

CONTROLS

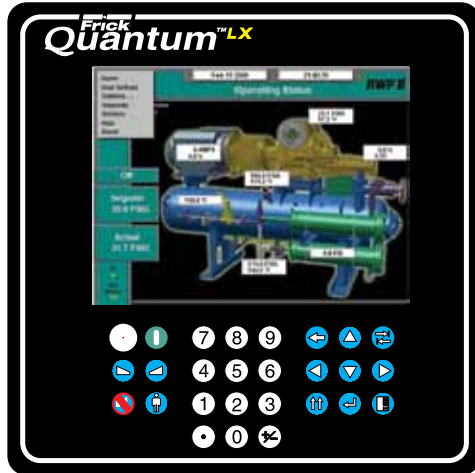
Quantum™ LX

Technologically Advanced Connectivity



Frick®

BY JOHNSON CONTROLS



The Frick® Quantum™LX Control Panel is a technologically advanced screw compressor control center.

Powered by a high-speed PC-based processor, the Quantum™LX control panel does it all with one program and one panel. Examine the features and you'll agree that the power and functionality of the Quantum™LX is provides the ability to let you "Take Control" of your entire refrigeration system.

Hardware - The Heart of the Panel

The Quantum™LX Control Panel incorporates hardware features and technology proven in millions of applications.

- **PC-Based Industrial Controller.** High-speed processor provides speed and processing capability far surpassing competitive microprocessor offerings.
- **10.4" Active Color VGA Graphics Display.** High contrast, crisp, clear display of compressor information and status with a superior viewing angle. Also available in a special outdoor option, viewable in direct sunlight.
- **Input/Output Upgrade Capability.** Additional I/O can be easily installed in the field. This feature provides flexibility for future engine room upgrades and changes.
- **Three Serial Communication Ports.** These field-selectable ports allow you to choose from a combination of RS-422, RS-485, or RS-232 port configurations for both interpanel and external communications.
- **Ethernet communications port.** Connection to this port is accomplished via industry standard RJ-45 connection, allowing Internet viewing, E-mail alarm notification, and compressor sequencing (all Quantum™LX panels required) without the need for additional software for the Quantum™LX panel.
- **Circuit Breaker Protection for Main Power.** Forget about ever having to change blown fuses due to power spikes and other line voltage disturbances. If a disturbance occurs, you will be back on line with the flip of a switch.
- **UL, cUL, CE, and ISO 9001 Certifications**
- **Flexible Analog Inputs.** Setup is easily changed in the field to accept 0-5 volt, 1-5 volt, 4-20 mA, ICTD, RTD, Current Transformer, and Potentiometer inputs.
- **Long Life Lithium Coin Cell Battery.** Used to back up time/date clock only.
- **Communication Activity and Diagnostic Lamps.** Numerous LED lamps simplify troubleshooting and provide visual indication of proper component operation.
- **NEMA 4 Enclosure.**



Input/Output Upgrade Capability



Circuit Breaker Protection for Main Power



Long Life Lithium Coin Cell Battery



■ **Flash Setpoint Memory.**

All setpoints are stored on an Internal Flash card, which requires no battery backup, and can be downloaded to an External Flash Storage device (USB Drive). You will never again lose a setpoint or have to reenter setpoints due to power loss. Setpoints can be field programmed within Frick defined limits. A notice is displayed if setpoints are entered outside of defined ranges.

■ **Replaceable Input and Output Modules** with individual replaceable fuses, on-board tester, and spare fuse.

Software - Bringing It All Together

All of the impressive hardware features would be wasted if we did not bring them together with a superior, user-friendly software package. Extensive discussions with contractors and end users have allowed us to develop a software package that is nothing short of spectacular.

■ **Intuitive Operator Interface.**

All of the Quantum™ LX screens are menu driven and easy to use and understand. Help screens and prompts are available to assist in setup or monitoring of system information. The software is user-level driven; each level is designed for different operator ability. Basic level is more graphical with limited information, while the service level has fewer graphics and more information.



■ **Software Diagnostics.**

Numerous diagnostic features have been incorporated to assist in troubleshooting. They include: sensor short/open, setpoint input out of sensing range, and memory error sensing.

■ **Multiple Capacity Controllers.** Four capacity/regulation controllers are available with the ability to select any defined analog point for control. This feature provides application flexibility for auto setback control and control reset for changes in modes of operation.

