Low Charge Central System (LCCS)

The Efficiency and Reliability of a Central Refrigeration System With The Controlled Precision of Remote Distributed Condensing Units

SINGLE SOURCE INDUSTRIAL REFRIGERATION SOLUTIONS

Frick® INDUSTRIAL REFRIGERATION

Johnson Controls

FRICK® LCCS – The True Low Charge Solution from a Single Source

The reliable, high efficiency central refrigeration system with a total system ammonia charge 85-95% less than traditional central ammonia systems.

The FRICK Low Charge Central System (LCCS) enhances the operational efficiency and reliability of a central refrigeration system by adding the controlled precision of the FRICK packaged remote distributed condensing (RDC) units.

This innovative configuration reduces the total system ammonia charge to as low as 1.5-3 lbm/TR, or 85-95% less than traditional central ammonia systems. This enhances the safety of food and beverage plant personnel and product, as well as people in the vicinity of the plant. In addition, the low charge can, in many cases, ease a facility's regulatory burden and compliance costs, as well as its insurance rates.

Best of all, a complete FRICK low charge solution includes compressors, evaporators, condensers and controls.

Top: A standard 50 TR RDC unit can be charged with 75 lbm from an ammonia cylinder in as little as 15 minutes
Bottom: DX evaporators

Remote Distributed Condensing – Ingenuity at Work

The FRICK LCCS is a one-of-a-kind system thanks to localized condensing made possible by RDC units managed by a patent-pending FRICK control system. By offering simplicity, flexibility and efficiency, RDC technology makes projects scalable based on your application needs.

The RDC units allow for the elimination of centralized condensers, the high-pressure receiver and large, long supply and return lines containing vast amounts of liquid refrigerant.

SCALABLE AND FLEXIBLE – THE LCCS IS SUITABLE FOR:

- New Projects
- Expansions
- Retrofits
- Cold storage warehouses
- Process facilities

Advantages of the FRICK LCCS

- Significantly reduces ammonia charge
- Lowest total cost of ownership of any low charge system
- Minimal liquid in occupied space
- Eases regulatory compliance burden
- Likely to reduce insurance costs due to significant reduction of liquid ammonia, especially in the building
- Flexibility with single and/or two-stage, economized, side loads
- Easy expansion capabilities
- Compression capacity redundancy
- Addresses water scarcity issues without water treatment concerns, using adiabatic or air-cooled condensing
- Ease of system start-up after power disruption
- Multiple heat recovery possibilities
- Compressor wiring, maintenance and oil cooling are in the engine room
- Retains familiar industry components
- FRICK Factor customization, installation and service

Remote Distributed Condensing (RDC) Model Nomenclature				
TR	Adiabatic[1]	PFHE[2]	Dry[3]	Evaporative[4]
20	RDC20A-(X)[5]	RDC20P-(X)	RDC20D-(X)	RDC20E-(X)
40	RDC40A-(X)	RDC40P-(X)	RDC40D-(X)	RDC40E-(X)
60	RDC60A-(X)	RDC60P-(X)	RDC60D-(X)	RDC60E-(X)
80	RDC80A-(X)	RDC80P-(X)	RDC80D-(X)	RDC80E-(X)
100	RDC100A-(X)	RDC100P-(X)	RDC100D-(X)	RDC100E-(X)
120	RDC120A-(X)	RDC120P-(X)	RDC120D-(X)	RDC120E-(X)

1. Adiabatic condensing: Based on 98°F condensing, 95°F dry bulb and 78°F wet bulb temperatures.
2. Plate frame heat exchanger condensing: Based on 98°F condensing with 85°F to 95°F propylene glycol (30%).
3. Dry condensing: Based on 110°F condensing and 95°F dry bulb temperatures.
4. Evaporative condensing: Based on 95°F condensing, 95°F dry bulb and 78°F wet bulb temperatures.
5. Substitute the suction temperature (+35/+20/0/-20) in °F, for the X in parentheses.

