

ENGINEERING
TOMORROW



NeoCharge

Take the shortcut to low-charge

NeoCharge is a game changer in industrial refrigeration. This unique yet simple technology reduces the charge in both new and existing systems. With easy installation in any type of system, NeoCharge gives you a shortcut to low-charge.



Reduce energy costs by
up to 20% and increase
capacity by up to

40%



**Low-charge
your system.
Super-charge
your business**

Introducing NeoCharge:

Cut ammonia charge
and reduce energy cost



NeoCharge is a complete solution

that gives industrial refrigeration systems low-charge capabilities. This allows refrigeration facilities to either cut energy and refrigerant costs—or increase capacity with the same charge in existing system. In Direct Expansion (DX) systems, NeoCharge eliminates superheat by operating evaporators in a much more stable and controlled way. This means that ammonia returns from evaporators with zero superheat or slightly wet.

In recirculating systems, the NeoCharge solution delivers a stable and controllable low recirculating ratio regardless of changing conditions. This reduces the ammonia charge by 30-40% in existing systems or even more in new systems.

In short, NeoCharge is a complete solution that turns the tables when it comes to low-charge.

How **NeoCharge** works

NeoCharge is a simple solution that takes evaporator control to a new level. In essence, it ensures evaporators are always fed with the exact right refrigerant charge.

The solution includes sensors, electronic control and valves.

Put simply, NeoCharge detects how much liquid is leaving each evaporator to control the injection valve. The heart of the solution is the controller, which runs with just a few parameters.

The system relies on differences in liquid gas heat conductivity to make reliable two-phase measurements; it is equipped with a dual-sensor system that relies on superheat and heat assisted superheat signals.

