

ENGINEERING
TOMORROW

Danfoss

Ensuring Food Quality and Plant Safety – Frozen Edamame Ammonia Refrigeration System Design

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Danfoss Partners



- Leading supplier of frozen high quality edamame, vegetable, fruits, and processed-food products since 1993
- Practicing sustainable agriculture to support a prospering community
- Meet strict international export standards

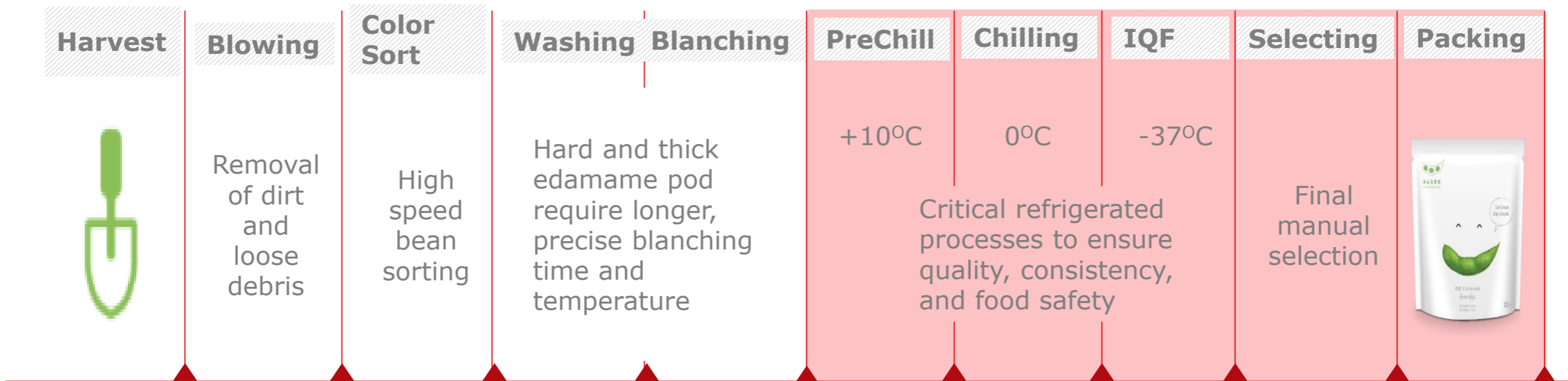


- 30 years of experience in industrial refrigeration, specializing in Ammonia, CO2 refrigerants, and HFC
- Completed 300+ projects in across Thailand and South East Asia



- Key Danfoss Partner in Industrial Refrigeration Valves and Controls in Thailand
- Delivers technical implementation, installation, as well as application expertise

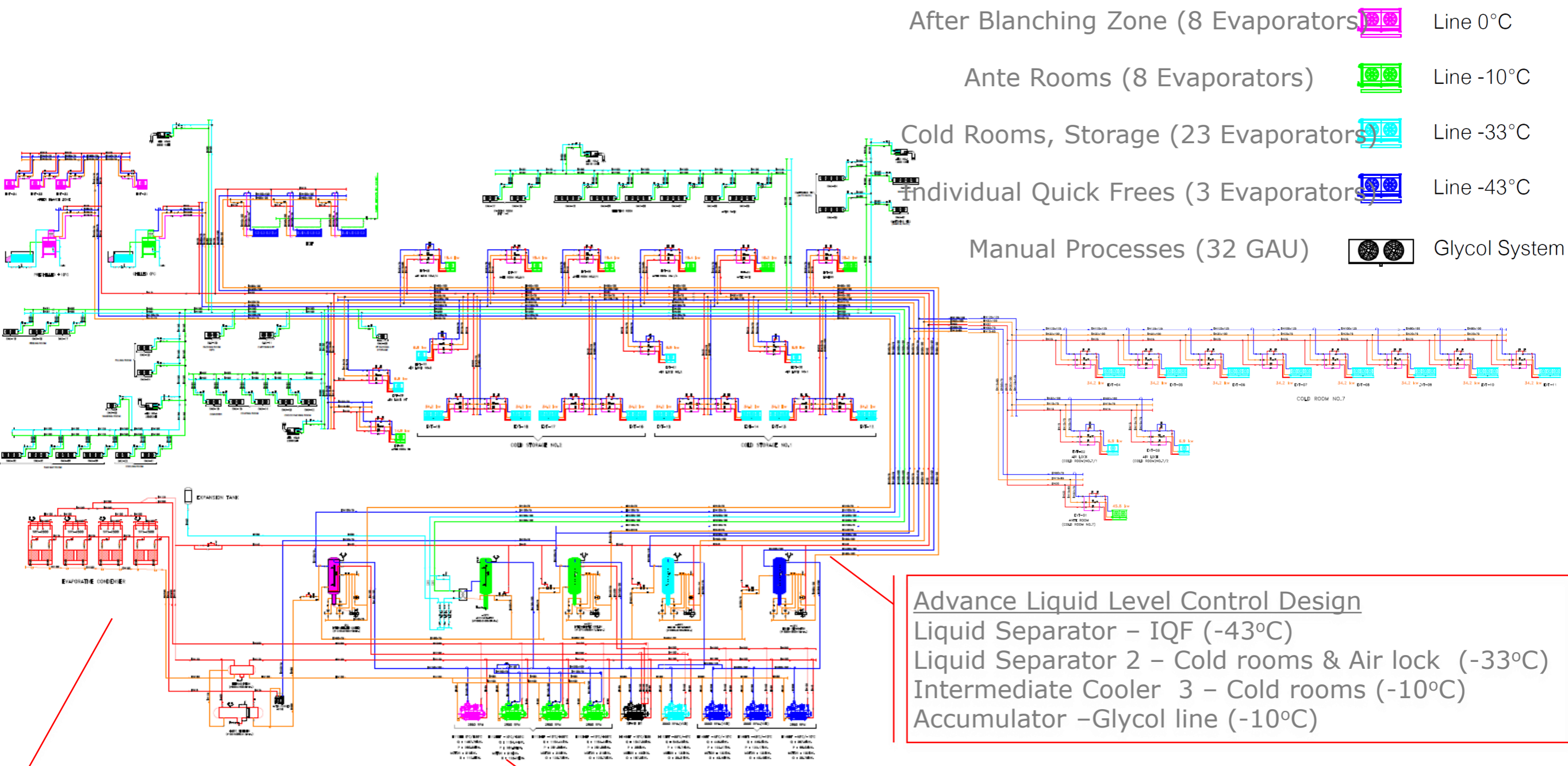
Edamame Value Chain



Customer Needs

- Increased production yield
- Ensure product quality, consistency, and food safety
- Energy efficient and leak-free ammonia refrigeration system

