

AK-255 Software Update Instructions

This document is intended to assist in the software upgrade for a Danfoss AK 255 System Controller, manufactured from 2005 through 2016. It is expected that the person(s) doing the upgrade are familiar with parallel refrigeration rack systems, Energy Management Systems, the Danfoss AK 255 controller and AKA65 software, Windows© software.

Technical Support is available from Danfoss during normal business hours (Mon – Fri 7:00 am through 6:00 pm ET):

888-Danfoss (326-3677) press 1-Cooling, 2-Technical Support, 2- Supermarket Electronics
Cooling.TS.FR.NA@Danfoss.com

Note: AK 255 Upgrades consist of upgrading the controller’s software and the controller’s database. These are considered two separate items. Much of this document concerns the upgrade of the controller’s software. Please see Appendix I concerning database upgrades before proceeding.

Table of Contents

Section 1: Pre-upgrade Checklist	Page 2
Section 2: Hardware Identification	2
Section 3: Specific Upgrade Steps	4
Section 4: First Generation Hardware Upgrade	4
Section 5: Second Generation, CPU version 1.0 Hardware Upgrade	6
Section 6: Second Generation, CPU version 1.1 Hardware Upgrade	7
Section 7: Second Generation, CPU version 1.2 Hardware Upgrade	8
Section 8: Second Generation, CPU version 1.3 Hardware Upgrade	9
Appendix I Upgrading the Database	11
Appendix II File Extension Definitions (.mot, .cmot, .csi, .mai, .fai)	12
Appendix III Boot Loader and Application version matching	13
Appendix IV Recommended database version upgrade steps	14
Appendix V FTP File Transfers (XML file loads)	15
Appendix VI Case Controller Device (Support Files)	16
Appendix VII Refrigerants Available by Version	17

AK-255 Software Update Instructions

Section 1: Pre-upgrade Checklist:

- Record any manual overrides for on/off inputs; (Communications / I/O Network / List Points / On-Off Inputs)

- Record any manual overrides for Relay Outputs; (Communications / I/O Network / List Points / Relay Outputs). An uppercase "M" will be under the Value column indicating the override. A letter "R" indicates an override at the relay board switch.

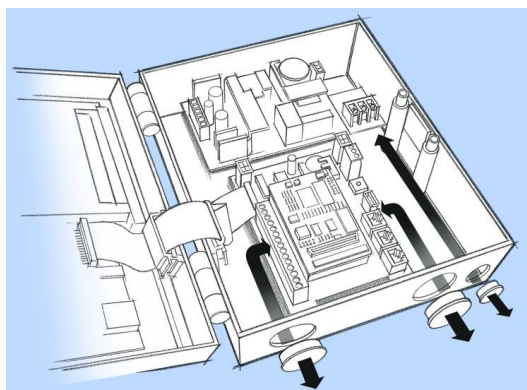
- Record status of any Digital compressors. Dummy On/Off Inputs may need to be assigned and overridden, or manual overrides may need to be re-entered.

- Check Dual Temp cases for dummy on-off inputs that may need to be re-entered for the Dual Temp Switch. Note whether cases are currently in Low Temp or Medium Temp state.

- Find all racks controlled by AK 255; racks will either need to be pumped-down, or have discharge pressures monitored during the upgrade.

Section 2: Hardware Identification

1. Identify the hardware in the controller. They will be classified as one of five (5) types:
 - a. Older box-type, **First Generation**:

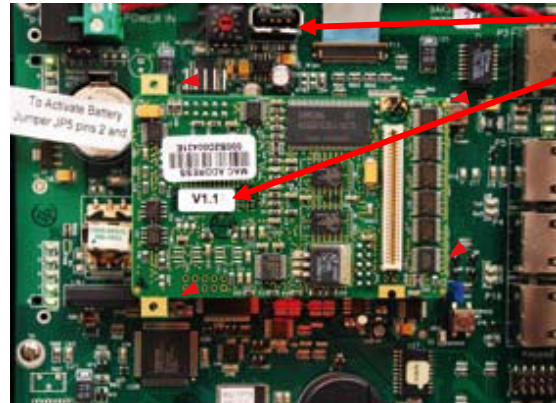


b. Second Generation, CPU version 1.0:



