will be used as max. time between defrosts.

When there is defrost with clock function or data communication, the interval time must be set for a somewhat longer period of time than the planned one, as the interval time will otherwise start a defrost which a little later will be followed by the planned one.

In connection with power failure the interval time will be maintained, and when the power returns the interval time will continue from the maintained value.

The interval time is not active when set to 0.

| d03 | Def Interval |
|     | (0=off)     |

**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 or via coordinated defrost.

| d04 | Max Def. time |

**Time staggering for defrost cut ins during start-up**

The function is only relevant if you have several refrigeration appliances or groups where you want the defrost to be staggered in relation to one another. The function is furthermore only relevant if you have chosen defrost with interval start (d03).

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.

<p>| d05 | Time Stagg. |</p>
<table>
<thead>
<tr>
<th>Parameter</th>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Drip-off time</strong></td>
<td>d06</td>
<td>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).</td>
</tr>
<tr>
<td><strong>Delay of fan start after defrost</strong></td>
<td>d07</td>
<td>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 &quot;tied&quot; to the evaporator).</td>
</tr>
<tr>
<td><strong>Fan start temperature</strong></td>
<td>d08</td>
<td>The fan may also be started a little earlier than mentioned under &quot;Delay of fan start after defrost&quot;, if the defrost sensor S5 registers a lower value than the one set here.</td>
</tr>
<tr>
<td><strong>Fan cut in during defrost</strong></td>
<td>d09</td>
<td>Here you can set whether fan is to operate during defrost.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>0: Stopped (Runs during pump down)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1: Running (stopped during &quot;fan delay&quot;)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2: Running during pump down and defrost. After that stopped</td>
</tr>
<tr>
<td><strong>Defrost sensor</strong></td>
<td>d10</td>
<td>Here you define the defrost sensor.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>0: None, defrost is based on time</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1: S5</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2: S4</td>
</tr>
<tr>
<td><strong>Pumpdown delay</strong></td>
<td>d16</td>
<td>Set the time where the evaporator is emptied of refrigerant prior to the defrost.</td>
</tr>
<tr>
<td><strong>Drain delay (only in connection with hotgas)</strong></td>
<td>d17</td>
<td>Set the time where the evaporator is emptied of condensed refrigerant after the defrost.</td>
</tr>
<tr>
<td><strong>Defrost on demand – aggregate refrigeration time</strong></td>
<td>d18</td>
<td>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.</td>
</tr>
<tr>
<td><strong>Defrost on demand – S5 temperature</strong></td>
<td>d19</td>
<td>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.</td>
</tr>
<tr>
<td><strong>Delay of the hot gas injection</strong></td>
<td>d23</td>
<td>Can be used when valves of the type PMLX and GPLX are used. Time is set so that the valve is closed completely before the hot gas is turned on.</td>
</tr>
<tr>
<td>If you wish to see the temperature at the defrost sensor, push the controller's lowermost button.</td>
<td></td>
<td>Defrost temp.</td>
</tr>
<tr>
<td>If you wish to start an extra defrost, push the controller's lowermost button for four seconds.</td>
<td></td>
<td>Def Start</td>
</tr>
<tr>
<td>You can stop an ongoing defrost in the same way</td>
<td></td>
<td>Here you can start a manual defrost</td>
</tr>
<tr>
<td>The LED on the controller's front will indicate whether a defrost is going on.</td>
<td></td>
<td>Defrost Relay</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Here you can read the defrost relay status or you can force-control the relay in &quot;Manual control&quot; mode.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Hold After Def</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Shows ON when the controller is operating with coordinated defrost.</td>
</tr>
<tr>
<td><strong>Fan</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Fan stopped at cut-out compressor</strong></td>
<td>F01</td>
<td>Here you can select whether the fan is to be stopped when the compressor is cut out</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(Yes = Fan stopped)</td>
</tr>
<tr>
<td><strong>Delay of fan stop when compressor is cut out</strong></td>
<td>F02</td>
<td>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.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Fan del. CO</td>
</tr>
</tbody>
</table>
### Fan stop temperature
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.

The LED on the controller's front will indicate whether a defrost is going on.

<table>
<thead>
<tr>
<th>Function</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>F04 FanStopTemp.</td>
<td>Fan Relay&lt;br&gt;Here you can read the fan relay status, or force-control the relay in “Manual control” mode.</td>
</tr>
</tbody>
</table>

### HACCP
Here you can see the temperature measurement that transmits signal to the function.

<table>
<thead>
<tr>
<th>Temperature</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>h01</td>
<td>HACCP temp.</td>
</tr>
</tbody>
</table>

#### Last too high HACCP temperature was registered in connection with:
- (Value can be read out).
- H01: Temperature exceeding during normal regulation.
- H02: Temperature exceeding during power failure. Battery backup controls the times.
- H03: Temperature exceeding during power failure. No control of times.

<table>
<thead>
<tr>
<th>Temperature</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>h02</td>
<td>-</td>
</tr>
</tbody>
</table>

#### Last time the HACCP temperature was exceeded:
- Year h03 | - |
- Month h04 | - |
- Day h05 | - |
- Hour h06 | - |
- Minute h07 | - |

#### Last exceeding:
- Duration in hours h08 | - |
- Duration in minutes h09 | - |

### Peak temperature
The highest measured temperature will continuously be saved when the temperature exceeds the limit value in h12. The value can be read out until the next time the temperature exceeds the limit value. After that it is overwritten with the new measurements.

