



VAPOR QUALITY

Energy Efficient
Evaporator Control



VAPOR QUALITY

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INTRODUCTION

- This presentation is about Vapor Quality Control
- Please note that we constantly improve and modify our presentations. This is our latest version, 2022.
- If you have comments or suggested improvements, please contact:
Henrik Kudsk, product manager, hk@hbproducts.dk



CASE STUDIES ON LOW CHARGE

• Colmac Coil has several case studies showing a reduction from 3.9 to 0.9 kg/kW (30 to 7 lbs/TR).

• A 64,000 m³ (2,260,00 ft³) cold store project developed by Scantec Refrigeration has a charge of only 385 kg.

• If a chiller design is used, the charge can be reduced below 0.1 kg/kW. This is demonstrated on the Ecodesign chiller we have in-house and which is described on our webpage.



DX AMMONIA COLD STORE IN ROMANIA

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40 % REDUCED ENERGY CONSUMPTION

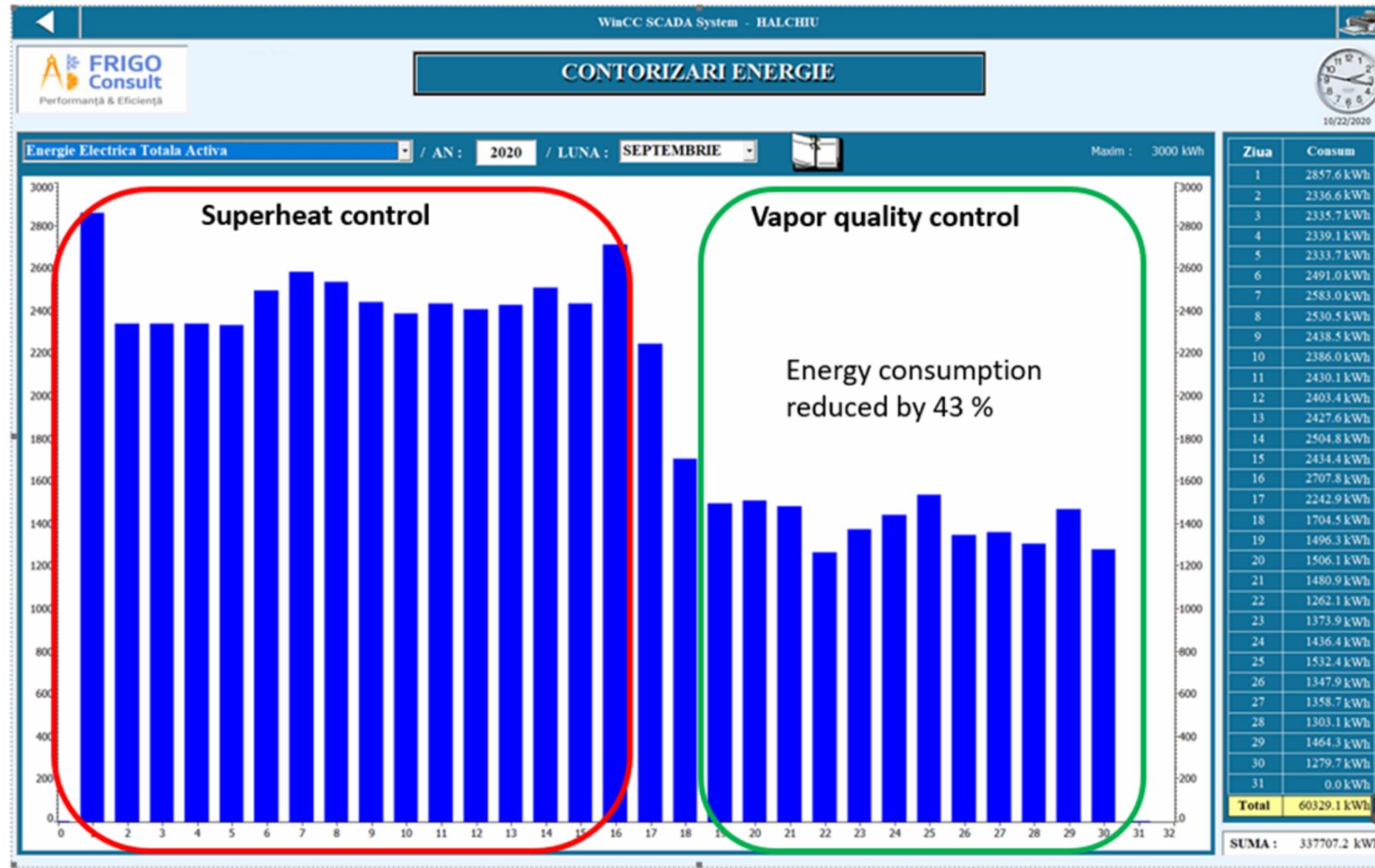
– THE HALCIU PLANT

THE RESULTS

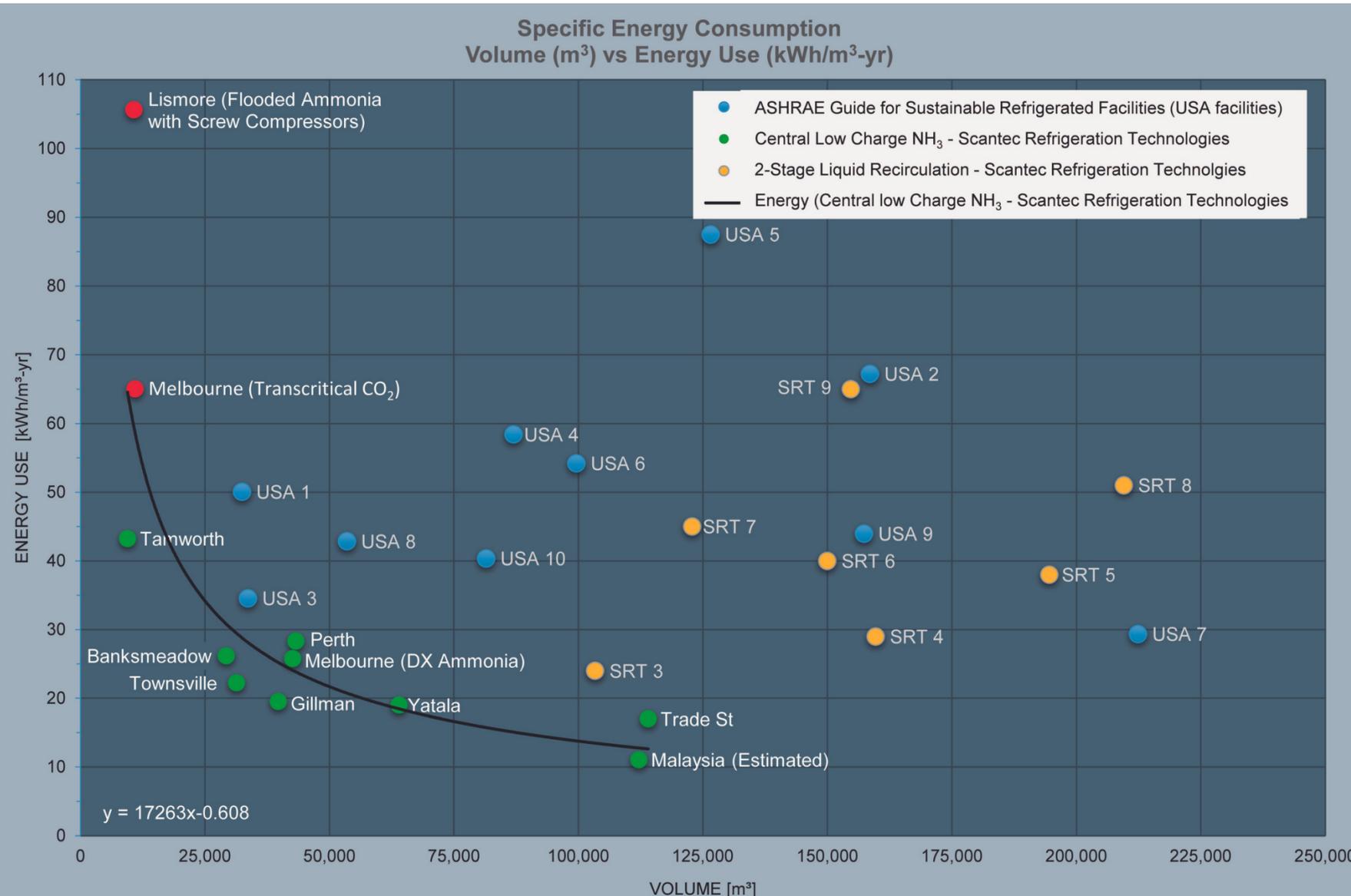
- The bar graph shows the daily energy consumption of the Halchiu plant in Romania.