Extremely Flexible in Design and Installation

- No heavy rooftop package
- All major components and routine maintenance items are easily accessible
- No confined space concerns

1 Remote Distributed Condensing (RDC) Units

- Standard 20, 40, 60, 80, 100, 120 TR per RDC unit
- Flexible condensing options include adiabatic, plate and frame, air cooled, and evaporative (adiabatic and plate and frame shown)
- Multiple RDC units work seamlessly together via FRICK control logic (patent pending)
- FRICK 24V panel – no arc flash concerns
- Factory-wired package for easy installation

2 Evaporators

- Low charge direct expansion feed
- Defrost – air or hot gas
- Automatic safety system for leak protection
- Defrost condensate returns to RDC unit

3 Hygienic Unit

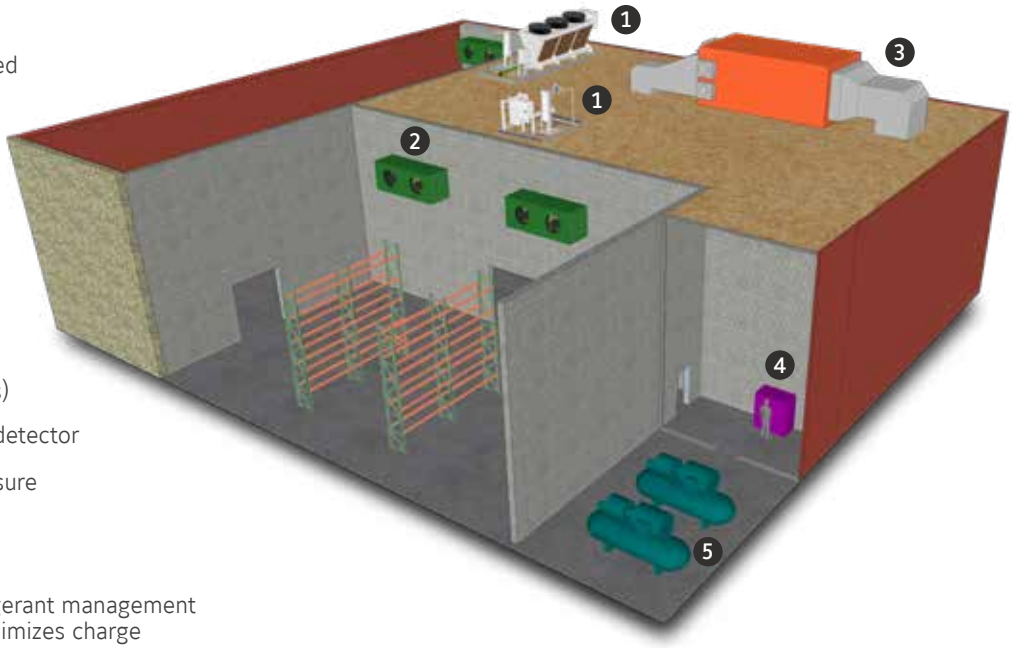
- Low refrigerant charge DX coil(s)
- Self-contained refrigerant leak detector
- Minimal risk of refrigerant exposure

4 Controls

- Patent-pending automatic refrigerant management between multiple RDC units minimizes charge
- Control of balanced energy and water usage delivers lower operating cost

5 Compressors

- Ease of service
- Compressor redundancy or swing
- Larger compressors increase efficiency
- Flexibility – single-stage, two-stage, economized



LCCS in the Engine Room

- Reduces size by approximately 50%
- Removes all liquid vessels
- Removes all liquid piping
- Removes all water treatment equipment (adiabatic or air-cooled condensing)
- Recovers heat for underfloor warming