<table>
<thead>
<tr>
<th>Temperature</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>h10</td>
<td>Max.temp.</td>
</tr>
</tbody>
</table>

#### Selection of function
0: No HACCP function
1: S3 and/or S4 used as sensor. Definition takes place in h14.
2: S5 used as sensor.

<table>
<thead>
<tr>
<th>Temperature</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>h11</td>
<td>HACCP sensor</td>
</tr>
</tbody>
</table>

#### Alarm limit
Here you set the temperature value at which the HACCP function is to enter into force. When the value becomes higher than the set one, the time delay starts.

<table>
<thead>
<tr>
<th>Temperature</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>h12</td>
<td>HACCP limit</td>
</tr>
</tbody>
</table>

#### Time delay for the alarm (only during normal regulation).
When the time delay has been passed the alarm is activated.

<table>
<thead>
<tr>
<th>Temperature</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>h13</td>
<td>HACCP delay</td>
</tr>
</tbody>
</table>

#### Selection of sensors for the measuring
If the S4 sensor and/or the S3 sensor is used, the ratio between them must be set. At setting 100% only S4 is used. At setting 0% only S3 is used.

<table>
<thead>
<tr>
<th>Temperature</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>h14</td>
<td>HACCP 54%</td>
</tr>
</tbody>
</table>

### Internal defrosting schedule/clock function
(Not used if an external defrosting schedule is used via data communication.)
Up to six individual times can be set for the defrost start throughout the day.

<table>
<thead>
<tr>
<th>Time setting</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>t01-t06</td>
<td>Defrost start, hour setting</td>
</tr>
</tbody>
</table>
| t11-t16 | Defrost start, minute setting (1 and 11 belong together, etc.)
When all t01 to t16 equal 0 the clock will not start defrosts. |

#### Real-time clock
Setting the clock is only necessary when there is no data communication. In the event of a power failure of less than four hours, the clock function will be saved. When mounting a battery module the clock function can preserved longer. There is also a date indication used for registration of temperature measurements.

<table>
<thead>
<tr>
<th>Temperature</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>t07</td>
<td>Clock: Hour setting</td>
</tr>
<tr>
<td>t08</td>
<td>Clock: Minute setting</td>
</tr>
<tr>
<td>t45</td>
<td>Clock: Date setting</td>
</tr>
<tr>
<td>t46</td>
<td>Clock: Month setting</td>
</tr>
<tr>
<td>t47</td>
<td>Clock: Year setting</td>
</tr>
</tbody>
</table>

### Miscellaneous
Delay of output signal after start-up
After start-up or a power failure the controller's functions can be delayed so that over-loading of the electricity supply network is avoided. Here you can set the time delay.

<table>
<thead>
<tr>
<th>Temperature</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>o01</td>
<td>DelayOfOutp.</td>
</tr>
</tbody>
</table>
### Digital input signal - DI1

The controller has a digital input 1 which can be used for one of the following functions:

1. **Off**: The input is not used
2. **Status display of a contact function**
3. **Door function**: When the input is open it signals that the door is open. The refrigeration and the fans are stopped. When the time setting in "A4" is passed, an alarm will be given and refrigeration will be resumed.
4. **Door alarm**: When the input is open it signals that the door is open. When the time setting in "A4" is passed, there will be an alarm.
5. **Defrost**: The function is started with a pulse signal. The controller will register when the DI input is activated. The controller will then start a defrost cycle. If the signal is to be received by several controllers it is important that ALL connections are mounted the same way (DI to DI and GND to GND).
6. **Main switch**: Regulation is carried out when the input is short-circuited, and regulation is stopped when the input is put in pos. OFF.
7. **Night operation**: When the input is short-circuited, there will be regulation for night operation.
8. **Reference displacement when DI1 is short-circuited**: Displacement with "r40".
9. **Separate alarm function**: Alarm will be given when the input is short-circuited.
10. **Separate alarm function**: Alarm will be given when the input is opened. (For 8 and 9 the time delay is set in A27)
11. **Case cleaning**: The function is started with a pulse signal. Cf. also description on page 4.

<table>
<thead>
<tr>
<th>Number</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Off</td>
</tr>
<tr>
<td>2</td>
<td>Status display of a contact function</td>
</tr>
<tr>
<td>3</td>
<td>Door function</td>
</tr>
<tr>
<td>4</td>
<td>Door alarm</td>
</tr>
<tr>
<td>5</td>
<td>Defrost</td>
</tr>
<tr>
<td>6</td>
<td>Main switch</td>
</tr>
<tr>
<td>7</td>
<td>Night operation</td>
</tr>
<tr>
<td>8</td>
<td>Reference displacement when DI1 is short-circuited</td>
</tr>
<tr>
<td>9</td>
<td>Separate alarm function</td>
</tr>
<tr>
<td>10</td>
<td>Separate alarm function</td>
</tr>
<tr>
<td>11</td>
<td>Case cleaning</td>
</tr>
</tbody>
</table>

If the controller is built into a network with data communication, it must have an address, and the master gateway of the data communication must then know this address.

These settings can only be made when a data communication module has been mounted in the controller and the installation of the data communication cable has been finished.

