

NH₃/CO₂ cooling system

NewTon

Forwarding to the future refrigeration systems

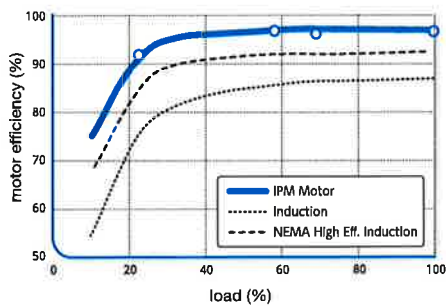


Realizing more advanced economics and energy-saving

The world's first introduction of semi-hermetic IPM motor to be mounted on ammonia screw compressor

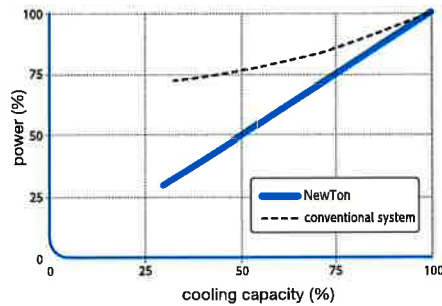
Interior Permanent Magnet (IPM) motor

In order to improve the drive efficiency the system employs IPM motor, achieving higher efficiency by 5 to 10 % than conventional induction type.



Revolution speed control by Variable Frequency Drive (VFD)

VFDs are used as driver to drive IPM motor. The rated revolution is set 4,500rpm (partially 5,600rpm) and continuously revolution speed control is equipped as a standard feature to correspond to part load operation. Driving at high speed and controlling revolution speed greatly contribute to energy-saving part load operation as compared to the conventional slide valve type.



New Profile

We developed a new profile for rotors with advanced machining technology enabling it to reduce internal leakage and achieve higher efficiency.



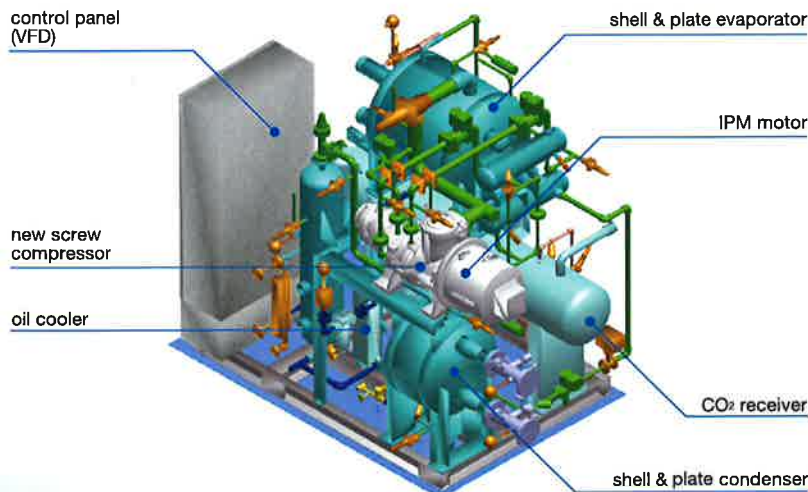
new rotors

Adopted shell & plate type heat exchanger

We employed compact and high performance shell & plate heat exchangers on both condenser and evaporator to enable them to exchange heat even with a small differential temperature.

Minimizing ammonia charge

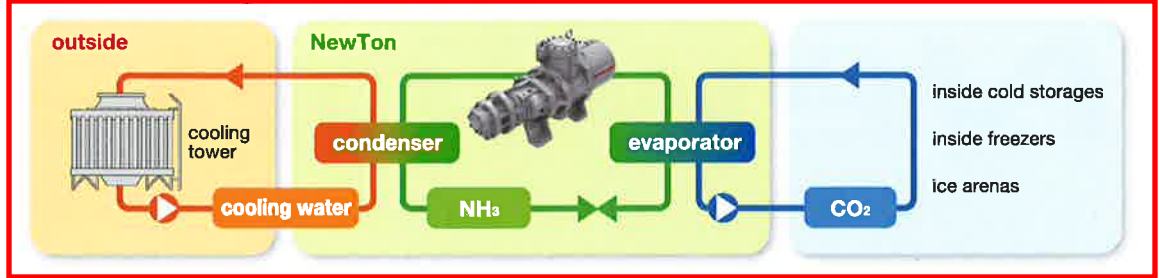
Employing indirect cooling method enables ammonia to be contained only in a machine room, plus ammonia charge volume in this product 25kg to max. 75kg for each package.



