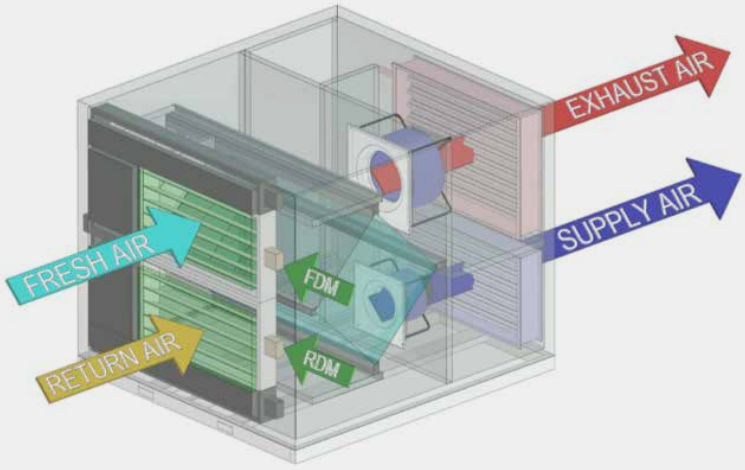
Equipment Component Options
For All ERV Models
Economy Cycle System

An Armcor Economy Cycle is designed to take advantage of favourable ambient air conditions to further enhance ERV equipment performance and efficiencies. Economy Cycle operation is sometimes referred to as 'Free Cooling'.

A standard Economy Cycle in Armcor ERV equipment consists of internal opposed blade dampers, operated by modulating motors which open & close upon demand. These are controlled by an ambient sensor supplied and installed by the mechanical contractor as part of the overall building management system controls.

Normal Operation



Fresh Air Damper Motor (FDM) is open

Fresh Air enters the unit, passes through the Energy Recovery Media and exits to the Supply Airstream.

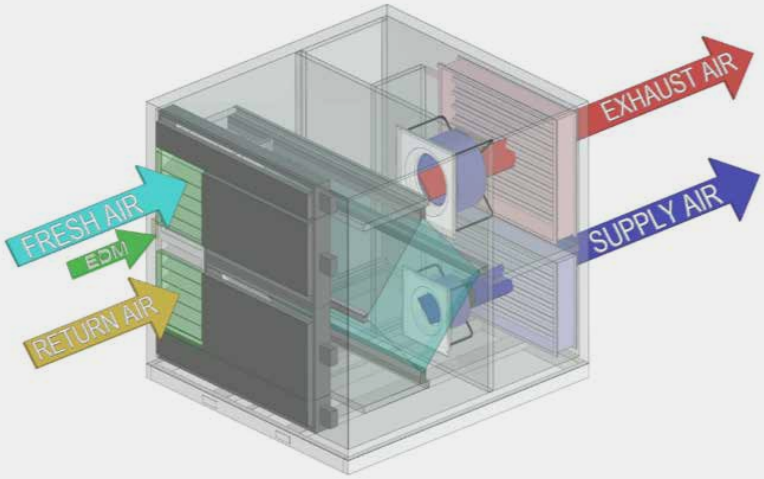
Return Air Damper Motor (RDM) is open

Return Air enters the unit, passes through the Energy Recovery Media and exits to the Exhaust Air.

Economy Cycle Damper Motor (EDM) is closed

The economy cycle dampers are closed – no air passes through the economy by-pass system.

Economy Cycle Operation



Economy Cycle Damper Motor (EDM) is open

Fresh Air enters the unit, passes through the economy bypass ducts and exits to the Supply Air stream. Return Air enters the unit, passes through the economy bypass ducts and exits to the Exhaust Air.

Fresh Air Damper Motor (FDM) and Return Air Damper Motor (RDM) are closed

The Fresh Air and Return Air dampers are closed so that air does not pass through the Energy Recovery Media.

Economy Cycle operation would typically activate in Summer when:

— There is a demand for cooling, and
— The ambient temperature is less than the indoor set point, or
— The ambient temperature is less the return air temperature.

Control of the Economy Cycle Operation

We recommend that the controls for an Economy Cycle system take the following into consideration.

— The Economy Cycle operation is not activated on a demand for heating. Economy operation is rarely effective as the outdoor air is normally colder than the return air.
— Controls are programmed for multi stage cooling with Economy Cycle operation acting as STAGE 1 Cooling.
— An outdoor 'Enthalpy Sensor' compatible with the master control system is used to activate the Economy Cycle. An enthalpy sensor is far more effective than a temperature sensor to determine when the outdoor ambient is more favourable than the indoor conditions. For example, even if the temperature is low (<18°C), the economy cycle will not operate if the relative humidity is high (>50% RH).