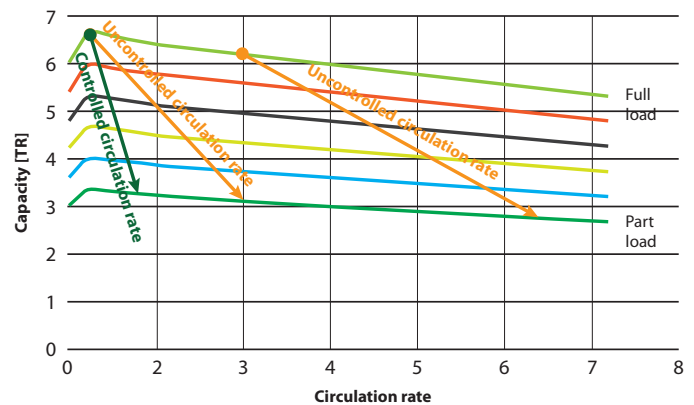
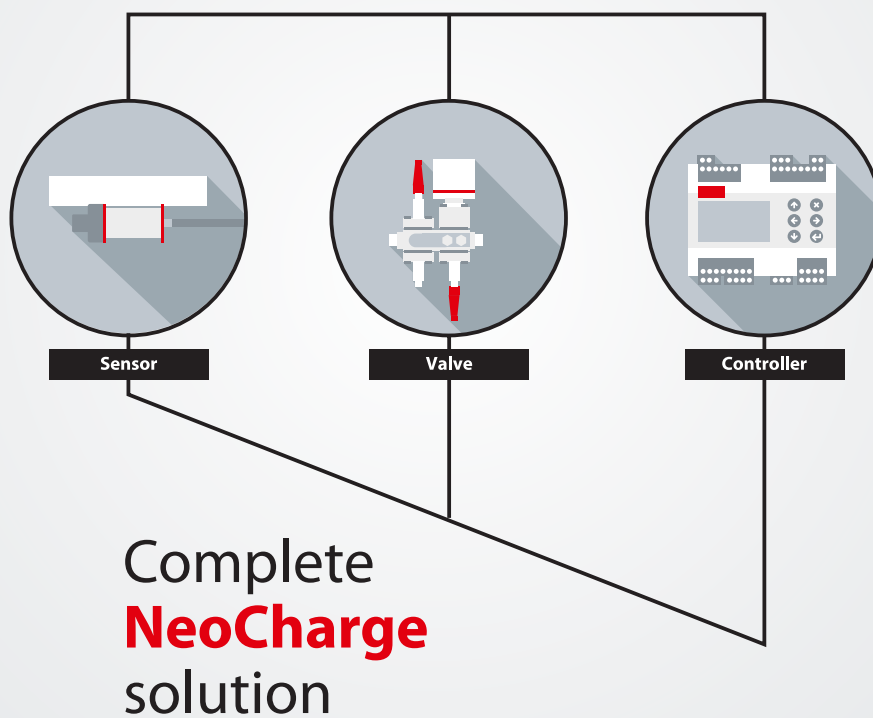
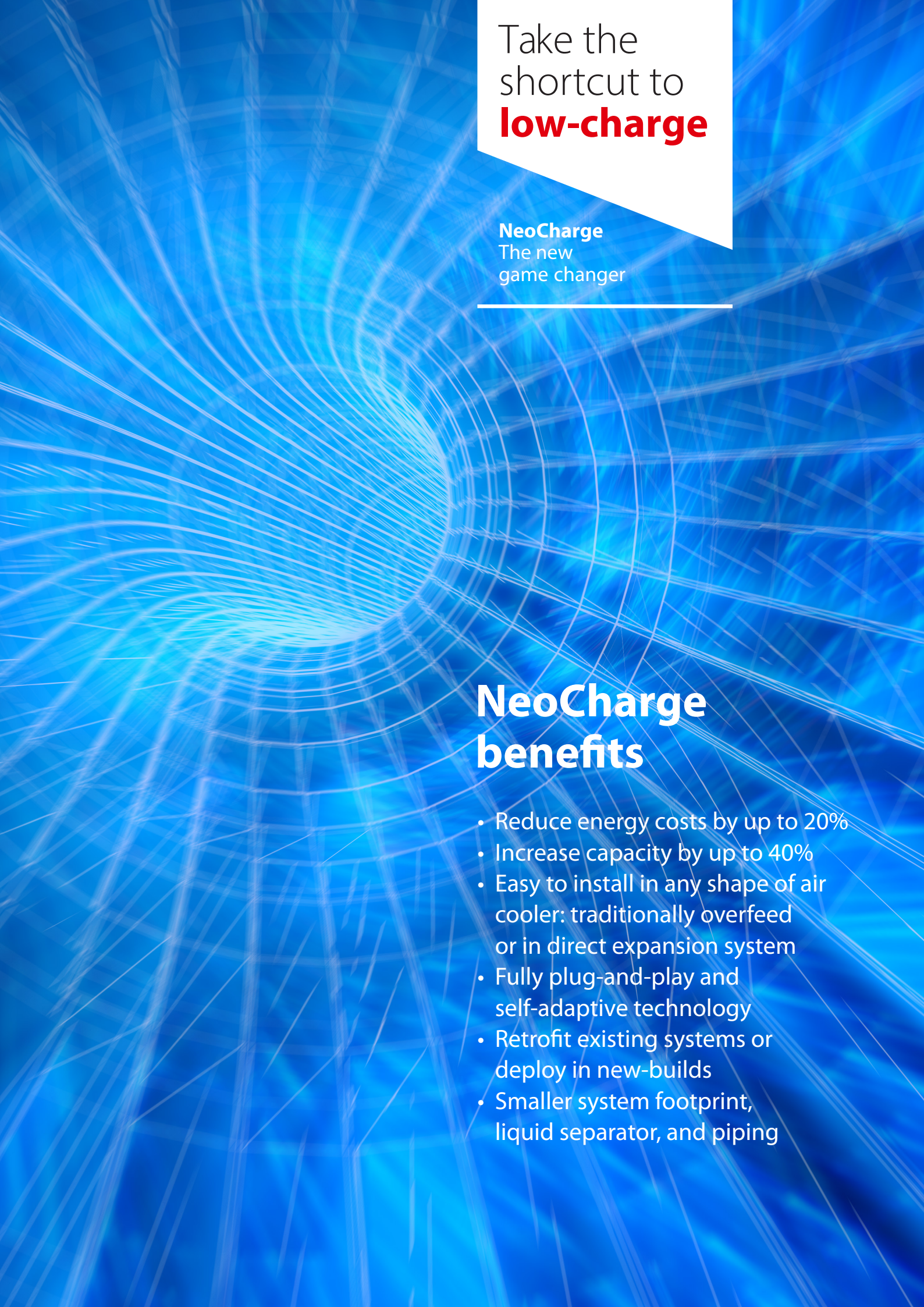