- Vapor Quality control, replaced superheat control in September 2020.

- The total energy consumption for the refrigeration system was reduced by 43%.



REDUCED ENERGY CONSUMPTION FOR COLD STORES



- The specific energy consumption (SEC) for refrigerated warehouses is usually recorded as annual energy consumption [kWh/a] divided by the refrigerated volume of the warehouse [m³].

- On the graph annual energy consumption per cubic meter is plotted versus the volume.

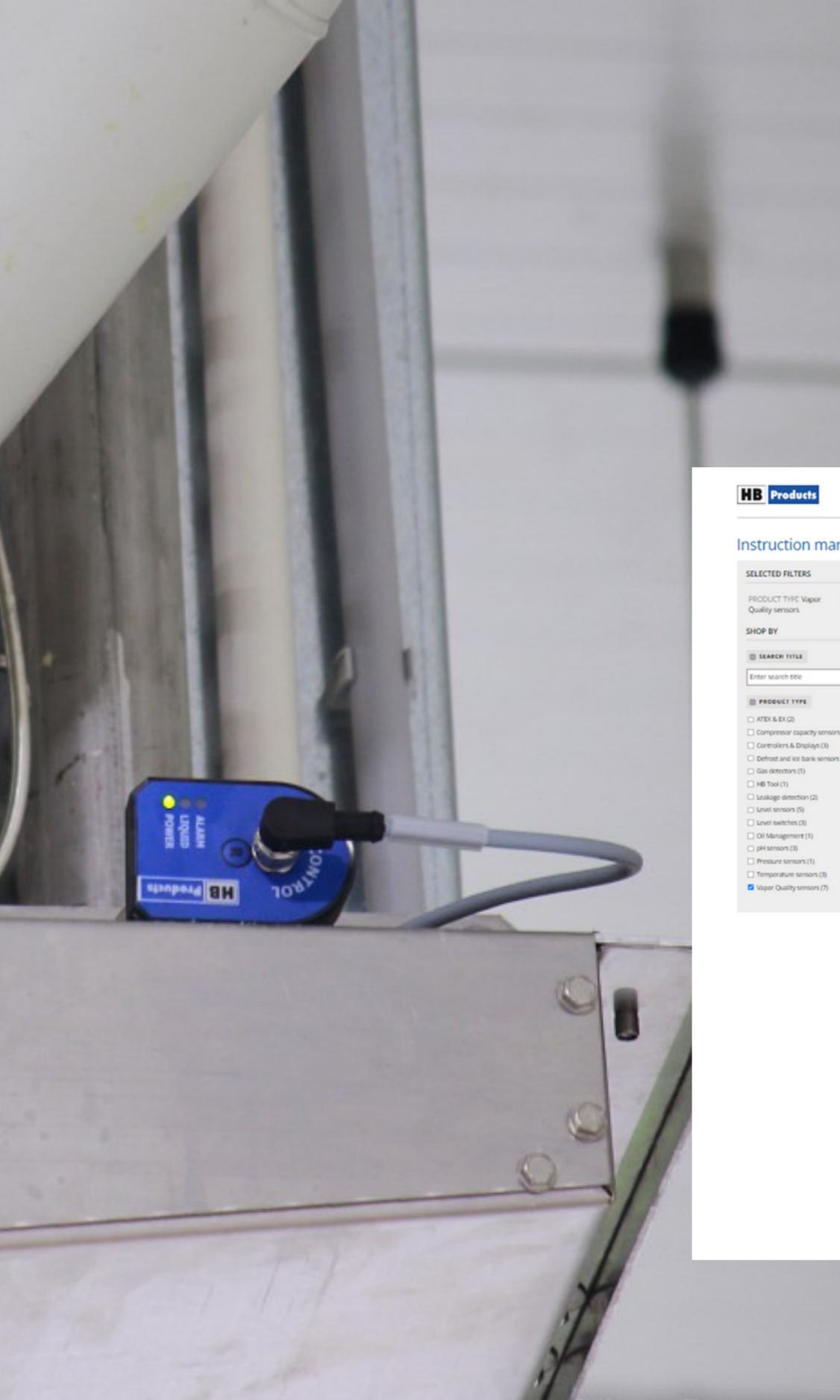
- The green dots, below the green line are all DX ammonia systems using vapor quality control.

