Using Low-Ambient Control for Higher Efficiency Air Conditioners

AQLA FAN SPEED CONTROLLER

WARNING

Mains voltage is present; care must be exercised when setting potentiometers
It is the responsibility of the user to ensure compliance with the Health and Safety at Work Act, 1974 and applicable codes of practice.

METHOD OF OPERATION

The function of the AQLA low ambient control is to maintain an adequate evaporating temperature in an Expansion Device feed air conditioning system in the cooling mode. The unit is consists of a Control Module and a Sensor which is fitted to one of the convenient liquid line exit from the condenser to measure the temperature of the condensing refrigerant. The fan motor and its power supply are connected to the controller, and the fan will then be automatically controlled to maintain a constant condensing temperature-and therefore a constant head pressure.
When the power is turned on, the fan runs at full speed for approximately 10 seconds, then the sensor measures the coil temperature and adjusts the fan speed to matchthe coil temperature to the set point, which can be set between 19°C and 41.5°C. As the ambient air temperature rises and falls, the fan speed increases and slows down, to produce the variable cooling effectneeded to give constant pressure.
If the ambient temperature drops far enough to require a fan speed lower then the set minimum speed, the fan will stop completely and the condenser is cooled by natural convection only. As the condensing temperature rises again, the fan will restart with a "hard start"of full speed for 10 seconds, and then the speed is again controlled by the sensor.

Before fixing, check that the package contents are correct.

Quantity	Package contents
1	AQLA Fan Speed Controller
1	Sensor Assembly
3	Buckle-clip
1	Adhesive Insulation (20mm X 80mm)
2	Tie Wrap(100mm)
1	Instruction Manual
3	Screw

FIXING

The controller should be mounted to control panel within the condensing unit using 2 screws supplied. Fasten it to any holes on control panel as long as there is enough space to install. If necessary, drill holes to install on proper position.

When drilling, ensure that metal swarf does not foul any electronic components.

P/No.: 3828A20096C

SAFETY FIRST!

1. Disconnect All power supplies before starting installation or maintenance work.
2. The controller and sensor are to be safely enclosed within the condensing unit.
3. All electrical wiring must be carried out by a competent person, and must comply with all National and Local electrical parts.

ELECTRICAL CONNECTIONS

It is essential that correct wiring connections are made. Read this instruction thoroughly before proceeding and follow exactly in conjunction with the wiring diagrams.

Some condensing units are equipped with two fans. In that case, connect the leadwire of each motor to terminal numbers 3 and 4.

Heat Pump Models

Where the Low Ambient Controller is to be used with a Heat Pump, the condenser fan needs to run at full speed during the heating mode, and is only modulated during the cooling mode.
When fitted to a Heat Pump, terminal numbers 6 and 7 should be wired directly to the reversing solenoid valve; in all cases both live and neutral side of solenoid valvebe connected to the controller.

Cooling Only Models

On cooling units only, where a reversing solenoid valve is not fitted, terminal numbers 6 and 7 should be left unconnected.

FITTING THE SENSOR

It is important that the sensor is correctly fixed.

1.Locate a return bend, two or three bends above a convenient liquid line exit from the condenser. This should ideally be chosen with its temperature closest to that of discharge saturation temperature. The discharge saturation temperature can be directly read from your gauges or with the aid of a touch probe thermometer.
This signal is then fed into the Controller which alters the voltage supplied to the fan motor, to keep the condensing temperature constant.

Note; If the sensor needs to be moved once fitted, it can be released by gently inserting the blade of a small screwdriver into the clip.

2. Fit the sensor head, bead side, to the pipe with a smear of the white thermal compound. Reinforce an appropriate buckle-clip with one of the tie wraps supplied and use the other to secure the cable to the adjacent pipe. It is important to have a good thermal contact between the sensor and the condenser tube, as this gives the controller its rapid yet damped response time, to give accurate control without "hunting". Finally, insulate the area of the bend with the insulation provided. Incorrect operation will result if the sensor is not adequately insulated and applied without thermal compound.

HEATING MODE

Fan speed control should not be used in the Heating mode; when heating, all fan(s) should operate at full speed.

SETTING THE CONTROL

Final adjustments are best carried out in low ambient temperature. The controller has been factory set at approximately 25°C, though this should always be verified at site. Should it be necessary to adjust the controller, proceed as follows.

Adjustments should always be carried out with the condensing unit covers in place, so that no air is short-circuited through the condenser coil.

1. With the unit running cooling mode, allow the system to settle. Observe both suction and discharge pressure.
2. Should setting be necessary, switch off electrical supply, disconnect one lead of the sensor, switch on electrical supply, and slowly adjust the minimum speed by rotating P2(Refer to Fig. 2, Graph 1)
   Aim for approximately 30% full speed. This will be the slowest speed at which the fan will operate when under the control of the AQLA controller without stalling.
3. Switch off electrical supply, re-connect the sensor, switch on the electrical supply, and adjust the set point P1(Refer to Fig. 1, Table 1) until, with a stable system, the suction temperature is between 0°C and +5°C. (Approximately 57-68psig when using R22.)
4. Check SW01F. If it doesn't indicate to **PIPE**, Switch it to **PIPE**.

