German Technology
Best Air Cooled Condensing Unit
“Ecostar”

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Bangkok

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EU : Efficiency Requirement for Condensing Unit

Minimum **E**nergy **P**erformance **S**tandards " **MEPS**"

Condensing Units :

Medium Temperature @ Te = -10 oC

Low Temperature @ Te = - 35 oC

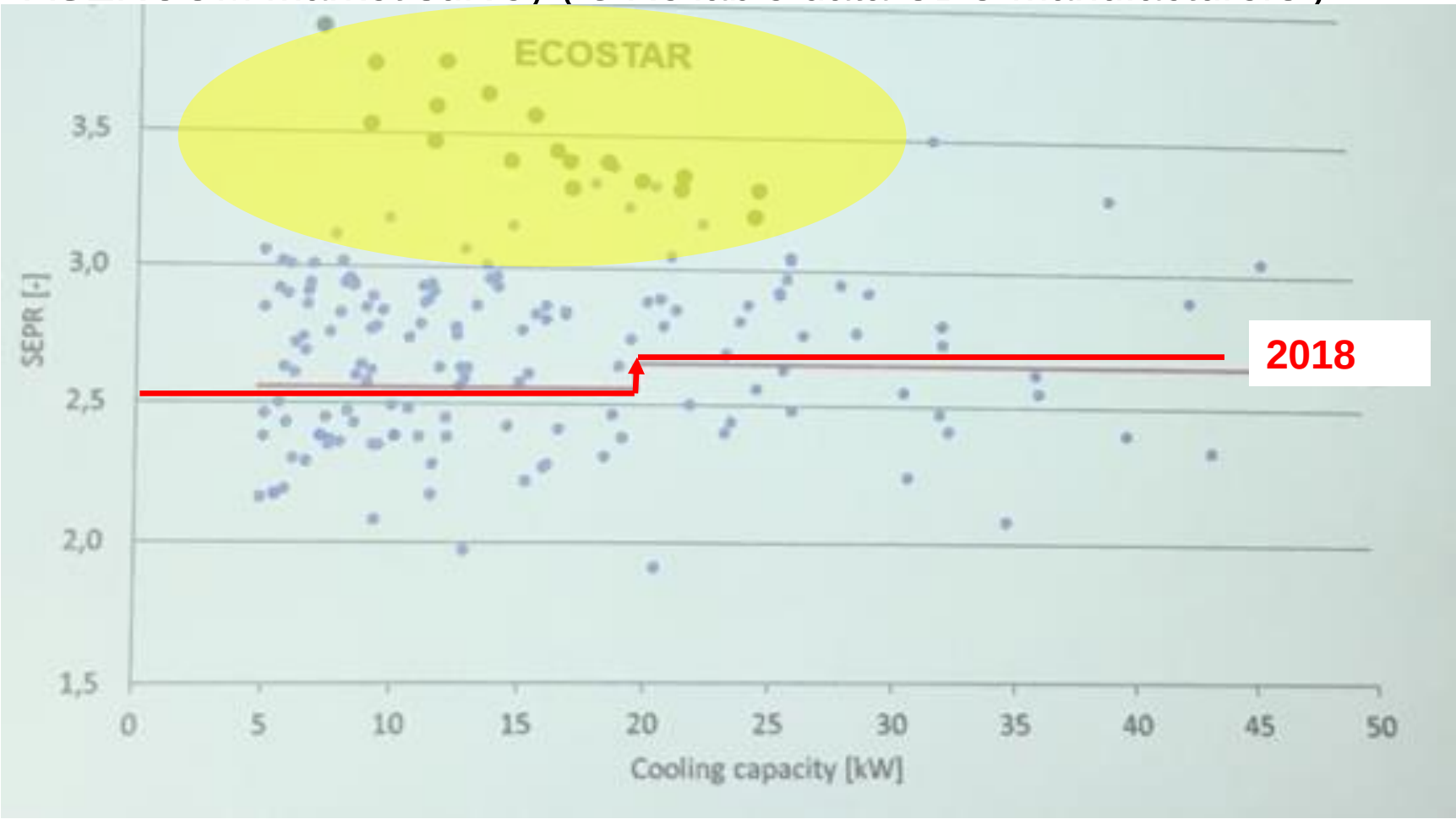
MEPS – SEPR (Seasonal Energy Performance Ratio) Analysis

	Capacity (kW)	MEPS Tier-1	MEPS 2018
Medium Temperature	5 kW…. < 20kW	2.25 →	2.55
	20kW…..< 50kW	2.35	2.65
Low Temperature	2 kW…. <8 kW	1.5 →	1.6
	8kW ……<20kW	1.6	1.7

EU 2018 Directive - Condensing Unit

Example : Medium Temperature – SEPR Analysis

ASERCOM market survey (3 Reliable data CDU manufacturers)



Proven Hardware's and Intelligent Software

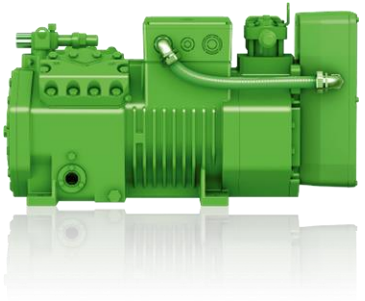
EC Fan (s)
(10~100%)