Figure 2: A stable system

NeoCharge feeds each evaporator with the exact right charge at all times. Even during capacity reduction, the circulation rate remains fixed. With NeoCharge dynamic control, all cooling processes remain stable.





Take the
shortcut to
low-charge

NeoCharge
The new
game changer

NeoCharge benefits

- Reduce energy costs by up to 20%
- Increase capacity by up to 40%
- Easy to install in any shape of air cooler: traditionally overfeed or in direct expansion system
- Fully plug-and-play and self-adaptive technology
- Retrofit existing systems or deploy in new-builds
- Smaller system footprint, liquid separator, and piping

Cut costs for refrigerants and energy

NeoCharge drastically improves the performance of both new and existing refrigeration systems.

In traditional overfeed systems, the charge is reduced by up to 45% (CCR), in Direct Expansion systems, evaporator performance is kept at 0K superheat (WDX), and in new systems, energy performance is improved markedly.

Ammonia charge with NeoCharge technology

Ammonia charge (kg/kW)

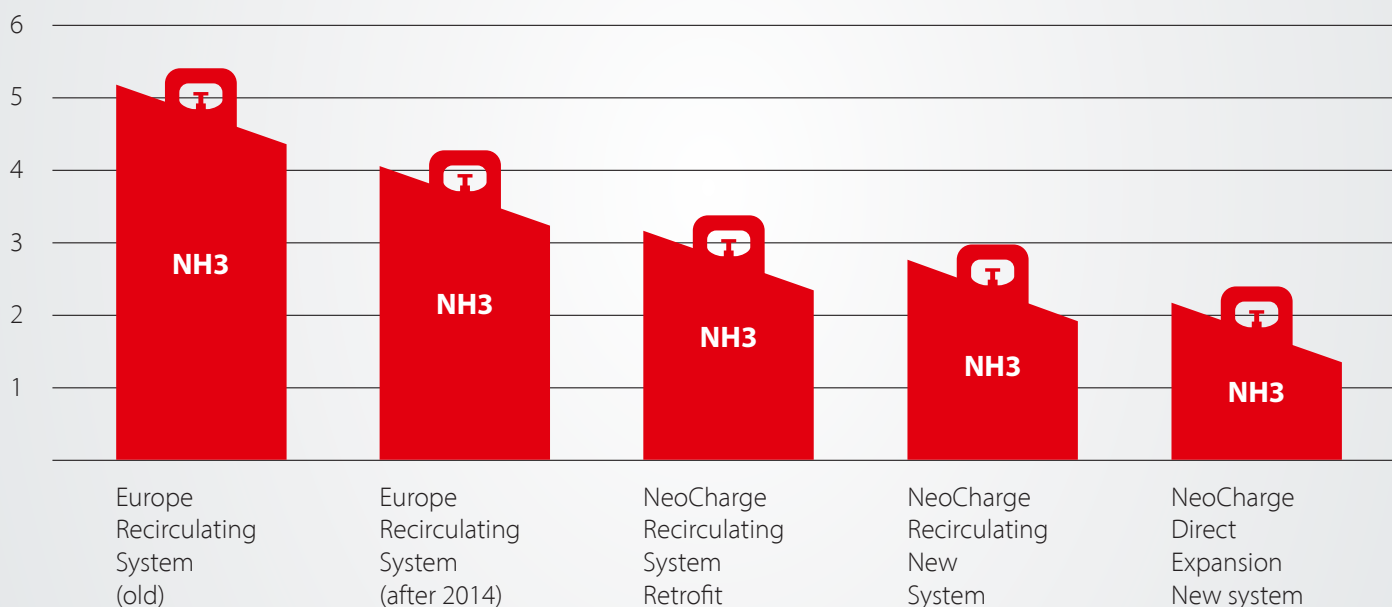


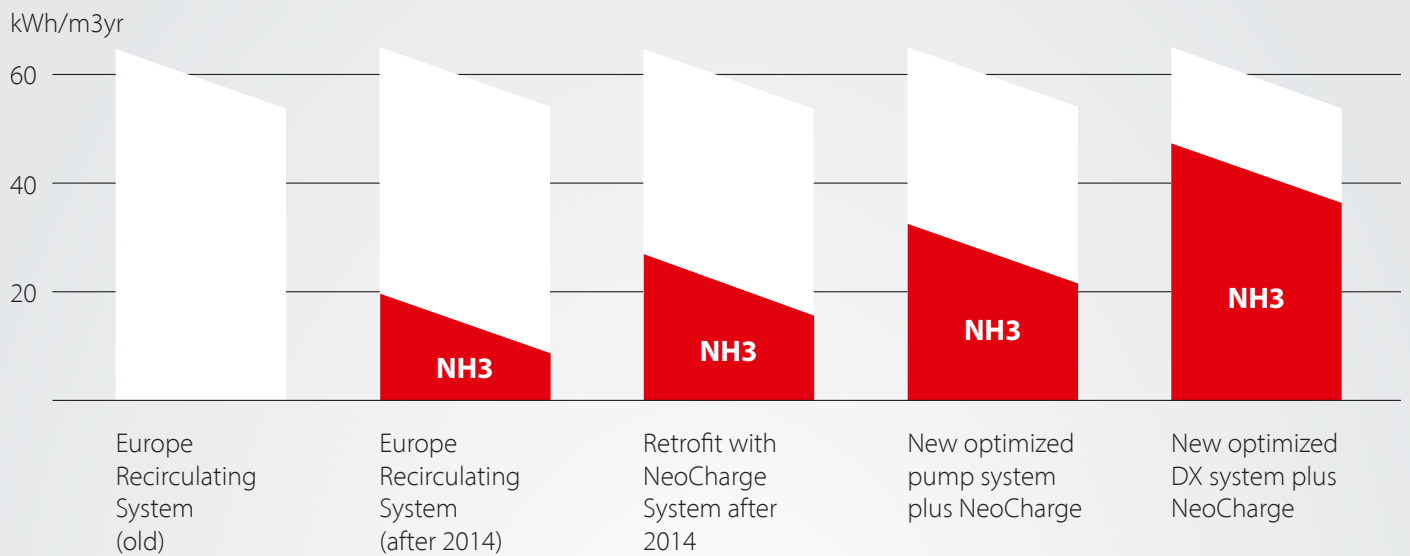
Figure 3: Charge reduction with NeoCharge

- Charge reduction up to 45%
- 40% extra capacity with the same charge in case of retrofit

NH3 100 KW -35°C	Design r=3	Actual r=4,65	Controlled r=1,5	Saving
Evaporator V=100 l	23 kg	27 kg	16 kg	11 kg
Wet suction pipe DN100 10 m	13 kg	17 kg	7 kg	10 kg
Tot	36 kg	44 kg	23 kg	21 kg

Figure 4: Ammonia savings in systems retrofit with NeoCharge

Energy savings potential with NeoCharge technology



Based on 100.000 m³ cold storage energy consumption.