This installation is mentioned in a separate document “RC8AC”.

The address is set between 1 and 60 (119), gateway determined.

The address is sent to the gateway when the menu is set in pos. ON

**IMPORTANT**: Before you set o04, you MUST set o61. Otherwise you will be transmitting incorrect data.

### Access code 1 (Access to 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).

### Sensor type

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 1000 sensor (1000 ohm) or an NTC sensor (5000 Ohm at 25°C).

All the mounted sensors must be of the same type.

### Display step

Yes: Gives steps of 0.5°
No: Gives steps of 0.1°

### Max. standby time after coordinated defrost

When a controller has completed a defrost it will wait for a signal which tells that the refrigeration may be resumed. If this signal fails to appear for one reason or another, the controller will itself start the refrigeration when this standby time has elapsed.

### Select signal for the display S4%

Here you define the signal to be shown by the display. S3, S4, or a combination of the two. With setting 0% only S3 is used. With 100% only S4.
Digital input signal - D2
The controller has a digital input 2 which can be used for one of the following functions:
Off: The input is not used.
1) Status display of a contact function
2) Door function. When the input is open it signals that the door is open. The refrigeration and the fans are stopped. When the time setting in "A4" is passed, an alarm will be given and refrigeration resumed.
3) Door alarm. When the input is open it signals that the door is open. When the time setting in "A4" is passed an alarm will be given.
4) Defrost. The function is started with a pulse signal. The controller will register when the DI input is activated. The controller will then start a defrost cycle. If the signal is to be received by several controllers it is important that ALL connections are mounted the same way (DI to DI and GND to GND).
5) Main switch. Regulation is carried out when the input is short-circuited, and regulation is stopped when the input is put in pos. OFF.
6) Night operation. When the input is short-circuited, there will be regulation for night operation.
7) Reference displacement when DI2 is short-circuited. Displacement with "r40".
8) Separate alarm function. Alarm will be given when the input is short-circuited.
9) Separate alarm function. Alarm will be given when the input is opened.
10) Case cleaning. The function is started with a pulse signal. Cf. also description on page 4.
11) Forced refrigeration at hotgas defrost when the input is short-circuited.
12) The input is used for coordinated defrost in conjunction with other controllers of the same type.

Configuration of light function (relay 4 in applications 2 and 6)
1) The relay cuts in during day operation
2) The relay to be controlled via data communication
3) The relay to be controlled by the door switch defined in either o02 or o37 where the setting is selected to either 2 or 3. When the door is opened the relay will cut in. When the door is closed again there will be a time delay of two minutes before the light is switched off.

Activation of light relay
The light relay can be activated here, but only if defined in o38 with setting 2.

Rail heat during day operation
The ON period is set as a percentage of the time

Rail heat during night operation
The ON period is set as a percentage of the time

Rail heat cycle
The period of time for the aggregate ON time + OFF time is set in minutes

Case cleaning
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 DI1 or DI2 input, the relevant status can be seen here in the menu.

Selection of application
The controller can be defined in various ways. Here you set which of the 10 applications is required. On page 6 you can see a survey of applications.
This menu can only be set when regulation is stopped, i.e. "r12" is set to 0.

Transfer a set of presetting to the controller
It is possible to select a quick setting of a number of parameters. It depends on whether an application or a room is to be controlled and whether defrost is to be stopped based on time or based on temperature. The survey can be seen on page 22.
This menu can only be set when regulation is stopped, i.e. "r12" is set to 0.
After the setting the value will return to 0. Any subsequent adjustment/setting of parameters can be made, as required.

Access code 2 (Access to adjustments)
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.

Copy the controller's present settings
With this function the controller's settings can be transferred to a programming key. The key can contain up to 25 different sets. Select a number. All settings except for Application (o61) and Address (o03) will be copied. When copying has started the display returns to o65. After two seconds you can move into the menu again and check whether the copying was satisfactory. Showing of a negative figure spells problems. See the significance in the Fault Message section.
**Copy from the programming key**
This function downloads a set of settings earlier saved in the controller. Select the relevant number.
All settings except for Application (o61) and Address (o03) will be copied. When copying has started the display returns to o66. After two seconds you can move back into the menu again and check whether the copying was satisfactory. Showing of a negative figure spells problems. See the significance in the Fault Message section.

**Save as factory setting**
With this setting you save the controller's actual settings as a new basic setting (the earlier factory settings are overwritten).