■ **Override Controls.** All safety and controller functions can be programmed to unload the compressor when maximum safety and control parameters are exceeded.

■ **On-screen Calibrations.** Sensors, motor current, slide valve and slide stop are calibrated on screen with easy to understand graphics. Potentiometer "tuning" has been eliminated. Slide valve and slide stop can be auto calibrated with just a push of a button.

■ **Shutdown Notification.**

Display backlight flashes on shutdown to attract attention in noisy engine rooms.

■ **Ability to add flexible digital and analog inputs.** They can be used for monitoring and setting alarms.

■ **Real-Time and Historical trending.** Selected data and time periods can be viewed in either an X-Y trending chart or a tabular chart and easily downloaded in .CSV format via USB Flash drive or through the browser.

■ **Multi-Language Capable.** Language displays included as standard are: English, French, Portuguese, Spanish, Polish, Traditional and Simplified Chinese.

■ **Selectable Pressure and Temperature Units.**

■ **Programmed compressor sequencing.**

■ **Programmed condenser control** is available as an option.

■ **Industry standard communication protocols.** Modbus TCP/IP, Modbus ASCII, Modbus RTU, Allen-Bradley DF1 Serial, and Ethernet IP.

The Quantum™ LX control panel provides nearly limitless expansion capabilities for growth to keep pace with control technology.



Replaceable Input and Output Modules



Screen Shots of the Quantum™ LX

Quantum™HD System Interface Panel



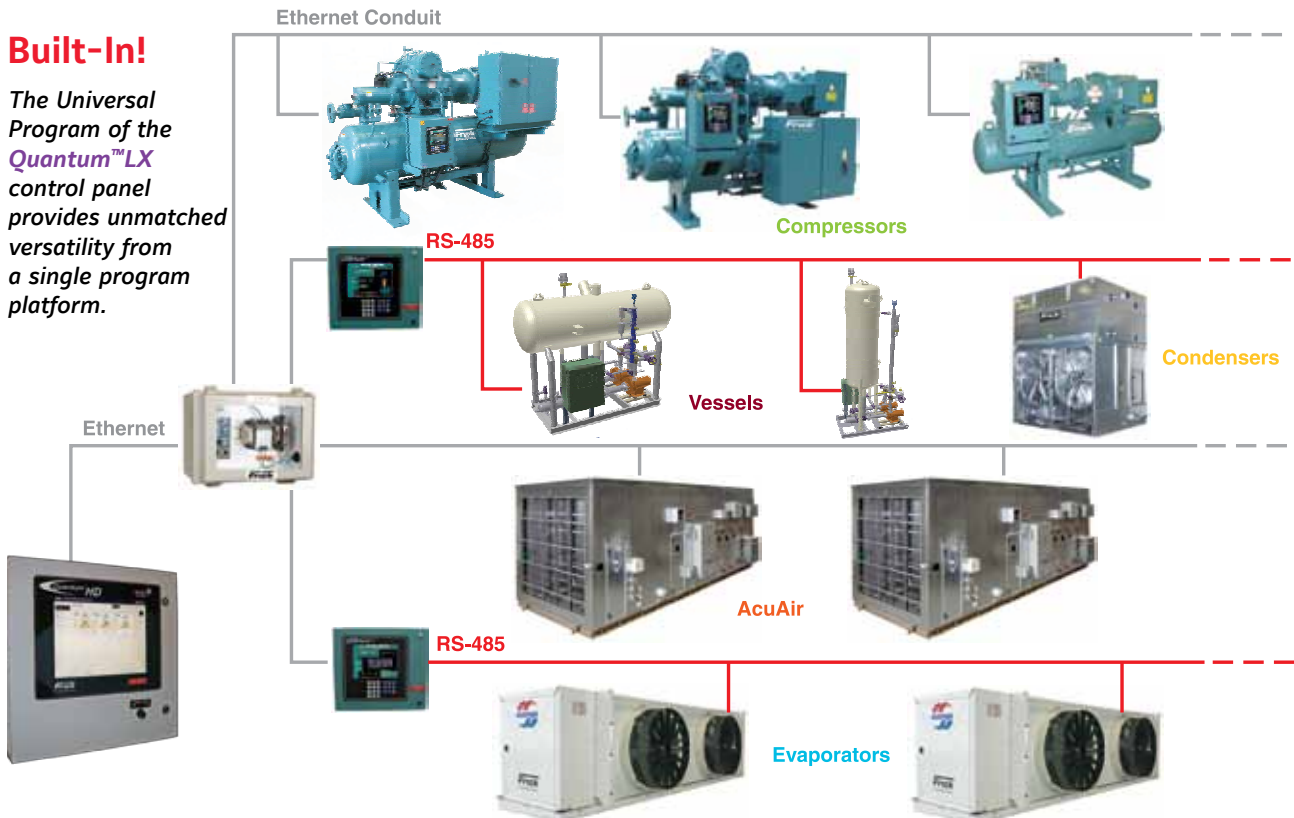
Quantum™ technology enables you to view and control your facility's entire refrigeration system, from the comfort of your office. View operating data or change setpoints – in real time – from one dedicated computer. Do it all, with one panel and one program!