Typical Economy Cycle Operation

Assume typical control conditions of:

— Indoor design temperature is 21°C with a return air of 24°C.
— An outdoor enthalpy sensor is installed that will activate (close the contacts) if ambient conditions are below 18°C and below 50%RH.

On a demand for cooling Stage 1 (eg Indoor temperature reaches 20.5°C):

— If the enthalpy sensor is closed:
  > Stage 1 cooling (Economy Cycle) will be utilised
  > The Economy Cycle dampers will open, and the Energy Recovery dampers will close.
  > The indoor and exhaust fans will operate.
  > The compressors will not operate.
— If the enthalpy sensor is open:
  > the economy dampers will not open, therefore there is no free cooling provided.

On a demand for cooling Stage 2 (eg Indoor temperature reaches 21°C):

— If the enthalpy sensor is still closed,
  > Stage 1 cooling (Economy Cycle) will be utilised.
  > Stage 2 (Compressor 1) will activate to give positive cooling.

If there are additional stages of cooling eg multiple compressors, these stages will operate similar to the above.

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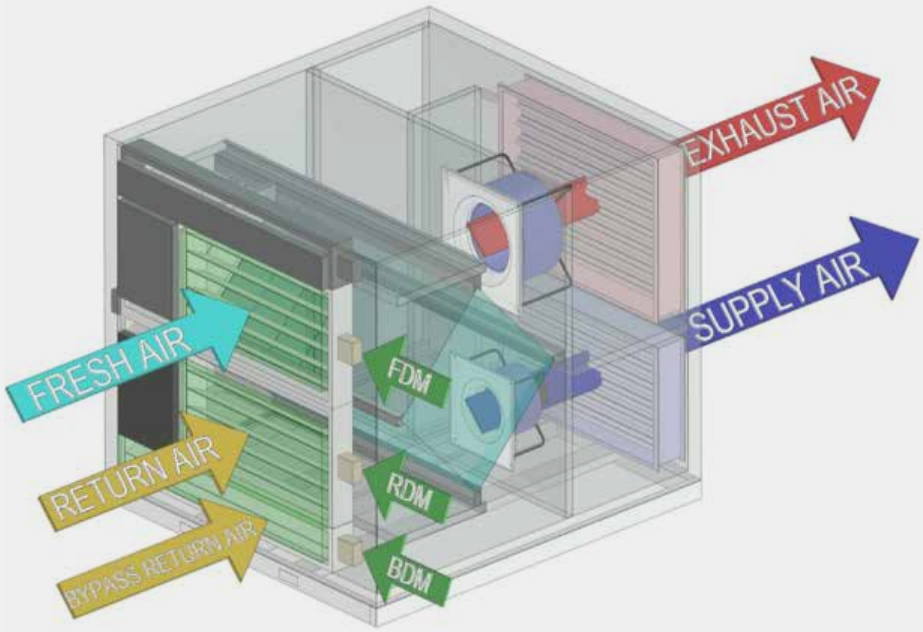
Equipment Component Options
For All ERV Models
Return Air By-Pass Damper

Some Armcor units are also designed to operate with a Return Air By-pass cycle. This cycle optimises operational efficiency by allowing indoor return air to recirculate when CO_2 conditions and/or indoor return air temperature conditions allow. Return Air By-Pass is often used for early morning winter warm up before a building is fully occupied or when full fresh air intake is not required.

The standard Return Air By-Pass system in Armcor Energy Recovery equipment consists of an opposed blade damper operated by a modulating motor which opens & closes upon demand. This is designed to accommodate a maximum of 50% of the total return air and is usually controlled by a CO_2 sensor supplied and installed by the mechanical contractor as part of the BMS controls.

Return Air By-Pass Operation



By-Pass Damper Motor (BDM) is open

Up to 50% of the Return Air enters through this damper, by-passes the Energy Recovery Media and flows directly to the Supply Air stream.

Return Air Damper Motor (RDM) is modulated

The balance of the Return Air enters the unit, passes through the Energy Recovery Media and exits to the Exhaust Air.

Fresh Air Damper Motor (FDM) is modulated

The required amount of Fresh Air enters the unit, passes through the Energy Recovery Media and exits to the Supply Air stream.

Return Air By-Pass operation would typically activate in winter when:

— There is a demand for heating, and
— The indoor CO_2 level is lower than the maximum set point, and
— The ambient temperature is less than the return air temperature.

Control of the Return Air By-Pass Operation

We recommend that the controls for a Return Air By-Pass system take the following into consideration.

— The operation can be activated on a demand for heating and cooling.
— Controls are programmed using some or all the following:
  > Time clock programmed for early morning warm up
  > Indoor CO_2 sensor set to disable the return air bypass if CO_2 levels are above 800ppm
  > Multi stage thermostat
  > Outdoor temperature sensor set to utilise return air if it is above outdoor fresh air temperature.

