



HANKISON



H SERIES

HIGH CAPACITY

REFRIGERATED

COMPRESSED AIR

DRYERS

The "Whys" Behind Superior Performance

Air Side

Designed to economically produce consistent dew points with low pressure drop

Features

Heat Exchangers

Hankison engineered and manufactured shell and radial finned tube design ensures sufficient cooling...minimizes pressure drop... resists fouling

- "Balanced" design maximizes the heat transfer rate while minimizing pressure drop
- Wide tube spacing, baffling, and right angle flow patterns make heat exchangers resistant to fouling...adding years of useful service life...no prefilter required

Air-to-Air Heat Exchangers

- Large air-to-air heat exchangers remove over half of the heat load from the incoming air stream - minimizing refrigeration system size and power requirements
- Hankison design balances the high heat transfer coefficient inside the tubes (caused by vapor condensation and low profile

swirl generators) with the greater surface area on the outside of the tubes... allows for a compact design, high heat transfer rate and low pressure drop

- Tube surfaces resist fouling... wet dirty air is exposed to smooth tube walls and removable free floating swirl generators

Air-to-Refrigerant Heat Exchanger

- Large surface area permits the compressed air stream to be consistently cooled to the dew point temperature
- A multi-pass refrigerant design allows maximum use of available refrigeration capacity
 - Refrigerant velocity controlled by varying the cross-sectional flow area (less cross-sectional area in the early passes where refrigerant is mostly a liquid; larger cross-sectional area in the later passes where it is mostly a gas)... ensures quick response to changes in load.
 - Swirl generators in the later passes enhance refrigerant droplet evaporation

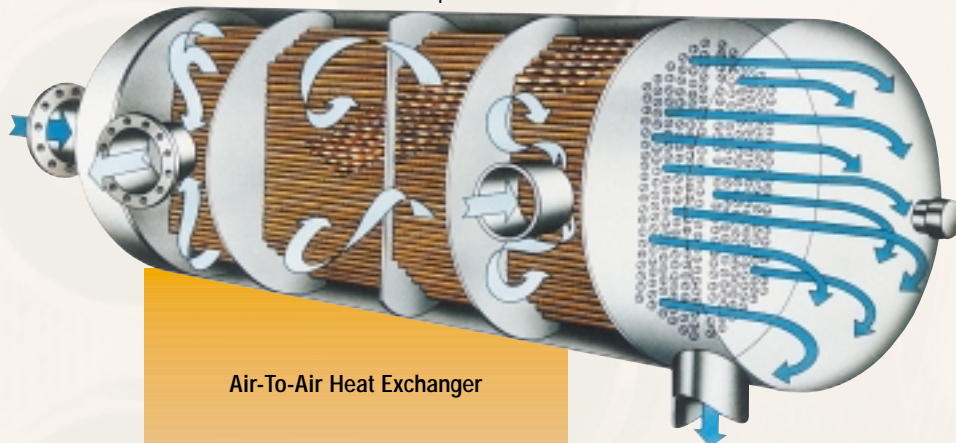
Separator - highly efficient separation prevents liquid carryover

Two stage separator removes 99+% of condensed moisture and maintains this high efficiency across a wide range of flows

- First stage stainless steel mechanical separator removes large liquid loads
- Second stage coalescing filter
 - Maintains high efficiency at varying load conditions
 - Removes smaller droplets (100% of all droplets 3 microns and larger) - prevents liquid re-entrainment
 - Filters out all solid contaminants 3 microns and larger
 - 5 ppm w/w of oil aerosols remaining

Automatic Condensate Drains - reliably discharge collected condensate

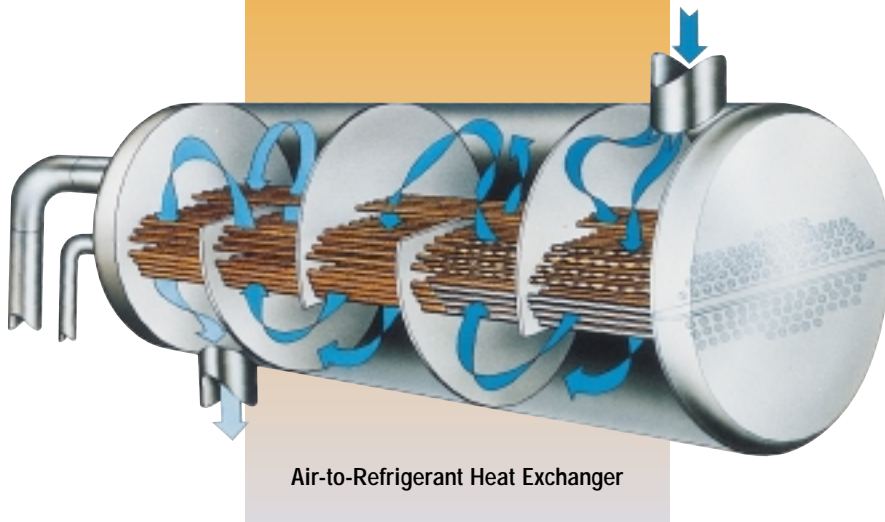
- Three drains reliably remove condensed moisture from the dryer



