NORTEC

Compressed Air, Gas & Fluid Technologies

HIGH CAPACITY REFRIGERATED AIR/GAS DRYERS

COMPRESSED AIR, GAS & FLUID TECHNOLOGIES
CULTURE OF INNOVATION
PASSION FOR SERVICE
QUALITY
PURSUIT OF EXCELLENCE
NORTEC

- Cycling and Non-Cycling Design
- Energy Efficient Compressors
- Fluctuating and Intermittent Loads
- Capacity – 3,500 CFM to 30,000+
- Pressures – 100 PSIG to 5,000+

Nortec High Capacity Refrigerated Air/Gas Dryers

In today's industrial world, compressed air is considered as the fourth utility. However, typical accounting procedures never consider it as a direct component of the production cost. Hidden behind overheads, it is usually considered as a cost that cannot be mitigated. In addition, in most plants the compressed air consumption is not uniform and fluctuations occur throughout the day. This cost can add up to hundreds of thousands of dollars annually.

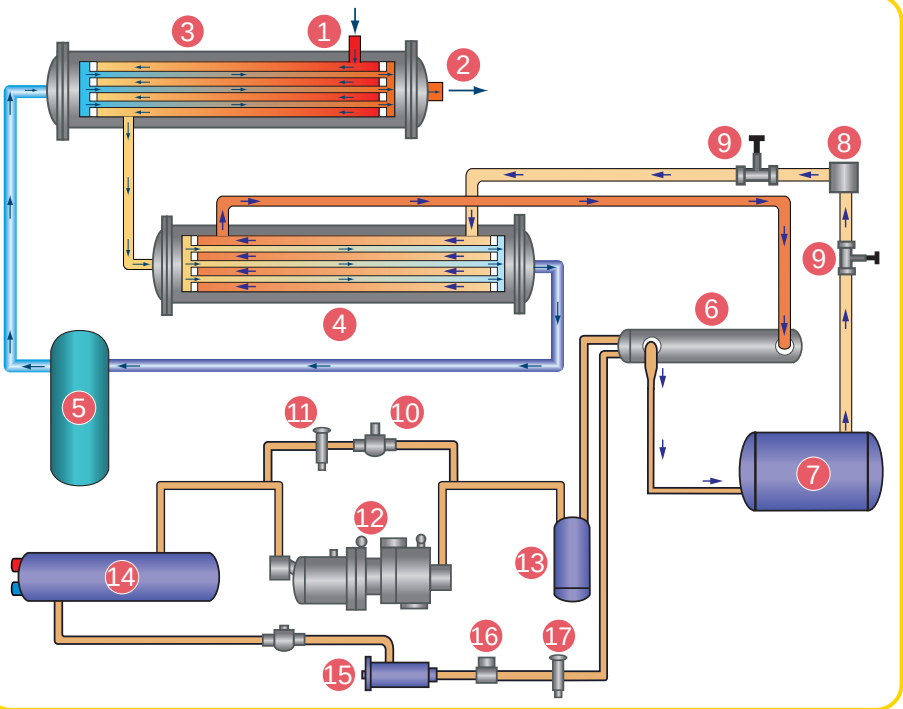
At Nortec, we realize that the cost of compressed air can be significant. Hence, we design and manufacture our dryers to work according to your plant's air demands. To accommodate the new generation of energy efficient Variable Frequency Drive (VFD) air compressor technology, Nortec has introduced the energy efficient cycling refrigerated dryers to meet today's stringent energy requirements.

The need for Clean Dry Air

Atmospheric air contains – air, dust particles, water vapor and other impurities. When ambient air is compressed from 14.7 PSIG to 100 PSIG (the typical air pressure required for most plant applications), the only component that is compressed is the air. The impurities and water vapor is not compressed and its ratio increases 7 times as much as that in ambient air. In addition, harmful oil and other contaminants are added to the air stream during the process of compression. This impure compressed air cannot be used in plants. As the hot compressed air cools, the water vapor condenses and forms water droplets along the entire air stream. This along with the impurities will contaminate the air stream, corrode the distribution lines and eventually damage the piping and the pneumatic tools and equipment. This will lead to periodic replacement of parts, excessive downtime for maintenance and will directly affect the bottom line.

Nortec's High capacity refrigerated air dryers with the recommended pre-filter and after-filter will eliminate the harmful impurities and reduce the Pressure Dew Point (PDP) of the compressed air stream to a safe level, thereby preventing condensation or any accumulation of moisture in the pipelines.

