

Nidea[®] inside



New Intelligent Defrosting Apparatus



Nidea® inside

Nidea® is the result of close research collaboration between LU-VE Group and the Polytechnic University of Milan. The system has grown out of the necessity to optimize all the dynamics of the defrost process of unit coolers and avoid wasting energy and money, without reducing the functionality of the equipment.

The complex algorithm of Nidea® is able to calculate and recognise the Optimal Defrost Point which is always variable.

Nidea® is available with electronic expansion valve pre-mounted and wired on board.



Nidea® is the INTELLIGENT response to the waste involved in periodic and constant defrosting based on a logic of precaution. In a traditional system the cycle is activated independently of the real need for defrosting.

Nidea® is equipped with two temperature sensors which determine the deactivation of the defrost cycle.

Nidea®, thanks to its pressure sensor, calculates and registers the parameters to identify the time and duration of optimal defrost.

Nidea®

Takes care

Resists

Feels

Speaks

Judges

Decides

Learns

Saves



Nidea® registers and “reasons”
in order to manage any anomalies.

Nidea® is adaptable and has a SELF
CALIBRATING SYSTEM in order
to automatically change the parameters
and the set points in accordance
with the current working condition.

The process of overmoulding which
seals in the PCB (Printed Circuit Board)
enables correct functioning
in a humid environment
down to a minimum temperature
of -30°C

**COMPARED TO TRADITIONAL
DEFROSTING (4 per day)**

75% less defrost cycles
With just one cycle per day!

30% reduction of energy
costs of the total
refrigerant plant

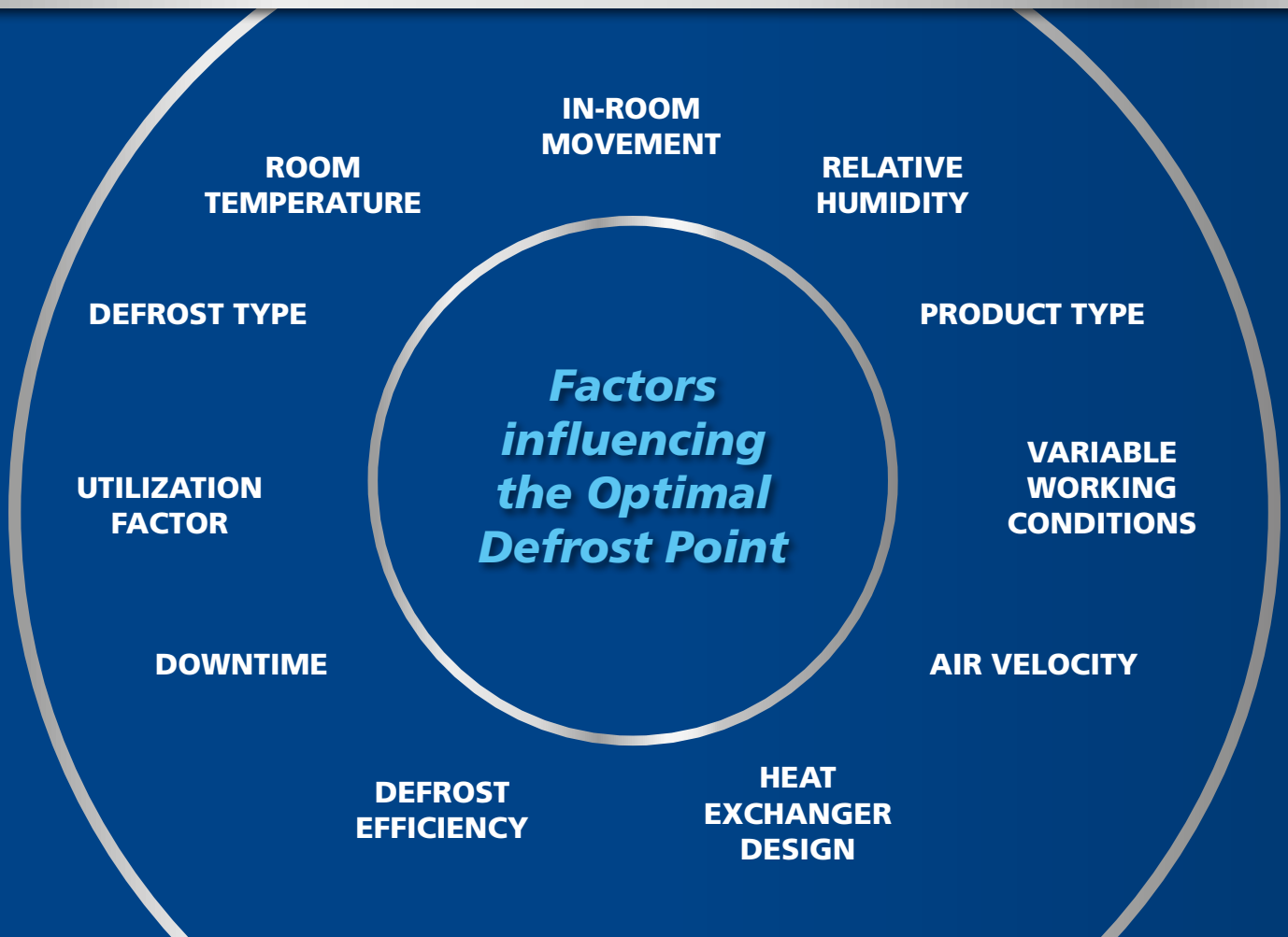
Data measured in real field test.
Energy savings depend on plant working conditions.



