

# Micro Control Systems

APPLICATION NOTE

APP-058

## MCS-MAGNUM Interface to Copeland Digital Scroll

### Revision History

Date	Author	Description
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## 1. GENERAL CONCEPT

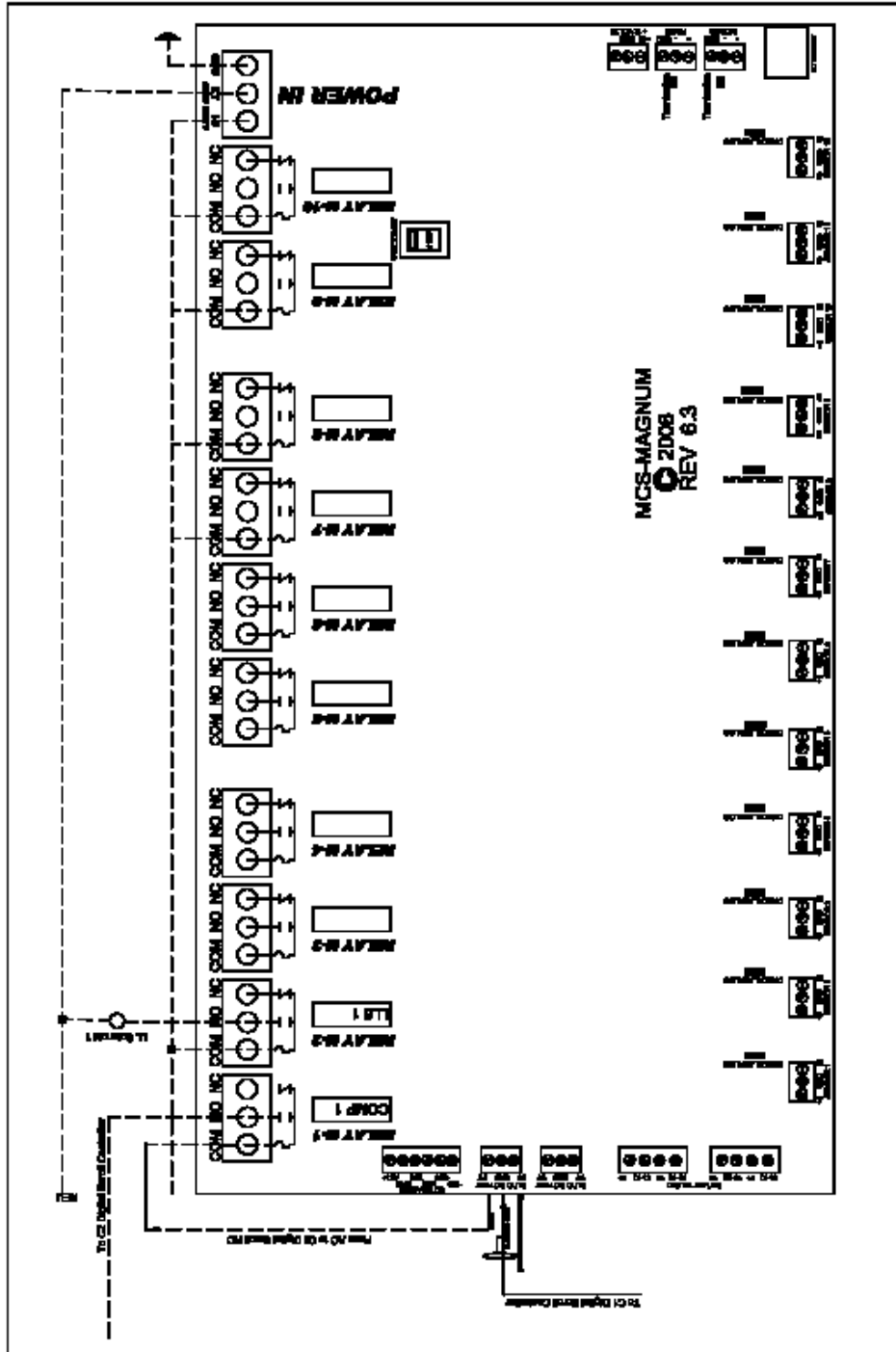
- a. Chiller or condensing unit has a Copeland Digital Scroll compressor with a Copeland control interface.
- b. Use the MCS Magnum to control speed.
- c. Use the MCS Magnum to control safeties so Alarms will provide description of problems.
- d. Allow the time delays to be controlled via the Magnum.