Don't settle. Forget the days of visiting each system component to monitor and change operation. Better access means better control, and better control leads to improved efficiency and prolonged equipment life.

- Centralized Management of all Quantum™LX Panels (Compressor, Condenser / Vessel, AcuAir, Evaporator)
- Ethernet based communications
- Industrial Touchscreen and Display in a NEMA 4 Enclosure
- 24 icons per screen, as seen below
- Customer configurable – does not need to be programmed from Frick
- The system interface is easily accessed from any PC running a web browser on the Quantum™LX ethernet network
- Legacy Quantum panels will need to be upgraded to LX technology to be viewed
- Enhanced features (check release date):
 - Local On-Screen Alarm Notification
 - Complete Access – ex. Compressor Panel - as if you are at the local panel

Built-In!

The Universal Program of the Quantum™LX control panel provides unmatched versatility from a single program platform.

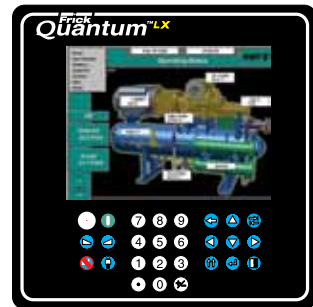




Quantum™LX Compressor Panel

The Quantum™LX Compressor Panel combines Frick compressor control experience, decades of compressor engineering, along with a graphical and web friendly user interface. Up to four different capacity control modes can be configured at once, and each can be controlled from any of the standard analog inputs as well as any of the auxiliary analog channels. The superior Variable Speed Drive control of the Quantum™LX will tune motor speed to match your current capacity needs while conserving power.

Quantum™LX technology provides a patented process for serving web pages to Internet capable devices over Ethernet, providing remote access to all Quantum™LX screens at broadband speeds. The LX screens can easily be accessed both from a link in your Favorites folder or from a hyperlink in a control system. One click puts you in front of your compressor so that you can monitor unit operation and status, change setpoints, and react to any condition or situation.



Operator Interface features (NEMA 4 Standard, NEMA 4X optional):

- Program / setpoints stored on Compactflash card
- Security provides (3) levels of user access
- Multi-Language Capability
- Display of Temperature/ Pressure and other units

- Trending/Setpoint saving (File transfer capability)
- (1) Ethernet Communication Port
- (3) Serial Communication Ports
- Industry Standard Communication Protocols Modbus TCP/IP Modbus ASCII, Modbus RTU, Allen-Bradley DF1 Serial, and Ethernet IP

Standard Control Features include:

- (4) User defined capacity control modes
- (5) Oil pump control modes
- Capacity control mode scheduling
- Multiple Compressor Sequencing up to (8) compressors per suction level (3 suction levels available) with Quantum™LX control panels on all compressors
- On Board monitoring of Bearing Vibration/Temperature, as well as Motor Stator Temperature
- Easily retrofits virtually any twin screw

compressor, 4-step reciprocating compressor or Chiller package

Optional Control Features include:

- Variable speed drive
- Engine drive
- Turbine drive
- Condenser control (4 steps digital + 2 steps analog, VSD fan control)

Retrofitting:

The Quantum™LX control panel has been retrofitted to control other manufacturer's compressors such as Mycom, Dunham-Bush, Kobe, Stal, Sullair, and GEA/FES to name a few.