Air-To-Air Heat Exchanger



Separator



The air and entrained water droplets then enter the separator (3) where the water droplets are removed from the air stream. Automatic condensate drains (4) discharge the collected water from the system after each heat exchanger and at the separator. The dry, chilled air then passes through the secondary side of the air-to-air heat exchanger (1) where it is reheated as it exits the dryer.

As long as the temperature of the compressed air, as it travels through the air system, does not fall below the dew point temperature produced in the dryer, downstream air lines and pneumatic equipment will be free of troublesome liquid water.

- Pilot operated, compressed air powered drains operate only when necessary with no loss of air (Pneumatically operated drains standard through model H-88; electrically operated timed drains optional. Electrically operated timed drains standard on models H-99 and larger).
- Furnished with isolation valves and piped to a common discharge point

Operation

Compressed air, saturated with water vapor, enters the air-to-air heat exchanger (precooler/reheater) (1) and is pre-cooled by the chilled outgoing air. The pre-cooled air then enters the air-to-refrigerant heat exchanger (2) where it is further cooled by the refrigeration system. As the air cools, water vapor condenses into liquid droplets.

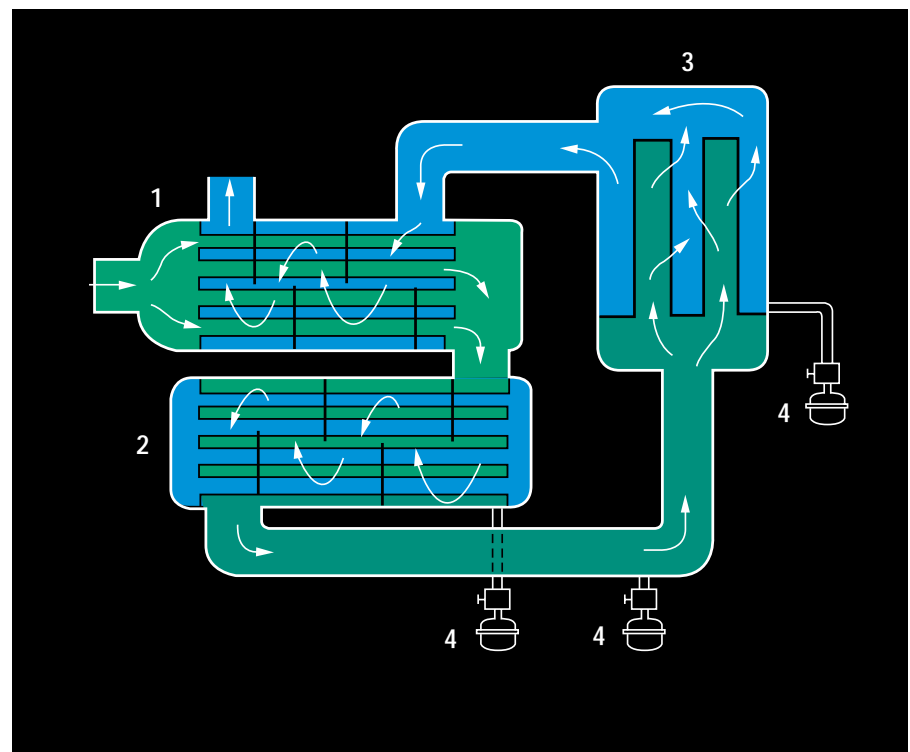
Fully Insulated

All heat exchangers, separator, and air piping surfaces are fully insulated to preserve cooling effect and prevent re-evaporation of liquid within the separator; also prevents sweating on cold surfaces

- Open cell urethane insulation protected with durable shroud; shroud prevents damage and ultraviolet deterioration

ASME code constructed and stamped

- All pressure vessels are ASME code constructed and stamped
- Interconnecting piping welded by ASME qualified welders; complete air side hydrostatically tested as an assembly



Refrigeration System

Designed to produce ample cooling capacity, accurate temperature control and system reliability

Features

Automatic temperature control maintains consistent dew point temperature across a wide range of operating conditions