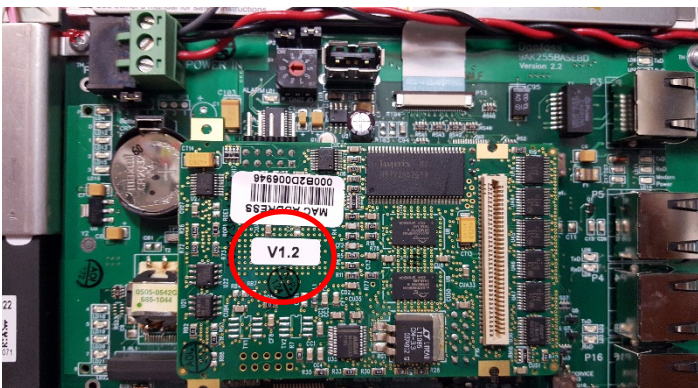
- no standard USB port to the right of the rotary address switch
- CPU board has no white, paper CPU version sticker.

c. Second Generation, CPU version 1.1:

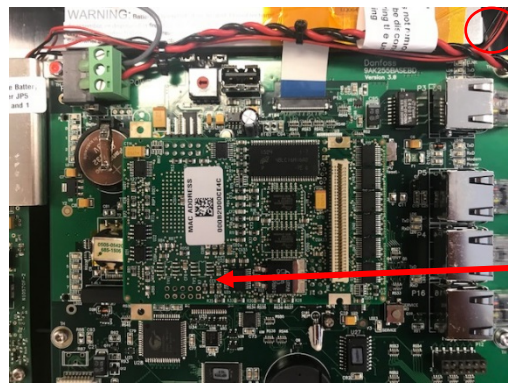


- USB port installed
- Version sticker

d. Second Generation, CPU version 1.2:



e. Second Generation, CPU version 1.3:



- Note several small, red and black wires leading to the display.
- V1.3 sticker may or may not be present here.

Section 3: Specific Upgrade Steps

- For **First Generation** Hardware, go to **Section 4**
- For **Second Generation, CPU version 1.0**, go to **Section 5**
- For **Second Generation, CPU version 1.1**, go to **Section 6**
- For **Second Generation, CPU version 1.2**, go to **Section 7**
- For **Second Generation, CPU version 1.3**, go to **Section 8**

Section 4: First Generation Hardware Upgrade

Equipment needed:

- Danfoss Direct connection cable (Part # 080z0262).
- USB adapter (if laptop does not have a DB9 9-pin serial port). If needed, use Danfoss USB to 9-pin adapter kit, part # 080z0267).
- Windows© XP or older laptop, if the AK 255 Boot Loader version is lower than 5.1.
- Ethernet CAT5 crossover cable, if the AK 255 Boot Loader version is lower than 5.1.
- Danfoss Code Loader software version 4.1 or higher.
- Boot Loader, software upgrade files.
- **Note: the highest allowable software version for this hardware is VR2.231**

Upgrade Steps:

1. Pullback database and save via direct connection inside the AK 255, using the "RS-232" P4 port. (The intent is to have an original backup if needed, because once this file is updated to the newer version, it cannot be restored to a previous version).
2. Turn off compressors or monitor discharge pressures with pressure gauges during the upgrade for safety reasons.
3. Save software update Win files (example: VR02_081.exe) in the C:/Danfoss/Code Loader folder. Save the code loader files into a new folder you create in the C:/Danfoss/Code Loader/VR02_081 folder (example: VR02_081.cmot and the ak255p1.lcf file). Save the boot loader file in the same folder (example: Boot 5_1.mot).
4. **If the controller's existing Boot Loader file is lower than version 5.1:**
 - a. Two cables will be needed for the upgrade: the Danfoss direct connect cable, and the Ethernet CAT5 crossover cable. Boot Loader versions above 5.1 only require the Danfoss direct connect cable, not the crossover cable.
 - b. Open the AK 255 Code Loader software on the laptop, and turn off the laptop's wireless networking connection.
 - c. Remove the Diag jumper (JP2), next to the Service button to put the 255 into update mode.
 - d. Press CPU reset switch (SW2) to reset the unit.
 - e. Look on the AK 255 display for the IP address.
 - f. If the IP address is all zeros, press the SHIFT button on the controller keypad and press the reset switch again.
 - g. Verify valid IP address on the controller screen.
 - h. Verify that the laptop acquires an IP address.
 - i. At the Danfoss Code Loader select "Browse" open File type on bottom of window and select Boot .mot Files(b*.mot). At the top of the window is a "Look in" button. Select boot loader and pick boot 5_1.mot. Then click on the Open button at bottom of window
 - j. Click on the "Send Network" button. This process will take 2 minutes or less.

