

Energy Recovery Wheel Standard Sequence of Operation

ENERGY WHEEL IS EQUIPPED WITH BYPASS DAMPERS ON THE SUPPLY AND EXHAUST SIDE WITH END SWITCH TO INDICATE FULL OPEN, A VARIABLE FREQUENCY DRIVE TO CONTROL ROTATION SPEED, AND A ROTATION DETECTION MODULE. ALL VALUES WILL BE DISPLAYED AS 0% TO 100% WHERE 0% IS 0% OPEN / MINIMUM, AND 100% IS FULL OPEN / MAXIMUM.

THE ENERGY WHEEL WILL BE ENABLED/ DISABLED WITH THE AIR HANDLING UNIT SUPPLY FAN. WHEN THE AIR HANDLING UNIT SUPPLY FAN HAS PROVEN "ON" AND THE ENERGY WHEEL VARIABLE FREQUENCY DRIVE IS NOT IN FAULT THE BAS WILL SEND A START COMMAND TO THE ENERGY WHEEL.

THE PROGRAM WILL CALCULATE THE ENERGY WHEEL'S ENTHALPY, DEWPOINT, AND WETBULB TEMPERATURE FOR THE LEAVING SUPPLY SIDE AND THE ENTERING AND LEAVING EXHAUST SIDE. THESE VALUES WILL BE BASED ON THE RESPECTIVE TEMPERATURE AND HUMIDITY INPUT VALUES.

THERE WILL BE FOUR OPERATIONAL MODES FOR THE ENERGY WHEEL

- FROST/CONDENSATE PREVENTION MODE
- HEAT RECOVERY MODE
- COOLING RECOVERY MODE
- CRAWL MODE

FROST/CONDENSATE PREVENTION MODE... WILL BE CONTROLLED WITH A DIRECT ACTING PROPORTIONAL AND INTEGRAL LOOP WITH THE LOOP OUTPUT REPRESENTED IN 0% TO 100% UNITS CALCULATED WITH THE DEVIATION BETWEEN THE PROCESS SET POINT AND THE PROCESS VARIABLE. THE PROCESS SET POINT WILL BE THE VALUE OF THE ENERGY WHEEL'S CALCULATED FROST DEWPOINT PLUS FIVE DEGREES F. THE PROCESS VARIABLE WILL BE REPRESENTED BY THE VALUE OF THE ENERGY WHEEL'S LEAVING EXHAUST TEMP.

HEAT RECOVERY MODE... WILL BE ENABLED BY A DEAD BAND SWITCH BASED ON OUTDOOR AIR TEMPERATURE, "ON" AT 48 DEGREES F. AND "OFF" AT 52 DEGREES F. AND WILL BE CONTROLLED WITH A REVERSE ACTING PROPORTIONAL AND INTEGRAL LOOP WITH THE LOOP OUTPUT REPRESENTED IN 0% TO 100% UNITS CALCULATED WITH THE DEVIATION BETWEEN THE PROCESS SET POINT AND THE PROCESS VARIABLE. THE PROCESS SET POINT IS THE VALUE OF THE AIR HANDLING UNIT'S DISCHARGE AIR TEMPERATURE SET POINT. THE PROCESS VARIABLE WILL BE REPRESENTED BY THE VALUE OF THE ENERGY WHEEL'S LEAVING SUPPLY TEMPERATURE. THE COMMAND FOR THE ENERGY WHEEL'S VARIABLE FREQUENCY DRIVE WILL BE THE MINIMUM VALUE OF THE ENERGY WHEEL ACCELL RAMP, FROST/CONDENSATE PREVENTION LOOP OUTPUT, AND THE HEAT RECOVERY LOOP OUTPUT, AND SHALL MODULATE TO MAINTAIN SETPOINT.

COOLING RECOVERY MODE... WILL BE ENABLED BY A DEAD BAND SWITCH BASED ON OUTDOOR AIR TEMPERATURE MINUS THE AIR HANDLING UNIT'S RETURN AIR TEMPERATURE, "ON" AT 5 DEGREES F.

DEVIATION AND "OFF" AT 2 DEGREES F. DEVIATION, AND WILL BE CONTROLLED WITH A DIRECT ACTING PROPORTIONAL AND INTEGRAL LOOP WITH THE LOOP OUTPUT REPRESENTED IN 0% TO 100% UNITS CALCULATED WITH THE DEVIATION BETWEEN THE PROCESS SET POINT AND THE PROCESS VARIABLE. THE PROCESS SET POINT IS THE VALUE OF THE AIR HANDLING UNIT'S DISCHARGE AIR TEMPERATURE SET POINT. THE PROCESS VARIABLE WILL BE REPRESENTED BY THE VALUE OF THE ENERGY WHEEL'S LEAVING SUPPLY TEMPERATURE. THE COMMAND FOR THE ENERGY WHEEL'S VARIABLE FREQUENCY DRIVE WILL BE THE MINIMUM VALUE OF THE ENERGY WHEEL ACCELL RAMP, FROST/CONDENSATE PREVENTION LOOP OUTPUT, AND THE COOLING RECOVERY LOOP OUTPUT, AND SHALL MODULATE TO MAINTAIN SETPOINT.

CRAWL MODE... THIS MODE WILL BE ENABLED WHEN BOTH THE HEAT RECOVERY ENABLE AND THE COOLING RECOVERY ENABLE ARE "OFF". WHEN THE CRAWL MODE IS ENABLED THE BYPASS DAMPERS WILL RAMP TO 100% BYPASS, AND THE ENERGY WHEEL'S VARIABLE FREQUENCY DRIVE WILL BE COMMANDED TO MINIMUM. WHEN THE HEAT RECOVERY ENABLE OR THE COOLING RECOVERY ENABLE ARE "ON" THE CRAWL MODE ENABLE WILL BE "OFF" AND THE BYPASS DAMPERS WILL RAMP TO 0% BYPASS, AND THE ENERGY WHEEL'S VARIABLE FREQUENCY DRIVE WILL MODULATE TO MAINTAIN DISCHARGE AIR TEMPERATURE SET POINT.

ALARMS...THE BAS WILL GENERATE ALL ALARMS AT THE HEAD END. THE FOLLOWING WILL STOP THE ENERGY WHEEL AND OPEN THE BYPASS DAMPERS TO FULL BYPASS.

- ENERGY WHEEL'S VARIABLE FREQUENCY DRIVE FAULT
- ENERGY WHEEL FAILS TO PROVE STATUS
- ROTATION DETECTION CONTROL MODULE GENERAL ALARM

SYSTEM SHUT DOWN...THE BAS WILL STOP THE ENERGY WHEEL AND OPEN THE BYPASS DAMPERS TO FULL BYPASS, SET ZERO IN ALL RAMPS AND CONTROL OUTPUTS, AND DISABLE THE ROTATION DETECTION CONTROL MODULE.