

# Star Cool

Energy efficient reefer machine





The improved thermal properties and reduced weight will help you reduce CO<sub>2</sub> emissions from your reefer operation.

Energy savings generated through high-precision capacity control make Star Cool units highly financially viable.



Cargo quality is given the highest priority with a Star Cool unit. First class technology keeps the commodity in pristine condition.

**Low Total Cost of Ownership**

**Outstanding user-friendliness**

**Superior cargo quality**

**Environmentally responsible choice - now and in the future**

**First-class service set up**



## Caring for cargo while saving energy

The Star Cool refrigeration unit is designed to minimise Total Cost of Ownership. Our deep insights into the needs and requirements of the intermodal industry led to the creation of the perfect reefer unit. With low energy consumption, light weight, low M&R costs, high power factor and many standard features compared with other reefer units, Star Cool safeguards cargo while reducing operation costs and environmental impact.

### High-quality cargo care

Star Cool will meet the needs of your most demanding customers while minimising your own costs. Optimum cargo quality is our primary objective, and unrivalled experience within the intermodal industry has let us construct a refrigeration unit that combines reliability, usability and cost efficiency on an unmatched level. Let Star Cool ensure the safety of all perishable commodities in your care.

### 100% focus on refrigerated container transport

Star Cool is created by the only company with a single focus; container refrigeration. The combination of unmatched knowledge of reefer box building, insulation technology and refrigeration allows Star Cool to be ahead at all times. The initial design goal of being 30% better than the best-in-class on energy efficiency

is still maintained, despite leaps in the competitive environment. That improves the competitiveness and financial viability of your business.

### Accurate temperature control

Star Cool does not deviate from the common refrigeration principle of accurate temperature control.  $\pm 0.25^{\circ}\text{C}$  ( $\pm 0.45^{\circ}\text{F}$ ) is our working area. System performance, and therefore compressor speed, is always perfectly aligned with the prevailing conditions and set-point temperature is maintained accordingly. The result is optimised cargo care at reduced energy consumption. Other benefits are less loading, minimum wear and reduced noise levels.

### Significant cost savings and revenue opportunities

Energy savings are just one aspect of the Star Cool approach to ensuring

the lowest Total Cost of Ownership. Double reefer plug utilisation, low unit weight, advanced humidity management, superior operator interface, high refrigeration capacity and the highest power factor are some of the features that make a Star Cool unit a feasible long-term investment in more ways than one.

### Prepared for the future

Star Cool is future refrigerant friendly. The combination of the simplicity of the system design, the electronic expansion valves and the ability to change compressor capacity via speed makes Star Cool ready for the arrival of new, even more environmentally sound refrigerants, with similar physical properties to R134a. Star Cool adapts easily: switching to another refrigerant can be as simple as replacing the refrigerant and uploading the software control to suit.



Star Cool is available as a fully integrated reefer as well as the traditional picture frame design.



## Mindset of a container operator and cargo shipper

The Star Cool approach to cargo care is uncompromising: quality is key. High-quality care requires high-quality technology, and Star Cool delivers everything from a varying speed compressor with a soft start for minimum wear and perfect temperature control, to optimised humidity and temperature setting functions. All this in a unit that also reduces energy consumption to give its owners an extra competitive edge.

### Total temperature control

Star Cool can be set to maintain a constant temperature perfectly - or temperature changes can be pre-programmed, letting Star Cool follow a predetermined temperature sequence during transport. Humidity is controlled to desired levels and the Cold Treatment programme ensures that government requirements are easily met by eliminating the risk of insects. Data for humidity, pressure, temperature, air ventilation and more is recorded as standard in the controller and can be studied directly on the graphic display.

### Humidity care

The unique Star Cool system design results in a low temperature difference between the surface of the evaporator coil and the refrigerant – normally referred to as “Superheat”. The result is

less condensation and fewer defrosts, allowing the Star Cool unit, under normal operating conditions, to preserve a high relative humidity (RH) in the container. High natural RH prevents moisture loss from unpackaged perishable cargo, maintaining freshness and weight.

### Automatic ventilation

An optional Automatic Ventilation (AV+) system can be fitted to allow for correct ventilation and even higher relative humidity in the container.

### Dehumidification

For commodities negatively affected by high Relative Humidity (RH), customer tests have shown that the Star Cool dehumidification system is the only system that delivers what it promises – RH values between 50% and 95%. And it is naturally not an

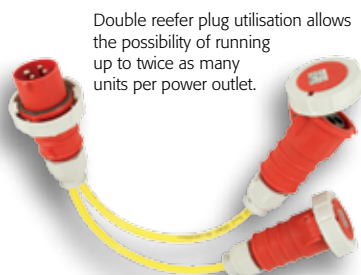
option – the function and sensor are included.

