

DUC SERIES

Magic Aire Fan Coil – Model DUC – Sizes 06, 08, 10, 12, 14, 16, 20

Multifunction Controller – Operational Features and Flowchart

1. INTRODUCTION:

The Magic Aire DUC product is offered with optional Multifunction Controller (MFC) to allow control of pump, boiler and DX condensing unit. This control package allows the customer to connect a thermostat to the Magic Aire air handling unit and then use dry contacts from the MFC to engage/disengage the remote pump, remote boiler, and remote DX condenser.

This integrated controller is only for use with DUC fan coils, which are air handling units with DX cooling and hydronic heating. These units control two speeds of a three-speed PSC fan motor.

2. GENERAL SPECIFICATIONS:

Connections “W”, “Y” and “G” are nominal 24 VAC field binary inputs. The pump, boiler, and DX terminals are connected to N.O. outputs of relays. These relays and associated traces are rated at a minimum of 5 Amps, 120VAC.

The low-limit and aquastat inputs are connected to dry contacts. The low limit switch closes to indicate a fault condition, while the aquastat contacts close to indicate that heated water is available.

The fan control outputs switch the L1 power input to the H or L terminals to provide high speed or low speed fan operation. These relays are wired to prevent terminals H and L from being energized simultaneously. These relay contacts are rated for a minimum of 5 amps (inductive) at 240VAC.

3. FUNCTIONAL DESCRIPTION:

- 3.1 See the following sections for a control flowchart.
- 3.2 On application of unit power the green status LED shall light. On power application, DX cooling operation shall be delayed for the time guard period.
- 3.3 High-speed fan operation is subject to an OFF delay. The normal fan status shall be OFF, except as listed in this specification. The fan input (G) shall have precedence over all inputs except the low limit thermostat.

- 3.4 A fixed 3 second delay (unaffected by test jumper) shall be used to delay low speed fan operation when transitioning from high fan speed to low fan speed.
- 3.5 The supply fan high-speed output is engaged immediately with a call for FAN (G). When G is satisfied, the fan returns to normal control after the OFF delay.
- 3.6 The DX control is subject to fixed OFF delay to prevent short cycling of the remote condenser. When a call for cooling is satisfied, this timer shall prevent the remote condenser from being engaged for 5 minutes (+/- 20%) after the end of the last call for cooling.
- 3.7 The DX control output shall be engaged when the OFF delay timer is satisfied and there is a call for cooling (Y). Regardless of the fan input status, the high-speed fan output shall be immediately engaged when the DX output is engaged.
- 3.8 Upon a call for heating (W), the boiler relay and the pump relays engage. The fan is NOT engaged until after the aquastat closes and the heating fan delay expires. The fan ON delay does not start until after the aquastat input closes.
- 3.9 If the aquastat opens during heating operation, fan operation is discontinued until the aquastat input closes and the heating fan delay expires.
- 3.10 If the water coil low limit input closes, the pump output is engaged and the DX output is disengaged, regardless of the status of other inputs. Pump operation returns to normal control when the low limit input opens. The DX output returns to normal control, including the time-guard timer, when the low limit input opens.
- 3.11 If the pump has not been operated in 24 hours and the daily pump cycle option is enabled, the pump shall be engaged for 2 minutes.
- 3.12 If the pump has not been operated in 2 weeks and the 2-week pump cycle is enabled, the pump shall be engaged for 2 minutes.