System Design



After Blanching Zone (8 Evaporators) Line 0°C

Ante Rooms (8 Evaporators) Line -10°C

Cold Rooms, Storage (23 Evaporators) Line -33°C

Individual Quick Freezes (3 Evaporators) Line -43°C

Manual Processes (32 GAU) Glycol System

Advance Liquid Level Control Design
 Liquid Separator – IQF (-43°C)
 Liquid Separator 2 – Cold rooms & Air lock (-33°C)
 Intermediate Cooler 3 – Cold rooms (-10°C)
 Accumulator –Glycol line (-10°C)

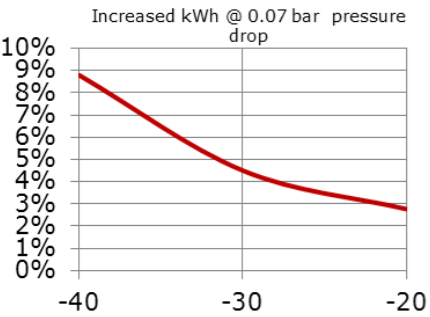
Evaporative Condenser (5 no.)
 – 1,923 kW (per no.)

Compressor 1 (1 no.) – IQF (-43 / -10°C)
 Compressor 2 (2 no.) – IQF (-43 / -10°C)
 Compressor 3 (1 no.) – Cold and Air Lock rooms (-33 / -10°C)
 Compressor 4 (4 no.) – Rooms and Glycol line (-10 / +38°C)
 Compressor 5 (1 no.) – Spare

Global Key trends – Industrial refrigeration

5 Cost

- primary growth in emerging markets with higher price pressure, TCO awareness



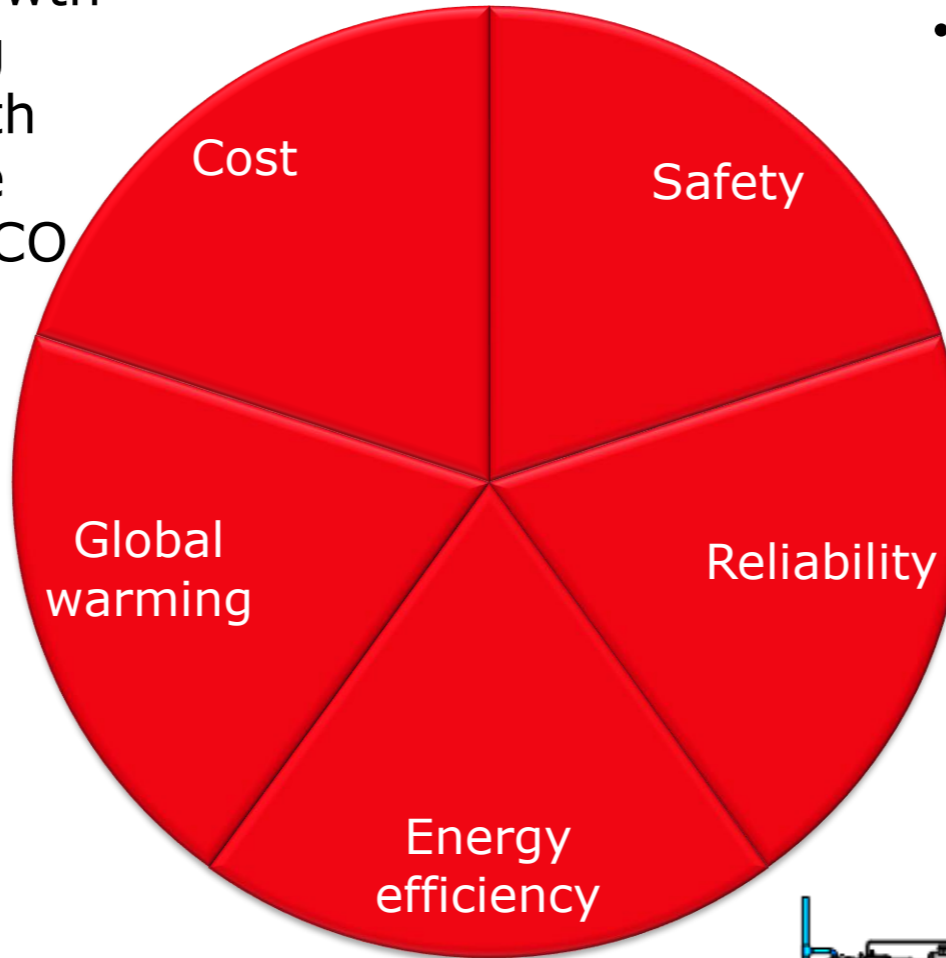
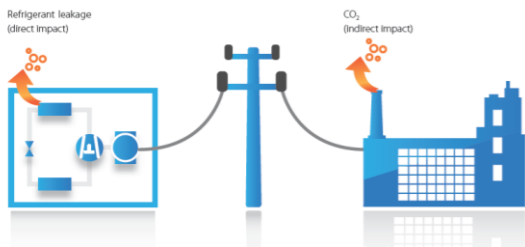
1 Safety