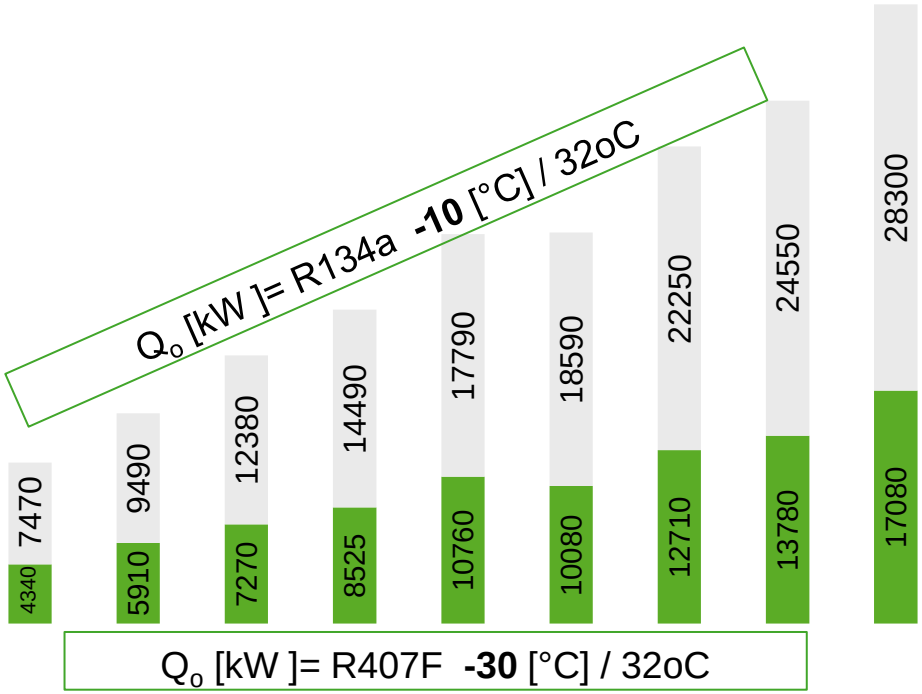
Intelligent Software

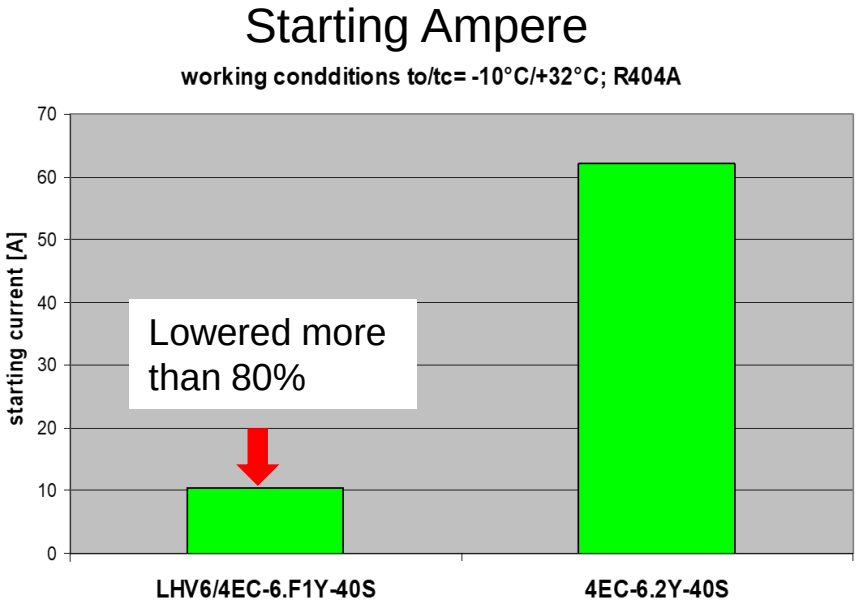
Maintenance Free Inverter
(25Hz ……87Hz)

Inverter Drive Compressor

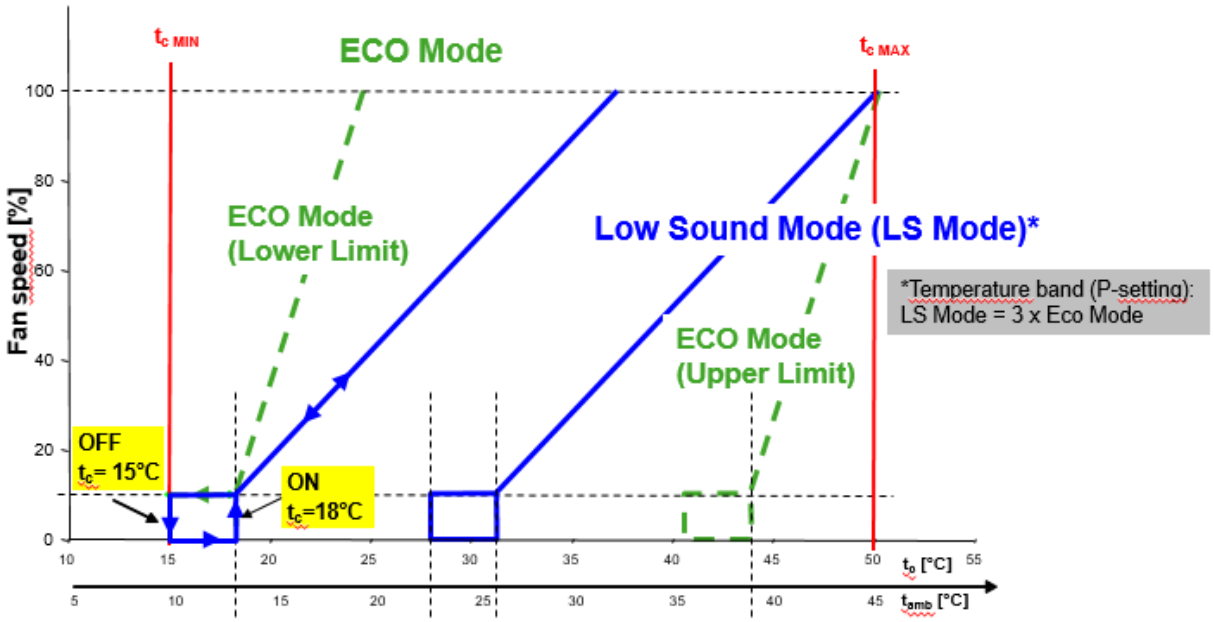
- Low starting Ampere
- 3:1 capacity Range
- Evaporating Temp : MT & LT
- R134a / R404A / R407F/ R448A/R513A