Principle of Operation



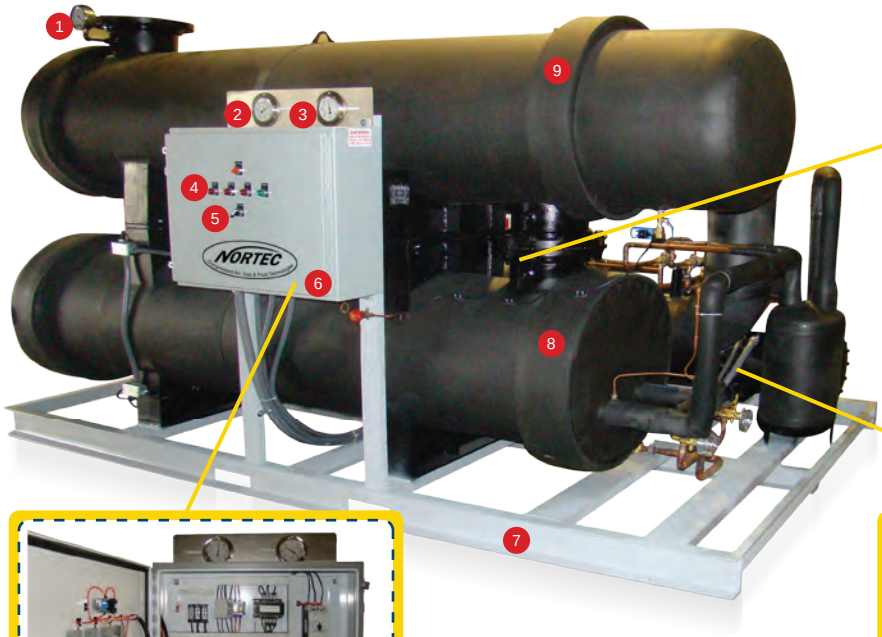
Item	Description
1	Air inlet
2	Air outlet
3	Pre-cooler/re-heater (Economizer)
4	Air-to-water/glycol heat exchanger
5	Moisture separator
6	Evaporator
7	Cold bank storage
8	Pump
9	Isolation valves
10	Solenoid valve
11	Defroster
12	Compressor
13	Suction accumulator
14	Condenser
15	Filter dryer
16	Sight glass
17	Thermostatic expansion valve

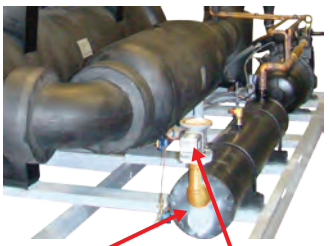
The hot compressed air from the compressor is passed through an after cooler to cool down to approximately 100^0 F. This compressed air stream enters the Air-Air heat exchanger where it is cooled by the outgoing cold dry air stream to approximately 70^0 F. This pre-cooled air then enters the Air-Glycol heat exchanger where it is cooled to 35^0-38^0 F by the chilled water-glycol mixture. The chilled air is then forced through a high efficiency moisture separator stripping the moisture out from the air stream. Before exiting the dryer, the chilled dry air passes through the Air-Air heat exchanger where it cools the entering hot moisture laden air. A zero-purge loss automatic timer drain periodically removes the trapped moisture from the chilled separator without wasting any valuable dry air.

The glycol-water mixture is kept chilled by utilizing multiple compressors and a thermal mass medium. By cycling, loading/unloading the compressors during intermittent or reduced loads, the desired temperature of the glycol-water mixture can still can be maintained. This cycling yields in substantial energy savings.

Nortec High Capacity Refrigerated Air/Gas Dryers

CRD Series- Cycling Thermal Mass Refrigerated Dryers





Water cooled condenser

Automatic water regulating valve

NEMA 12 Enclosure

Compressor

Standard Features

1	Inlet temperature gauge	14	Pump sequencer (for units with duplex pumps)
2	Refrigeration suction pressure gauge	15	Air inlet pressure gauge
3	Refrigeration discharge pressure gauge	16	Air outlet pressure gauge
4	Status indicator lights	17	Zero-purge drain system
5	Compressor ON indicator	18	Pump pressure gauge
6	Standard NEMA 12 Enclosure	19	Thermal storage temperature gauge
7	Single skid mounted	20	Rotation protection module
8	Air-Water/Glycol heat exchanger	21	High-temperature module
9	Air-Air Pre-cooler/re-heater (Economizer)	22	Pump failure indicator
10	Condenser automatic water regulating valve	23	No-flow indicator
11	Inlet temperature indicator	24	Pump starter with overload protection
12	Outlet temperature indicator	25	Compressor starter with overload protection
13	Compressor sequencer (for units with multiple compressors)	26	Outlet pressure indicator