- products and system design



4 Global warming

- refrigerants focus, plays along with NH3 and CO2



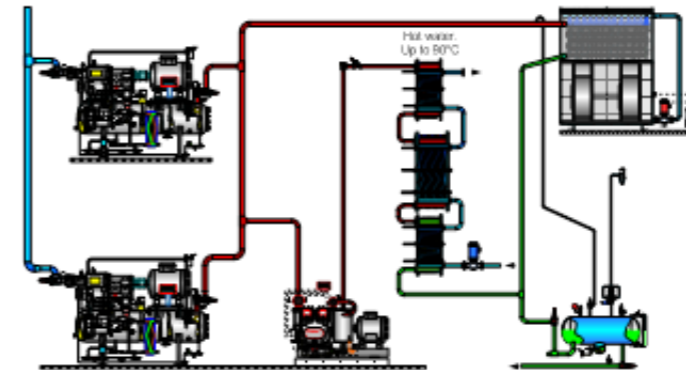
2 Reliability

- Automatic runing



3 Energy efficiency

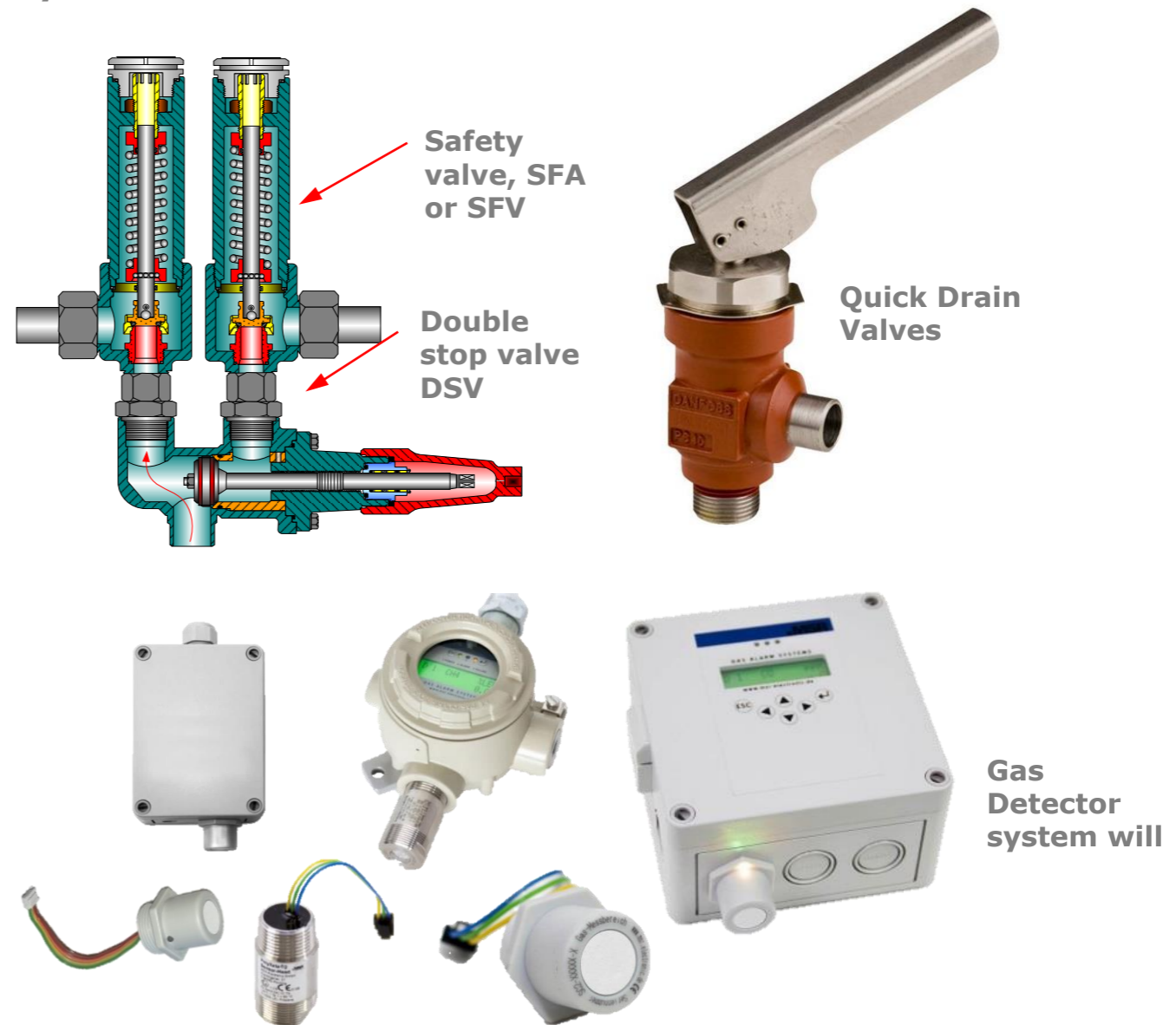
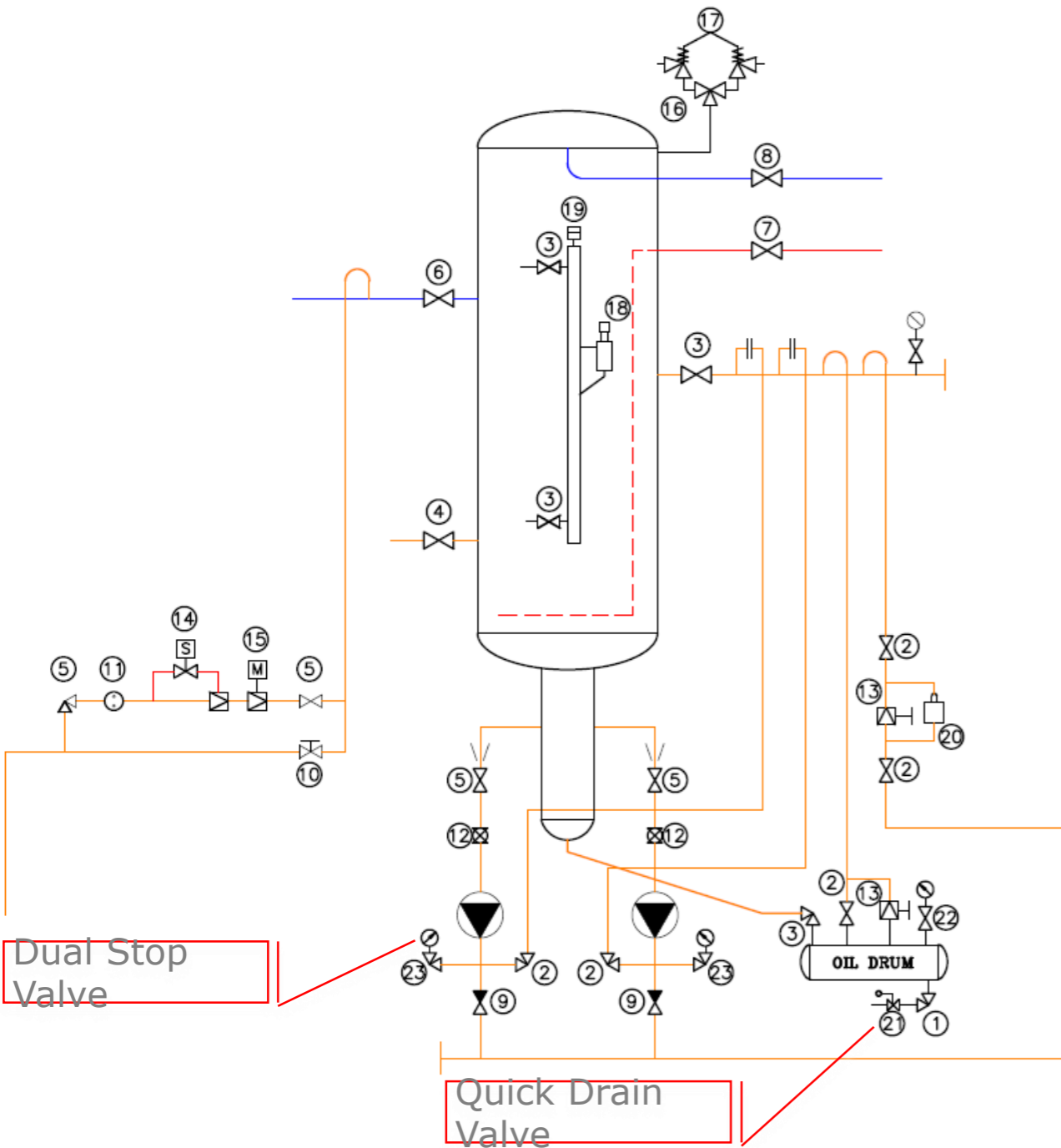
- new and retrofit systems
- Industrial heat pumps