Direct expansion, non-cycling refrigeration system allows rapid response to changes in load

Three Valve System Controls Refrigeration System Pressures and Temperatures

- Evaporator heat load response
 - A thermal expansion valve (TXV) quickly responds to changes in load by feeding the proper amount of refrigerant into the evaporator
 - TXV also controls temperature (superheat) of refrigerant leaving evaporator... prevents excessive liquid from returning to compressor
- Evaporator pressure control
 - Highly accurate, pilot operated hot gas by-pass valve (HGBP) maintains constant evaporator pressure (sets boiling point of refrigerant)
 - Hot gas fed into suction line AFTER the evaporator to maintain consistent cooling temperature during load changes...prevents TXV from overcompensating
 - Models with 15 kW and larger compressors use compressor valve unloading in conjunction with HGBP for close control

- Return gas temperature
 - De-superheating valve controls temperature of refrigerant gas returning to compressor; prevents compressor overheating

Hankison's three valve system is superior to the two valve systems offered by many competitors. Two valve systems introduce hot gas into the evaporator and sacrifice tight temperature control by depending on the TXV to control both heat load response and return gas temperature.

All control valves are protected by filters or strainers.

Built for years of reliable operation

Refrigeration system design protects compressor from floodback and flooded starts

- Floodback prevention keeps excessive liquid refrigerant from returning to compressor during operation
 - Properly sized TXV maintains correct superheat
 - Routing the hot gas by-pass into the suction line AFTER the evaporator prevents hot gas from pushing liquid refrigerant back to the compressor during rapid load reduction
 - Accumulators (sized to hold over 50% of total charge) collect liquid refrigerant in the suction line

- Flooded start prevention keeps refrigerant from migrating to compressor crankcase during off periods... allows safe start-ups
 - Crankcase heater - keeps crankcase warm, prevents oil and refrigerant from mixing (automatically de-energizes after start-up)
 - Pump-down system - pumps refrigerant out of the evaporator for storage in the receiver

Hankison refrigeration systems are built to maximize integrity

- Cold lines are fully insulated
- Refrigeration lines are silver brazed while being purged with nitrogen
- Refrigeration lines are securely mounted and protected from vibration with vibration eliminators and loops
- Accessible liquid and suction line filters
- Refrigerant dryer ensures complete system dryness



- Electrical and refrigeration system cut-outs are provided to protect the refrigeration compressor:
 - Suction (low side) refrigerant pressure cut-out
 - Head (high side) refrigerant pressure cut-out
 - Low oil pressure cut-out
 - Motor temperature and current cut-outs
- Systems design ensures proper oil return
 - Properly sized refrigerant piping and minimal clearances ensure that crankcase oil is not trapped-out as it circulates through the system.
 - Accumulators are sized to accurately meter oil back to the compressor.

Refrigeration Compressor Performs Reliably for Years

Copeland Discus semi-hermetic, direct coupled, suction gas cooled compressor

- Sized for the heat removal capacity required
- Pressure lubricated, includes oil pressure pump, oil strainer, sight glass and pressure gauge
- Operating noise level below 85 dBA at three feet

Choice of water-cooled or air-cooled condenser

Water-cooled

- Removable heads and cleanable copper tubes (other wetted materials available)
- ASME constructed and stamped