Figure 5: Power savings in different systems with NeoCharge

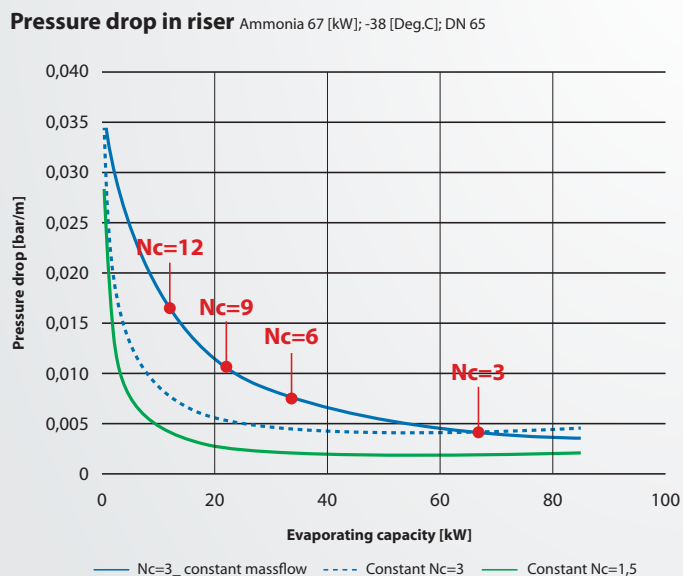
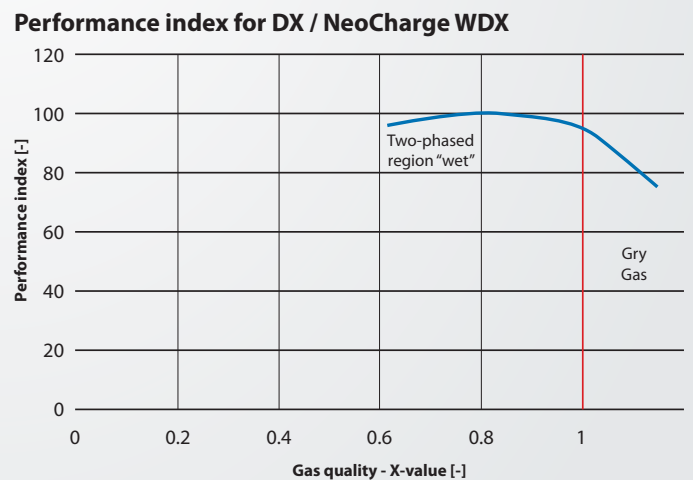
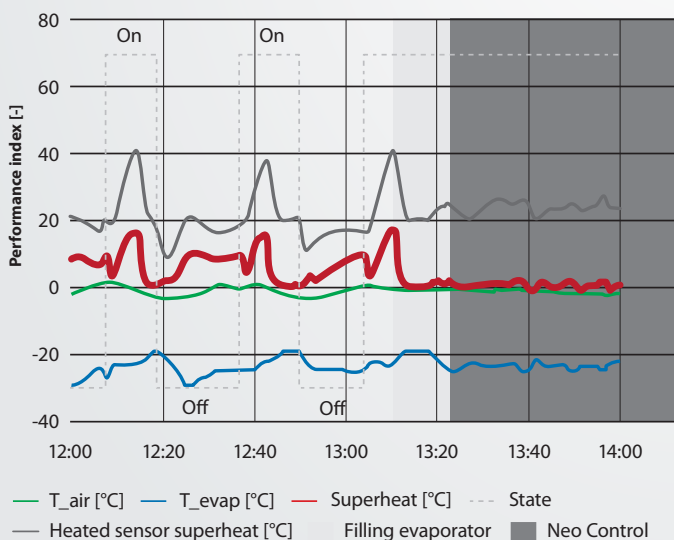


Figure 6: Reduction of suction pressure loss

With NeoCharge, suction pressure loss can be reduced by up to 60% for a 5 m riser at -35°C reducing compressor power consumption. This means pump size can be reduced by 30% (1MW cooling capacity @-35°C).