Optional Features

◆	Duplex pumping mounted on skid	◆	Three-valve by-pass
◆	Multiplex compressor	◆	Mounted pre and after-filter
◆	Air-cooled condenser	◆	Digital dew point monitor
◆	Remote condenser	◆	NEMA 4, 4x or 7 electrical
◆	Compressor sequencer		

Nortec High Capacity Refrigerated Air/Gas Dryers

CRD Series- Cycling Thermal Mass Refrigerated Dryers

CRD - Specifications

Model	Capacity in CFM	Comp. HP	AIR In/Out Conn. FLG	Max. Working Pressure PSIG	KW (Full Load)	Run Load Amps	Standard Voltage	Dimensions (inches)			Weight (lbs)
								Length	Width	Height	
3500-CRD	3,500	2 x 10	6"	150	15	37	460-3-60	130	60	70	3,900
4000-CRD	4,000	2 x 10	6"	150	15	45	460-3-60	130	60	70	4,200
5000-CRD	5,000	2 x 13	8"	150	19	50	460-3-60	130	60	75	6,000
6000-CRD	6,000	30	8"	150	22	50	460-3-60	130	70	75	7,200
7000-CRD	7,000	35	8"	150	26	65	460-3-60	135	80	77	8,600
8000-CRD	8,000	40	10"	150	30	71	460-3-60	140	82	80	9,800
9000-CRD	9,000	50	10"	150	36	80	460-3-60	145	85	80	12,200
10000-CRD	10,000	50	10"	150	38	91	460-3-60	145	85	80	12,500
12000-CRD	12,000	60	12"	150	45	97	460-3-60	160	90	80	13,800
15000-CRD	15,000	2 x 40	12"	150	60	138	460-3-60	180	90	85	17,000
20000-CRD	20,000	2 x 50	14"	150	75	175	460-3-60	200	100	85	21,500
25000-CRD	25,000	120	16"	150	93	186	460-3-60	210	120	87	23,000
30000-CRD	30,000	150	18"	150	112	195	460-3-60	230	125	90	27,000

Capacity rated at Standard CAGI Inlet conditions - Pressure = 100 PSIG, Temperature = 100 Deg. F and Ambient Temperature = 100 Deg. F

Dryer Sizing

Calculate the dryer's capacity at your inlet conditions

Adjusted Capacity = SCFM x (CF1 x CF2 x CF3 x CF4)

To calculate the actual capacity of the dryer pertaining to your inlet conditions, obtain the correction factors from the table below.

Example:
Selected Dryer: 4000-CRD
Standard Capacity: 4000 SCFM
Your Inlet Conditions:
Inlet Temperature: 90⁰ F
Inlet Pressure: 125 PSIG
Ambient Temperature: 90⁰ F
Required Dew Point: 38⁰ F

Dryer Capacity at your inlet conditions
= 4000 x CF1 x CF2 x CF3 x CF4
= 4000 x 1.21 x 1.07 x 1.05 x 1.0
= 5438 CFM

Hence, 4000-CRD will be able to handle 5438 CFM at your mentioned inlet conditions.

Select a suitable dryer model for actual inlet conditions

Adjusted Capacity = SCFM / (CF1 x CF2 x CF3 x CF4)

To pick a suitable dryer for the adjusted capacity of your application, divide the capacity by the correction factors:

Example:
Capacity: 7000 CFM
Your Inlet conditions:
Inlet Temperature: 90⁰ F
Inlet Pressure: 125 PSIG
Ambient Temperature: 90⁰ F
Required Dew Point: 38⁰ F

Dryer suitable for your inlet conditions and flow
= 7000/ (CF1 x CF2 x CF3 x CF4)
= 7000/ (1.21 x 1.07 x 1.05 x 1)
= 5150 CFM

Referring to the models and capacity in the table above, you can easily determine that you need a 6000-CRD dryer.

Suitable Dryer Model: 6000-CRD

CF1 – Inlet Temperature

Inlet Temperature (°F)	80	90	100	110	120	140
Correction Factor	1.50	1.21	1.00	0.82	0.72	0.61

CF2 – Inlet Pressure

System Pressure (psig)	50	75	100	125	150	175	200	225	250
Correction Factor	0.85	0.95	1.00	1.07	1.13	1.18	1.20	1.22	1.24

CF3 – Ambient Temperature

Ambient Temperature (°F)	70	80	90	100	110	115	120
Correction Factor	1.10	1.07	1.05	1.00	0.94	0.85	0.65

CF4 – Required Dew-Point

Dew Point (°F)	38	41	45	50
Correction Factor	1.00	1.12	1.17	1.22

Nortec High Capacity Refrigerated Air/Gas Dryers

Nortec Advantages:

Nortec uses the most energy efficient components in the manufacture of these High Capacity Refrigerated Dryers. The dryers are custom-built to suit your design and application requirements.