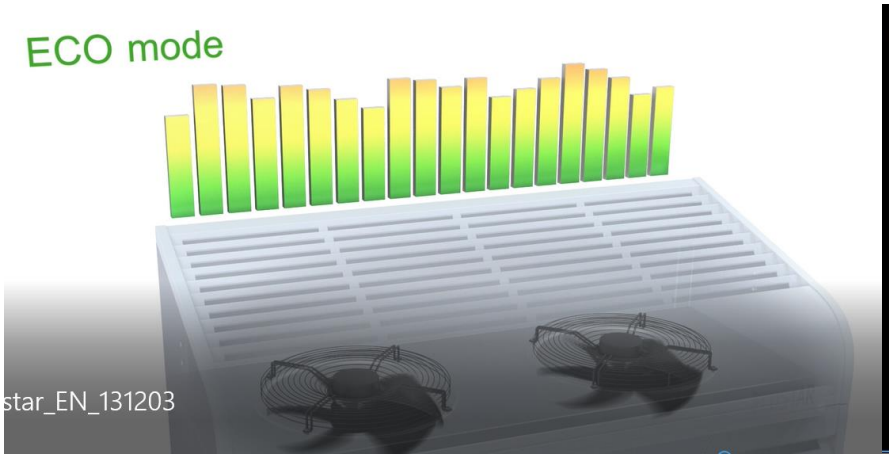


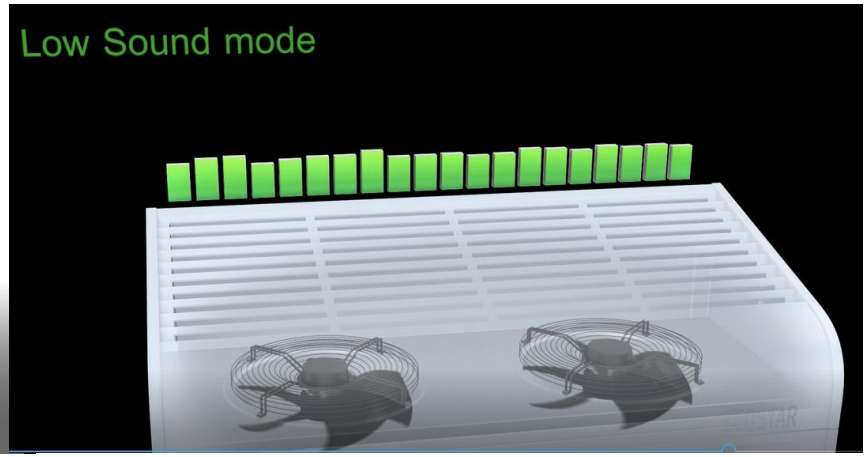
EC Fans – Fan Regulations



Fan Regulation :

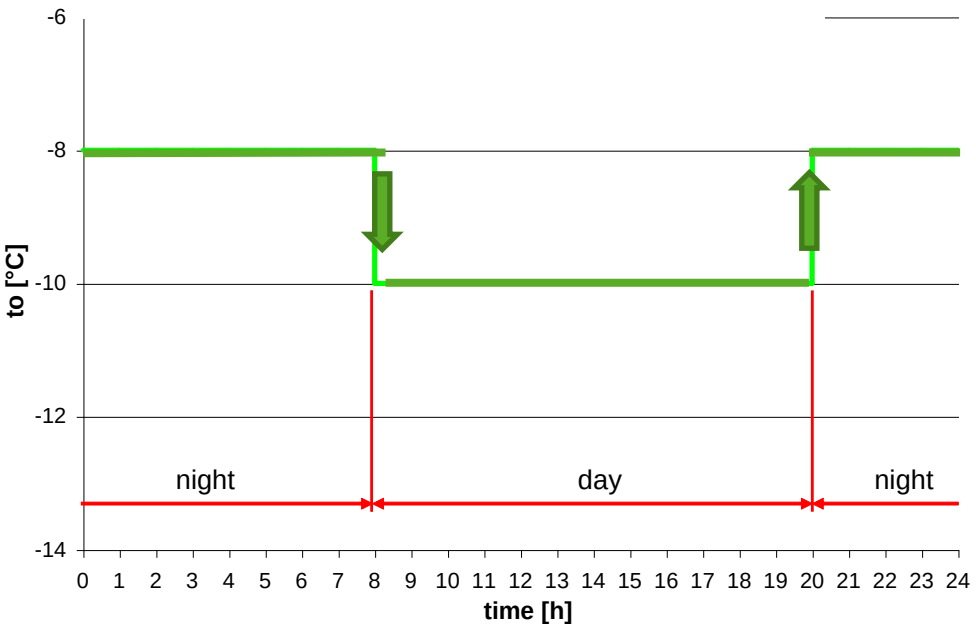
- 10%.....100%
- Ambient adjustment





Timer Included – Weekly timer

Example : MT @ Te = -10oC
Lift up to -8 oC at night



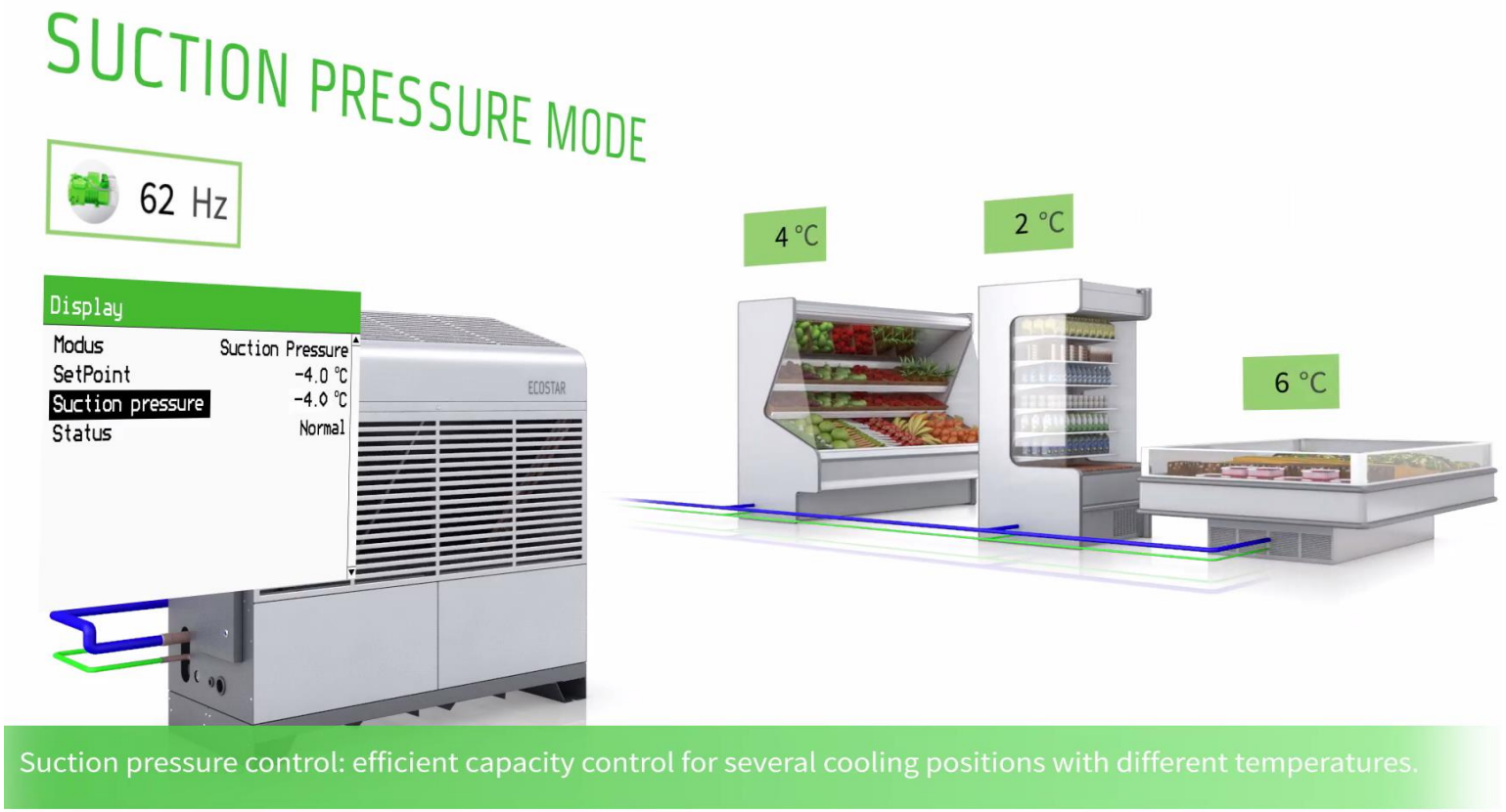
31-01-2010	Week program	09:31
Select		Active
Day	Time Fan mode	Setp.
Monday1	0600 Off	-10°C
Monday2	2200 On	-10°C
Monday3	Off Off	0°C
Monday4	Off Off	0°C
Copy:	Monday -> Tuesday	