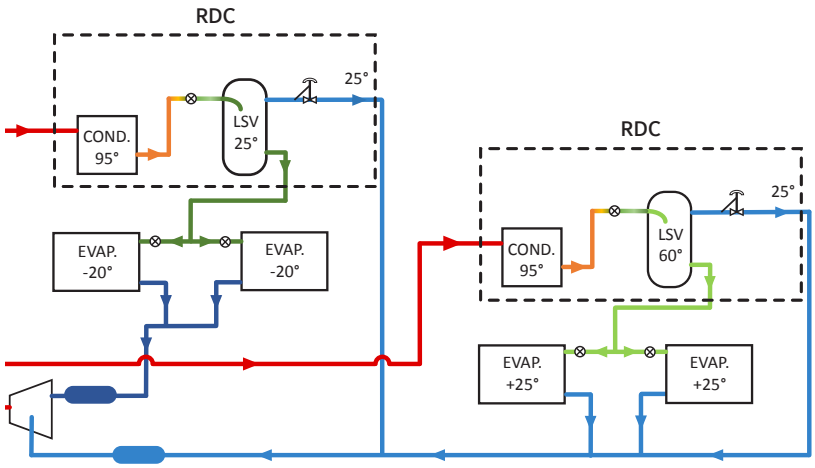
Low Charge Central System Circuits

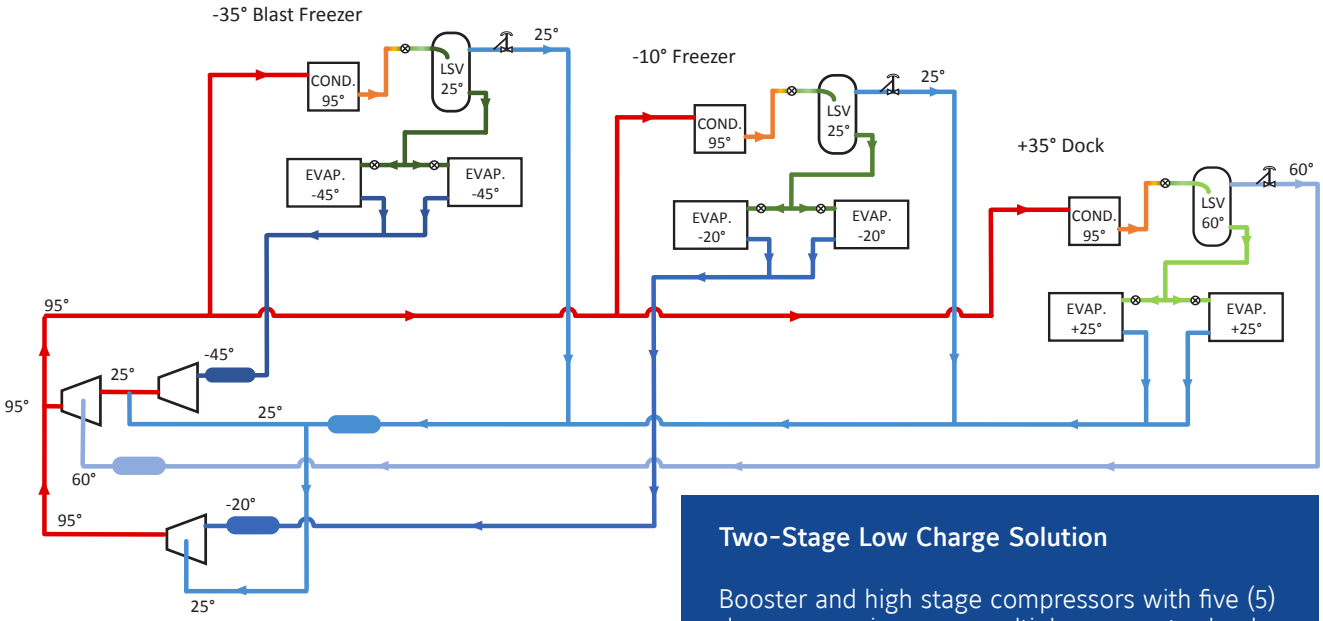
Single-Stage Low Charge Solution

One or more compressors piped with three (3) dry vapor mains serve multiple evaporator loads at differing suction conditions.

No liquid refrigerant is in the engine room.

- Economizer Vapor
- Compressor Discharge Line
- Subcooled Liquid
- Suction Line





Two-Stage Low Charge Solution

Booster and high stage compressors with five (5) dry vapor mains serve multiple evaporator loads at differing suction conditions.

No liquid refrigerant is in the engine room. Ideal for blast freezing.

