

INTEGRATED POWER PACK V5



Ultra's premier heat recovery product, now in its 8th evolution is poised to set the bar for the next generation of heat recovery systems.

ENERGYsmart thinking...at any temperature



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TECHNICAL OVERVIEW

A previous RAC runner up and highly commended product, the IPP v5 is testament to Ultra's commitment to the constant evolution of their premier heat recovery product.

The Integrated Power Pack features LT, HT and AC compressors, each targeting suction pressures to suit the attached refrigerated fixtures and at total of 8 compressors are configurable.

The new V5 boasts a variable frequency drive for each compressor, with speeds fully variable from 20 to 85hz dependent on the selected compressor models. Ultra have fine-tuned the speed ranges and software control based on extensive site trials of various compressor models and probably play host the most experience of frequency driven standard scroll compressors.

The intelligent control software, written 'in-house' especially for this application, runs on the RDM intuitive range for robust reliability and easy connection to the industry's leading monitoring system, the DM-Touch and has BACnet as standard for integration with other BMS systems if required. The controller will automatically choose the optimum compressor speed for both oil return and system performance whilst maintaining highly accurate optimised suction pressures. Compressor head temperatures are also monitored along with suction return temperatures and oil levels to ensure the operating envelopes are not exceeded.

For efficiency, the controller will 'triple boost' each of the compression stages when possible for optimum energy savings whilst a bypass arrangement ensures each compressor can single stage for better heat recovery performance or for back-up.

The pack features a second controller dedicated to heat recovery. Up to 2 IPPs can work together along side the IPP Heat Station, a closed loop water circuit containing high efficiency heat exchangers allowing condensing to take place into the water circuit. After which, liquid pressure is reduced before entering the outdoor liquid sub-cooler to ensure the refrigerant is fully condensed at a reduced liquid pressure.

Of course, the controller optimises discharge pressure and when heating demand falls, head pressure is carefully lowered to avoid destabilisation of the system until the optimum condensing pressure is achieved, at which point the outdoor liquid sub cooler is used as a standard high efficiency condenser.

Ultra know that with their highly efficient refrigeration system and during low ambient conditions, waste heat is not always plentiful and therefore the controller will automatically engage the false-load evaporator connected to the AC compressor(s). This evaporator is incorporated into the custom designed Searle condenser block to recover heat from the environment and liquid refrigerant, as well as providing liquid sub-cooling.

If more than one pack is connected, then the controller will first collect heat from one pack before employing both, this is controlled on a first-in-first-out (FIFO) basis so as not to overstress the same pack each time and ensuring the other is running at optimum efficiency if demand for full heat recovery is not required.

In the summer for comfort cooling or to prevent high humidity and misting of display case doors, the IPP system also features a plate heat exchanger to cool the water circuit. A three way valve will ensure the water passes through the cooling plate only. Temperature sensors around the water system make certain the system is operating optimally and a water pressure switch will alert the operator of maintenance needs whilst also protecting the energy efficient EC pump motor.

Connected to the water circuit throughout the occupied space are up to 8 ceiling cassettes or door curtains, each with its own custom RDM TDB controller to allow zoning or individual temperature setting, priority control and one of three fan speeds. The integrated condensate pump is also monitored for failure and will alert the operator to a pending water leak. Each cassette has its own temperature sensors and transmits this data to one another and back to the central controller for analysis by which the mode of operation and priority control can be automated.

Connection to fire detection and intruder alarm systems is made possible so that the system can either stand-by or use any available recovered heat in a 'set'back' mode.

V5 is designed for new lower GWP refrigerants such as Opteon XP40 (R449A) with its slightly higher discharge temperature being advantageous to heat recovery.

Unlike other systems on the market derived from airconditioning units, IPP is designed primarily as a refrigeration pack and contains failsafes to ensure refrigerated product is protected. Along with advanced plant temperature and pressure monitoring, anomalies with heat recovery or comfort cooling will force the system to prioritise its refrigeration duties. For example, air conditioning will be sacrificed if discharge pressures become unusually high i.e. in the event of failure of a condenser fan.

The condenser features EC fans as standard for low energy use, to guarantee flat-line optimised pressure control, and for low noise applications with optional nighttime set-back, either based on a time schedule or daylight hours. Of course, the fans are also monitored for healthy operation.

The IPP package system is proving to be very popular with convenience store operators and detailed energy data released by Lincolnshire Co-Operative Group shows IPP installations to be responsible for their most energy efficient sites with trials of the new V5 already underway and expected to set the bar for the next generation of heat recovery systems.