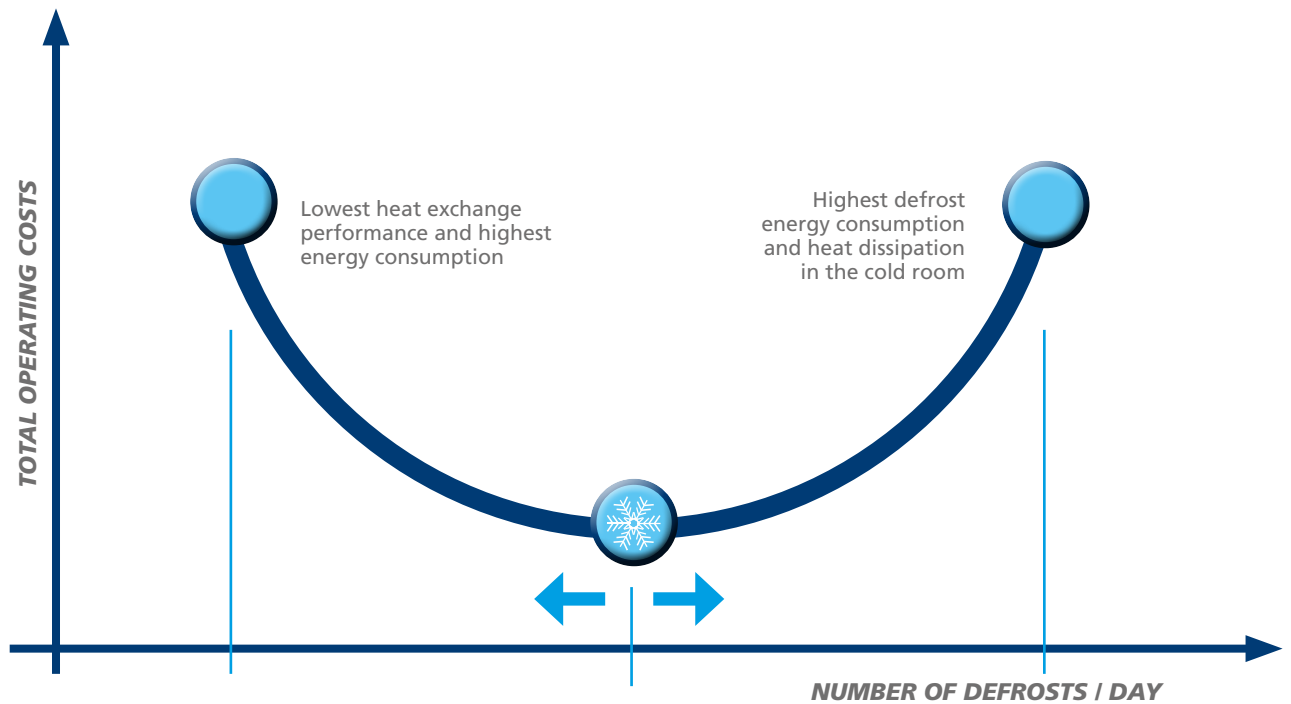
Nidea® inside

The search for the Optimal Defrost Point

Nidea® can register and compare a great quantity of data to calculate the Optimal Defrost Point (which is variable) and therefore to define the duration of the individual cycle and the ideal daily frequency.



The Optimal Defrost Point is the optimal ratio of consumption costs to daily frequency of defrosts. It is calculated as the moment of lesser consumption of the two moments of lesser heat transfer and greater heat dissipation.



How can Nidea® manage so many variables?

Nidea® is self-calibrating: using an advanced algorithm it can combine measurements of pressure, temperature and schedules memorized from previous cycles.



- Δp on an initially clean coil is measured
- defrost is started when the Δp exceeds the pre-set threshold value
- two defrost sensors stop the cycle
- required defrost time is memorized
- optimal time and Δp with clean coil is compared
- threshold value is recalculated for the next defrost