<table>
<thead>
<tr>
<th>Service</th>
<th>Service</th>
</tr>
</thead>
<tbody>
<tr>
<td>Temperature measured with S5 sensor</td>
<td>u09</td>
</tr>
<tr>
<td>Status on DI1 input. on/1=closed</td>
<td>u10</td>
</tr>
<tr>
<td>Temperature measured with S3 sensor</td>
<td>u12</td>
</tr>
<tr>
<td>Status on night operation (on or off) 1=closed</td>
<td>u13</td>
</tr>
<tr>
<td>Temperature measured with S4 sensor</td>
<td>u16</td>
</tr>
<tr>
<td>Thermostat temperature</td>
<td>u17</td>
</tr>
<tr>
<td>Read the present regulation reference</td>
<td>u28</td>
</tr>
<tr>
<td>Status on DI2 output. on/1=closed</td>
<td>u37</td>
</tr>
<tr>
<td>Temperature shown on display</td>
<td>u56</td>
</tr>
<tr>
<td>Measured temperature for alarm thermostat</td>
<td>u57</td>
</tr>
<tr>
<td>** Status on relay for cooling</td>
<td>u58</td>
</tr>
<tr>
<td>** Status on relay for fan</td>
<td>u59</td>
</tr>
<tr>
<td>** Status on relay for defrost</td>
<td>u60</td>
</tr>
<tr>
<td>** Status on relay for railheat</td>
<td>u61</td>
</tr>
<tr>
<td>** Status on relay for alarm</td>
<td>u62</td>
</tr>
<tr>
<td>** Status on relay for light</td>
<td>u63</td>
</tr>
<tr>
<td>** Status on relay for valve in suction line</td>
<td>u64</td>
</tr>
<tr>
<td>** Status on relay for compressor 2</td>
<td>u67</td>
</tr>
</tbody>
</table>

*) Not all items will be shown. Only the function belonging to the selected application can be seen.
### 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 more keep on 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:

| **A1**: High temperature alarm | High t. alarm |
| **A2**: Low temperature alarm | Low t. alarm |
| **A4**: Door alarm | Door Alarm |
| **A5**: Information. Parameter o16 is expired | Max Hold Time |
| **A15**: Alarm. Signal from DI1 input | DI1 alarm |
| **A16**: Alarm. Signal from DI2 input | DI2 alarm |
| **A45**: Standby position (stopped refrigeration via r12 or DI input) | Standby mode |
| **A59**: Case cleaning. Signal from DI1 or DI2 input | Case cleaning |
| **A60**: High-temperature alarm for the HACCP function | HACCP alarm |
| **E1**: Faults in the controller | EKC error |
| **E6**: Fault in real-time clock. Check the battery / reset the clock. | - |
| **E25**: Sensor error on S3 | S3 error |
| **E26**: Sensor error on S4 | S4 error |
| **E27**: Sensor error on S5 | S5 error |

When copying settings to or from a copying key with functions o65 or o66, the following information may appear:

0: Copying concluded and OK
4: Copying key not correctly mounted
5: Copying was not correct. Repeat copying
6: Copying to EKC incorrect. Repeat copying
7: Copying to copying key incorrect. Repeat copying
8: Copying not possible. Order number or SW version do not match
9: Communication error and timeout
10: Copying still going on
(The information can be found in o65 or o66 a couple of seconds after copying has been started).

### Alarm destinations

The importance of the individual alarms can be defined with a setting (0, 1, 2 or 3)
Operating status (Measurement)

<table>
<thead>
<tr>
<th>Status Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>S0</td>
<td>Regulating</td>
</tr>
<tr>
<td>S1</td>
<td>Waiting for end of the coordinated defrost</td>
</tr>
<tr>
<td>S2</td>
<td>When the compressor is operating it must run for at least x minutes.</td>
</tr>
<tr>
<td>S3</td>
<td>When the compressor is stopped, it must remain stopped for at least x minutes.</td>
</tr>
<tr>
<td>S4</td>
<td>The evaporator drips off and waits for the time to run out</td>
</tr>
<tr>
<td>S10</td>
<td>Refrigeration stopped by main switch. Either with r12 or a DI-input</td>
</tr>
<tr>
<td>S11</td>
<td>Refrigeration stopped by thermostat</td>
</tr>
<tr>
<td>S14</td>
<td>Defrost sequence. Defrost in progress</td>
</tr>
<tr>
<td>S15</td>
<td>Defrost sequence. Fan delay — water attaches to the evaporator</td>
</tr>
<tr>
<td>S17</td>
<td>Door is open. DI input is open</td>
</tr>
<tr>
<td>S20</td>
<td>Emergency cooling *)</td>
</tr>
<tr>
<td>S25</td>
<td>Manual control of outputs</td>
</tr>
<tr>
<td>S29</td>
<td>Case cleaning</td>
</tr>
<tr>
<td>S30</td>
<td>Forced cooling</td>
</tr>
<tr>
<td>S32</td>
<td>Delay on outputs during start-up</td>
</tr>
<tr>
<td>S33</td>
<td>Heat function r36 is active</td>
</tr>
</tbody>
</table>

Other displays:

- non: The defrost temperature cannot be displayed. There is stop based on time
- d: Defrost in progress / First cooling after defrost
- PS: Password required. Set password

*) Emergency cooling will take effect when there is lack of signal from a defined S3 or S4 sensor. The regulation will continue with a registered average cutin frequency. There are two registered values – one for day operation and one for night operation.

Warning! Direct start of compressors *

To prevent compressor breakdown parameter c01 and c02 should be set according to suppliers requirements or in general:
- Hermetic Compressors c02 min. 5 minutes
- Semihermetic Compressors c02 min. 8 minutes and c01 min. 2 to 5 minutes (Motor from 5 to 15 KW)

*) Direct activating of solenoid valves does not require settings different from factory (0)
Operation

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 in °F.

Light-emitting diodes (LED) on front panel
HACCP = HACCP function is active
The other LED’s on the front panel will light up when the belonging relay is activated.

= Refrigeration
= Defrost
= Fan running

The light-emitting diodes will flash when there is an alarm. In this situation you can download the error code to the display and cancel/sign for the alarm by giving the top knob a brief push.