PLANT & FOOD SAFETY

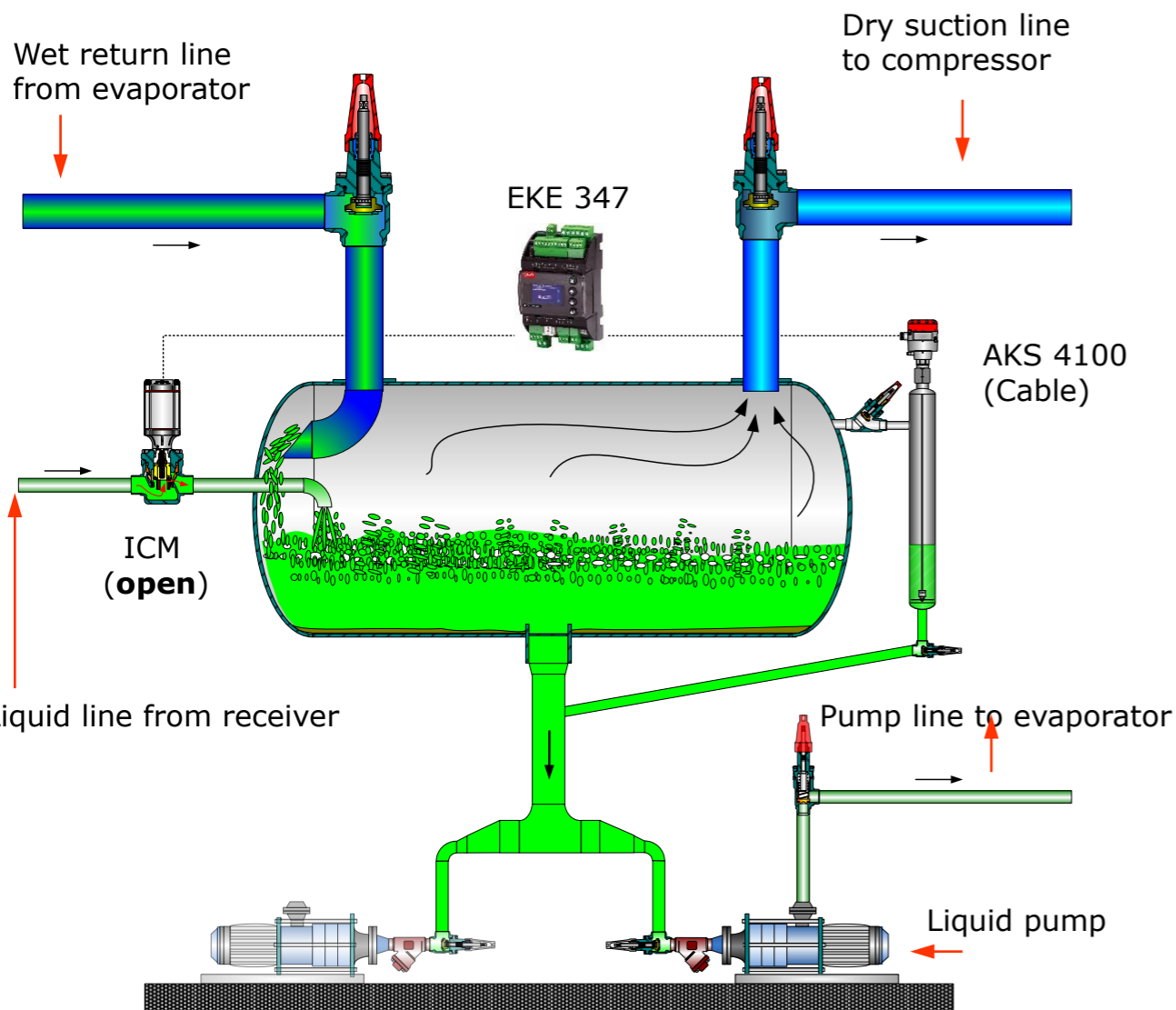
Pressure Vessel Design

Dual safety valve system, quick drain valve, and Gas detection system, fulfills requirements for safe ammonia system.