- k. After download is complete, the unit should reset itself; if not, press the reset switch (SW2). After reset, check to see if Boot 5.1 is on the screen at the top of the 255 unit.
- l. On the Code Loader software, select Browse. Then at the bottom of the window select Application .csi Files (d* .csi;v* .csi).At the top of the window select code files in the Look In option. Find the VR02_081.csi file and click on it. Then click the Open button at the bottom of the window. Load the file with either Send Network or Send RS-232.

5. If the controller's existing Boot Loader file is version 5.1 or higher:

- a. Remove the Diag jumper (JP2), next to the Service button to put the 255 into update mode.
 - b. Press CPU reset switch (SW2) to reset the unit.
 - c. At the Danfoss Code Loader select "Browse" open File type on bottom of window and select Boot .csi Files(b*.csi). At the top of the window is a "Look in" button. Select boot loader and pick boot file. Then click on the Open button at bottom of window.
 - d. Click on the "Send RS232" button. This process will take 2 minutes or less.
 - e. After download is complete, the unit should reset itself; if not, press the reset switch (SW2). After reset, check to see if Boot 5.1 is on the screen at the top of the 255 unit.
 - f. On the Code Loader, select Browse. Then at the bottom of the window select Application .csi Files (d* .csi;v* .csi).At the top of the window select code files in the Look In option. Find the VR02_081.csi file (for example) and click on it. Then click the Open button at the bottom of the window.
 - g. Click on the "Send RS232" button. This will load the new version of VR02_081 to the unit. This takes about 5 minutes or less.
 - h. When complete, reinstall jumper on JP2 and reset unit with the SW2 reset switch. When unit is completely rebooted, verify the boot version is 5.1 and the Software Version is R02.081 in the AK2-SC255 Info screen.
6. Reconnect to the controller via the AKA 65 software and get authorized at Supervisor level. Select "Load database" from the file menu and follow the on-screen instructions to load the database that you saved in step 1.
 7. When finished uploading the new file, turn back on all compressors and verify the operation of the rack and all I/O is online. When in doubt, perform a Complete Rescan.
 8. Configure the History and start history collection if it's not already Collecting.

Post-Upgrade Checklist

- Verify all I/O boards are online. If in doubt, perform a Complete Rescan.
- Verify that any manual overrides (both On/Off Inputs and Relay Outputs) are re-entered, since they may be lost during the upgrade.
- Verify that any Digital compressors are controlling, with a % shown. Messages such as "Bypass on no Proof" or "Bypass on Fault" are not normal and should be corrected.
- Verify that any Dual Temp cases are using the correct target.
- Verify that no Host communication alarms are active.
- Perform a Test Alarm via modem or network if applicable.
- Request someone connect remotely and pullback the database at the new version if applicable.

Section 5: Second Generation, CPU version 1.0 Hardware Upgrade

Equipment needed:

- Danfoss Direct connection cable (Part # 080z0262).
- USB adapter (if laptop does not have a DB9 9-pin serial port). If needed, use Danfoss USB to 9-pin adapter kit, part # 080z0267).
- Danfoss Code Loader software version 4.1 or higher.
- Boot Loader, software upgrade files.

Upgrade Steps:

1. Connect to the AK 255 via the outside Direct Connection port, using the Danfoss Direct Connect cable. Save the database.
2. Turn off compressors or monitor discharge pressures with pressure gauges during the upgrade for safety reasons.
3. Remove the DIAG jumper, next to the Service button. Reset the controller with the CPU Reset button.
4. Using the Code Loader software, load new boot file, for example: boot6_15.csi. If the controller does not reset automatically after the file loads, reset the controller. The new boot version will be displayed at the top of the screen.
5. Using the Code Loader software, load the new Application software's .csi file, for example: VR02_173.csi.
6. Replace the DIAG jumper and reset the controller using the CPU reset button.