Day and Night set point

Set Point change max. 4 times/ day

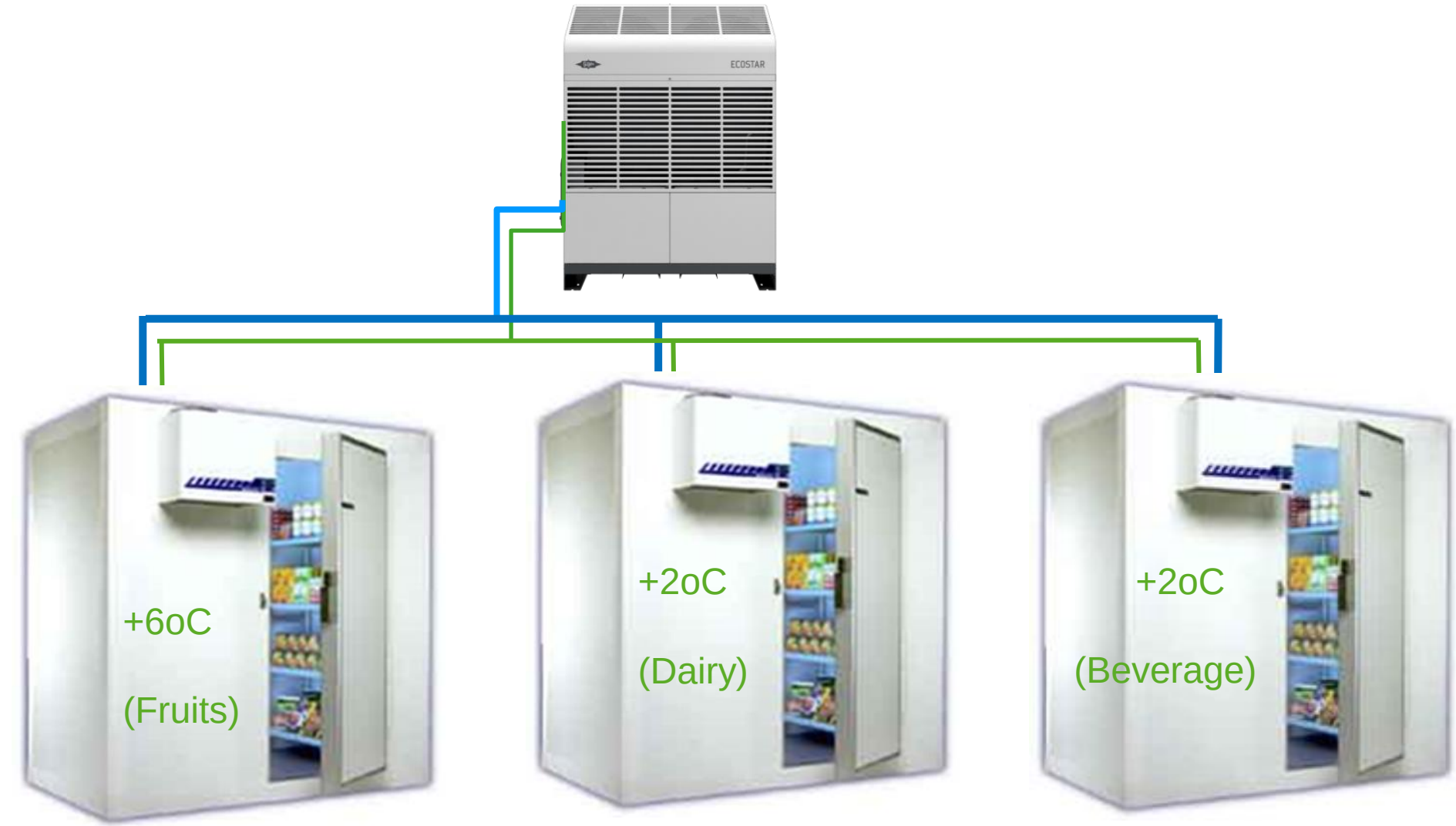
Multiple Evaporators

- Suction pressure control
  - Multiple evaporators



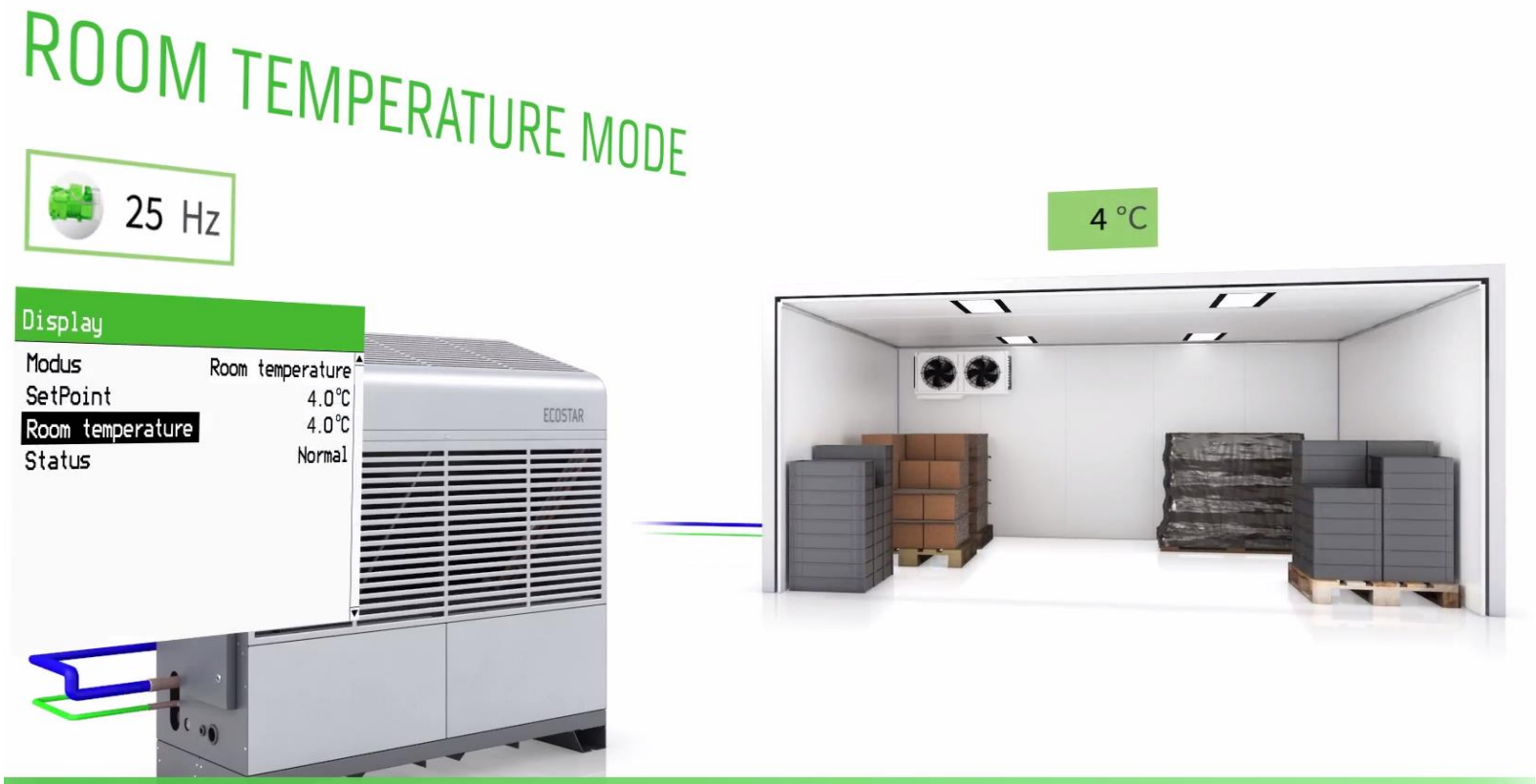
Suction pressure control: efficient capacity control for several cooling positions with different temperatures.

Multiple Evaporators (Cold Rooms)



Single Evaporator

/ Room temperature control



Temperature control: efficient capacity control for one cooling position based on room temperature.

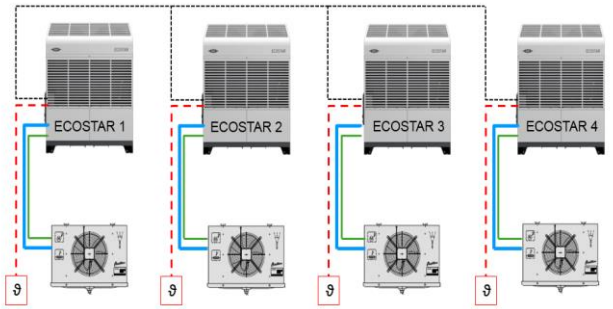
Large Cold Room

- Master/Slave function for up to 4 ECOSTAR
  - Efficient master/slave controlling of room temperature