Evidence for Criterion 2 (secondary loop cooling system using natural refrigerant)

Indirect cooling method utilizing carbon dioxide (CO₂) characteristics

NewTon system can contain ammonia completely only in machine room so that it can achieve both energy-saving and safety.



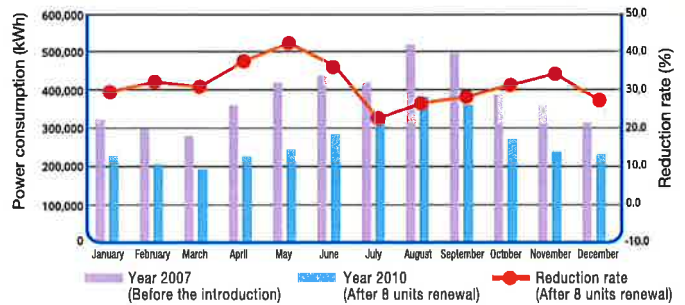
Over 30% energy-saving

Tokyo Toyomi Cold Storage Funabashi Logistic center



capacity (ton)	after construction (year)	previous equipment		the number of NewTon units (unit)	Reducing rate of consumption electricity (%)
		refrigerant	compressor		
18,000	29	HCFC-22	Screw	8	31.1

Comparison of before and after introducing NewTon



* estimation from the power company bills
* all electricity including main machine, auxiliary machine, transporting machine, lighting and etc.

For Cold storages and Ice plants **NewTon R** **NewTon C**

	NewTon R-3000	NewTon R-6000	NewTon R-8000	NewTon C
CO ₂ supply temperature		-32°C		-5°C
cooling capacity	94.5kW	189kW	270kW	235kW
motor kW	43kW	86kW (43kW × 2)	120kW	65kW
C.O.P (EER)	2.2		2.25	
power source	for motor	AC400/440V × 50/60Hz	AC400/440V × 50/60Hz	AC400/440V × 50/60Hz
	for control	AC200/220V × 50/60Hz	AC200/220V × 50/60Hz	AC200/220V × 50/60Hz
refrigerant	primary: NH ₃			
compressor	type	semi-hermetic compound screw		semi-hermetic single stage screw
	drive method	VFD		
	motor type	IPM motor		
ammonia charge	25kg	50kg	75kg	60kg
outer dimensions	L2,780 × W1,950 × H2,400 mm	L4,725 × W2,378 × H2,600 mm	L3,950 × W2,550 × H2,650 mm	L3,400 × W2,200 × H2,700 mm
net weight	3,300kg	6,800kg	7,600kg	6,000kg

In the case of cooling water at 32°C

Evidence for Criterion 3-5:

For Freezers **NewTon F**

	NewTon F-300	NewTon F-600	NewTon F-800
CO ₂ supply temperature		-42°C	
cooling capacity	70kW	140kW	170kW
motor kW	43kW	86kW (43kW × 2)	100kW
power source	for motor	AC400/440V × 50/60Hz	AC400/440V × 50/60Hz
	for control	AC200/220V × 50/60Hz	AC200/220V × 50/60Hz
refrigerant	primary: NH ₃		
compressor	type	semi-hermetic compound screw	
	drive method	VFD	
	motor type	IPM motor	
ammonia charge	25kg	50kg	75kg
outer dimensions	L2,780 × W1,950 × H2,400 mm	L4,725 × W2,378 × H2,600 mm	L3,950 × W2,550 × H2,650 mm
net weight	3,300kg	6,800kg	7,600kg

In the case of cooling water at 32°C

For Ice arenas **NewTon S**

	NewTon S	
CO ₂ supply temperature	-11°C	
cooling capacity	185kW	
motor kW	63kW	
power source	for motor	AC400/440V × 50/60Hz
	for control	AC200/220V × 50/60Hz
refrigerant	primary: NH ₃	
compressor	type	semi-hermetic single stage screw
	drive method	VFD
	motor type	IPM motor
ammonia charge	60kg	
outer dimensions	L3,400 × W2,200 × H2,700 mm	
net weight	6,000kg	

In the case of cooling water at 32°C

VFD: Variable-frequency drive (inverter)
COP: 70kW / 43kW = 1.63

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