DX energy savings



Figures 7 and 8: Direct Expansion energy savings

Direct Expansion (DX) systems are commonly controlled using the superheat signal. But the used superheat must be compensated. This results in a lower evaporating temperature, which in turn results in a 5-15% higher energy consumption. NeoCharge eliminates this need.

A plug-and-play system for easy installation



Application

NeoCharge can be applied to both NH₃ and CO₂ air coolers. It is easy to mount on bottom-, top-, or side-fed systems and is suitable for stainless steel pipes as well as carbon-steel galvanized pipes.

Signal required

Minimum signal required is Cooling ON, OFF and defrost ON/OFF (in existing system).

Defrost in new systems

In new systems, the EKE450 Controller can manage defrost in addition to injection control.



NeoCharge **Solution**

084H1150	NeoCharge Controller 24V 10-12-16 mm
	NeoCharge Controller EKE450 With display 24V
	Solid state relay
	NeoCharge Sensor 14W 24Vdc 10-12-16mm
084H1151	NeoCharge Controller 230V 10-12-16 mm
	NeoCharge Controller EKE450 With display 230V
	Solid state relay
	NeoCharge Sensor 14W 24Vdc 10-12-16mm
084H1152	NeoCharge Controller 24V 20-22-27 mm
	NeoCharge Controller EKE450 With display 24V
	Solid state relay
	NeoCharge Sensor 14W 24Vdc 20-22-27mm
084H1153	NeoCharge Controller 230V 20-22-27mm
	NeoCharge Controller EKE450 With display 230V
	Solid state relay
	NeoCharge Sensor 14W 24Vdc 20-22-27mm
	NeoCharge Controller 24V 20-22-27 mm
	NeoCharge Controller EKE450 With display 24V
	Solid state relay
	NeoCharge Sensor 14W 24Vdc 20-22-27mm

NeoCharge

New PWM valves for CCR

NeoCharge can also be used with all existing ICM valves and function modules.



PWM function modules	ICFA20A	ICFA20B	ICFA20C	
	MOPD 21 bar	MOPD 3,4 bar	MOPD 21 bar	

*10W coil AC

Retrofit

	PWM retrofit function module	ICFA20A	ICFA20B	ICFA20C	
Function modules	Existing valve station				
	ICF 15 EVRAT				
	ICF 20 EVRAT	027L1258	027L1256	027L1358	
	ICF 15-4				
	ICF 20				

Complete valves



FA15+EVRAT 3-10-15	ICF 15 EVRAT PWM	027L4675	027L4565		
FA20+EVRAT 20	ICF 20 EVRAT PWM		027L4567	027L4566	

New system

Complete valves



PWM function modules	ICFA20A	ICFA20B	ICFA20C		Connection
ICF 20-2-122 PWM		027L3820			DIN 15
ICF 20-2-122 PWM		027L3823			ANSI 15
ICF 20-2-122 PWM			027L3821		DIN 20
ICF 20-2-122 PWM			027L3824		ANSI 20
ICF 20-2-122 PWM		027L3833	027L3834		ANSI SOC 20
ICF 20-2-122 PWM			027L3822		DIN 25
ICF 20-2-122 PWM			027L3825		ANSI 25