WHEN DEFROST STARTS

WHEN DEFROST STOPS

Judges

PROBLEM MANAGEMENT

NUMBER OF DEFROSTS

Decides

DEFROSTS TIME PERIOD

Takes care

REDUCE ENERGY CONSUMPTION

Resists

DOWN TO -30°C

Nide

a® inside

Learns

ADAPTABLE
WITH ANY
COOLER AND
REFRIGERANT

SELF
CALIBRATING
SYSTEM

INTELLIGENT
RECOGNITION

Saves

UP TO -75%
ENERGY
CONSUMPTION
FOR DEFROST

UP TO -30%
PLANT ENERGY
SAVING

Speaks

MOD-BUS

DIGITAL
OUTPUT

Feels

1 AIR PRESSURE
SENSOR

2 TEMPERATURE
SENSORS



**Saves more...
up to 20%
EXTRA SAVINGS**
The unit cooler equipped
with NIDEA® including pre-mounted
electronic expansion valve

APPLICATION OF NIDEA® TO A REAL CASE

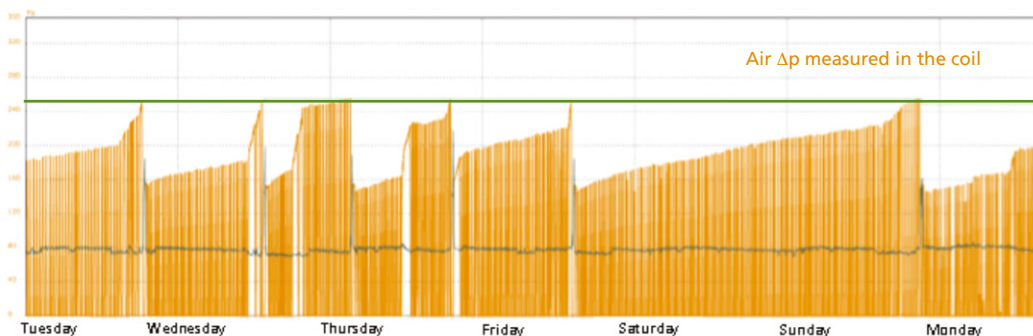
- LT cold room for frozen products in storage warehouse
- LU-VE unit cooler CS71H 4404 E10 with E3V electronic valve and the Nidea® system
- System constantly monitored via telecontrol



Performance in a typical week

After the laboratory test the product was then tested in a cold room operating in real conditions.