  - Wide range of capacity with optimized full- and part load
    - ⇨ Single unit: 25-87Hz (additional advantage: numbers of ECOSTAR as slave)
  - Backup and redundancy

Refrigerant site = Single pipe system
→ Every ECOSTAR has his own refrigerant circuit!

Convenient efficiency: master/slave function for up to four ECOSTAR.

1 Master + 3 Slaves

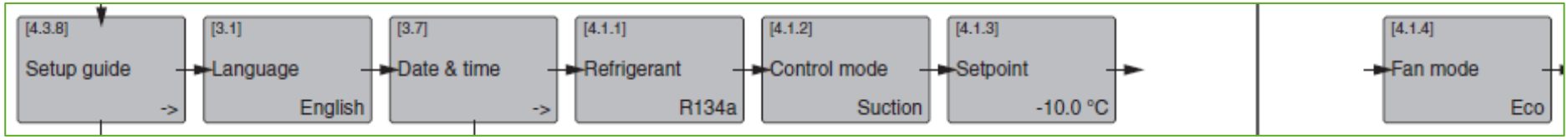


Easy Commissioning

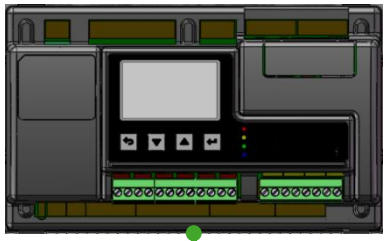
Plug and Play

/ Setup guide

- Simple commissioning in 5 steps
  - ⇨ Selection of language
  - ⇨ Setting of date and time
  - ⇨ Selection of refrigerant
  - ⇨ Selection of operating mode
  - ⇨ Selection of fan mode



