Micro Control Systems
APPLICATION NOTE
APP-015

Variable Speed
Condenser Fan Logic

Revision History

Date	Author	Description
2/01/99	Kelly Mitchell	Created Application Note
2/15/99	Kelly Mitchell	Updates from JGW

APP-015 Variable Speed Fan Logic

This Application Note outlines the Variable Speed Condenser Control Logic incorporated in the MCS-8 standard chiller software. The variable speed control logic supports the following types of condensers, Air Common, Air Individual, or Air Combination. The type of condenser, number of condenser relays (RO's) and the variable speed output (AO) are specified when building the MCS-8 configuration file.

Requirements for Variable Speed Condenser Logic

1) MCS-8 must have software "CHL S05.00-R" or "CHL R05.00-M" or later
2) PC-CFG version 2.8 or later

How to Setup using PC-CFG

1) Setup the analog output point name under the "AO Info" screen.
2) Select the "Chiller Info" button and scroll down to the circuits portion of the window. Scroll over to the number of condenser RO's.

3) Select Condenser Type – Air Common, Air Individual, Air Combination.
   a) If Air Common is selected then setup "Starting Cond Relay" & "# of Cond Stages" in the condenser information section. Then set the columns in all circuits for "Num of Condenser RO's" equal to zero & "Starting Condenser RO" to NOT USED. Now setup the "Condenser Fan AO" column for circuit #1 to point to the AO for fan speed and circuit #2-4 as Not Used.
   b) If Air Individual is selected then setup the "Num of Condenser RO's" & "Starting Condenser RO" columns for all used circuits. Also setup "Condenser Fan AO" column to point to the corresponding AO for fan speeds.
   c) If Air Combination is selected then setup the "Num of Condenser RO's" & "Starting Condenser RO" columns for Circuits #1 and #3. Also setup

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Condenser Fan AO" columns for circuit #1 and #3 to point to the corresponding AO fan speeds.

How the Control Logic Works

Condenser fans will be turned on and off based upon discharge pressure compared to the cut in and cut out values. The variable speed analog output will be modulated proportional to the cut in and cut out pressures for the current stage.

When the discharge pressure reaches setpoint #31 "COND ST1 ON" the first condenser fan is turned on and the variable speed is set to 100%. If additional condenser fans exist, they will turn on when the discharge pressure exceeds the previous stage's cut in value plus setpoint #33 "COND DIFF ST".

When the discharge pressure drop below setpoint #32 "COND ST1 OFF" the first condenser fan will be turned off. If additional condenser fans exist, they will turn off when the discharge pressure drops below the previous stage's cut out value plus setpoint #33 "COND DIFF ST".

Example - 3 Stage Variable Speed Condenser

Stage #	ON if PSI greater than	OFF if PSI less than	Fan #1 modules proportional to PSI 30% - 100%
1	200.0 PSI	150.0 PSI	150 P – 200 P
2	230.0 PSI	180.0 PSI	180 P – 230 P
3	260.0 PSI	210.0 PSI	210 P – 260 P

When the discharge pressure reaches 200 PSI, Fan #1 will turn on at 100% capacity and will modulate its speed 30% - 100% proportional to the discharge pressure of 150 PSI – 200 PSI. For example if the pressure is 170 PSI, fan # 1 will run at 58% capacity. If the pressure continues to increases, and reaches a pressure of 230 PSI fan #2 will turn on. Fan #1 will continue to run but will now modulate its speed 30% - 100% proportionally to 180 PSI – 230 PSI. So if the discharge pressure falls down to 220 PSI, Fan #2 is on and fan #1 is at 86% capacity. Fan # 3 will turn on when the discharge pressure reaches 260 PSI. Fan #1 and fan #2 will both continue to run but fan #1 will now modulate its speed 30% - 100% proportionally to 210 PSI – 260 PSI.

The logic works the same way as the discharge pressure drops. When the discharge pressure drops below it's cut out it will be turned off and fan #1 will modulate it speed based on the current stage's cut in and cut out values.