Post-Upgrade Checklist

- Verify all I/O boards are online. If in doubt, perform a Complete Rescan.
- Verify that any manual overrides (both On/Off Inputs and Relay Outputs) are re-entered, since they may be lost during the upgrade.
- Verify that any Digital compressors are controlling, with a % shown. Messages such as "Bypass on no Proof" or "Bypass on Fault" are not normal and should be corrected.
- Verify that any Dual Temp cases are using the correct target.
- Verify that no Host communication alarms are active.
- Perform a Test Alarm via modem or network if applicable.
- Request someone connect remotely and pullback the database at the new version if applicable.

Section 6: Second Generation, CPU version 1.1 Hardware Upgrade

Equipment needed:

- Danfoss Direct connection cable (Part # 080z0262).
- USB adapter (if laptop does not have a DB9 9-pin serial port). If needed, use Danfoss USB to 9-pin adapter kit, part # 080z0267).
- Danfoss Code Loader software version 4.1 or higher.
- Boot Loader, software upgrade files.

Upgrade Steps:

1. Connect to the AK 255 via the outside Direct Connection port, using the Danfoss Direct Connect cable. Save the database.
2. Turn off compressors or monitor discharge pressures with pressure gauges during the upgrade for safety reasons.
3. Remove the DIAG jumper, next to the Service button. Reset the controller with the CPU Reset button.
4. Using the Code Loader software, load new boot file, for example: boot6_15.csi. If the controller does not reset automatically after the file loads, reset the controller. The new boot version will be displayed at the top of the screen.
5. Using the Code Loader software, load the new Application software's .csi file, for example: VR02_173.csi.
6. Replace the DIAG jumper and reset the controller using the CPU reset button.

Post-Upgrade Checklist

- Verify all I/O boards are online. If in doubt, perform a Complete Rescan.
- Verify that any manual overrides (both On/Off Inputs and Relay Outputs) are re-entered, since they may be lost during the upgrade.
- Verify that any Digital compressors are controlling, with a % shown. Messages such as "Bypass on no Proof" or "Bypass on Fault" are not normal and should be corrected.
- Verify that any Dual Temp cases are using the correct target.
- Verify that no Host communication alarms are active.
- Perform a Test Alarm via modem or network if applicable.
- Request someone connect remotely and pullback the database at the new version if applicable.

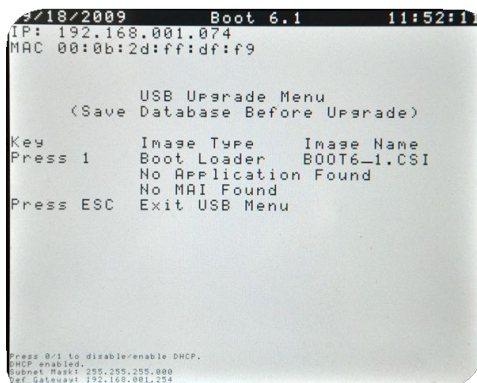
Section 7: Second Generation, CPU version 1.2 Hardware Upgrade

Equipment needed:

- USB 2.0 Flash (Thumb) Drive, 1 MB or larger capacity. **(If existing Boot Loader version is 6.1 or higher).**
- Danfoss Direct connection cable (Part # 080z0262), **(if existing Boot Loader version is lower than 6.1).**
- USB adapter (if laptop does not have a DB9 9-pin serial port). If needed, use Danfoss USB to 9-pin adapter kit, part # 080z0267).
- Danfoss Code Loader software version 4.1 or higher.
- Boot Loader, software upgrade files (.csi, .mai or .fai files).
 - A note about upgrade files:
 - **.csi** file: only contains the software application; does not include controller support files (such as .edf, .lst), XML files or HTML web files.
 - **.mai** file: contains the software application file + controller support files such as .edf and .lst, XML files and HTML files
 - **.fai** file: contains the software application file + controller support files such as .edf and .lst, XML files and HTML files + the factory application file, only used as a backup when remote upgrades are performed

Upgrade Steps:

1. Connect to the AK 255 via the outside Direct Connection port, using the Danfoss Direct Connect cable or use a USB flash drive. Save the database.
2. Turn off compressors or monitor discharge pressures with pressure gauges during the upgrade for safety reasons.
3. Remove the DIAG jumper, next to the Service button. Reset the controller with the CPU Reset button.
4. For Boot Loader versions 6.1 and higher:
 - a. On-screen menu will be similar to this:



- b. Verify that boot and software application files used for the upgrade are loaded on the USB flash drive.
- c. Using the on-screen options, load the boot___.csi file first.
- d. When the file load is finished, reset the controller, then remove and reinsert the USB flash drive.
- e. Load the software upgrade file. It is good practice to load the .mai or .fai file whenever possible, as this ensures more internal files are upgraded. Upgrades with .mai or .fai files will take longer, since compressed files need to be extracted. Time to extract the files is generally 30-60 minutes. During the file

extraction time (as displayed on the AK 255 screen, the DIAG jumper can be replaced and the USB flash drive can be removed. The controller will boot back into normal mode when the file extractions have completed.

