Electronic “Refrigeration”

- Market Drivers
- Integrating Refrigeration with overall control
  - Supply Air Control with DX cooling
- Refrigeration Energy Efficient Measures
- Government Rebate Programs
Market Drivers

• Customers desire to “need to know”
  – Government Regulations
  – Liability
  – Energy Usage
Integration

- New Electronic refrigeration devices specifically valves, interfaces, controllers, and sensors allow for a total “integration” approach to the Equipment and the Facility.

- Existing DDC HVAC controls maybe used to control the refrigeration system
  - One controller for equipment and refrigeration
  - Setpoints for the parameters do not need to be set independently

- Results:
  - Accurate and reliable control
  - Efficient equipment operation
  - Efficient facility operation
  - Information
EC3 Series Controllers: Features

- Quick & easy Installation
  - Din Rail mounted
  - Plug-in connectors
- Optional
  - ECD Series User Interface Unit
  - IR Remote Controller
EC2-000/001 Display Case Controller

- Main features:
  - Temperature Controller
  - Superheat Controller for EX2
  - Defrost Management
  - Fan Management
### Typical Order Package:

For a display case:

<table>
<thead>
<tr>
<th>Component</th>
<th>Type</th>
<th>Order Nr.</th>
</tr>
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<tbody>
<tr>
<td>Case Controller</td>
<td>EC2-311</td>
<td>807 681</td>
</tr>
<tr>
<td>Expansion valve</td>
<td>EX2-M00</td>
<td>801 091</td>
</tr>
<tr>
<td>Orifice 2</td>
<td>EXO-003</td>
<td>801 088</td>
</tr>
<tr>
<td>Terminal Kit</td>
<td>K02-000</td>
<td>800 050</td>
</tr>
<tr>
<td>2 pipe sensors</td>
<td>ECN-P60</td>
<td>804 281</td>
</tr>
<tr>
<td>2 air sensors</td>
<td>ECN-S30</td>
<td>804 305</td>
</tr>
<tr>
<td>Defroost sensor</td>
<td>ECN-F60</td>
<td>804 283</td>
</tr>
<tr>
<td>Transformer</td>
<td>ECT-523</td>
<td>804 332</td>
</tr>
</tbody>
</table>

### Temperature Sensors

<table>
<thead>
<tr>
<th>Description</th>
<th>Cable Length</th>
<th>Type</th>
<th>Order Nr.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Air Sensors (10 kΩ at 25°C)</td>
<td>1.5 m</td>
<td>ECN-S15</td>
<td>804 304</td>
</tr>
<tr>
<td></td>
<td>3 m</td>
<td>ECN-S30</td>
<td>804 305</td>
</tr>
<tr>
<td></td>
<td>6 m</td>
<td>ECN-S60</td>
<td>804 284</td>
</tr>
<tr>
<td>Pipe Sensors (10 kΩ at 25°C)</td>
<td>3 m</td>
<td>ECN-P30</td>
<td>804 280</td>
</tr>
<tr>
<td></td>
<td>6 m</td>
<td>ECN-P60</td>
<td>804 281</td>
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<tr>
<td></td>
<td>8 m</td>
<td>ECN-P80</td>
<td>804 282</td>
</tr>
<tr>
<td>NTC Sensors (defrost type)</td>
<td>6 m</td>
<td>ECN-F60</td>
<td>804 283</td>
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</table>

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**Order Chart**

<table>
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<tr>
<th>Description</th>
<th>Transceiver Type</th>
<th>FTT10</th>
<th>RS485</th>
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<tbody>
<tr>
<td>Display Case Controller EXV</td>
<td>EC2-311</td>
<td>807 681</td>
<td>EC2-310</td>
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<td>Display Case Controller TXV</td>
<td>EC2-211</td>
<td>807 661</td>
<td>EC2-210</td>
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<tr>
<td>Universal I/O Controller</td>
<td>EC2-111</td>
<td>807 701</td>
<td>EC2-110</td>
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</table>

**Terminal Kit**

| K02-000 | 800 050 |

**EC2 Series**

*Case Controllers*

**Document Nr.:** A3.5.18/E 6  
**Replacement for:** A3.5.18/E 5  
**Date:** 14.07.03

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Refer to: Datasheet A3.5.016/E for EX2 Pulse width modulated expansion valve & A3.5.029/E for general information on sensors.
EC1 Electronic Temperature Controllers are suitable for numerous controls applications including Commercial Refrigeration and Air Conditioning. They are available in different versions featuring various input and output configurations and are pre-programmed for easy modification of different application requirements.