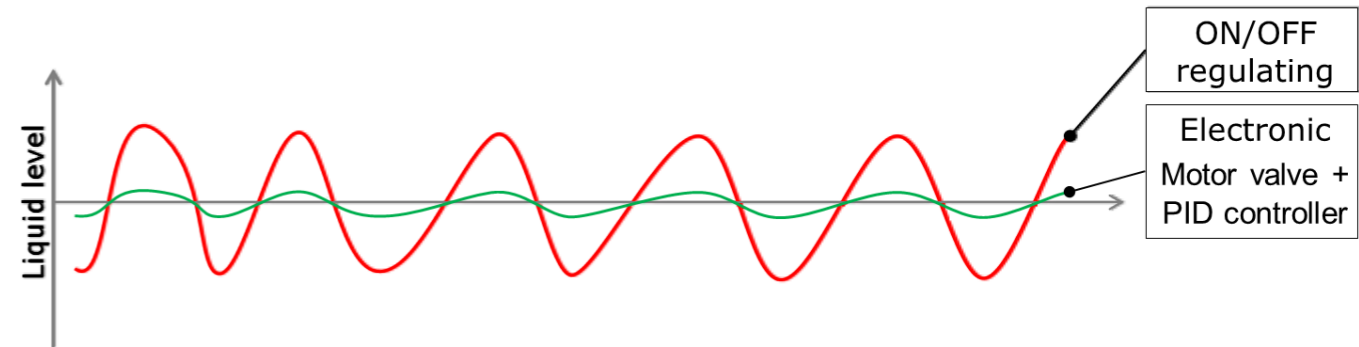


ENERGY EFFICIENCY

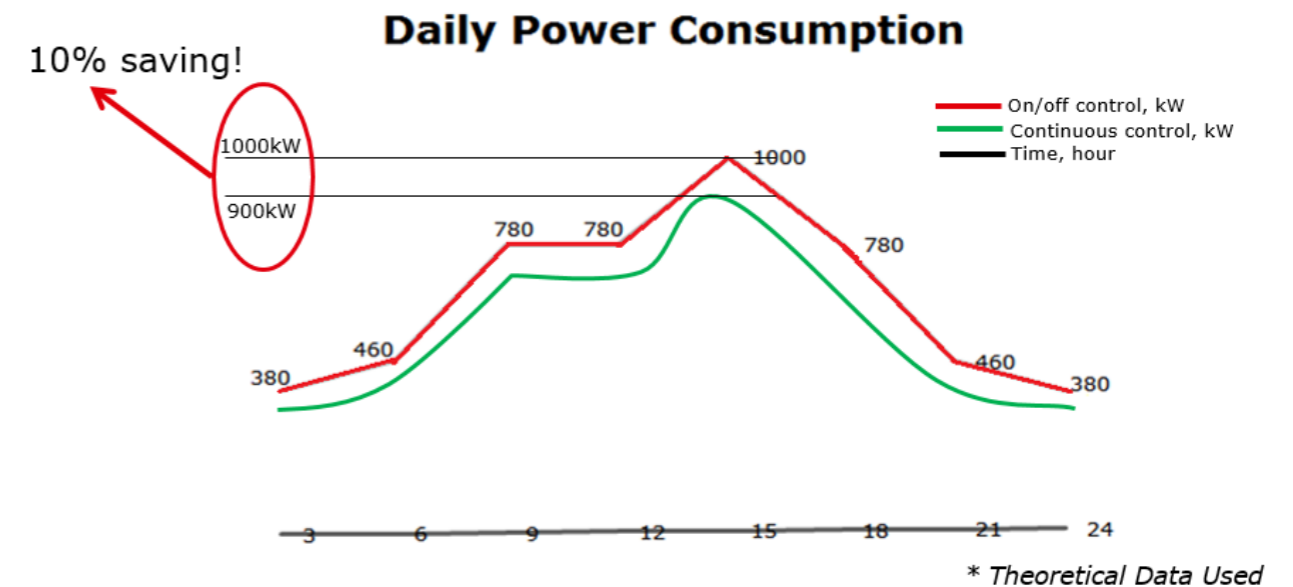
Liquid Level Control



Control methods

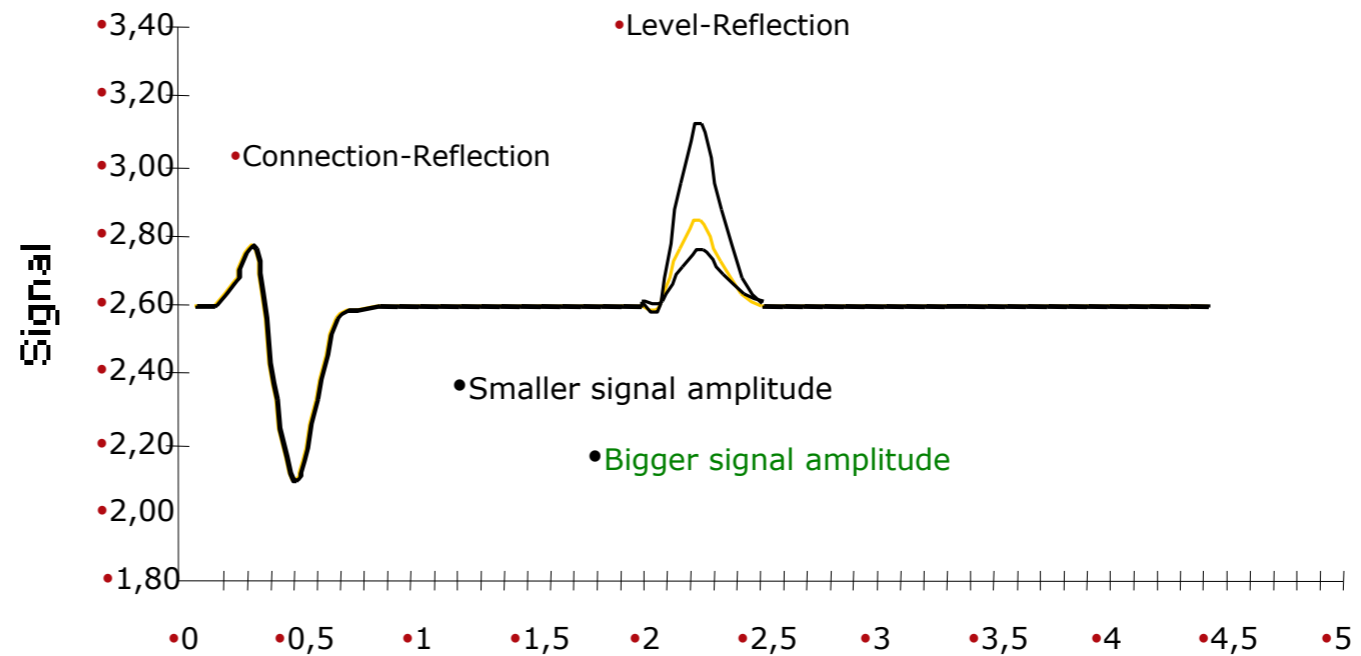
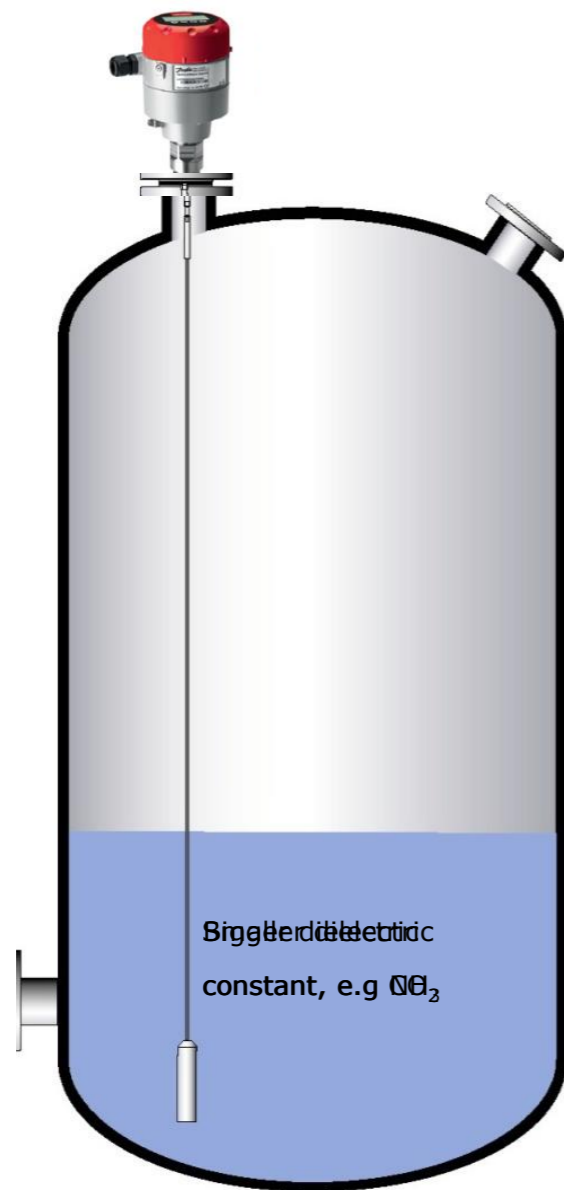