- Pressure relief device
- Includes water regulating valve and strainer

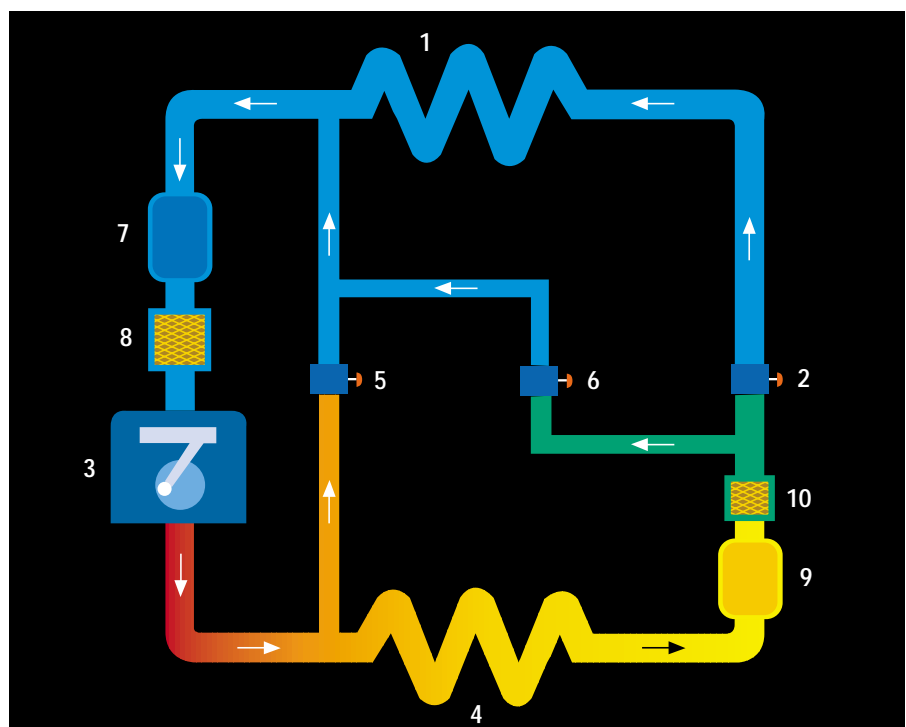
Air-cooled

- Includes heat exchanger and fans (may be equipment mounted on smaller sizes or shipped separately for remote mounting)
- Fused fan motors
- Head pressure controlled fan cycling on all fans
- Flooded head pressure control allows operation in low ambient temperatures

Operation

High pressure liquid refrigerant is metered into the air-to-refrigerant heat exchanger (refrigeration system evaporator) (1) through a

thermal expansion valve (2). A reduction in pressure allows the low pressure liquid refrigerant to evaporate into a gas as it takes heat from the compressed air. The low pressure gas then moves through the suction line to the refrigeration compressor (3) where it is compressed into a high pressure gas. The high pressure gas moves to an air or water cooled condenser (4) where it gives up heat and condenses into a high pressure liquid. The high pressure liquid travels through the liquid line to the thermal expansion valve and begins the circuit again. A hot gas by-pass valve (5) controls evaporator pressure while a desuperheating valve (6) controls the return gas temperature.



- | | |
|---------------------------|-------------------------|
| 1 Evaporator | 6 De-Superheating Valve |
| 2 Thermal Expansion Valve | 7 Accumulator |
| 3 Compressor | 8 Suction Line Filter |
| 4 Condenser | 9 Receiver |
| 5 Hot Gas By-Pass Valve | 10 Filter/Dryer |

Instrumentation

Allows easy operation and system diagnostics

A PLC (programmable logic controller) system monitors all critical operating conditions, indicates operating status and fault conditions on an LCD display, protects compressor from adverse operating conditions, stages compressor unloaders, and sets message flags and alarm contacts.

Control functions:

- Monitors oil and refrigerant head and suction pressures and shuts off compressor if a fault condition occurs
- Monitors refrigerant suction pressure and stages compressor unloaders

A back-lit LCD display indicates:

- Dryer and compressor operating status
- Inlet air pressure
- Refrigerant suction pressure
- Refrigerant head pressure
- Compressor loading (indicates approximate % on units supplied with unloaders)
- Fault messages for:
 - High refrigerant pressure
 - Low refrigerant pressure

- Low oil pressure
- High evaporator temperature
- Motor over-temperature
- Motor starter open

An alarm light (indicates that a fault condition exists) and a set of common alarm contacts are standard.

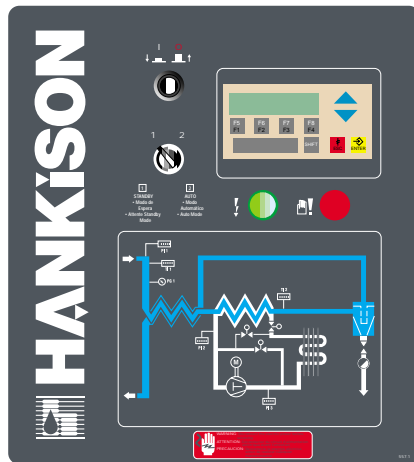
Equipment mounted inlet pressure gauge.

Options:

Extended Monitoring Package which includes:

- Air side pressure drop indication (includes pressure differential readout and fault message if pressure drop is too high); used to monitor condition of separator elements
- Inlet air and lowest air temperature indication (includes temperature readouts and fault message if temperature is too high)

- Low water pressure fault message (water-cooled models)
- High condensate level fault message
- Multiple alarm contacts
- Remote operation - allows dryer to be placed in Auto or Stand-by mode from remote location



Electrical Construction

Across-the-line, full voltage, magnetic motor starter standard.

All wires are numbered, terminated on a terminal strip, and enclosed in wiring trays.

All electrical components are UL and CSA approved.