Features
- 2½ digit LED display with automatic decimal point
- Standard 33 x 75 mm dimensions
- Display in °C or °F
- 4 models for typical modes of operation:
  - Electronic Thermometer EC1-000
  - Thermostat for off cycle defrost (1 relays)
  - Thermostat for electric or hot-gas defrost (2 relays)
  - Thermostat for electric or hot-gas defrost and fan control (4 relays)
- Integrated timer and alarm functions
- All parameters and functions programmable on keypad or with infrared remote control
- Password protection to eliminate abuse
- Supports low cost highly accurate encapsulated NTC temperature sensors
- IP 65 protection class when mounted in front panel

Options
- ALCO EC1-IRC Infrared Remote Control for easy parameter setting and programming
- NTC temperature sensors
- Transformers for 110V or 230V AC mains
<table>
<thead>
<tr>
<th>Sensors and Accessories</th>
<th>Temp. C.</th>
<th>Case Controller</th>
<th>Cold Room Controller</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>EC1-000</td>
<td>EC2-000</td>
<td>EC2-210</td>
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<td>EX2</td>
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<td>TXV</td>
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<td>EX5</td>
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<tr>
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<tr>
<td>3 m</td>
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<tr>
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<td>230 V</td>
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<td>Condenser Controller</td>
<td>Rack &amp; Condenser Controller</td>
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<td><strong>Hot Side</strong></td>
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<td>Air Sensors 1.5m</td>
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<td>6m</td>
<td>ECN-S30</td>
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<td>1 opt.</td>
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<td>ECN-S60</td>
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</tr>
<tr>
<td>Air Sensors 1.5m</td>
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<td>1 opt.</td>
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<td>6m</td>
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<td>Pressure Transmitters</td>
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<td>807 640</td>
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<td>24V, 20VA</td>
<td>110/230</td>
<td>ECT-523</td>
<td>804 332</td>
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<tr>
<td>24V, 50VA</td>
<td>230 V</td>
<td>ECT-623</td>
<td>804 421</td>
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</tbody>
</table>
EXD-U00 universal driver modules enable the operation of ALCO stepper motor driven valves EX5 / EX 6 / EX7 / EX8 as
- Solenoid valve
- Electronic expansion valve
- Capacity control by means of hot gas bypass or evaporating pressure regulator
- Crankcase pressure regulator
- Condenser pressure regulator

Features
- 4-20mA or 0-10V analogue input signal
- Plug and run, no parameter for setting i.e. automatic operation
- Easy configurable by Dip-switches
- DIN rail mounted with aluminium housing
- Easy wiring
- Fully tested and ready for operation
- CE marked
EX5 / EX6 / EX7 / EX8
Electronic Expansion Valves
Technical Data

Document Nr.: A3.5.008 2
Replacement for: A3.5.008 1
Date: 26.02.2003

EX5
EX6
EX7
EX8

Yorkland Controls
ENVIRONMENTAL SOLUTIONS
### Nominal Capacity Tables for Different Functions

#### Duty: Expansion valve – superheat control (Capacity / kW)

<table>
<thead>
<tr>
<th>Valve Type</th>
<th>R407C</th>
<th>R22</th>
<th>R134a</th>
<th>R404A</th>
<th>R410A</th>
</tr>
</thead>
<tbody>
<tr>
<td>EX5</td>
<td>5 to 53</td>
<td>5 to 50</td>
<td>4 to 39</td>
<td>4 to 35</td>
<td>6 to 58</td>
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<tr>
<td>EX6</td>
<td>15 to 126</td>
<td>15 to 120</td>
<td>10 to 93</td>
<td>10 to 84</td>
<td>15 to 140</td>
</tr>
<tr>
<td>EX7</td>
<td>35 to 347</td>
<td>35 to 330</td>
<td>25 to 255</td>
<td>25 to 230</td>
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<td>EX8</td>
<td>100 to 925</td>
<td>90 to 880</td>
<td>70 to 680</td>
<td>60 to 613</td>
<td>-</td>
</tr>
</tbody>
</table>

Nominal capacities are at +4°C, +38°C. For other conditions, pages 4 to 8.