System Operation – RDC and Evaporators

Normal Operation

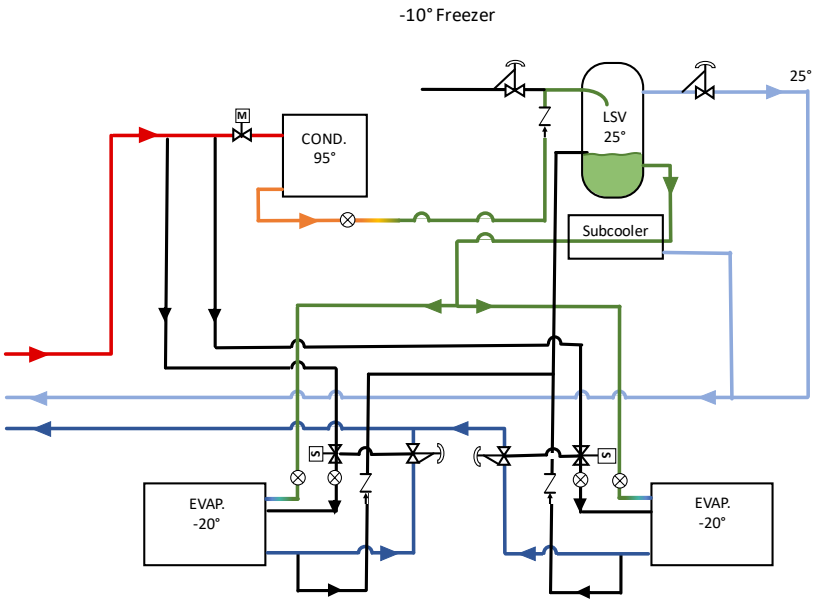
In normal operation, the discharge vapor is condensed very close to the evaporators and then fed into the liquid supply vessel.

The supply vessel feeds the condensed liquid to two or three evaporators.

Electronic expansion valves on each evaporator function so that only dry vapor is returned to the compressors.

Evaporated ammonia (100% vapor) returns to compressor suction line.

All liquid is contained between the RDC units and the evaporators.



Defrost Operation

During defrost, hot gas is directed away from the condenser and fed into one of the evaporators.

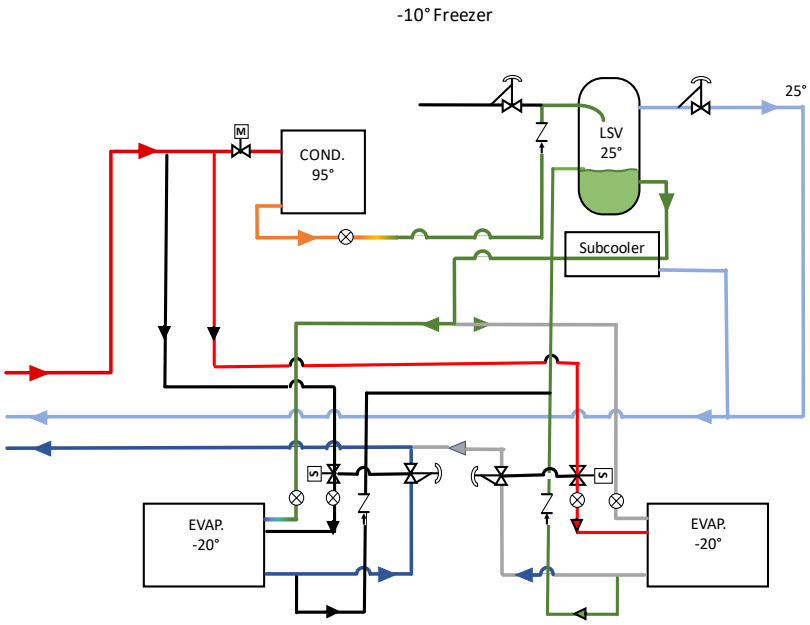
The hot gas is condensed and fed into the liquid supply vessel.

The beneficial liquid makeup is added to the existing liquid ballast feeding the other evaporator.

Evaporated ammonia (100% vapor) returns to compressor suction line.

All liquid is contained between the RDC units and the evaporators.

Condensate Return



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