Pressure fluctuation



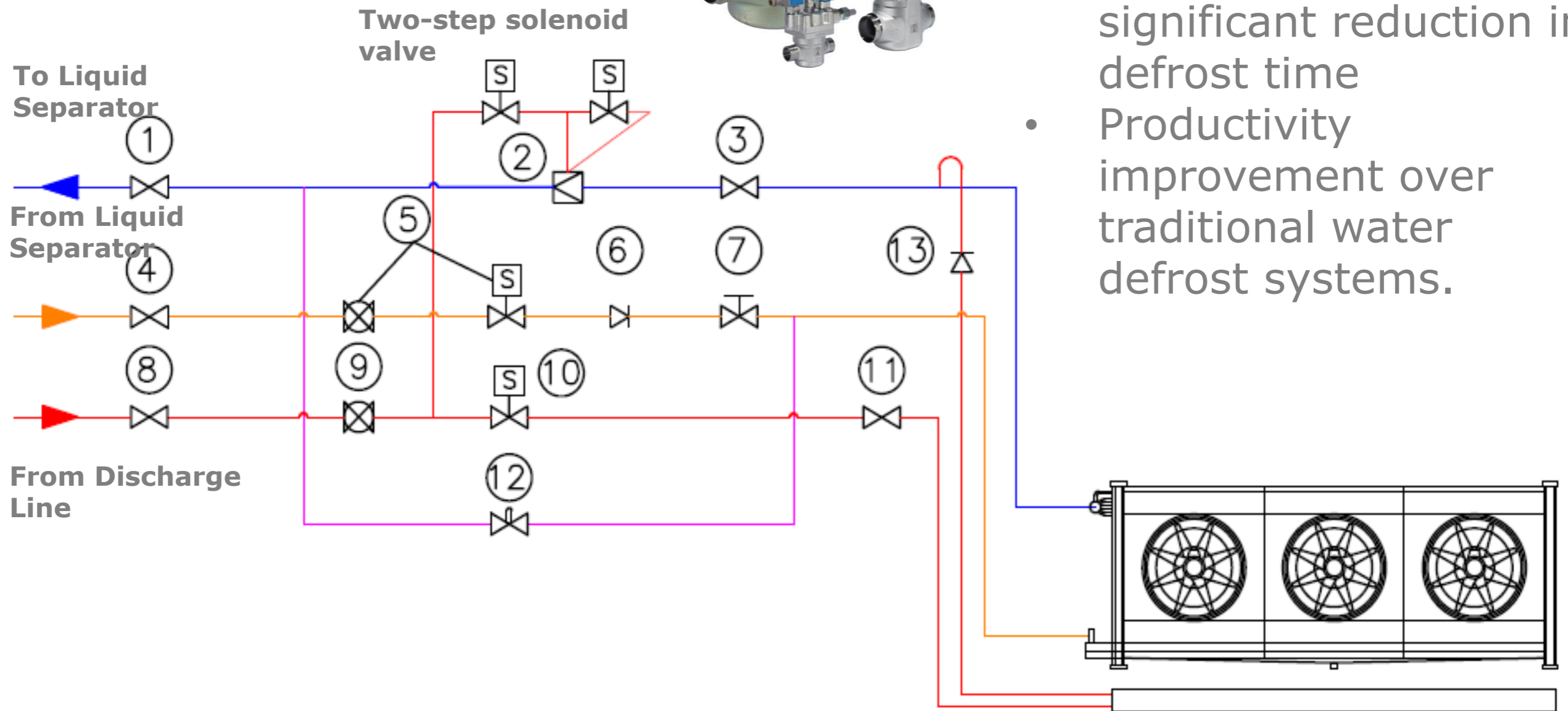
- Very accurate modulating level control in different working conditions
- Stable running of compressors and pumps (energy saving)