Defrost
During defrost a –d– is shown in the display. This view will continue up till 15 min. after the cooling has resumed. However the view of –d– will be discontinued if:
- The temperature is suitable within the 15 minutes
- The regulation is stopped with “Main Switch”
- A high temperature alarm appears

The buttons
When you want to change a setting, the upper and the lower buttons will give you a higher or lower value depending on the button you are pushing. But before you change the value, you must have access to the menu. You obtain this by pushing the upper button for a couple of seconds - you will then enter the column with parameter codes. Find the parameter code you want to change and push the middle buttons until value for the parameter is shown. When you have changed the value, save the new value by once more pushing the middle button.

Examples

Set menu
1. Push the upper button until a parameter r01 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 freeze the value.

Cutout alarm relay / receipt alarm/see alarm code
- Push short 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.

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 again to conclude the setting.

Reading the temperature at defrost sensor
- Push the lower button

Manuel start or stop of a defrost
- Push the lower button for four seconds.
(Though not for application 4).

See HACCP registration
1. Give the middle button a long push until h01 appears
2. Select required h01-h10
3. See value by giving the middle button a short push

Get a good start

With the following procedure you can start regulation very quickly:
1 Open parameter r12 and stop the regulation (in a new and not previously set unit, r12 will already be set to 0 which means stopped regulation.)
2 Select electric connection based on the drawings on page 6
3 Open parameter o61 and set the electric connection number in it
4 Now select one of the preset settings from the table on page 22.
5 Open parameter o62 and set the number for the array of presettings. The few selected settings will now be transferred to the menu.
6 Open parameter r12 and start the regulation
7 Go through the survey of factory settings. The values in the grey cells are changed according to your choice of settings. Make any necessary changes in the respective parameters.
8 For network. Set the address in o03 and then transmit it to the gateway/system unit with setting o04.
**HACCP**

This function will follow the appliance temperature and sound an alarm if the set temperature limit is exceeded. The alarm will come when the time delay has elapsed. When the temperature exceeds the limit value it will continuously be registered and the peak value will be saved until the later readout. Saved together with the value will be the time and duration of the temperature exceeding.

Examples of temperature exceeding:

- Exceeding during normal regulation
- Exceeding in connection with power failure where the controller can keep on registering the time performance.
- Exceeding in connection with power failure when the controller has lost its clock function and hence also its time performance.

The readout of the various values in the HACCP function can take place with a long push on the middle button. The readouts are, as follows:

- h01: The temperature
- h02: Readout of the controller's status when temperature was exceeded:
  - H1 = normal regulation.
  - H2 = power failure. Times are saved.
  - H3 = power failure. Times not saved.
- h03: Time. Year
- h04: Time. Month
- h05: Time. Day
- h06: Time. Hour
- h07: Time. Minute
- h08: Duration in hours
- h09: Duration in minutes
- h10: The registered peak temperature

(Setup of the function takes place just like the other setups. See menu survey on the next page).
### Menu survey