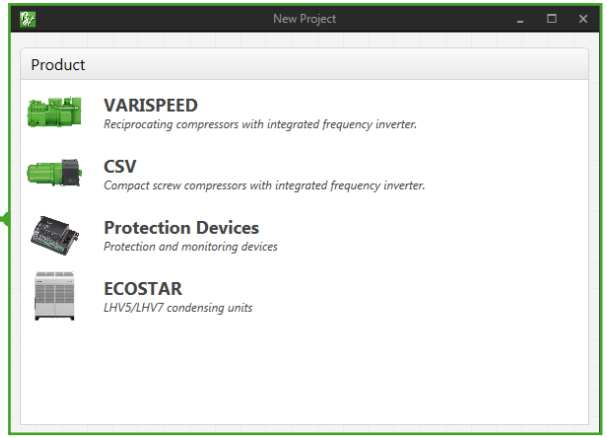
Commissioning By Computer



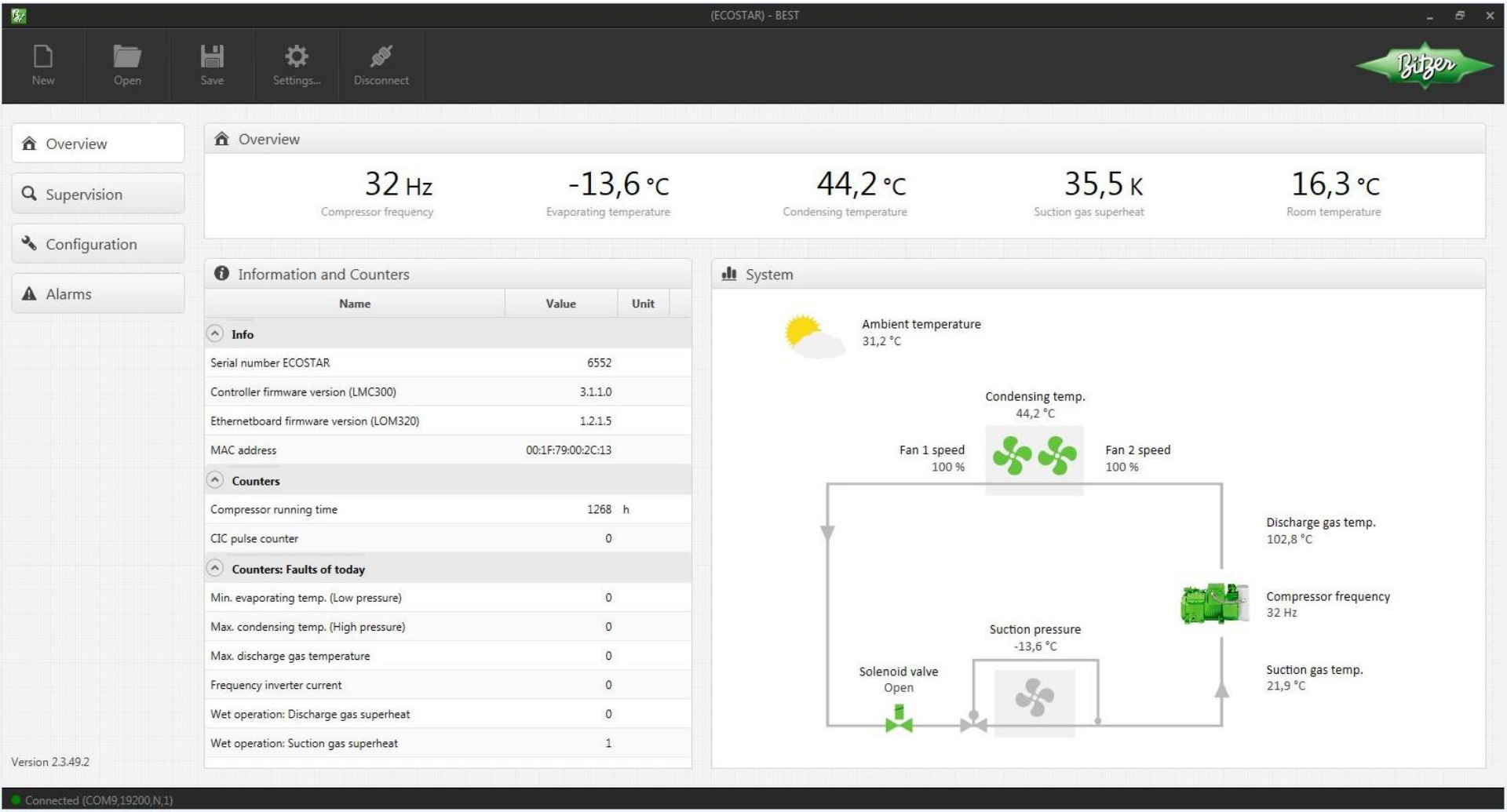
USB-Cable

~2 meters

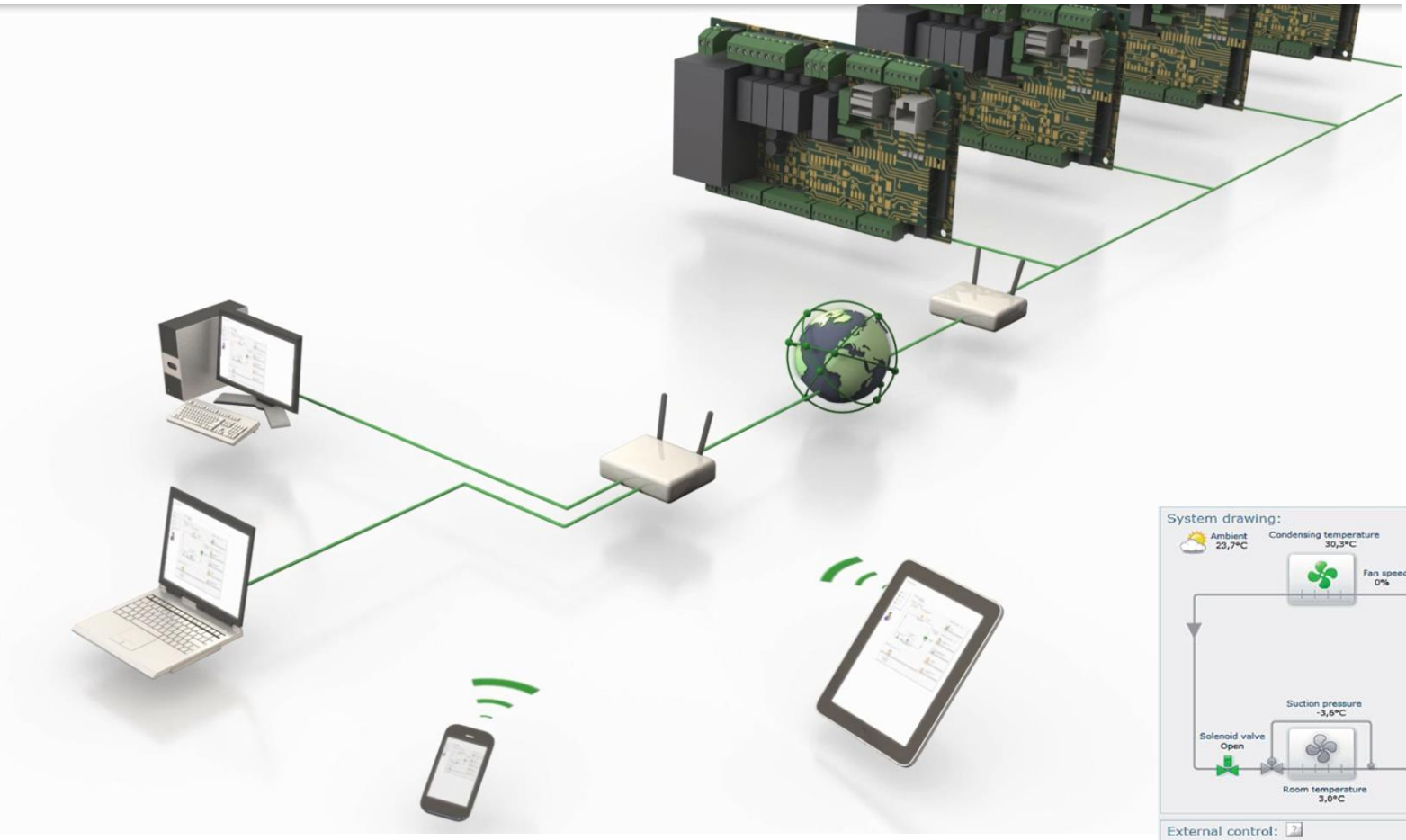
- With BEST Software (computer)
  - Via USB Cable
- All menu points
- New – By Bluetooth