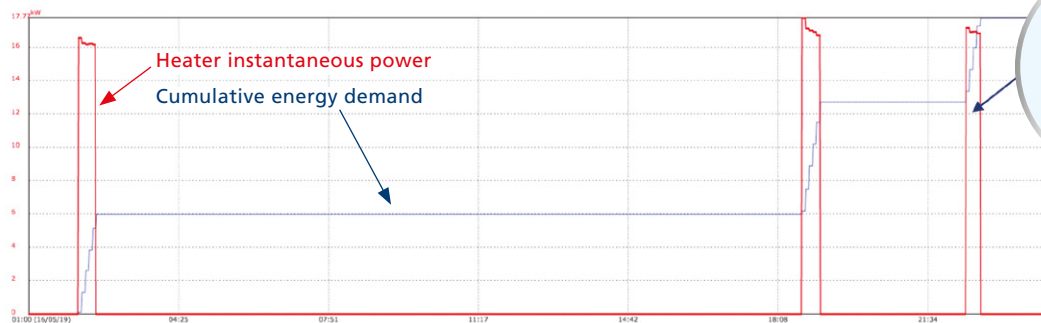
Examining the behaviour of pressure loss through the coil in a typical week, it can be seen that there are long periods with modest variations of p (e.g. the weekend), interspersed with sudden peaks coinciding with moments when the cold room is opened with a consequent increase in humidity and load factor.



Pressure loss trend through the coil. The green line represents the threshold Δp , the blue curve represents the temperature sensor value.

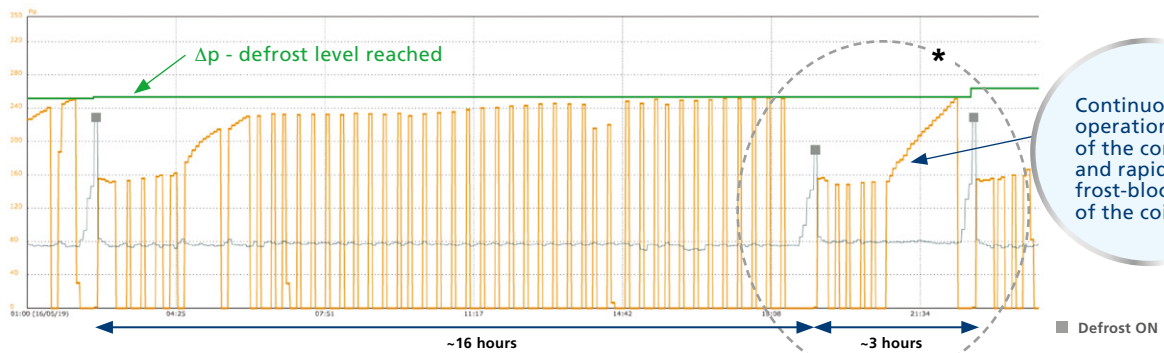
- Sudden variations of Δp following the filling/emptying of the cold room
- Prolonged periods with modest Δp variations, e.g. the weekend
- Defrosting is carried out when the Δp exceeds the threshold (green line)

Daily energy-meter analysis



One defrost operation is carried out shortly after the previous one.

Trend over one day of power absorbed by the heaters. Around 20.45 there was an increase in the temperature in the cold room which caused the compressor to run continuously with the consequent need for a defrost shortly after.



Continuous operation of the compressor and rapid frost-blocking of the coil.

Pressure loss trend through the coil.

*Thanks to NIDEA®, the unit cooler works with a "clean" coil for significant time, keeping high the heat exchange coefficient with important benefits for compressor power consumption and COP.