Basics of TDR technology



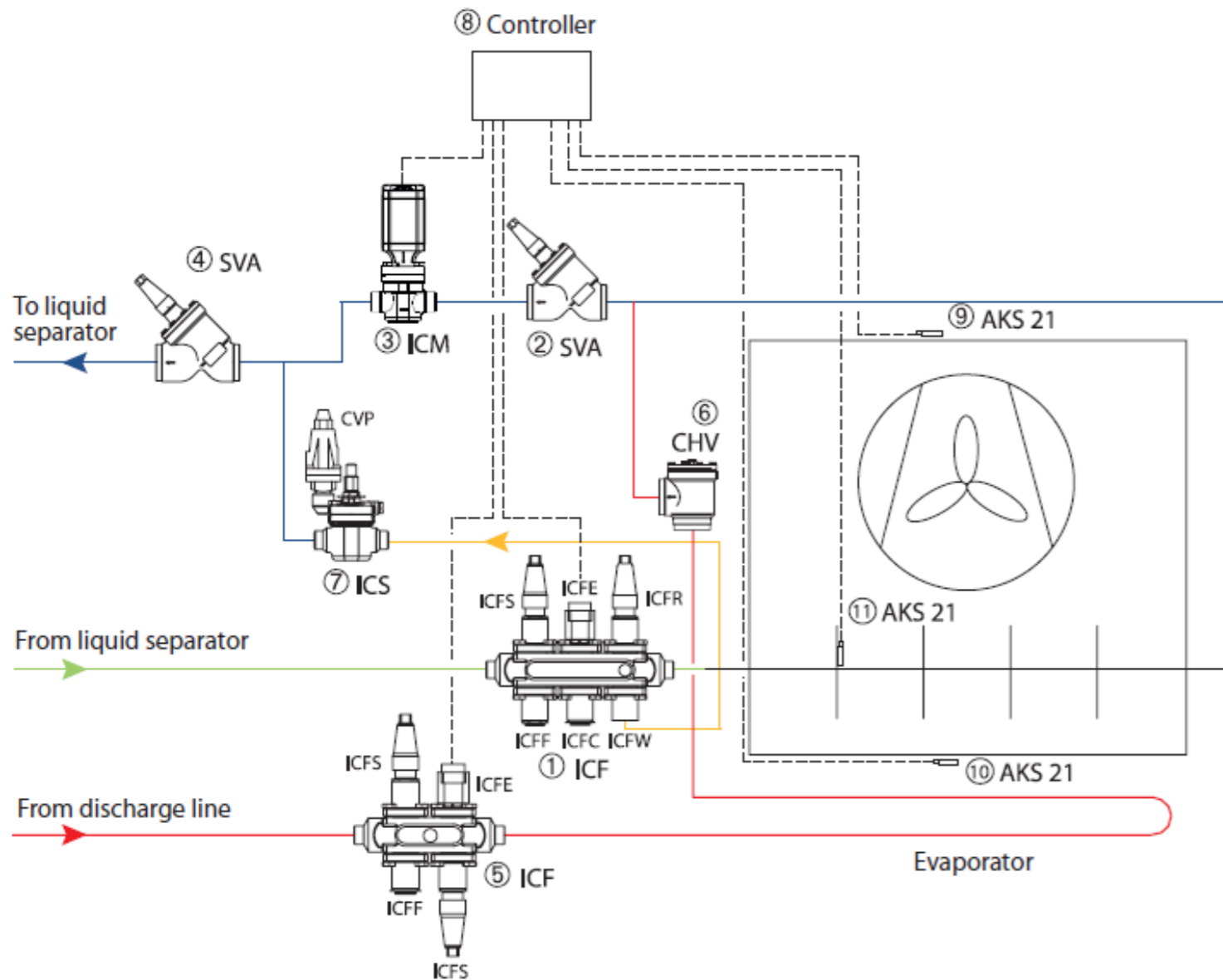
ENERGY EFFICIENCY

Hot Gas Defrost

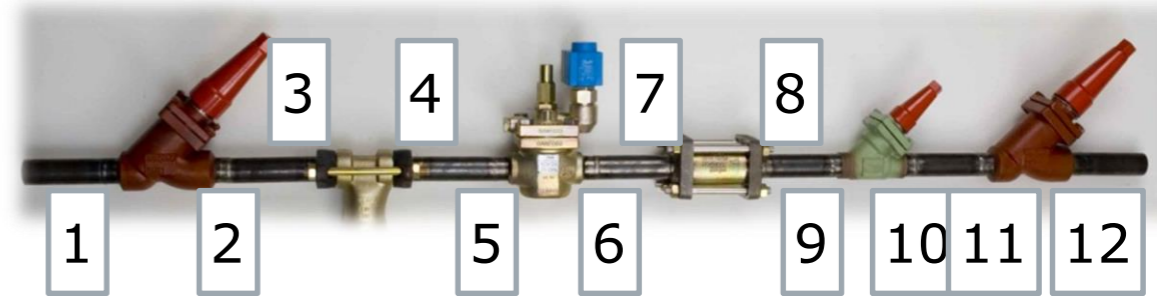


- Hot gas defrost system allows for significant reduction in defrost time
- Productivity improvement over traditional water defrost systems.