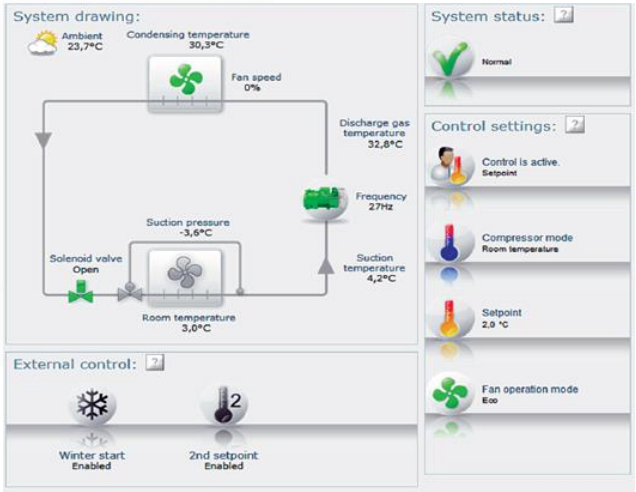


Overview BEST for ECOSTAR



Possible Remote Monitoring

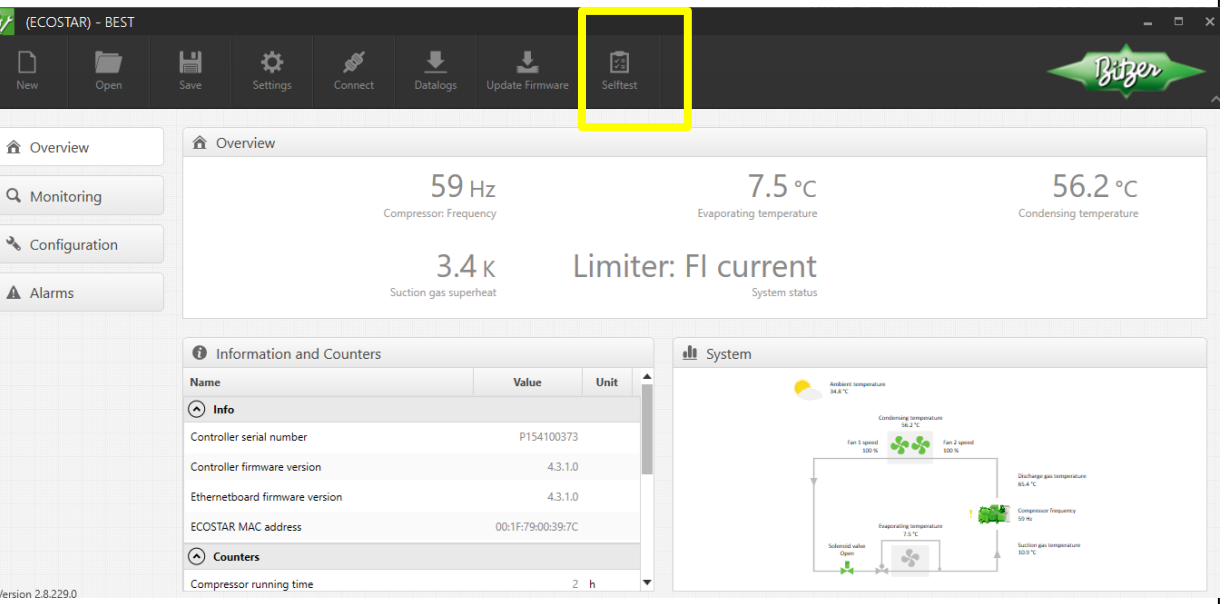




Quick Maintenance – Self Test Function

/ Self test

- Easy self analysis of ECOSTAR equipment for fast commissioning and professional service
- 31 points test report as PDF file available



ECOSTAR LHV7E Self Test Report

Date and time: 20.09.2016 13:21:05

Compressor model : 4EE-6.F1
Refrigerant : R134a
Controller serial number : P154700605