Post-Upgrade Checklist

- Verify all I/O boards, modules and controllers are online. If in doubt, perform a Complete Rescan.
- Verify that any manual overrides (both On/Off Inputs and Relay Outputs) are re-entered, since they may be lost during the upgrade.
- Verify that any Digital compressors are controlling, with a % shown. Messages such as "Bypass on no Proof" or "Bypass on Fault" are not normal and should be corrected.
- Verify that any Dual Temp cases are using the correct target.
- Verify that no Host communication alarms are active.
- Perform a Test Alarm via modem or network if applicable.
- Request someone connect remotely and pullback the database at the new version if applicable.

Section 8: Second Generation, CPU version 1.3 Hardware Upgrade

Equipment needed:

- USB 2.0 Flash (Thumb) Drive, 1 MB or larger capacity.
- Danfoss Code Loader software version 4.1 or higher.
- Boot Loader, software upgrade files (.csi, .mai or .fai files).
 - A note about upgrade files:
 - **.csi** file: only contains the software application; does not include controller support files (such as .edf, .lst), XML files or HTML web files.
 - **.mai** file: contains the software application file + controller support files such as .edf and .lst, XML files and HTML files
 - **.fai** file: contains the software application file + controller support files such as .edf and .lst, XML files and HTML files + the factory application file, only used as a backup when remote upgrades are performed

Upgrade Steps:

1. Connect to the AK 255 via the outside Direct Connection port, using the Danfoss Direct Connect cable or use a USB flash drive. Save the database.
2. Turn off compressors or monitor discharge pressures with pressure gauges during the upgrade for safety reasons.
3. Remove the DIAG jumper, next to the Service button. Reset the controller with the CPU Reset button.
4. For Boot Loader versions 6.1 and higher:

- a. On-screen menu will be similar to this:

```
9/18/2009 Boot 6.1 11:52:11
IP: 192.168.001.074
MAC 00:0b:2d:ff:df:f9

          USB Upgrade Menu
          (Save Database Before Upgrade)

Key      Image Type      Image Name
Press 1  Boot Loader      BOOT6_1.CSI
          No Application Found
          No MAI Found
Press ESC Exit USB Menu

Press 0/1 to disable/enable DHCP.
DHCP enabled.
Subnet Mask: 255.255.255.000
Def. Gateway: 192.168.001.254
```

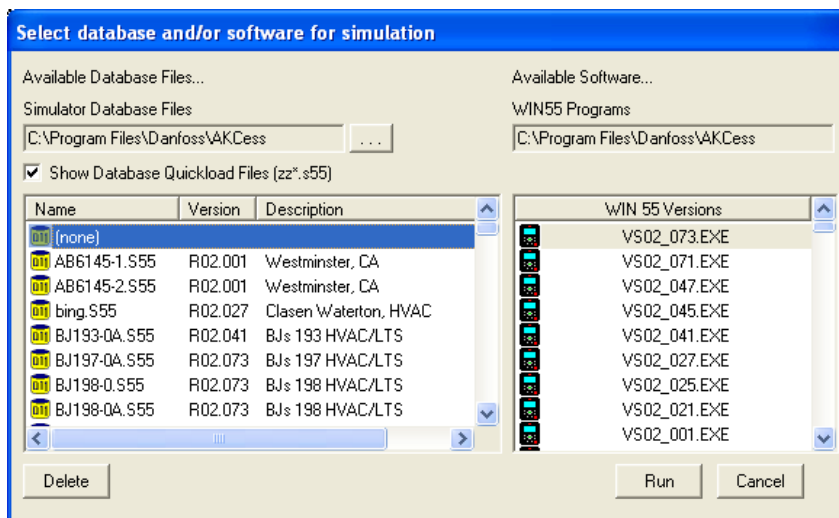
- b. Verify that boot and software application files used for the upgrade are loaded on the USB flash drive.
- c. Using the on-screen options, load the boot___.csi file first.
- d. When the file load is finished, reset the controller, then remove and reinsert the USB flash drive.
- e. Load the software upgrade file. It is good practice to load the .mai or .fai file whenever possible, as this ensures more internal files are upgraded. Upgrades with .mai or .fai files will take longer, since compressed files need to be extracted. Time to extract the files is generally 30-60 minutes. During the file extraction time (as displayed on the AK 255 screen, the DIAG jumper can be replaced and the USB flash drive can be removed. The controller will boot back into normal mode when the file extractions have completed.