NEMA rating:

- Water-cooled models: NEMA 4
- Air-cooled models: Dryer and condenser - NEMA 4

Optional: Flange mounted, circuit breaker type disconnect switch with safety interlock

Ease of Installation

Hankison H Series dryers are delivered fully assembled, with all necessary electrical and refrigeration system wiring, piping, components and controls installed. All components are mounted on an industrial grade structural steel frame ready to install and operate. Installation is made easy with conveniently located air, cooling water and drain connections.

Serviceability

High and low side service valves and isolation valves

Refrigerant control valves can be repaired without removing valve bodies from the system

Refrigerant sight glasses with moisture indicators allow monitoring of refrigerant quality

Oil sight glass

H series dryers custom designed to match your requirements

Give us the operating conditions (Input Data) listed here and allow us to select a heat exchanger set and condensing unit combination that will most efficiently produce the outlet dewpoint and pressure drop you require.

If desired, several sizings can be computed so that you can evaluate initial costs versus various pressure drop and dew point options.

Input Data	
Flow rate: _____	Power requirements: _____ V
Compressed air conditions	_____ ph
Inlet temperature: _____	_____ Hz
Inlet pressure: _____	Gas to be dried:
Required outlet dewpoint: _____	Compressed air,
Required pressure drop across dryer: _____	Other (specify) _____
Condenser Cooling Medium:	Output data
Liquid cooled	Dryer Model: _____
Medium (water, glycol): _____	Capacity @
Temperature: _____	conditions indicated: _____
Air-Cooled	Outlet dewpoint: _____
Min/Max Ambient	Pressure drop: _____
Air Temperature: _____ / _____	

Flow Capacity (m ³ /min) (1)	Model Number	Refrigeration Compressor Nominal kW		Maximum Operating Pressure (MOP)
		3°C Pressure Dew Point	10°C Pressure Dew Point	
60	H-11	7	6	12.3 kgf/cm ²
70	H-12	11	6	
75	H-22	11	6	
95	H-33	11	7	
110	H-34	19	11	
120	H-44	19	11	
140	H-45	22	15	
150	H-55	22	15	
180	H-66	26	19	
210	H-67	26	19	
240	H-77	30	22	
250	H-78	37	26	
290	H-88	37	26	
360	H-99	52	30	
440	H-1010	52	37	

(1) Conditions for rating dryers are 7 kgf/cm² and 35°C saturated inlet compressed air conditions when operating with 30°C cooling water (water-cooled models) or in a 25°C ambient (air-cooled models).

Capacity based on 380-420V 3ph 50Hz operation. Consult factory for 60Hz operation or other operating conditions. Pressure drop 0.35 kgf/cm² or less. Air volume based on 20°C and 1 bar absolute.

■ Standard sizes to 440 m³/min

■ Dew points from 3°C to 10°C

Dimensions, Connections, Weight

Model Number	Dimensions (mm) ⁽¹⁾			Inlet/Outlet Flange Connection in.	Weight kg ⁽¹⁾⁽³⁾
	H ⁽²⁾	D	W		
H-11	2086	1372	2870	4	1443
H-12	2086	1372	2870	4	1540
H-22	2086	1372	2870	4	1564
H-33	2088	1372	2870	6	1754
H-34	2143	1372	2870	6	1800
H-44	2148	1372	2870	6	1958
H-45	2148	1372	2870	6	2126
H-55	2210	1372	2870	8	2258
H-66	2383	1524	3251	8	2714
H-67	2383	1524	3251	8	3051
H-77	2499	1524	3251	10	3334
H-78	2502	1981	3962	10	3681
H-88	2578	1981	3962	10	4645
H-99	2646	1981	3962	10	5433
H-1010	2845	2045	4064	12	6296
H-1111	2826	2432	4578	14	9072

(1) Dimensions and weight are for reference only. Request certified drawings for construction purposes.

(2) Height shown is for water-cooled units and air-cooled units with remotely mounted condensers. Maximum height for units with self-contained air-cooled condenser is 110".

(3) Weight shown is approximate for 38°F dew point water-cooled models only.

Custom Engineering

In house design allows precision computer matching of Air Sides and Refrigeration Systems to your flow, dew point, and pressure drop requirements. A wide variety of options are available, including: fused disconnects, cooling water temperature and pressure gauges, low ambient packages, cooling units, packaged aftercoolers and filters, and air by-pass valve assemblies.

Highest Quality Standards in Manufacturing

Hydrostatic testing is performed on air side assemblies.

Refrigeration systems are cleaned, purged, and evacuated before being charged with refrigerant.

Dryers are heat load tested before shipment.

Service

A full time service department with trained Technicians is available for telephone consultation or field service work. A complete inventory of repair parts is maintained at the factory. Factory start-up service is available.



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