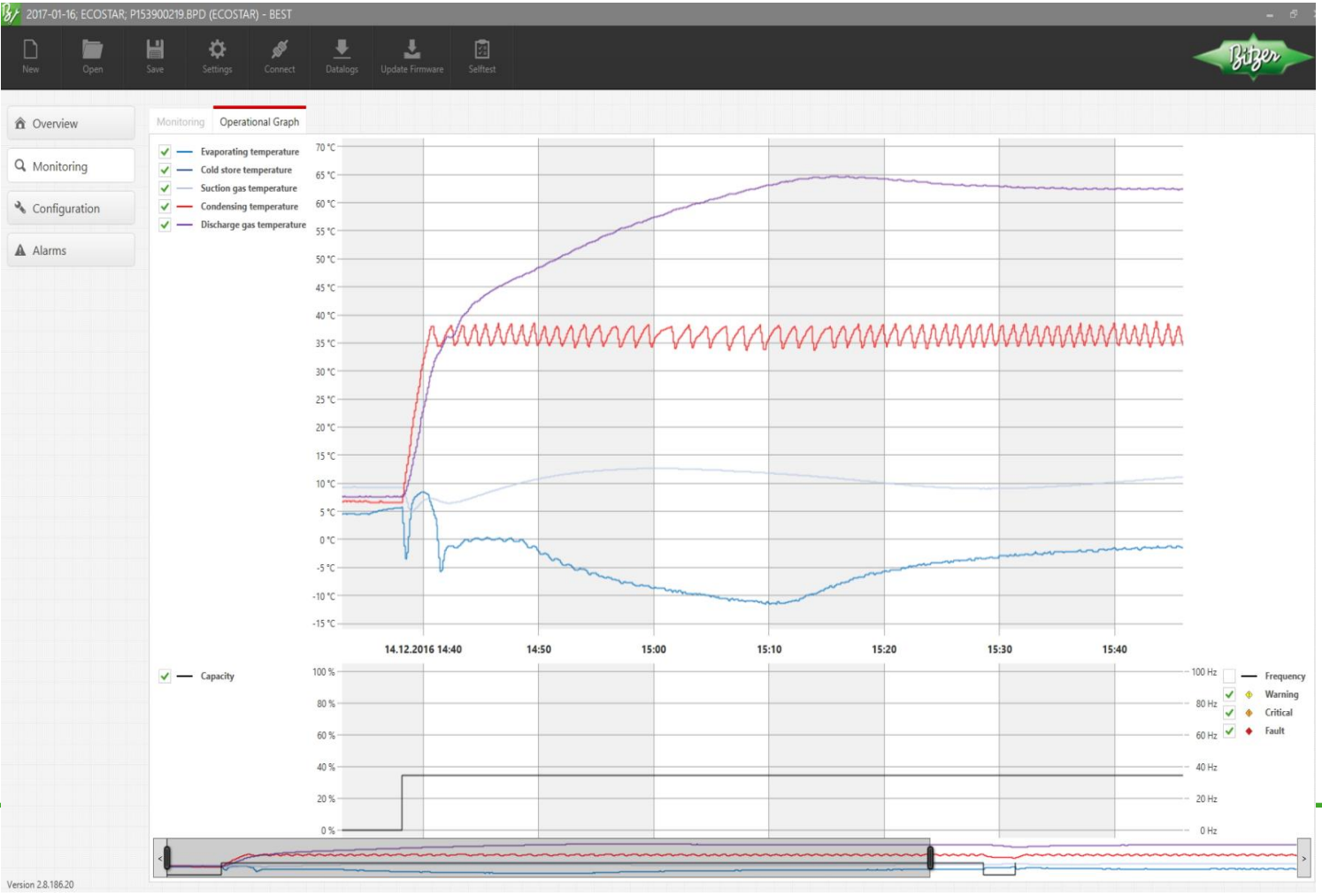
Step No.	Step Name	Step Result
1	Suction Pressure	Ok
2	Condensing temperature	Ok
3	Ambient temperature	Ok
4	Discharge gas temperature	Ok
5	Suction gas temperature	Ok
6	Cold store temperature	Ok
7	External setpoint adjustment	Skip
8	Motor protection	Ok
9	Oil monitoring	Ok
10	ON/OFF	Ok
11	HP/LP	Ok
12	Fan 1	Ok
13	Fan 2	Ok
14	Motor protection	Ok
15	Oil monitoring	Ok
16	ON/OFF	Ok
17	HP/LP	Ok
18	Fan 1	Ok
19	Fan 2	Ok
20	Auto test FI communication, reading IGBT	Ok
21	BMS relay (Building Management System)	Fail
22	Crankcase Heater	Fail
23	RI	Skip
24	LLV	Skip
25	Fan 1: Low speed	Skip
26	Fan 1: High speed	Skip
27	Fan 2: Low speed	Skip
28	Fan 2: High speed	Skip
29	Solenoid Valve Liq. Line	Skip
30	Solenoid Valve RI	Skip
31	Running the compressor	Ok

Easy Plot Graph

/ Datalog function

- Evaluation of logged operation values for analysis and system optimization

  ⇨ Livelog



Software Self Monitoring

Cover most refrigerants / MT / LT Application

/ Self monitoring of operating limits (like doctor …)

Active application limits monitoring ➔ Actions to prevent cut-outs

Examples:

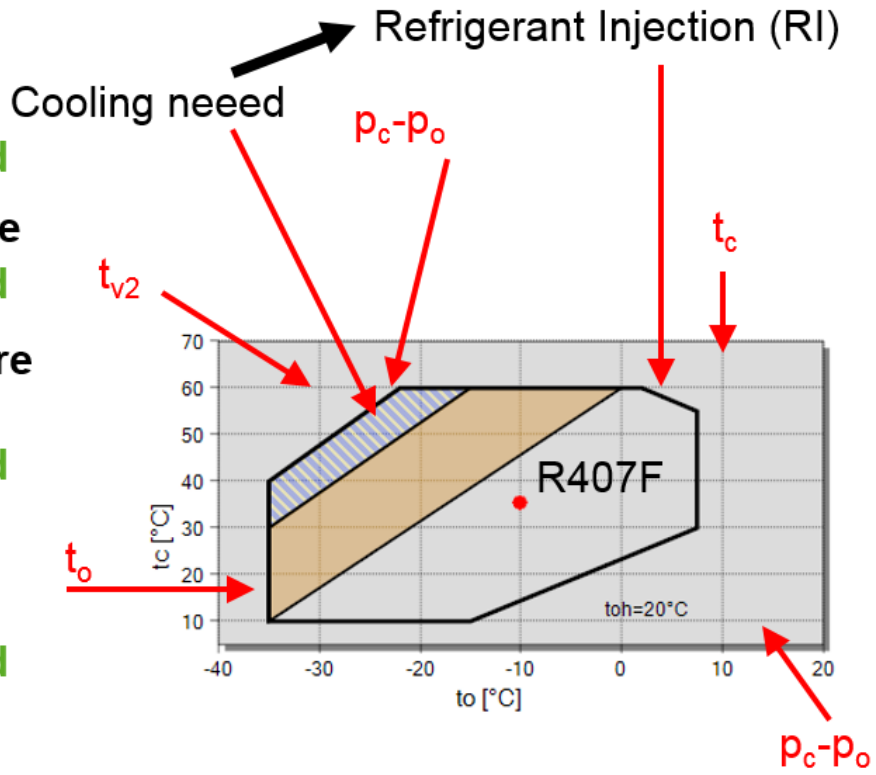
Max. condensing pressure
/ FI reduces compressor speed

Min./max. evaporating pressure
/ FI reduces compressor speed

Max. discharge gas temperature
/ Fans increase speed
/ FI reduces compressor speed

Max. pressure difference
/ Fans increase speed
/ FI reduces compressor speed

Min. pressure difference
/ Fans decrease speed



New Significant Features

/ Emergency mode
The Unit will not stop after a sensor failure !
During this time Compressor 50Hz
fan(s) are operating with 100%

/ Two Digital Inputs provided

- Night switch. Etc 45 dB(A) @ R134a/-10/32/20 / 10 m distance

- Door switch – Change set point when door open.

Thank You
For your attention

Questions?