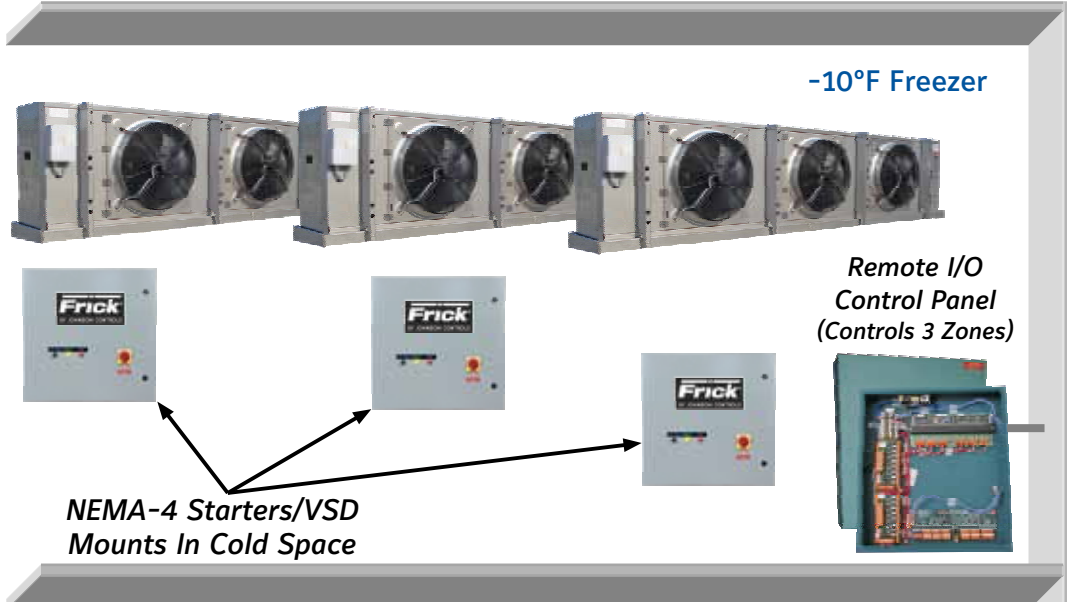
Works with PAC Chillers too !



Let Q-Net w/Quantum™LX Technology Operate Your Entire System!



AcuAir® Hygienic Air U

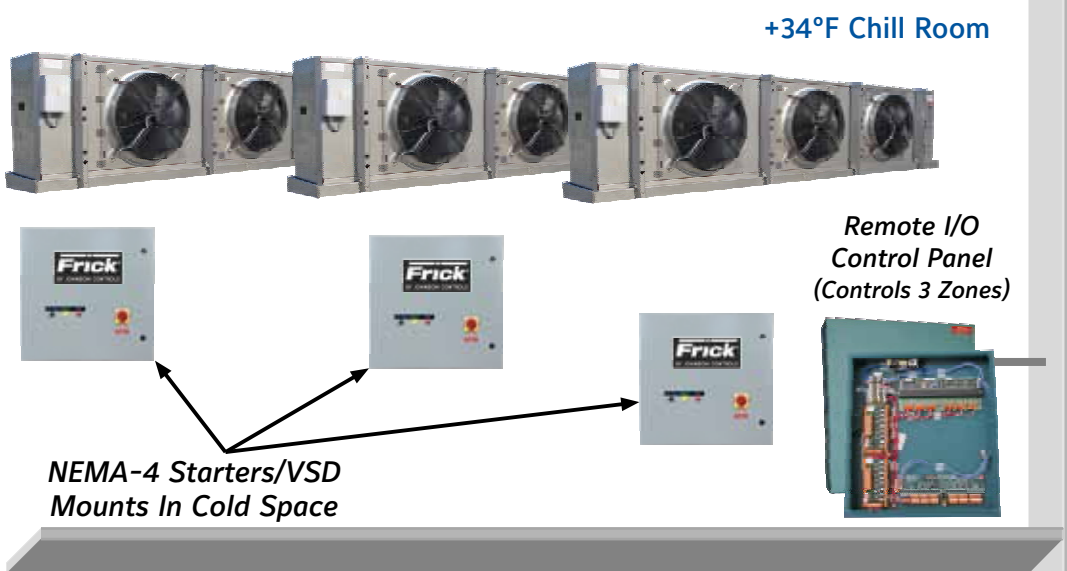


-10°F Freezer

Remote I/O Control Panel (Controls 3 Zones)

NEMA-4 Starters/VSD Mounts In Cold Space

Mounting of Remote I/O Panels, close to the equipment, reduces installation costs!