Typical Return Air By-Pass Operation for Early Morning Warm Up

On a demand for Stage 2 Heating (eg indoor temperature is more than 3°C below setpoint)

— If the CO_2 sensor is closed,
  > The Return Air By-Pass damper will fully open allowing return air to pass directly to the DX coil which will speed up the heating of a cold building.
  > The Fresh Air Recovery damper should be shut to approx. 50% (0-10VDC signal) to reduce the fresh air intake.
  > The compressors and fans will be operating to provide maximum heating capacity.

On a demand for Stage 1 Heating (eg indoor temperature is 1°C below setpoint)

  > The Return Air By-Pass damper will close, and
  > The Fresh Air Recovery damper will be fully open allowing normal full fresh air operation.
  > The compressors and fans will operate to provide the required heating capacity.

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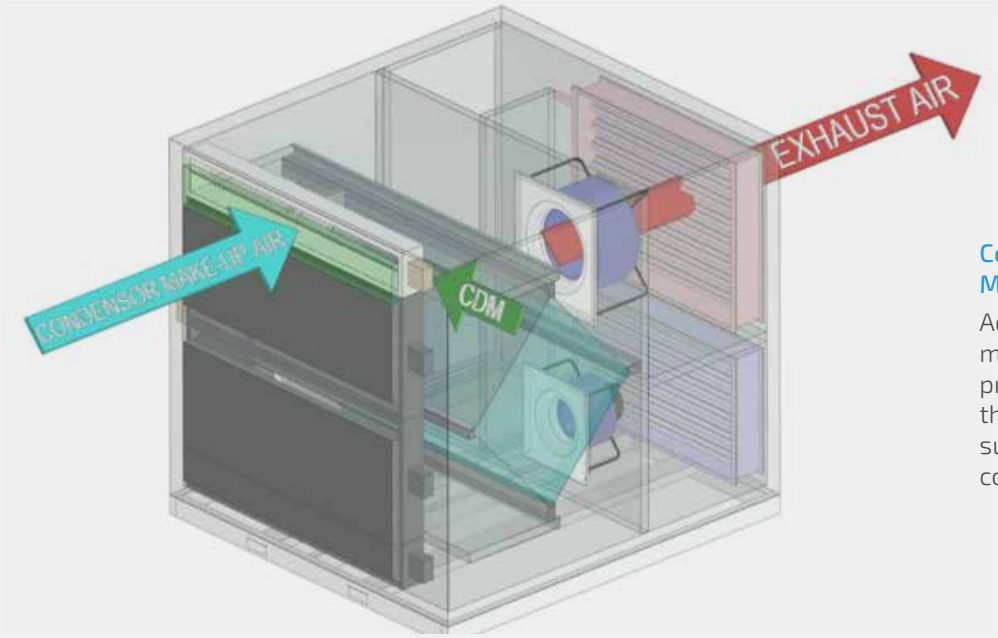
Equipment Component Options
For All ERV-PAC Models
Condenser Make-Up Air Damper

Armcor ERV Packaged Air-conditioning Units incorporate Condenser Make-Up Air to provide the correct airflow requirement to the condenser coil.

A supply of fresh air flow is introduced through a modulating balancing damper which is controlled by a refrigerant head pressure sensor.

Condenser Make-Up Air Operation



Condenser Make-Up Damper Motor (CDM) is open

Additional Make-Up Air, modulated by a head pressure sensor, enters through this damper, and supplies air directly to the condenser coil.

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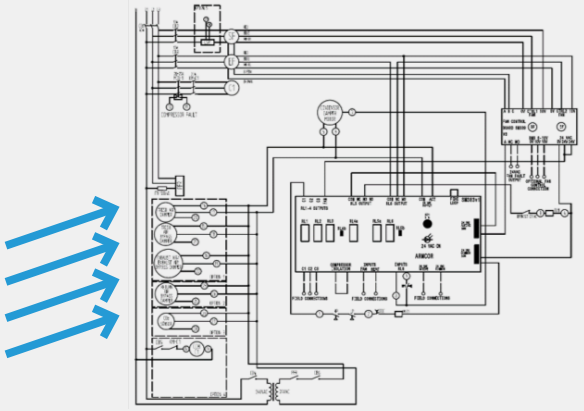
Equipment Component Options
For All ERV-PAC Models
Damper Controls and Wiring

All damper motors are wired to the control board ready for on-site connection to the BMS or control system.

The mechanical contractor or the controls engineer will usually provide the necessary sensors to maintain compatibility to the building control system. Connections to the equipment control board are simple and clear.



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