<table>
<thead>
<tr>
<th>Function</th>
<th>Codes</th>
<th>EL-diagram number (page 6)</th>
<th>Min.-value</th>
<th>Max.-value</th>
<th>Factory setting</th>
<th>Actual setting</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Normal operation</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Temperature (set point)</td>
<td>---</td>
<td></td>
<td>-50.0°C</td>
<td>50.0°C</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Thermostat</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Differential</td>
<td><strong>r01</strong></td>
<td></td>
<td>0.1 K</td>
<td>20.0 K</td>
<td>2.0 K</td>
<td></td>
</tr>
<tr>
<td>Max. limitation of setpoint setting</td>
<td><strong>r02</strong></td>
<td></td>
<td>49.0°C</td>
<td>50.0°C</td>
<td>50.0°C</td>
<td></td>
</tr>
<tr>
<td>Min. limitation of setpoint setting</td>
<td><strong>r03</strong></td>
<td></td>
<td>50.0°C</td>
<td>50.0°C</td>
<td>50.0°C</td>
<td></td>
</tr>
<tr>
<td>Adjustment of temperature indication</td>
<td><strong>r04</strong></td>
<td></td>
<td>-20.0 K</td>
<td>20.0 K</td>
<td>0.0 K</td>
<td></td>
</tr>
<tr>
<td>Temperature unit (°C/F)</td>
<td><strong>r05</strong></td>
<td></td>
<td>°C</td>
<td>°F</td>
<td>°C</td>
<td></td>
</tr>
<tr>
<td>Correction of the signal from S4</td>
<td><strong>r06</strong></td>
<td></td>
<td>-10.0 K</td>
<td>+10.0 K</td>
<td>0.0 K</td>
<td></td>
</tr>
<tr>
<td>Correction of the signal from S3</td>
<td><strong>r07</strong></td>
<td></td>
<td>-10.0 K</td>
<td>+10.0 K</td>
<td>0.0 K</td>
<td></td>
</tr>
<tr>
<td>Manual service, stop regulation, start regulation (-1, 0, 1)</td>
<td><strong>r08</strong></td>
<td></td>
<td>-1</td>
<td>1</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Displacement of reference during night operation</td>
<td><strong>r09</strong></td>
<td></td>
<td>-10.0 K</td>
<td>10.0 K</td>
<td>0.0 K</td>
<td></td>
</tr>
<tr>
<td><strong>Definition and weighting, if applicable, of thermostat sensors -54% (100%=S4, 0%=S3)</strong></td>
<td><strong>r10</strong></td>
<td></td>
<td>0%</td>
<td>100%</td>
<td>100%</td>
<td></td>
</tr>
<tr>
<td>The heating function is started a number of degrees below the thermostats cutout temperature</td>
<td><strong>r11</strong></td>
<td></td>
<td>-15.0 K</td>
<td>-3.0 K</td>
<td>-15.0 K</td>
<td></td>
</tr>
<tr>
<td>Activation of reference displacement r40</td>
<td><strong>r12</strong></td>
<td></td>
<td>-50.0 K</td>
<td>50.0 K</td>
<td>0.0 K</td>
<td></td>
</tr>
<tr>
<td><strong>Alarm</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Delay for temperature alarm</td>
<td>A03</td>
<td></td>
<td>0 min</td>
<td>240 min</td>
<td>30 min</td>
<td></td>
</tr>
<tr>
<td>Delay for door alarm</td>
<td>A04</td>
<td></td>
<td>0 min</td>
<td>240 min</td>
<td>60 min</td>
<td></td>
</tr>
<tr>
<td>Delay for temperature alarm after defrost</td>
<td>A12</td>
<td></td>
<td>0 min</td>
<td>240 min</td>
<td>90 min</td>
<td></td>
</tr>
<tr>
<td>High alarm limit</td>
<td>A13</td>
<td></td>
<td>-50.0°C</td>
<td>50.0°C</td>
<td>8.0°C</td>
<td></td>
</tr>
<tr>
<td>Low alarm limit</td>
<td>A14</td>
<td></td>
<td>-50.0°C</td>
<td>50.0°C</td>
<td>30.0°C</td>
<td></td>
</tr>
<tr>
<td>Alarm delay DR1</td>
<td>A27</td>
<td></td>
<td>0 min</td>
<td>240 min</td>
<td>30 min</td>
<td></td>
</tr>
<tr>
<td>Alarm delay DR2</td>
<td>A28</td>
<td></td>
<td>0 min</td>
<td>240 min</td>
<td>30 min</td>
<td></td>
</tr>
<tr>
<td>Signal for alarm thermostat, 54% (100%=S4, 0%=S3)</td>
<td>A36</td>
<td></td>
<td>0%</td>
<td>100%</td>
<td>100%</td>
<td></td>
</tr>
<tr>
<td><strong>Compressor</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Min. ON-time</td>
<td>c01</td>
<td></td>
<td>0 min</td>
<td>30 min</td>
<td>0 min</td>
<td></td>
</tr>
<tr>
<td>Min. OFF-time</td>
<td>c02</td>
<td></td>
<td>0 min</td>
<td>30 min</td>
<td>0 min</td>
<td></td>
</tr>
<tr>
<td>Time delay for cutin of comp.2</td>
<td>c03</td>
<td></td>
<td>0 sec</td>
<td>999 sec</td>
<td>0 sec</td>
<td></td>
</tr>
<tr>
<td>Compressor relay 1 must cutin and out inversely (NC-function)</td>
<td>c30</td>
<td></td>
<td>0</td>
<td>1</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td><strong>Defrost</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Defrost method (none/EL/GAS/BRINE)</td>
<td>d01</td>
<td>no</td>
<td>bri</td>
<td>EL</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Defrost stop temperature</td>
<td>d02</td>
<td>0.0°C</td>
<td>25.0°C</td>
<td>6.0°C</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Interval between defrost starts</td>
<td>d03</td>
<td>0 hours</td>
<td>240 hours</td>
<td>8 hours</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Max. defrost duration</td>
<td>d04</td>
<td>0 min</td>
<td>180 min</td>
<td>45 min</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Displacement of time on cutin of defrost at start-up</td>
<td>d05</td>
<td>0 min</td>
<td>240 min</td>
<td>0 min</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Drop off time</td>
<td>d06</td>
<td>0 min</td>
<td>60 min</td>
<td>0 min</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Delay for fan start after defrost</td>
<td>d07</td>
<td>0 min</td>
<td>60 min</td>
<td>0 min</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fan start temperature</td>
<td>d08</td>
<td>-15.0°C</td>
<td>0.0°C</td>
<td>-5.0°C</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fan cutin during defrost</td>
<td>d09</td>
<td>0</td>
<td>2</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>0: Stopped</td>
<td>Running during</td>
<td>Running during</td>
<td>pump down and defrost</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Defrost sensor (0=on, 1=S5, 2=S4)</td>
<td>d10</td>
<td>0</td>
<td>2</td>
<td>0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pump down delay</td>
<td>d16</td>
<td>0 min</td>
<td>60 min</td>
<td>0 min</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Drain delay</td>
<td>d17</td>
<td>0 min</td>
<td>60 min</td>
<td>0 min</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Max. aggregate refrigeration time between two defrosts</td>
<td>d18</td>
<td>0 hours</td>
<td>48 hours</td>
<td>0 hours</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Defrost on demand - S5 temperature's permitted variation during frost build-up. On central plant choose 20 K (=off)</td>
<td>d19</td>
<td>0.0 K</td>
<td>20.0 K</td>
<td>20.0 K</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Delay of hot gas defrost</td>
<td>d23</td>
<td>0 min</td>
<td>60 min</td>
<td>0 min</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Fan</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fan stop at cutout compressor</td>
<td>F01</td>
<td>no</td>
<td>yes</td>
<td>no</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Delay of fan stop</td>
<td>F02</td>
<td>0 min</td>
<td>30 min</td>
<td>0 min</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fan stop temperature (SS)</td>
<td>F04</td>
<td>-50.0°C</td>
<td>50.0°C</td>
<td>50.0°C</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>HACCP</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Actual temperature measurement for the HACCP function</td>
<td>h01</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Last registered peak temperature</td>
<td>h10</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Selection of function and sensor for the HACCP function, 0 = no HACCP function, 1 = S4 used (maybe also S3), 2 = S5 used</td>
<td>h11</td>
<td></td>
<td>0</td>
<td>2</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Alarm limit for the HACCP function</td>
<td>h12</td>
<td></td>
<td>-50.0°C</td>
<td>50.0°C</td>
<td>8.0°C</td>
<td></td>
</tr>
<tr>
<td>Time delay for the HACCP alarm</td>
<td>h13</td>
<td></td>
<td>0 min</td>
<td>240 min</td>
<td>30 min</td>
<td></td>
</tr>
<tr>
<td>Select signal for the HACCP function, 54% (100%=S4, 0%=S3)</td>
<td>h14</td>
<td></td>
<td>0%</td>
<td>100%</td>
<td>100%</td>
<td></td>
</tr>
<tr>
<td><strong>Real time clock</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Six start times for defrost. Setting of hours.</td>
<td>t01-t06</td>
<td>0 hours</td>
<td>23 hours</td>
<td>0 hours</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Six start times for defrost. Setting of minutes.</td>
<td>t11-t16</td>
<td>0 min</td>
<td>59 min</td>
<td>0 min</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Clock - Setting of hours</td>
<td>t07</td>
<td>0 hours</td>
<td>23 hours</td>
<td>0 hours</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Clock - Setting of minute</td>
<td>t08</td>
<td>0 min</td>
<td>59 min</td>
<td>0 min</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Clock - Setting of date</td>
<td>t45</td>
<td>1</td>
<td>31</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Clock - Setting of month</td>
<td>t46</td>
<td>1</td>
<td>12</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Clock - Setting of year</td>
<td>t47</td>
<td>0</td>
<td>99</td>
<td>0</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Miscellaneous</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Delay of output signals after start-up</td>
<td>e01</td>
<td>0 s</td>
<td>600 s</td>
<td>5 s</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Can only be set when regulation is stopped (r12=0)