*** Caution: SW01F should indicate PIPE to work properly. Ensure SW01F indicate PIPE.**

FIGURES OF OPTION SWITCHES

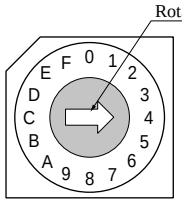


Fig. 1: Rotary S/W P1
(default:4)

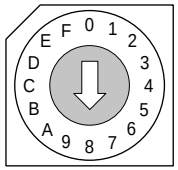


Fig. 2: Rotary S/W P2
(default:8)

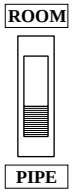
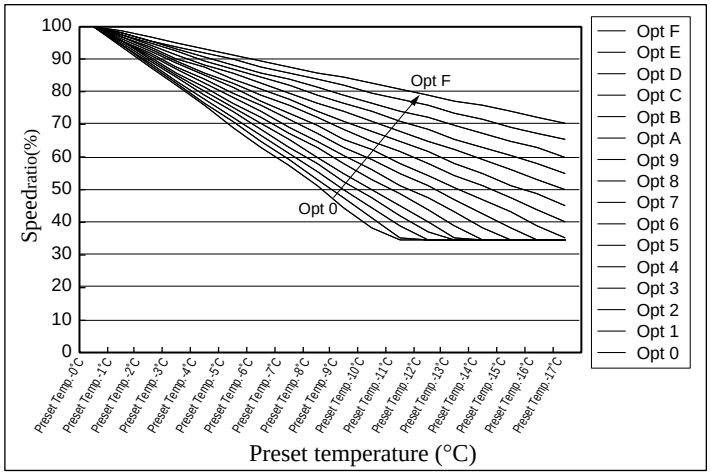


Fig. 3: S/W SW01F
(default: PIPE)

GRAPHS

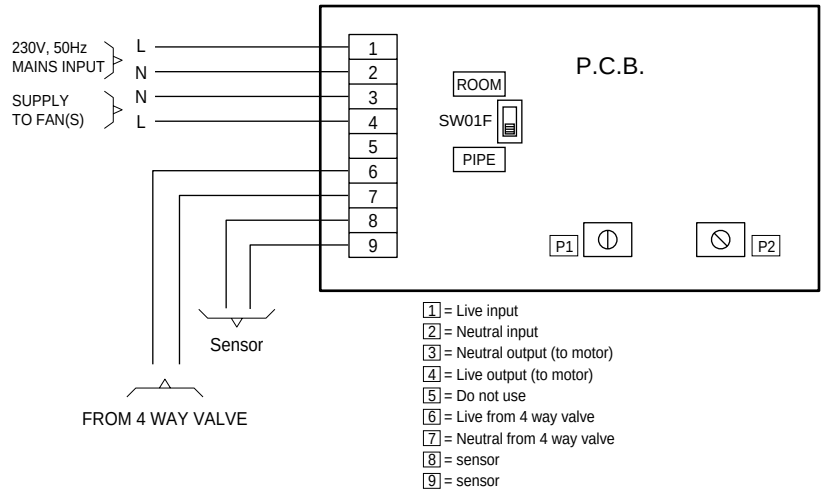


Graph 1: Speed ratio(%) ; Controlled by rotating P2

TABLES

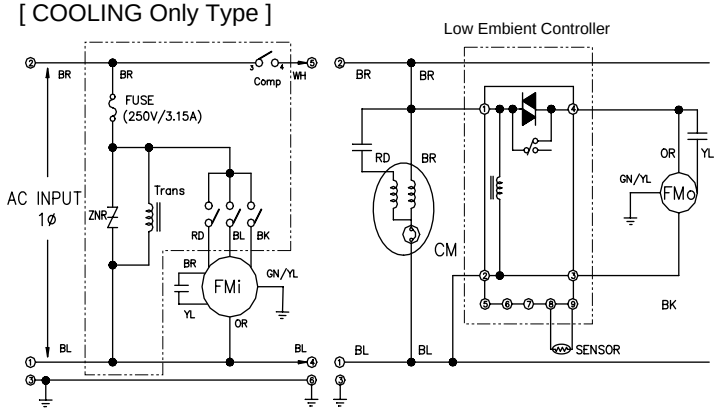
	Opt 0	Opt 1	Opt 2	Opt 3	Opt 4	Opt 5	Opt 6	Opt 7	Opt 8	Opt 9	Opt 10	Opt 11	Opt 12	Opt 13	Opt 14	Opt 15
PRESET TEMP	19°C	20.5°C	22°C	23.5°C	25°C	26.5°C	28°C	29.5°C	31°C	32.5°C	34°C	35.5°C	37°C	38.5°C	40°C	41.5°C
FAN ON TEMP	2°C	3.5°C	5°C	6.5°C	8°C	9.5°C	11°C	12.5°C	14°C	15.5°C	17°C	18.5°C	20°C	21.5°C	23°C	24.5°C
FAN OFF TEMP	4°C	5.5°C	7°C	8.5°C	10°C	11.5°C	13°C	14.5°C	16°C	17.5°C	19°C	20.5°C	22°C	23.5°C	25°C	26.5°C

Table 1: Setting Temperatures ; Controlled by rotating P1



CIRCUIT DIAGRAM

[COOLING Only Type]



[HEAT-PUMP Type]