### On-demand dual defrost

On-demand defrost solution reduces unwanted temperature variations to a minimum and also reduces energy consumption. The defrost system utilises both hot gas and heat elements for a fast, efficient defrost sequence.

### Achievement through technology

The Star Cool benefits are brought to you by ingenious use of first-grade technology. A high-quality compressor at the heart of the system with a directly linked inverter ensures perfect reliability, intelligent control maintains temperatures and humidity levels exactly where you want them, and capacity control cuts energy consumption to a minimum.



Double reefer plug utilisation allows the possibility of running up to twice as many units per power outlet.



Capacity control of the high-quality Star Cool compressor with variable speed ensures that Star Cool units maintain the desired temperature and humidity with complete consistency, preserving the quality of any commodity.

The low Total Cost of Ownership reached through energy savings, reliable operation, and easy maintenance is appreciated by many customers.



Whether in Siberia or Ecuador, Star Cool keeps temperatures inside the containers stable at all times.

Service can make a world of difference. That is why Star Cool has an extensive network of authorised service providers around the world.



## Star Cool Integrated is the best of two worlds

Building on the strengths of the efficient Star Cool Refrigeration unit and the sturdy and reliable Mark Q reefer box, the Star Cool Integrated reefer takes two of MCI's most convincing solutions and combines them in a single unit. The result is a container that makes a visible difference to the bottom line and is yet an example of MCI's commitment to develop solutions with the lowest possible Total Cost of Ownership.

With the demands of modern container transportation at the centre of our attention, we have developed a unique solution that combines two separate fields of expertise: box building and unit manufacturing.

By integrating the Star Cool refrigeration unit directly into the container box, we have developed an intelligently designed container solution that weighs less, carries more and consumes less energy than today's typical container solutions, without sacrificing strength or reliability.

### **Design innovation with a focus on total cost**

Traditionally, refrigeration units are bolted to a frame on the container from the outside, using a thermal gasket to prevent thermal leakage between the two separate parts. Although initially efficient, such joints deteriorate over

time, resulting in reduced racking stiffness and air tightness, which in turn leads to excessive thermal loss and subsequent extra energy costs for refrigeration.

Our designers have solved this problem by treating the container box and refrigeration unit as one.

By integrating the Star Cool reefer unit directly into the container, we have completely eliminated the unit frame and achieved uninterrupted insulation of the entire front wall.

This effectively reduces overall weight by 100 kg and improves the strength of the front frame. In addition, the tighter connection between the refrigeration unit and container has removed thermal bridges, improving overall energy efficiency.



By integrating the Star Cool reefer unit directly into the container, the unit frame is completely eliminated and uninterrupted insulation of the entire front wall is achieved.

## ADVANTAGES

### **Integrated benefits with bottom line impact**

- Uninterrupted insulation of front wall eliminates thermal bridges and reduces heat leakage by 5%
- Eliminating the machinery frame increases loading capacity by 100 kg
- The fully welded end wall construction adds extra strength to the box
- Improved airflow

User-friendliness is enhanced by features such as the user interface, where operators can view nine lines of information at once – ideal for an instant overview. On the detailed graphic display, temperature graphs and other important information can be evaluated.