Capacity and type of application determines the use of one of these three types of high quality energy saving compressors.

Rotary Screw Compressor

Semi Hermetic Energy Saver Screw and Open Drive Rotary Screw Compressors

Semi Hermetic Reciprocating Compressor

Semi Hermetic High Performance Piston Compressor

High Efficiency Scroll Compressor

High Efficiency Scroll Compressor

Air Cooled Condenser

Air cooled condensers are constructed from high thermal efficiency copper tubes, coils and aluminum fins and are rated for 100^0 F ambient temperature.

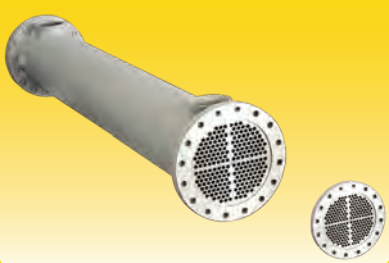
NEMA Electrical Enclosure

NEMA 12 enclosures are standard on all high capacity refrigerated dryers. Optional controls, monitoring systems, indicators and NEMA 4, 4x and NEMA 7 enclosures are also available.

Separator

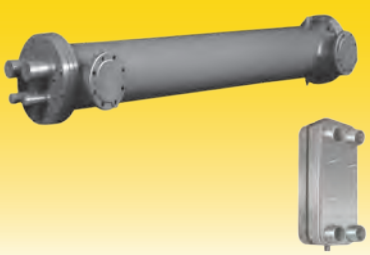
With very little pressure drop, the cyclone separator strips the moisture from the chilled air and safely discharges the condensate with the use of a zero-purge loss drain.

Water Cooled Condenser



Water cooled condensers are designed according to ASME standards with carbon steel shell and copper tubes to provide adequate cooling capacity that exceeds the refrigeration demand. They are equipped with head pressure control and energy saver water regulating valve.

Evaporator



Evaporators are either shell-and-tube type or brazed stainless steel plate type and are designed for high heat transfer efficiency. Each refrigeration zone has its own independent evaporator, so failure of one refrigeration compressor will have no effect on the other circuits.

Controller

State of the art PLCs (Programmable Logic Controller) are used for close monitoring of Inlet, Outlet and Dew-point temperatures of these dryers. Their modular and versatile features make them suitable for various applications including local and remote display.

Nortec High Capacity Refrigerated Air/Gas Dryers

NRD Series – Non-Cycling Refrigerated Dryers

The Non-Cycling Refrigerated Dryers (Direct Expansion Type) are the best value dryers. With a substantial lower investment, these high-efficiency dryers are most suited for applications that have marginal load fluctuations (constant load). Periodic maintenance and automated drain systems will ensure years of trouble-free performance from these dryers.

NRD - Specifications

Model	Capacity in CFM	Comp. HP	In/Out Conn. Inches	Max. Working Pressure PSIG	Full Load KW	Full Load Amps	Standard Voltage	Dimension in Inches			Weight in Lbs.
								Length	Width	Height	
3500-NRD	3500	2 x 10	6 FLG	150	15	45	460-3-60	130	60	70	3700
4000-NRD	4000	2 x 10	6 FLG	150	15	45	460-3-60	130	60	70	4000
5000-NRD	5000	2 x 13	8 FLG	150	19	65	460-3-60	130	60	75	4800
6000-NRD	6000	30	8 FLG	150	22	50	460-3-60	130	70	75	5200
7000-NRD	7000	35	8 FLG	150	26	63	460-3-60	135	80	77	6500
8000-NRD	8000	40	10 FLG	150	30	71	460-3-60	140	82	80	7500
9000-NRD	9000	50	10 FLG	150	38	69	460-3-60	145	85	80	8600
10000-NRD	10000	50	10 FLG	150	38	69	460-3-60	145	85	80	9700

Capacity rated at Standard CAGI Inlet conditions - Pressure = 100 PSIG, Temp. = 100 Deg. F and Ambient Temp. = 100 Deg. F
All above models are standard air-cooled. For water-cooled units, consult factory. Full load amps at standard voltage.

Specifications subject to change without notice - 01/10

ENVIRO-FRIENDLY PRODUCTS
for a green planet

NORTEC CORPORATION

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