Post-Upgrade Checklist

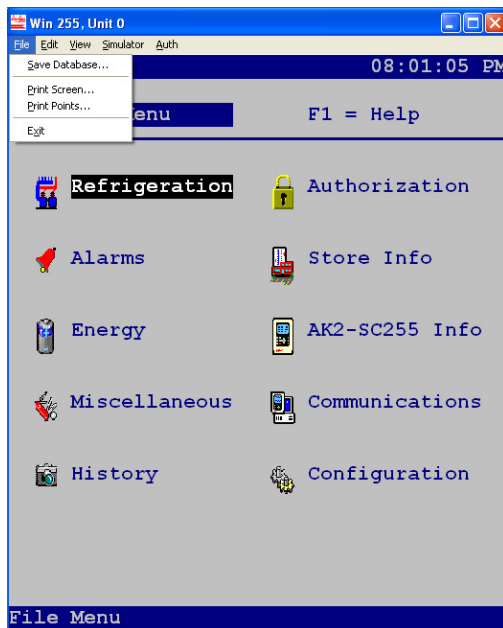
- Verify all I/O boards, modules and controllers are online. If in doubt, perform a Complete Rescan.
- Verify that any manual overrides (both On/Off Inputs and Relay Outputs) are re-entered, since they may be lost during the upgrade.
- Verify that any Digital compressors are controlling, with a % shown. Messages such as "Bypass on no Proof" or "Bypass on Fault" are not normal and should be corrected.
- Verify that any Dual Temp cases are using the correct target.
- Verify that no Host communication alarms are active.
- Perform a Test Alarm via modem or network if applicable.
- Request someone connect remotely and pullback the database at the new version if applicable.

Appendix I: Upgrading the controller's database (see also Appendix IV)

1. The AK 255 is able to Auto Convert databases when the jump in versions is not too large.
2. In general, if the change in software versions is not more than two large steps, the Auto Convert can be utilized to upgrade the database. For example:
 - a. VR2.131 to VR2.151 - okay for Auto Convert
 - b. VR2.131 to VR2.191 - needs to be upgraded with AKA65
 - c. VR2.073 to VR2.246 - needs to be upgraded with AKA65
 - d. VR2.211 to VR2.231 - okay to Auto Convert
3. To upgrade a controller database file in AKA65, use the Simulator option to 'step-up' the file.
 - a. Select the saved database on the right column, then select a higher version of software on the right column.



- b. When the file opens, save it with a unique name under File / Save Database.



- c. If AKA65 is used to upgrade the controller's database, use the new file to reload the AK 255. This is done by:
 - i. Connecting to the controller in AKA65
 - ii. Login with a Supervisor Access code, then File, Load Database.

Appendix II: File Extension Definitions (.mot, .cmot, .csi, .mai, .fai)

Important File Extensions:

- **.mot** file: Boot file used for upgrading older 255s, using a Boot version lower than 5.1
- **.cmot** file: Application file used for upgrading older 255s, using a Boot file lower than 5.1
- **.lcf** file: support file that was created to support the .cmot file. The /cmot and .lcf files should be kept in the same folder, unique to each version
- **.csi** file: only contains the software application; does not include controller support files (such as .edf, .lst), XML files or HTML web files.
- **.mai** file: contains the software application file + controller support files such as .edf and .lst, XML files and HTML files
- **.fai** file: contains the software application file + controller support files such as .edf and .lst, XML files and HTML files + the factory application file, only used as a backup when remote upgrades are performed