+34°F Chill Room

Remote I/O Control Panel (Controls 3 Zones)

NEMA-4 Starters/VSD Mounts In Cold Space

Evaporator Interface Panel (control 10 Remote I/O panels, 30 zones)

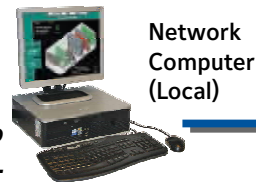
RS-485 Comm.

(Optional) System Interface Touch Panel Provides monitoring and management of all Quantum™LX Panels in one place

Plant Operations Office



Work with your I.T. department to establish *World Wide Web* access. Monitor and manage your equipment from wherever you are. **No** need for special software.



Plant Ethernet System



The Quantum™LX Q-net System

The low cost technology alternative by Johnson Controls/Frick for when a complete custom Engineered Control System is not necessary.

VSD or Full Voltage Starters in NEMA-3R (shown), NEMA-4 or 12 are available from Johnson Controls/Frick.

XLP2 Condenser



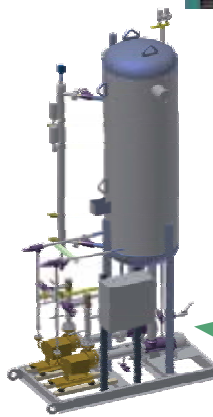
Unit

Condenser Control Remote I/O Panel
(Controls up to 23 condenser steps with 8 VSD outputs)



RS-485 Comm.

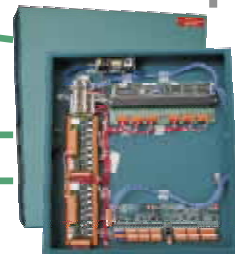
Frick Vessels w/Starters by Johnson Controls



Condenser/Vessel Interface Panel



Vessel Control Remote I/O Panel
(Controls 3 Vessels, 2 pumps each - 3rd Pump Optional)



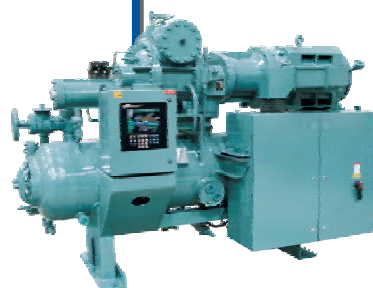
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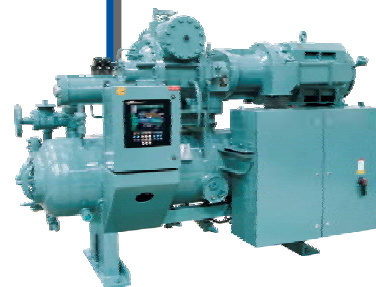
Ethernet Switch w/Power Supply



RWFII w/Vyper™ Drive



RWFII w/DBS Starter



RWFII w/DBS Starter

Quantum™LX Evaporator Panel

Scalable and efficient evaporator zone control is provided by the Quantum™LX Evaporator system. The LX cycles on zones to maintain room or return air temperatures and defrosts as required based on scheduling and/or refrigeration counters. VFD fan control, ammonia monitoring along with common system - hot gas / liquid control are options.

Three zones can be controlled from each Remote I/O Panel and up to 30 zones (10 Remote Panels) per Evaporator Interface panel. Only a two wire communication cable is needed to link each Remote Panel allowing for installation flexibility and savings.

Status and setpoints for each zone can be accessed at the Evaporator Interface Panel or from a remote computer over Ethernet. The Quantum™LX Evaporator system can easily be integrated with other LX technology-driven refrigeration control panels to provide convenient remote access.



Evaporator Interface features (NEMA 4 Standard, NEMA 4X optional):

- Program / setpoints stored on Compactflash card
- Security provides (3) levels of user access
- Multi-Language Capability
- Temperature Display
- Pressure Display
- Trending/Setpoint saving (File transfer capability)
- (1) Ethernet Communication Port
- (3) Serial Communication Ports

- Industry Standard Communication Protocols
Modbus TCP/IP
Modbus ASCII,
Modbus RTU,
Allen-Bradley DF1 Serial,
and Ethernet IP

- Software updates performed with USB drive at the interface panel only (No need to update remote panels).