	Port M1/M2	Port M3			Port M4	
ICF 15-4-12 PWM	Stop valve/filter	027L4573			Stop valve	DIN 15
ICF 15-4-12 PWM	Stop valve/filter	027L4528			Stop valve	ANSI SOC 15
ICF 15-4-12 PWM	Stop valve/filter	027L4522	027L4661		Stop valve	DIN 20
ICF 15-4-12 PWM	Stop valve/filter	027L4556	027L4662		Stop valve	ANSI 20
ICF 15-4-12 PWM	Stop valve/filter	027L4613	027L4663		Stop valve	ANSI SOC 20
ICF 15-4-13 PWM	Stop valve/filter	027L4626	027L4653		Stop/check valve	DIN 15
ICF 15-4-13 PWM	Stop valve/filter	027L4631	027L4655		Stop/check valve	ANSI 15
ICF 15-4-13 PWM	Stop valve/filter	027L4529			Stop/check valve	ANSI SOC 15
ICF 15-4-13 PWM	Stop valve/filter	027L4523		027L4654	Stop/check valve	DIN 20
ICF 15-4-13 PWM	Stop valve/filter	027L4555		027L4656	Stop/check valve	ANSI 20
ICF 15-4-13 PWM	Stop valve/filter	027L4614	027L4660		Stop/check valve	ANSI SOC 20
ICF 20-4-12 PWM	Stop valve/filter		027L4669	027L4670	Stop valve	DIN 20
ICF 20-4-12 PWM	Stop valve/filter		027L4671	027L4672	Stop valve	ANSI 20
ICF 20-4-12 PWM	Stop valve/filter		027L4673	027L4674	Stop valve	ANSI SOC 20
ICF 20-4-13 PWM	Stop valve/filter		027L4664	027L4657	Stop/check valve	DIN 20
ICF 20-4-13 PWM	Stop valve/filter		027L4665	027L4659	Stop/check valve	ANSI 20
ICF 20-4-13 PWM	Stop valve/filter		027L4666	027L4667	Stop/check valve	ANSI SOC 20



Sofrilog

Case story

Sofrilog specializes in logistics and refrigerated transport from its headquarters in Normandy, France and throughout Europe and Morocco. A family-run business, Sofrilog delivers tailor-made solutions to the cold storage and food processing industry.

Sofrilog wanted to expand the cold room and freezing capacity of an ammonia-based refrigeration

system servicing a nearby brioche factory. Always willing to test innovative solutions and technology that can improve its systems, Sofrilog was looking for a way to expand the system, while keeping the ammonia charge below 1.5 tons¹. Doing so would keep the cost of expanding capacity to a minimum.



Results

After adopting NeoCharge, Sofrilog's freezer systems now run with 297 kg less ammonia while maintaining performance, allowing the addition of an extra freezer without extra charge. The technology's precise control also means unused ammonia can be applied to boost the cold room's capacity.

Thanks to the consistent 1.5 circulation rate, each evaporator uses just the right amount of charge required. The system improvement leads to cooler air by about 1°C and more efficient night-time cooling, leveraging lower electricity prices and saving energy when costs are higher.

"The NeoCharge sensor was easy to install on the existing evaporators and it makes it easy for us to understand how each evaporator is performing," says Simon Caillaud, responsible for refrigeration installations at Sofrilog.



"With the complete system retrofitted to NeoCharge, we can add a new freezer to our daily production and enlarge the cold room running over night. I think this is the most effective way to realize our production expansion plan while using the present charge."

Simon Caillaud





About **Danfoss**

Danfoss is focused on engineering a better tomorrow. From one of the world's first radiator thermostats and mass-produced frequency converters to the many solutions and technologies that push the boundaries of what's possible today, we have always kept an eye on building a better future. Our journey began in 1933 when Mads Clausen founded Danfoss in his parent's farmhouse in Nordborg, Denmark. Since then, the business has grown from a solo enterprise into one of the world's leading innovative and energy-efficient solutions suppliers.

The passion for technology and our customers has led to a legacy of rising to increasingly complex challenges and delivering exceptional results. With the promise of quality, reliability, and innovation deeply rooted in our DNA, we deliver an extensive range of products and solutions across a multitude of business segments. Our focus on meeting ESG ambitions sets us apart, and we believe it allows us to pioneer decarbonization solutions, best-in-class circular products, transparency, and a better customer experience. Partner with us, and let's engineer the future together.