- The yellow and blue dots are typical pump-circulated systems using ammonia.

- Typically the energy consumption of the pump-circulated systems is 1.4 to 8 times larger than the DX ammonia system.

DOWNLOAD MATERIALS

Find under "Downloads" and "Knowledge" Including;
Instruction manuals – Brochures – Whitepapers – Case studies



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Instruction manuals

Sort By Position 1 Items 1 - 7 Of 7 Show 15 Per Page

- DX Plant Optimization
- Guide on where to install the vapor quality sensor
- HDCP Instruction Manual
- HDX Rodstyle Instruction Manual
- HDX Vapor Quality Sensor Instruction Manual
- Leakage detection

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VAPOR QUALITY

POSSIBLE WITH NH₃, CO₂, HFC / HFO

Evaporator control based on Vapor Quality

- Energy saving
- For all refrigerants
- Enables low charge systems

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VAPOR QUALITY CONTROL

REDUCTION OF ENERGY CONSUMPTION USING VAPOR QUALITY CONTROL

VAPOR QUALITY • OVERFEED AND DX SYSTEMS



Downloads

- Overfeed Systems Plant Optimization
- Instruction Manuals
- Quick Guides
- Drawings
- Product Catalog
- Knowledge



IF YOU LIKE MORE INFORMATION, FIND OUR INSTRUCTION MANUALS AND PRODUCT SPECIFICATIONS AVAILABLE ON OUR WEBSITE

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PRODUCT SPECIFICATIONS

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Useful Info

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- HB Products & Services

Vapor Quality Sensor in Strainer Housing

The vapor quality sensors have a unique inductor well design which makes them ideal for measuring the flow of refrigerant gas and oil in a refrigerant line, gas or liquid gas, or liquid refrigerant or other sensor applications. It can be used for both wet and dry applications where the flow of the gas passes through. The sensor measures the density of the fluid, and as the refrigerant density changes, the sensor's output signal changes. The sensor's output signal can be used to control the expansion valve or the compressor. The sensor is available in stainless steel and carbon steel.

The sensor offers very precise measurements and provides instant readouts of the gas quality, making it suitable for monitoring superheat, gas, and oil in refrigerant lines.