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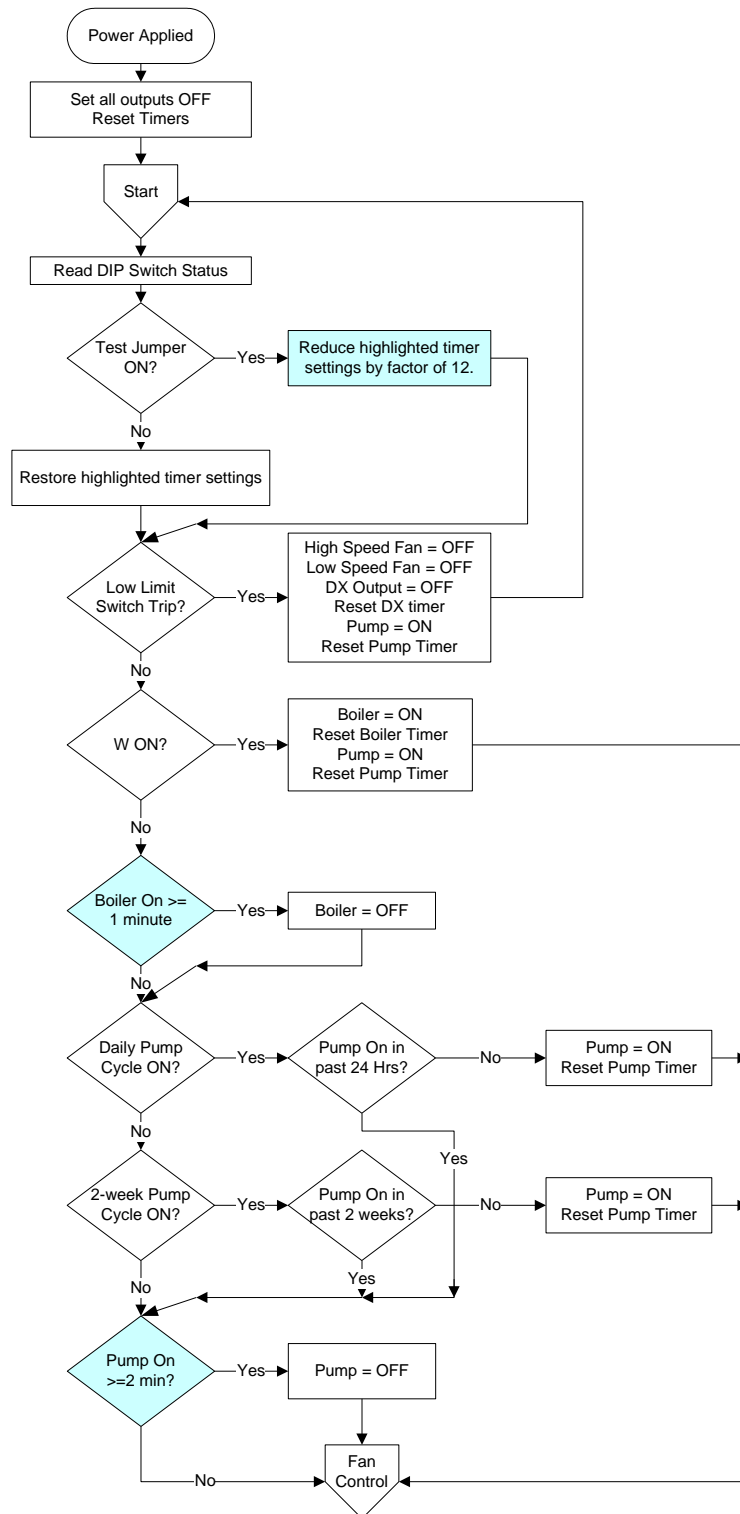
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- 3.13 TEST MODE – Used for FACTORY TESTING only. When the TEST input is closed the unit shall enter test mode. In test mode, the board shall operate normally, except that all time delays shall be reduced by a factor of 12. For example, a 60 second delay shall become 5 seconds. This allows the field inputs to be used to toggle to board on/off and eliminates long delays that increase the unit test time. This test exercises both the controller inputs and outputs.
- 3.14 Field Configuration: This controller shall allow the end user to configure the controller via dual-inline package (DIP) switches. The switch shall be set so that the DIP ON position corresponds to enabling the feature. The features and default settings: 1-minute Fan Delay (ON), 3-minute fan Delay (OFF), Daily Pump Cycle (OFF), and 2-week Pump Cycle (OFF).
- 3.15 Status Indication: A green LED shall indicate when the controller is powered. A red LED shall indicate when the unit is in low limit condition or the time delays are active. The red LED shall be ON when the low limit trips. The red LED shall flash at the rate of 500 ms OFF, 500 ms ON when there is a call for cooling and the cooling is locked out on the time-guard delay. This LED shall flash at the rate of 1 s OFF, 1 s ON when the fan time delays are active. The cooling delay status shall have precedence over the fan delay status. The low limit status shall take precedence over the delay status.

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4. CONTROL FLOWCHART: STARTUP, PUMP AND BOILER CONTROL



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5. CONTROL FLOWCHART: FAN AND DX CONTROL