Remote I/O Control Panel (NEMA 4 Standard, NEMA 4X optional):

- Each panel controls three evaporator zones
- Up to 10 Remote Panels (30 zones) per Interface Panel
- HOA modules are standard

Standard Control Features Include:

- Cooling / Heating Modes (4 available)
- Seven day mode schedule (user configurable for up to 4 different modes per day)
- Zone Temperature Alarms
- Fan Control and Cycling
- Up to 30 configurable Ammonia Sensors per system (3 sensors per remote panel)
- Defrost Control
- Seven Day Defrost Schedule (user configurable for up to 8 defrosts per day)
- Liquid ontime counter
- Defrost schedule with liquid counter override

Optional Features Include:

- Dehumidification and Reheat Control
- Zone alarm outputs one per zone
- Main Hot Gas and Main Liquid
- Soft hot gas control one per zone
- Suction vent control one per zone
- Variable speed fan control
- Fan low speed control one per zone
- Auxiliary output one per zone
- (1) Auxiliary input



Quantum™LX Condenser Panel

The Quantum™LX Condenser control optimizes condenser operation to maintain discharge pressure while conserving energy. A Condenser Remote I/O Panel can control up to 23 condensing steps (fans and pumps). These condenser steps are cycled on and off based on discharge pressure changes. Up to 8 variable speed outputs are available for more precise and efficient condenser control. Wet bulb control, defrost pressure setpoints and separate summer / winter setpoints are available.

The Quantum™LX Condenser Interface Panel includes the standard Quantum™LX features and web ready graphics. When the Condenser Remote I/O Panel and the Vessel Remote I/O Panel are used, they are controlled from the same Quantum™LX Condenser / Vessel Interface Panel.



Condenser Interface features (NEMA 4 Standard, NEMA 4X optional):

- Provides ability to view status information and change setpoints.
- Program / setpoints stored on Compactflash card.
- Security provides (3) levels of user access
- Multi-Language Capability
- Temperature Display
- Pressure Display
- Trending (File transfer capability)
- One interface panel does both Condenser and Vessel control

- Setpoint saving (File transfer capability)
- (1) Ethernet Communication Port
- (3) Serial Communication Ports
- Industry Standard Communication Protocols Modbus TCP/IP Modbus ASCII, Modbus RTU, Allen-Bradley DF1 Serial, and Ethernet IP
- Software updates performed with USB drive at the interface panel only (No need to update remote panels)

Condenser Remote I/O Control Panel (NEMA 4 Standard, NEMA 4X optional):

- One Condenser Remote I/O control panel per Condenser / Vessel Operator Interface Panel
- Controls (11) steps of condenser fans or pumps as standard, option available for an additional (12) steps of control

Control Strategies

- Control Pressure
- Wet Bulb
- Defrost Pressure

Step Types:

- Water Pump
- Single / Variable Speed Fan
- Two Speed Fan

Step Sequences

- Summer / Winter Control Setpoints with automatic transition

Quantum™LX Vessel Panel

The Quantum™LX Vessel control provides level control and safety monitoring for recirculators and other vessels. A vessel remote I/O panel can control up to 3 vessel packages. The vessel level can be controlled with both solenoids and motorized valves. Refrigerant pump differential pressure can be monitored for cavitation detection. Pumps will be disabled if this condition occurs. Status and setpoints for each vessel can be accessed at the Quantum™LX Vessel Interface Panel or from a remote computer over the Ethernet.

Quantum™LX Recir-Q-lator Panel

The new Quantum LX Recir-Q-lator panel is available on new Frick vessels. The Recir-Q-lator incorporates both the Interface and the Remote I/O Control panels into one enclosure. Add up to 23 points of condenser control including 8 analog outputs for VSD fan control by simply adding the condenser Remote I/O Control panel and enabling condenser control at the Recir-Q-lator panel. Add starters, which can be factory wired and tested to simplify installation.