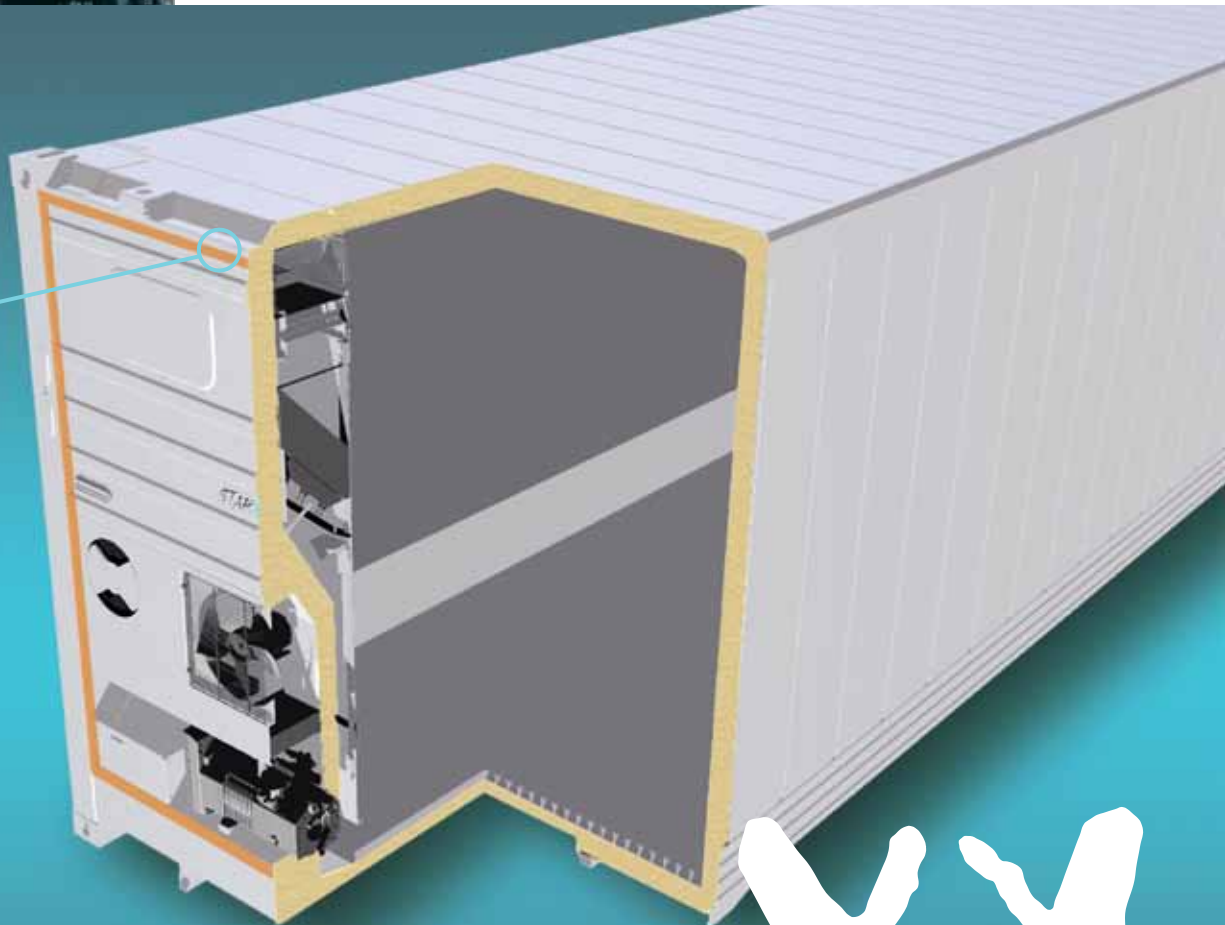
The machinery components are easily installed via two main modules, in both the integrated and the picture frame designs.



**Thermal bridges eliminated**

In a conventional reefer, there is a high level of heat transfer in the joint between machinery and container, indicated here by an orange line.

The Star Cool Integrated is specially designed to minimise thermal bridges, resulting in reduced heat leakage and improved energy efficiency.



# Cool performance

## Improve business with Star Cool



The purchase price is only a fraction of the true cost of owning and operating a reefer

Reducing the Total Cost of Ownership (TCO) for MCI reefers involves many different aspects.

Your TCO will be reduced by choosing Star Cool through:

- Lowest energy consumption
- High refrigeration capacity
- Environmental responsibility
- Highest power factor
- Double reefer plug utilisation
- Lowest unit weight
- Advanced humidity management
- Superior operator interface
- Fresh air ventilation solutions

### Service

A little extra attention can make a world of difference to the way business is conducted. Our aim is to provide you with the best possible service, around the world.

#### • 24-hour support - just a phone call away.

We provide access to hotline support at any time, night or day. All calls are answered by highly skilled service technicians who know the units – and the business – inside out.

#### • Spare parts and service available worldwide

The units are made from high-quality parts that are readily available worldwide through our network of skilled service providers. You may also buy spare parts online and find service providers on [www.starcool.dk](http://www.starcool.dk)

#### • Customised service

Star Cool has an extensive network of service providers. However, you can also nominate those skilled providers you already know and use in certain locations.

#### • Training seminars especially for you

Star Cool has a team of product specialists who are constantly on the road organising seminars. You are welcome to join one of these or you can even tell us where you would like us to organise a training seminar!



Star Cool	Height	Width	Depth
Dimensions (Unit)	2,235 mm	2,025 mm	420 mm
Weight (Unit)	380 kg		
Refrigerant	4.5 kg HFC-R134A		
Power supply	3 phase, 350/500 Volt, 50/60 Hz		
Noise	Less than 75 dB(A) in 250 Hz band		
Cooling capacity at 37.8 C (100F) ambient			
+1.7 C (35F)	11,500 watt	9,890 kcal/h	(39,250 BTU/H)
-18 C (0F)	6,500 watt	5,590 kcal/h	(22,180 BTU/H)
-29 C (-20F)	4,000 watt	3,440 kcal/h	(13,650 BTU/H)

### Options

- AV+  
Automatic fresh air control can easily be applied. Please refer to the separate brochure for more information.

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