The sensor's unique design also functions as a well filter, making it the ideal choice of a monitoring device when monitoring the refrigerant quality on the line. The sensor can be set up with an external control system for monitoring the refrigerant quality in the system. The sensor is available with a cable for connection to a PLC or a control system, or a sensor where the signal is sent to the external measurement system.

A vapor quality sensor is available for controlling both gas and liquid gas systems.

Vapor Quality Sensor in Strainer Housing

With a vapor quality sensor, you can monitor the quality of the refrigerant gas and oil in the system. The sensor is available in stainless steel and carbon steel. The sensor is easy to install and easy to maintain. The sensor is available in stainless steel and carbon steel. The sensor is easy to install and easy to maintain. The sensor is available in stainless steel and carbon steel.

Besides the benefits of easy installation, the sensor is also available in stainless steel and carbon steel. The sensor is available in stainless steel and carbon steel. The sensor is available in stainless steel and carbon steel.

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Product Features Applications Specifications Ordering code Downloads

- Measures the relative vapor quality of gas in a gas/liquid mixture
- Excellent superheat control for outdoor condensing units in operation with high load & low load
- Can be used to control an expansion valve directly with a microcontroller using a 4-20mA signal to a PLC
- Can be used for expansion valve control with a microcontroller using a 4-20mA signal to a PLC
- Instant measurement and analog output
- Can be used for expansion valve control

INSTRUCTION MANUALS

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Installation and configuration guide

HBX Vapor Quality sensor

Sensors for optimizing Evaporator Control, both for DX (direct expansion) and overfeed - systems

For compressor protection and leakage detection (ammonia carbamate)

Angle strainer version

Large rod version

Stainless version

Introduction

The three different versions are available, with the same function. Pipe size and piping layout, bend or straight, is different and suited for different applications. The strainer house version has one fixed flow direction, whereas the two stainless versions accept flow in both directions.

HBX Vapor Quality Sensors measures the Vapor Quality of the refrigerant vapor leaving an evaporator and use this signal for controlling the expansion valve. Thanks to the capacitive measurement principle it is able to measure the liquid content of the fluid leaving the evaporator without pressure drop.

For "DX" systems the vapor quality sensor can replace the conventional superheat control and is able to reduce the superheat to zero. The sensor can control the valve directly or it can provide the high vapor quality signal control system. The vapor quality sensor reacts instantaneously if the dryness of the gas is changed in the evaporator outlet. Experience has shown that the entire system is in better balance with minimum variation in pressure.

In overfeed and flooded systems the sensor is able to measure the low vapor quality in the evaporator outlet and control the circulation rate (CR) by controlling the liquid valve or the pump capacity, either directly or as an input for a PLC.

The sensor is manufactured in stainless steel or carbon steel and can be used for all commonly used refrigerants CO₂, Hydrocarbons, ammonia, HFO's and HFC's with different settings. The HBX sensor is available in several versions, with and without temperature sensor and cable for direct connection to an expansion valve. Three types of expansion valves are supported: stepper motor, PWM pulse modulating ex. AMV valves and modulating 4-20mA controlled expansion valve.

A special ATEX/IECEx (Ex ib IIC) version is available for use in special hazardous areas and with flammable refrigerants. This product is only suited for external control and is not able to control an expansion valve directly.

HBX all types installation and calibration manual 02 date: 23-04-2020 WWW.HBPRODUCTS.DK

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Configuration guide

Vapor quality sensor - rodstyle

Optimizing Evaporator Control, both for DX (direct expansion) and overfeed - systems

For compressor protection and leakage detection (ammonia carbamate)

The rod style version of the vapor quality sensor family. The sensor is very sensitive, but when installed correctly it works perfectly.

The sensor measures the Vapor Quality of the refrigerant vapor leaving an evaporator and controlling the expansion valve. Thanks to the capacitive measurement principle it is able to measure the liquid content of the fluid leaving the evaporator without pressure drop.

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date: 23-04-2020 WWW.HBPRODUCTS.DK



ADDITIONAL INFO

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