***) With access code 2 the access to these menus will be limited

Factory setting
If you need to return to the factory-set values, it can be done in this way:
- Cut out the supply voltage to the controller
- Keep both buttons depressed at the same time as you reconnect the supply voltage
### Auxiliary table for settings (quick-setup)

<table>
<thead>
<tr>
<th>Function via data communication</th>
<th>Functions to be used in the gateway's override function</th>
<th>Used parameter in AK-CC 210</th>
</tr>
</thead>
<tbody>
<tr>
<td>Start of defrosting</td>
<td>Defrost control</td>
<td>- - - Def.start</td>
</tr>
<tr>
<td>Coordinated defrost</td>
<td>Defrost control</td>
<td>- - - HoldAfterDef u60 Def.relly</td>
</tr>
<tr>
<td>Night setback</td>
<td>Day/night control</td>
<td>- - - Night setbck</td>
</tr>
<tr>
<td>Light control</td>
<td>Day/night control</td>
<td>o39 Light Remote</td>
</tr>
</tbody>
</table>

### Ordering

<table>
<thead>
<tr>
<th>Type</th>
<th>Function</th>
<th>Code no.</th>
</tr>
</thead>
<tbody>
<tr>
<td>AK-CC 210</td>
<td>Refrigeration controller without data communication but prepared for mounting of one module</td>
<td>230 V a.c 084B8520 115 V a.c. 084B8534</td>
</tr>
<tr>
<td>EKA 178A</td>
<td>Data communication module MOD-BUS</td>
<td>084B8564</td>
</tr>
<tr>
<td>EKA 179A</td>
<td>Data communication module LON RS 485</td>
<td>084B8565</td>
</tr>
<tr>
<td>EKA 181C</td>
<td>Battery module that will protect the clock in case of lengthy power failure</td>
<td>084B8577</td>
</tr>
<tr>
<td>EKA 182A</td>
<td>Copy key EKC - EKC</td>
<td>084B8567</td>
</tr>
<tr>
<td>EKA 163A</td>
<td>External display for AK-CC 210</td>
<td>084B8562</td>
</tr>
</tbody>
</table>

### Override

The controller contains a number of functions that can be used together with the override function in the master gateway / System Manager.
Connections

Power supply
230 V a.c.

Sensors
S3 and S4 are thermostat sensors. A setting determines whether S3 or S4 or both of them are to be used.
S5 is a defrost sensor and is used if defrost has to be stopped based on temperature.

Digital On/Off signals
A cut-in input will activate a function. The possible functions are described in menus o02 and o37.

External display
Connection of display type EKA 163A (EKA 164A).