Before the installation of Nidea®, 4 defrosts were scheduled per day.

With Nidea® there is only one defrost per day, a reduction therefore of **75%**, with average energy required for each defrost less than the "traditional" value. Average monthly electricity savings **up to 30%** and are maximum in the coldest months when compressor consumption is less because of the lower condensation temperature. In this case the energy savings translate into financial savings of the order of €2000 per year.

Result: average monthly defrosts over 4 months

		NIDEA®	TRADITIONAL DEFROST	DIFFERENCE
No. of defrosts	-	26	112	-76.6%
Average energy for each defrost	kWh	6.0	8.1	-25.6%
Energy introduced to cold room for defrosts	kWh	108.75	843.75	-87.1%
Total Energy (heaters, compressors, motors)	kWh	4081	5355	-23.8%
Total energy cost (0.15 €/kWh)	€	612	803	-23.8%

Summary table after four months testing on a refrigeration system

LEADERSHIP WITH PASSION



LU-VE Group is an international enterprise with its headquarters in Uboldo, Varese, along with its main offices and principle production facility. The strength of the Group lies in its 10 production plants located in 6 different countries: Italy, China, Poland, Czech Republic, Russia and Sweden. The companies which make up the Group are:



AIA/LU-VE Sweden (Asarum, Sweden):

heat exchangers for refrigeration, air conditioning and industrial applications;



HTS Heat Transfer Systems (Novsedly, Czech Republic):

coils for air conditioning, refrigeration and for special applications (trains and means of transport in particular);



LU-VE Digital (Uboldo, VA, Italy):

information technology, development and implementation of calculation softwares;



LU-VE Exchangers (Uboldo, VA, Italy):

heat exchangers for refrigeration, air conditioning and industrial applications;



LU-VE Heat Exchangers (Changshu, China):

heat exchangers for refrigeration and air conditioning, destined for the Chinese and Asian markets;



SEST (Limana, BL, Italy), SEST LU-VE Polska (Gliwice, Poland), "OOO" SEST LU-VE (Lipetsk, Russia) & SEST LU-VE China (Changshu, China):

heat exchangers and condensers for refrigerated cabinets and finned heat exchanger coils for commercial refrigeration and air conditioning;



SPIROTECH Heat Exchangers (Bhiwadi, Rajasthan, India):

heat exchangers for domestic appliances, air conditioning and refrigeration;



TECNAIR LV (Uboldo, VA, Italy):

close control air conditioning for applications in surgical rooms, white rooms, data centres and telephone exchangers;



TGD - Thermo Glass Door (Travacò Siccomario, PV, Italy):

glass doors and closing systems for professional, domestic and industrial refrigeration equipment.

LEADERSHIP IN ACTION



Heat exchangers for industrial and commercial refrigeration, air conditioning and industrial applications.

LU-VE S.p.A. is the holding company of LU-VE Group. In 1985 LU-VE S.p.A. acquired Contardo S.p.A., established in 1928. Production began in 1986.

LU-VE quickly made its mark thanks to high standards of quality, new solutions designed in its own laboratories and to the care taken with the appearance of its products. (Beautiful outside - Revolutionary inside).

It was the first company in the world to apply avant-garde solutions to commercial and industrial refrigeration:

- grooved tube technology;
- specialized heat exchange surfaces;
- certified performance levels;
- innovative materials and colours;
- advanced design.

The success of LU-VE in the international market stems from its research and development policy, its great respect for the environment and its rigorous ethical and commercial principles.

In 2000, LU-VE was the first company in Europe to attain the prestigious Eurovent “Certify-All” certification for the entire range of its products: unit coolers, condensers and dry coolers.

LU-VE and the Group have introduced new ways of conceiving and constructing products for refrigeration, air conditioning and industrial applications, creating new technologies which have then gone on to become the benchmark for the entire industry.

Nidea[®] inside