#### Duty: Capacity control by means of hot gas bypass (Bypass capacity / kW)

<table>
<thead>
<tr>
<th>Valve Type</th>
<th>Kv</th>
<th>R22/R407C</th>
<th>R134a</th>
<th>R404A/R507</th>
</tr>
</thead>
<tbody>
<tr>
<td>EX5</td>
<td>0.68</td>
<td>16</td>
<td>11</td>
<td>15</td>
</tr>
<tr>
<td>EX6</td>
<td>1.57</td>
<td>37</td>
<td>26</td>
<td>35</td>
</tr>
<tr>
<td>EX7</td>
<td>5.58</td>
<td>131</td>
<td>92</td>
<td>126</td>
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<td>EX8</td>
<td>16.95</td>
<td>399</td>
<td>278</td>
<td>382</td>
</tr>
</tbody>
</table>

Nominal capacities are at +4°C, +38°C. For other conditions, page 8.

#### Duty: Evaporating pressure regulator or crankcase pressure regulator (Capacity / kW)

<table>
<thead>
<tr>
<th>Valve Type</th>
<th>Kv</th>
<th>R407C</th>
<th>R22</th>
<th>R134a</th>
<th>R404A</th>
</tr>
</thead>
<tbody>
<tr>
<td>EX7</td>
<td>5.58</td>
<td>14</td>
<td>15</td>
<td>11</td>
<td>13</td>
</tr>
<tr>
<td>EX8</td>
<td>16.95</td>
<td>42</td>
<td>45</td>
<td>34</td>
<td>38</td>
</tr>
</tbody>
</table>

Nominal capacities are at +4°C, +38°C and 0.15 bar pressure drop. For other conditions, page 9 to 10.

Multiply above nominal capacities by following factors to obtain capacities at different pressure drops.

<table>
<thead>
<tr>
<th>AP, bar</th>
<th>Factor</th>
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<td>0.82</td>
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<tr>
<td>0.15</td>
<td>1.00</td>
</tr>
<tr>
<td>0.20</td>
<td>1.15</td>
</tr>
<tr>
<td>0.30</td>
<td>1.41</td>
</tr>
</tbody>
</table>

#### Duty: Condensing pressure regulator (Capacity / kW)

<table>
<thead>
<tr>
<th>Valve Type</th>
<th>Kv</th>
<th>R407C</th>
<th>R22</th>
<th>R134a</th>
<th>R404A</th>
</tr>
</thead>
<tbody>
<tr>
<td>EX5</td>
<td>0.68</td>
<td>18</td>
<td>20</td>
<td>18</td>
<td>13</td>
</tr>
<tr>
<td>EX6</td>
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<tr>
<td>EX7</td>
<td>5.58</td>
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<td>491</td>
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<td>323</td>
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</table>
ECP-024 is intended to be used with ALCO EXD / EC3-33x drivers and controllers which are connected to stepper motor driven valves series EX5 / EX6 / EX7 / EX8.

In case of power failure, ECP-024 insures that the valve is driven to the shut-off position.

**Features**
- Two outputs for maximum two drivers or controllers
- 24VAC input
- For DIN rail mounting with aluminium housing
- Easy wiring
- Fully tested and ready for operation
- CE marked

**Selection Table**

<table>
<thead>
<tr>
<th>Description</th>
<th>Type</th>
<th>Order number</th>
</tr>
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<tbody>
<tr>
<td>Uninterruptible power supply</td>
<td>ECP-024</td>
<td>804 558</td>
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<td>Electrical terminal kit</td>
<td>K09-P00</td>
<td>804 560</td>
</tr>
<tr>
<td>Transformer 230 V/24 V AC, 20 VA</td>
<td>ECT-523</td>
<td>804 332</td>
</tr>
</tbody>
</table>

Electrical terminal kit is not included with ECP-024, please order separately.
Application: Expansion valve

- Expansion valve
- Controller
- 4-20 mA/0-10V output from controller
Application: Liquid injection

4-20 mA/0-10V
output from controller
Application: Expansion valves in heat pumps (two EXVs)
Application: Liquid level control

[Diagram showing a control system with a liquid level sensor, controller, and various flow paths involving 4-20mA signals.]
Application: Capacity control / discharge air temperature control by means of hot gas bypass
Application: Capacity control | discharge air temperature control by means of evaporating pressure regulation
Application: Head pressure regulator

Condensing pressure regulator

0.14 bar ΔP
Check valve

Controller

4-20mA/0-10V
Application: Crankcase pressure regulator
EXD-S.. driver module is for stepper motor driven ALCO electronic expansion valves. The driver module contains all required algorithms, hardware and software for full operation of ALCO EXVs. Driver module can be started after completion of wiring without any additional setting.