Appendix III: Boot Loader and Application version matching

<u>Software Version</u>	<u>Boot Version*</u>
v2.001	v2.0
v2.027	v2.6
v2.045	v3.1
v2.075	v4.4
v2.081	v5.1
v2.083	v5.1
v2.085	v5.3
v2.101	v6.1
v2.111	v6.1
v2.131	v6.1
v2.151	v6.5
v2.153	v6.5
v2.155	v6.5
v2.165	v6.5
v2.171	v6.7
v2.173	v6.7
v2.181	v6.9
v2.191	v6.9
v2.201	v6.11
v2.203	v6.11
v2.211	v6.13
v2.231 and higher	v6.15

*version is minimum requirement-higher versions ok

Appendix IV: Recommended database version upgrade steps

Starting Version	Step up to ...
2.001	2.027
2.003	2.027
2.021	2.027
2.027	2.045
2.031	2.045
2.043	2.073
2.045	2.073
2.073	2.081
2.075	2.081
2.077	2.081
2.081	2.121
2.083	2.121
2.085	2.121
2.111	2.121
2.121	2.165
2.131	2.165
2.151	2.165
2.153	2.165
2.155	2.173
2.165	2.173
2.171	2.201

Starting Version	Step up to ...
2.173	2.211
2.181	2.211
2.191	2.231
2.201	2.231
2.211	2.231
2.231	2.246
2.240	2.246
2.243	2.246
2.244	2.246

Appendix V: FTP File Transfers (XML file loads)

Notes:

- For XML options to be present in the AK 255, the controller needs the XML.cgi file to reside in the HTML folder of the controller's file section
- Versions older than 2.111 do not have an HTML folder, but will gain the folder when the controller's software is upgraded
- The XML.cgi file cannot be added to the controller with AKA65 software
- Since older controllers cannot be upgraded with .mai or .fai files, it may be necessary to add the file manually, using a File Transfer Protocol (FTP) application
- FTP software applications:
 - Filezilla: <https://filezilla-project.org/>
 - SmartFTP: <https://www.smartftp.com/>
- When using FTP software to connect and transfer files into the HTML folder of the controller, check your laptop's Firewall settings to verify that the FTP software is allowed to move files through the Windows firewall.

Appendix VI: Case Controller Device (Support Files)

Notes:

- Upgrades with .csi files do not include .edf files needed for case controllers
- Case controller support files can be added using AKA65 software:
- When connected to the controller and logged in at a Supervisor level:



- The device.lst file contains a list of all available Generic devices that can communicate to the AK 255, such as case controllers, RTUs, and some Lighting panels.
- The device.lst file can change as AK 255 versions change. Contact Danfoss Technical Support if you need files at 888-Danfoss (326-3677), then press 1-2-2 when prompted.
- Common device support files are:

File Name	Controller
080z0124.edf	AK-CC 303A, US Version
080z0130.edf	AK-CC 750, sw 5.5
80z0130a.edf	AK-CC 750, sw 6.0
084B8520.edf	AK-CC 210, 230v
084B8534.edf	AK-CC 210, 115v
084B8030.edf	AK-CC 550A, 230v, sw 1.5
084B8036.edf	AK-CC 550A, 115v, sw 1.5
84B8030a.edf	AK-CC 550A, 230v, sw 1.8
84B8036a.edf	AK-CC 550A, 115v, sw 1.8
84B8030b.edf	AK-CC 550A, 230v, sw 1.9
84B8036b.edf	AK-CC 550A, 115v, sw 1.9

- After files are loaded, the AK 255 must be reset, in order to use the files.

Appendix VII: Refrigerants Available by Version

AK SC 255 Version	Standard Refrigerants	Added Refrigerant	
VR2.001	R-12, R-13, R-13B1, R-22, R-23, R-32, R-114, R-123, R-125, R-134A, R-142B, R-152A, R-170, R-227, R-290, R-401A, R-401B, R-402A, R-402B, R-403B, R-404A, R-407A, R-407B, R-407C, R-408A, R-409A, R-410A, R-413A, R-417A, R-500, R-502, R-503, R-507, R-600, R-600A, R-717, R-744, R-1270		
VR2.027			
VR2.045			
VR2.075			
VR2.081			R-422D
VR2.083			
VR2.085			
VR2.101			
VR2.111			
VR2.121			
VR2.131			
VR2.151			
VR2.153			
VR2.155			
VR2.165			
VR2.171			R-407F
VR2.173			
VR2.181			
VR2.191			
VR2.201			
VR2.211		Rx*	
VR2.231			
VR2.244			
VR2.246		R-448A, R-449A	

*Rx = R-448A

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