## 2. PROBLEMS

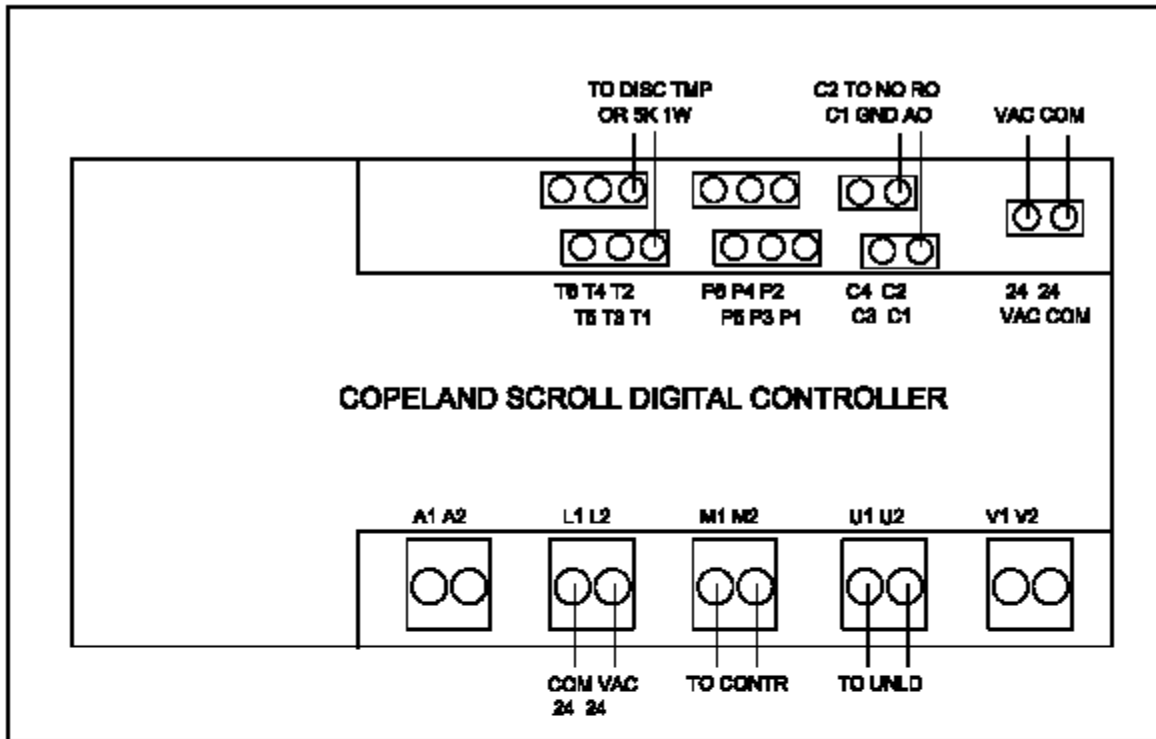
- e. The Copeland controller has a built in time delay of between 90 seconds to 120 second.
- f. The time delay starts when the compressor is off and power is supplied.
- g. On a power fail / power return the time will start if 24 vac power is supplied to the Copeland controller.
- h. The Compressor contactor must be energized from the Copeland controller.
- i. The Copeland controller will not load above 50% if a discharge thermistor is not installed or a resistor to simulate the thermistor.
- j. If the Magnum Relay Output energizes the compressor contactor a fault occurs on the Digital Scroll controller.
- k. If the Magnum Relay Output supplies power to the Digital Scroll controller the Digital Scroll Time Delay will not turn on the compressor thus not allowing proper safety protection through the Magnum

### 3. MAGNUM / COPELAND WIRING

a. MCS MAGNUM CONTROLLER  
(Figure 1)



b. COPELAND DIGITAL CONTROLLER  
(Figure 2)



## 4. WIRING STEPS

- COPELAND CONTROLLER
  - a. Wire 24 VAC Line & Common to terminals L1 / L2.
  - b. Wire 24 VAC to VAC / COM on opposite sides of the board.
  - c. Wire M1 / M2 to compressor contractor.
  - d. Wire U1 / U2 to compressor unloader.
  - e. Wire C2 to MCS MAGNUM Normally Open Relay for compressor.
  - f. Wire C1 to MCS MAGNUM ground on Analog Output for compressor.
  - g. Wire between 4K to 5K Resistor between T2 & T1. (If discharge temperature safety is on MCS MAGNUM. Otherwise wire Copeland Discharge Thermister to T2 & T1.
  
- MCS MAGNUM CONTROLLER
  - a. Wire MCS Analog Output to Compressor Relay Output Common.
  - b. Wire C2 to MCS MAGNUM Normally Open Relay for compressor. (Step e above.)

## 5. MCS MAGNUM CFG SET POINTS

SP #	SP NAME	SP VALUE	COMMENTS
23	POWERUP DLAY	90 SECONDS MIN	AT POWERUP WE NEED TO GET BY DIGITAL SCROLL CONTROLLER TIME DELAY
59	ACYC OFF-ON	60 SECONDS MIN	WHEN COMPRESSOR SHUTS OFF THIS 60 SECOND DELAY PLUS 60 SECONDS IN READY STATE
63	ACYC ON-ON	NO MIN	THIS IS USED TO CONTROL # STARTS PER HOUR
76	Loamp NOstrt	MIN = MAX = 5 SECONDS	BY GETTING THE TIME DELAYS BY THE SCROLL CONTROLLER DELAY WE CAN TEST AMPS TO VERIFY RUNNNG CORRETLY
87	HI DISC TEMP	230 F	USING THE MAGNUM DISCHARGE TEMP CONTROL ALLOWS THE SYSTEM TO STOP LOADING, UNLOAD & RELOAD AS REQUIRED
88	HI DISC UNLD	2 F	UNLOAD IF 228 F
89	HI DISC RELD	5 F	RELOAD IF 225 F

## 6. CONCLUSION

- By setting up the controllers as specified here allows the Magnum to provide many unique safeties without interference from the Digital Scroll time delay.
- The Low Amp Safety checks for inadequate amp draw. Possible mechanical trip, missing phase, etc.
- The Hi Disc safety allows the Magnum to automatically control its way past a High Discharge Temp Failure.
- The Anti Cycle timers allow the Magnum to insure we are pass the Digital Scroll Control Time delay with minimum wasted time.
- Alarms are now in Descriptive form rather than counting blinking lights.