AEC
Advanced Evaporator Control - MODBUS

What to gain by controlling the evaporator by HB!

• Zero superheat control
• For Semi Flooded evaporator operation, it ensures optimal heat transfer at all loads
• Increased evaporation temperature & suction pressure
• Lower discharge temperature
• Optimal performance in all climates
• Compressor protection

Demand Defrost Control
Measuring Ice Thickness

Savings:
Energy.............>20%
Installation......>30%
Maintenance....>30%

Zero Super-Heat Control
Measuring Vapor Dryness

How do HB controlling the evaporator today

HB Sensors interface

AEC Modbus
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Evaporator products for optimization

- HBX Sensor
- Defrost Sensor
HBX Sensor

- Measures vapor quality in refrigeration systems – measures the relationship between gas and liquid (Refrigerant h Log P diagram).

- The vapor quality sensor allows for the operation of DX ammonia technology with minimal "superheat".

- The vapor quality sensor ensures a dry suction pipe from the freezer, which minimizes loss of pressure in risers, and it provides increased flexibility of the pipe installation.

- Semi Flooded evaporator operation ensures optimal heat transfer at all loads

- Optimizes at any given load
  - Big savings on full load
  - Even bigger savings at partial load
• Defrost starts only when needed (on demand)

• Stop the defrost when ice is melted (input from temperature sensor located on evaporator surface)

• Save energy compared with timer based defrosting

• Gain more capacity - fewer and shorter defrost cycles

• Easy installation - also on existing sites

• Also available for Heat Pump- and -60°C applications
HB Products

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Sensors output:
• mA output
• Digital output

Sensors input:
• USB cable interfacing to PC

PC Tool:
• HBP configuration tool

Configuration of the sensors:
• It's done locally, where temperature at -30 °C
• Height up 10 meters
• These conditioning can make it inconvenient for changing parameters during start up
• Remotely access to the sensors

• Access without interrupting the running process of the sensor

• Sensors still needs to control expansions valve directly

• Same configuration parameters as offered by HBP tool

• Configuration is done remotely, independent of environment condition

How to achieve this interfacing to HB sensors?

By the AEC module!
AEC:

- Savings on the installation
- More user friendly - all setup is done in the control room
- Independent of location

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Elongated diagram showing various components and sensors connected with labeled streams for suction and other process flows.
THE NEXT BIG THING IN REFRIGERATION

CO₂...NH₃...PROPANE...HFO...HFC

ZERO SUPER-HEAT CONTROL

SAVING >30%

SAVING >15%

Defrost on Demand
HBDF sensor

ONLY DEFROST WHEN NEEDED

AEC Advanced Evaporator Control
RS485/MOD-BUS

Evaporator Load
Flow sensor measurement
Refrigerant temperature measurement

Defrost-Control
Relay Box
5 x Relay output

Expansion Valve

1. 4-20mA, modulating
2. Stepper-motor
3. PWM, (pulse modulating valve)

Temp. Inlet
Temp. Outlet

Evaporator Air/liquid temperature ΔT IN/OUT

MOD-BUS

Temp. Inlet
Temp. Outlet

Evaporator data:
Performance kW/COP

Future evaporator control: AEC controls the refrigerant phase according to the load and ensures maximum heat transfer and thus highest possible evaporating pressure at any given load.

WE INCREASE UPTIME AND EFFICIENCY IN THE REFRIGERATION INDUSTRY
THE NEXT BIG THING IN REFRIGERATION

CO₂…NH₃….PROPANE….HFO….HFC

Vapor Quality
HBX sensor "X"

Start/Stop
Master Control

Evaporator Load
Flow sensor
measurement

Refrigerant
temperature
measurement

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DEFROST ON DEMAND HBDF SENSOR

ONLY DEFROST WHEN NEEDED

MOD-BUS

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CO₂...NH₃...PROPANE...HFO...HFC

START/STOP HBX SENSOR "X"

VAPOR QUALITY

Evaporator Load Flow sensor measurement

Refrigerant temperature measurement

SAVING >30%

SEMI FLOODED OPERATION

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**THE NEXT BIG THING IN REFRIGERATION**

- CO2, NH3, PROPA...E, HFO, HFC

**ZERO SUPER-HEAT CONTROL**

- SAVING >30%

**SEMI FLOODED OPERATION**

**AEC Advanced Evaporator Control**

**RS485/MOD-BUS**

- Defrost on Demand: HBDF sensor
- Start/Stop: HBX sensor "X"
- Vapor Quality: Flow sensor measurement
- Evaporator Load: Temperature measurement

**ONLY DEFROST WHEN NEEDED**

- MOD-BUS 1: 4-20mA, modulating
- 2: Stepper-motor
- 3: PWM (pulse modulating valve)

**Evaporator data:**
- Performance kW/COP
- Evaporator Air/liquid temperature ΔT IN/OUT

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RS485/MOD-BUS

AEC

Evaporator Load Flow sensor measurement
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Defrost on Demand HBDF sensor

Start/Stop Master Control

"X" Batch Freezing Remote input

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Thank you for your attention
Any questions?

- Ideas, expectations creates tomorrows innovation for optimization
There is no planet B
think green and save the Earth

USE

- HB sensor solutions to optimize the efficiency
- Natural refrigerants
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<th>Time</th>
<th>Day 1</th>
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