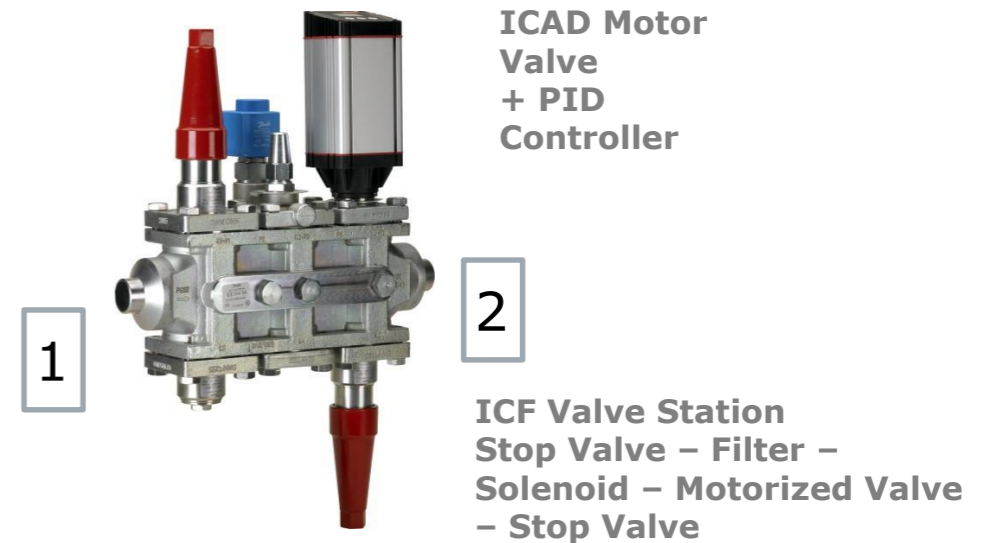
AUTOMATION CONTROL Optimized System



Conventional Valve setup

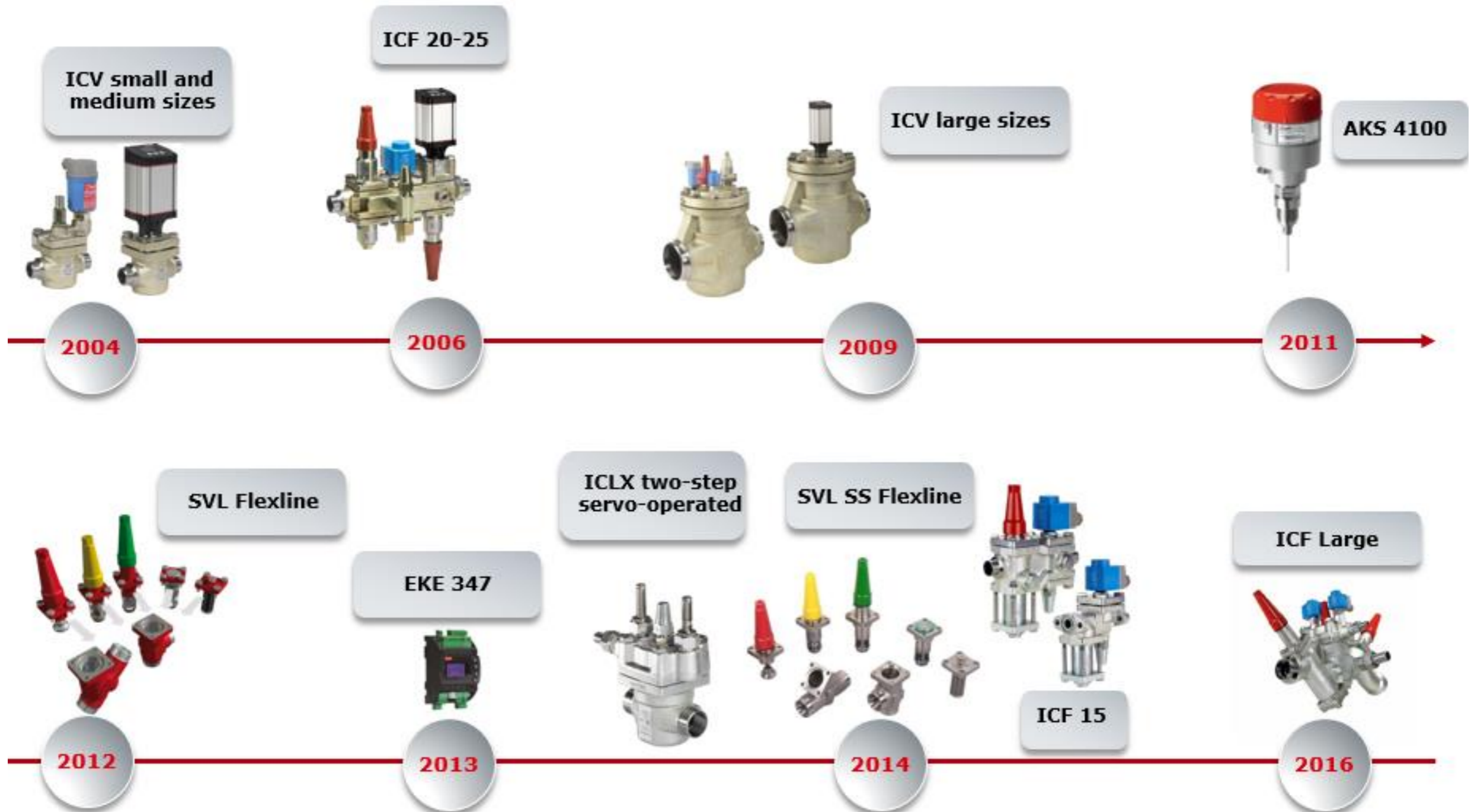


Valve Station



- Direct Weld reduce welding point by 80% reducing possible leak points
- Faster installation
- Precise temperature control to ensure food quality, Taste, Color, with use of ICM motor operated valve

Leading Innovation





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