Micro Control Systems

APPLICATION NOTE

APP-009

Hall Screw Compressors

Revision History

Date	Author	Description
05/19/98	Bob Toney	Created Application Note
10/07/98	Bob Toney	Revised Application Note
12/05/01	Ron Andersen	Replaced with APP-009A

This Application Note outlines the set up and the sequence of relay outputs for a Hall screw compressor systems.

Theory

This application note should be used with the documentation for the PC-Config program. Note the PC-Config program is a generalized program that supports the creation of configuration files for all applications.

Screw Compressor Models:

The following Hall screw compressor models are supported:
- Hall 50 Ton 230 Volt
- Hall 50 Ton 460 Volt
- Hall 65 Ton 230 Volt
- Hall 65 Ton 460 Volt
- Hall 85 Ton 230 Volt
- Hall 85 Ton 460 Volt
- Hall 95 Ton 230 Volt
- Hall 95 Ton 460 Volt

Select the Hall compressor in circuit grid of the Chiller information screen in the PC-Config program. A multiple circuit system can have different models on different circuits.

The following is how a model is selected:

	Circuit #	Compressor Type	Number of Compressor ROs	Starting Compressor RO	Number of Condensor ROs
▶	1	Hall 95 Ton 460V ▼	6	COMP1A	1
	2	Name ▲		Not Used	0
	3	Hall 50 Ton 230V		Not Used	0
	4	Hall 50 Ton 460V		Not Used	0
	5	Hall 65 Ton 230V		Not Used	0
	6	Hall 65 Ton 460V		Not Used	0
◀		Hall 85 Ton 230V			
		Hall 85 Ton 460V			
		Hall 95 Ton 230V			
		Hall 95 Ton 460V ▼			

CIRCUITS

Select the desired model with the appropriate voltage requirement.

Hall Screw Compressor Overview:

The 50 and 65 ton compressors can provide infinite compasitity between start up and fully loaded, these values are setting via set points. The load and unload solenoids will be energized to move the valve to obtain the desired cooling capacity.

The 85 and 95 ton compressors can provide infinite compasitity with in two fixed ranges. When the LOADA solenoid is de-energized, the compressor will provide infinite compasitity between 25 and 50%. To move to the second range of capacity, the LOADA solenoid is energized and the unload solenoid is energized until the slide is completely unloaded. At this point the compressor is providing 75% of its capacity. The compressors can now provide infinite compasitity in the second range, 75 to 100%. The load and unload solenoids will be energized to move the valve to obtain the desired cooling capacity.

RELAY OUTPUT:

The MCS-8 chiller algorithm has a predefined sequence of relay outputs that is based upon the model selected. The relay outputs must be consecutive points. This sequence can start at any relay output, assuming enough relay outputs follow to handle the sequence; however the first compressor point is usually assigned to the first relay on the board.

The RO sequence for Hall screw compressors of 50 and 60 ton:

	#	Name	Display Button	Max Pulses (10th of Sec.)	
	1-1	COMP1A	Not Used	0	
	1-2	COMP1B	Not Used	0	
	1-3	LOAD B	Not Used	0	
	1-4	UNLOAD B	Not Used	0	
	1-5	LIQUID J	Not Used	0	
	1-6	ECONIZER	Not Used	0	
	1-7	SPARE1-7	Not Used	0	
	1-8	EXV 1	Not Used	60	

Relay Output Information Screen

The points 1-1 & 1-2 are the two compressor points for either a part winding or star delta starter. These points are turned on when the compressor is to be started. If a part winding, the second point (COMP1B) will be turned on 1 second after the first point (COMP1A). If a star delta, the second point (COMP1B) will be turned on 4 seconds after the first point (COMP1A).

These models have a load (LOAD 1B) and unload (UNLOAD1B) solenoids that control the slide valve from initial setting as specified in set point, MIN VAR STEP through its maximum setting as specified in set point, MAX VAR STEP. These solenoids must be on for a maximum pulsed of 25 millisecond for each pulse.

This example has a liquid injection point and an economizer. Note there sequence is fixed. Point 1-8 has a pulsed electronic solenoid to control the liquid line. A standard on/off liquid line solenoid is also supported.

The RO sequence for Hall screw compressors of 85 and 95 ton:

	#	Name	Display Button	Max Pulses (10th of Sec.)
Relay Output Information Screen				
	1-1	COMP1A	Not Used	0
	1-2	COMP1B	Not Used	0
	1-3	LOAD B	Not Used	0
	1-4	UNLOAD B	Not Used	0
	1-5	LOAD A	Not Used	0
	1-6	LIQUID J	Not Used	0
	1-7	SPARE1-7	Not Used	0
	1-8	EXV 1	Not Used	60

The points 1-1 & 1-2 are the two compressor points for either a part winding or star delta starter. These points are turned on when the compressor is to be started. If a part winding, the second point (COMP1B) will be turned on 1 second after the first point (COMP1A). If a star delta, the second point (COMP1B) will be turned on 4 seconds after the first point (COMP1A).

The points 1-1 & 1-2 are the two compressor points for either a part winding or star delta starter. These points are turned on when the compressor is to be started. If a part winding, the second point (COMP1B) will be turned on 1 second after the first point (COMP1A). If a star delta, the second point (COMP1B) will be turned on 4 seconds after the first point (COMP1A).

These models have a load (LOAD 1B) and unload (UNLOAD1B) solenoids that control the slide valve plus a solenoid (LOADA) that will move the slide range from 25 to 50% range to 75 to 100%. The load and unload solenoids are used to control the slide valve with in these two ranges. The load and unload solenoids must be on for a maximum pulse of 25 millisecond for each pulse.

The control algorithm will determine when the system must move from one range to the other, the system will wait the number of seconds specified in set point, LOADA DELAY before energizing or de-energizing the solenoid (LOADA) that moves the system between ranges.

This example has a liquid injection point. Note there sequence is fixed. Point 1-8 has a pulsed electronic solenoid to control the liquid line. A standard on/off liquid line solenoid is also supported.