Relays
The general uses are mentioned here. See also page 6 where the different applications are shown.
DO1: Refrigeration. The relay will cut in when the controller demands refrigeration
DO2: Defrost. The relay will cut in when defrost is in progress
DO3: For either fans or refrigeration 2
Fans: The relay will cut in when the fans have to operate
Refrigeration 2: The relay will cut in when refrigeration step 2 has to be cut in
DO4: For either alarm, rail heat, light or hotgas defrost
Alarm: Cf. diagram. The relay is cut in during normal operation and cuts out in alarm situations and when the controller is dead (de-energised)
Rail heat: The relay cuts in when in alarm situations and when the controller is dead (de-energised)
Light: The relay cuts in when in alarm situations and when the controller is dead (de-energised)
Hotgas defrost: See diagram. The relay will cut out when defrost has to be done

Data communication
The controller is available in several versions where data communication can be carried out with one of the following systems: MOD-bus or LON-RS485.
If data communication is used, it is important that the installation of the data communication cable is performed correctly.
See separate literature No. RC8AC...

Electric noise
Cables for sensors, DI inputs and data communication must be kept separate from other electric cables:
- Use separate cable trays
- Keep a distance between cables of at least 10 cm
- Long cables at the DI input should be avoided

Coordinated defrost via cable connections

The following controllers can be connected up in this way:
AK-CC 210, AK-CC 250, AK-CC 450,
AK-CC 550
Max. 10.
Refrigeration is resumed when all controllers have “released” the signal for defrost.

Coordinated defrost via data communication

Gateways/
System manager
### Data

<table>
<thead>
<tr>
<th>Supply voltage</th>
<th>230 V a.c. +10/-15 %, 2.5 VA, 50/60 Hz</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sensors 3 pcs off either</td>
<td>Pt 1000 or PTC 1000 or NTC-M2020 (5000 ohm / 25°C)</td>
</tr>
<tr>
<td>Accuracy</td>
<td>Measuring range -60 to +99°C</td>
</tr>
<tr>
<td></td>
<td>Controller ±1 K below -35°C ±0.5 K between -35 to +25°C ±1 K above +25°C</td>
</tr>
<tr>
<td></td>
<td>Pt 1000 sensor ±0.3 K at 0°C ±0.005 K per grad</td>
</tr>
<tr>
<td>Display</td>
<td>LED, 3-digits</td>
</tr>
<tr>
<td>External display</td>
<td>EKA 163A</td>
</tr>
<tr>
<td>Digital inputs</td>
<td>Signal from contact functions</td>
</tr>
<tr>
<td>Requirements to contacts: Gold plating</td>
<td></td>
</tr>
<tr>
<td>Use auxiliary relays when the cable is longer</td>
<td></td>
</tr>
<tr>
<td>Electrical connection cable</td>
<td>Max.1,5 mm² multi-core cable</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Relays*</th>
<th>CE (250 V a.c.)</th>
<th>UL *** (240 V a.c.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>DO1. Refrigeration</td>
<td>8 (6) A</td>
<td>10 A Resistive 5FLA, 30LRA</td>
</tr>
<tr>
<td>DO2. Defrost</td>
<td>8 (6) A</td>
<td>10 A Resistive 5FLA, 30LRA</td>
</tr>
<tr>
<td>DO3. Fan</td>
<td>6 (3) A</td>
<td>6 A Resistive 3FLA, 18LRA 131 VA Pilot duty</td>
</tr>
<tr>
<td>DO4. Alarm</td>
<td>4 (1) A Min. 100 mA**</td>
<td>4 A Resistive 131 VA Pilot duty</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Environments</th>
<th>0 to +55°C, During operations -40 to +70°C, During transport 20 - 80% Rh, not condensed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Density</td>
<td>IP 65 from front. Buttons and packing are imbedded in the front.</td>
</tr>
<tr>
<td>Escapement reserve for the clock</td>
<td>4 hours</td>
</tr>
<tr>
<td>Approvals</td>
<td>EU Low Voltage Directive and EMC demands re CE-marking complied with LVD tested acc. EN 60730-1 and EN 60730-2-9; A1, A2 EMC tested acc. EN61000-6-3 and EN 61000-6-2</td>
</tr>
</tbody>
</table>

* DO1 and DO2 are 16 A relays. The mentioned 8 A can be increased up to 10 A, when the ambient temperature is kept below 50°C. DO3 and DO4 are 8 A relays. Max. load must be kept.  ** Gold plating ensures make function with small contact loads  *** UL-approval based on 30000 couplings.

Capacitive load
The relays cannot be used for the direct connection of capacitive loads such as LEDs and on/off control of EC motors. All loads with a switch mode power supply must be connected with a suitable contactor or similar.
This warning does not mean that Hussmann products will cause cancer or reproductive harm, or is in violation of any product-safety standards or requirements. As clarified by the California State government, Proposition 65 can be considered more of a ‘right to know’ law than a pure product safety law. When used as designed, Hussmann believes that our products are not harmful. We provide the Proposition 65 warning to stay in compliance with California State law. It is your responsibility to provide accurate Proposition 65 warning labels to your customers when necessary. For more information on Proposition 65, please visit the California State government website.
The MODEL NAME and SERIAL NUMBER is required in order to provide you with the correct parts and information for your particular unit. They can be found on a small metal plate on the unit. Please note them below for future reference.

MODEL: ____________________________

SERIAL NUMBER: ____________________