Vessel Interface features (NEMA 4 Standard, NEMA 4X optional):

- Program / setpoints stored on Compactflash card
- Security provides (3) levels of user access
- Multi-language Capability
- Temperature/Pressure Display
- Trending/Setpoint saving (File transfer capability)
- One interface panel does both Condenser and Vessel control
- (3) Serial Communication Ports
- Industry Standard Communication Protocols

Modbus TCP/IP
Modbus ASCII,
Modbus RTU,
Allen-Bradley DF1 Serial,
and Ethernet IP

- Software updates performed with USB drive at interface panel only (No need to update remote panels)

Vessel Remote I/O Control Panel (NEMA 4 Standard, NEMA 4X optional):

- HOA modules are standard
- One Vessel Remote I/O control panel per Condenser/Vessel Operator Interface Panel
- Controls up to (3) Vessel packages with two

pumps each (3rd pump control optional)

Standard Control Vessel Features Included:

- (2) Liquid feed solenoid outputs for each vessel
- (2) Refrigerant pump outputs for each vessel (third pump optional)
- Vessel high level shutdown & warning float switches
- Vessel operating level #1 & #2 float switches
- Vessel low level warning & shutdown float switches
- High side pumps #1 & #2 pressure for each vessel (3rd pump optional)

- Low side pumps #1 & #2 pressure for each vessel (3rd pump optional)

- (1) Modulating valve 4-20ma output for each vessel

- Optional add prices for Vessel #2 & Vessel #3

- Monitor Vessel Level and Pressure

- Control 2 Solenoid Valves and one Modulating Valve

Starters:

- The Recir-Q-lator Vessel Control System can also provide the pump starters in a second enclosure; all factory wired and tested to simplify installation of your new Frick vessels.



Quantum™LX AcuAir® Panel

Providing flexible and precise control for AcuAir® hygienic air units, the Quantum™LX AcuAir® Panel brings all the Quantum™LX technology advantages to the AcuAir® product line. The LX panel accurately controls refrigeration, heating and air pressurization for many different styles of units in a variety of climates and seasons. Optional control features include sequential defrost, desiccant wheel dehumidification and VSD exhaust fan control.

The Quantum™LX AcuAir® screens can be viewed on a variety of Internet capable devices including the Frick System Interface Panel, a standard PC or through a control system. Just like the Quantum™LX Compressor Panel, the patented remote access process allows these screens to be viewed as web pages and can be hyperlinked with other web content.



AcuAir® I/O Control Panel (NEMA 4 Standard, NEMA 4X optional, Panel heat optional):

Available Control Features Include:

- Maintains the control temperature
- Four Stages of Digital Control
- One Modulating Valve
- Defrost
- Sequential

Cooling (Pre-wheel)

- Conditions air before it passes through the desiccant wheel
- Two Stages of Digital Control
- One Modulating Valve

Heating

- Supply Burner
- Direct
- Indirect
- Two Stages of Digital Control
- One Modulating Valve
- May be used as primary heat source or for reheat

Dehumidification

- Cooling and Reheat
- Desiccant Wheel
- Regen Burner
- Regen Steam Coil

Supply Fan

- Constant Speed
- Variable Speed
- Speed varies with Mode

- Speed varies with Mode and Outside Air Temperature
- In Cleanup Mode speed decreases with Outside Air Temperature

Exhaust Fans

- VSD and Single Speed
- Two Stage (Constant Speed)

Exhaust Control Strategies

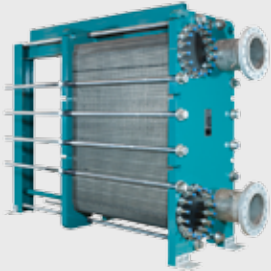
- Room Pressure (Process) / Outside Air Damper (Cleanup)
- Room Pressure Always
- Outside Air Damper Always

Optional Touch-screen AcuAir Interface Panel (NEMA 4 Standard, NEMA 4X optional):

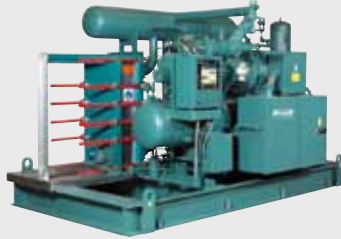
- Provides ability to view status information and change setpoints for up to (23) AcuAir® units
- Remote Display Access over Ethernet using an Internet Browser to allow for full access to Quantum™LX. No special software required

Single Source Industrial Refrigeration Solutions !

Heat Exchangers



Packaged Equipment



Hygienic Air Units



Vessels



Controls



Evaporators



Compressors



Condensers



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