**Features**
- MOP function
- Shut-off function
- Fully tested and ready for operation after wiring
- Plug and play
- Operating modes and alarms via LED for easy diagnostics
- Easy wiring
- CE-Marking for electromagnetic compatibility
- DIN rail mounted housing

**Options**
- Other setting values upon request, minimum 10 pieces per order quantity
### Selection Table

<table>
<thead>
<tr>
<th>Type</th>
<th>Order-No.</th>
<th>Valve</th>
<th>Capacity regulation kW *</th>
<th>Capacity regulation</th>
<th>Refrigerant</th>
<th>Superheat setting K</th>
<th>MOP setting bar</th>
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<td>11.6</td>
</tr>
</tbody>
</table>

*) Nominal conditions: +38°C condensing temperature, +4°C evaporating temperature and 1K subcooling. For other conditions see pages 4 to 8.

100F condensing, +25F evap.
EXD-S  
Stand-alone Driver Module  
for EX5, EX6, EX7, EX8  

<table>
<thead>
<tr>
<th>Description</th>
<th>Type</th>
<th>Order No.</th>
<th>Note</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cable and plug assembly</td>
<td>ECC-028</td>
<td>800 591</td>
<td>only for EX5 or EX6 ^</td>
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<td>Pressure Sensor</td>
<td>PT3-07A</td>
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<td>for R 22, R 407C, R 134a and R 404A/R 507</td>
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<td>Pressure Sensor</td>
<td>PT3-18A</td>
<td>802 277</td>
<td>for R 410A only</td>
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<td>Temperature Sensor, 6 m cable length</td>
<td>ECN-C60</td>
<td>804 514</td>
<td>-</td>
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<tr>
<td>Uninterruptible power supply</td>
<td>ECP-024</td>
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<td></td>
</tr>
</tbody>
</table>

^ EX7 and EX8 will be delivered with standard Din plug.
Electronic “Refrigeration”

- Integrating Refrigeration with overall control
  - Supply Air Control with DX cooling
- Refrigeration Energy Efficient Measures
- Government Rebate Programs
Electronic Capacity Control of Refrigeration Cycle
Discharge Air

- Cooling demand depends on internal and external load
- Outdoor air temperature impacts the cooling load
  - What is the OA_T range in which the refrigeration system runs on part load?
- Refrigeration System is designed for a given point (design day) – depends on the calculated cooling load and the outdoor air temperature at that load
- As outdoor air drops, cooling demand of the building reduces and refrigeration system is oversized at this point
  - Typical at OA-T= 23C, cooling demand at 55% and refrigeration system capacity at 90%
Capacity Control – On/Off

• On/Off control, at certain outdoor air temperatures gives rise to Supply Air temperature swings

• Example:
  – Room Temp SP = 21.5 C
  – Room Temp = 23 C (no solar radiation)
  – Average Required Supply Air Temp = 16 C
  – To avoid drafts, min SA-T should be met (14 C)
On/Off Capacity Control

- Room Comfort is met (temperature does not deviate more than 1.5°C)
- Supply Air Temp varies widely dropping below minimum
  - Over cooling
  - Energy waste (re-heat?)
  - Occupant comfort issues
- Compressor cycle – adjusting the switching differential may run the compressors longer but at the expense of supply air temp and comfort
Compressor Switching Frequency

- Excessive cycling causes motor heating
- During the start phase, the oil pressure is low, lubrication is not optimal
- More oil enters the refrigeration system during startup than in continuous operation — frequent switching does not provide sufficient oil return
Modulated Capacity Control
Capacity Control Strategy

- Room / Return Air reset of Discharge Air.
- Discharge Air Controls Refrigeration System
  - Suction Control
  - Hot Gas Bypass
Suction – Throttle Control

4-20 mA/0-10V
output from controller

Evaporator temperature regulator

Controller

4-20mA/0-10V
Suction Throttle Control

• Control Valve between evaporator and compressor throttles the gas flow based on the controlled variable (Temp, Hum)
• Pressure and Vaporization temperature rises in the evaporator and falls between the control valve and compressor. Evaporator output falls.
• Superheating of the refrigerant decreases with rising vaporization temperature. TX valve reduces the flow volume until suction gas reaches superheat setpoint. Compressor draws less refrigerant, circulating refrigerant volume decreases and with it refrigeration capacity.
Suction-Throttle Control

- Throttles refrigeration capacity down to 15% to 40% depending on compressor type
- Lower limits are determined by the required refrigerant guaranteed for cooling the compressor
Capacity Control – Hot Gas Bypass
Capacity Control – Hot Gas Bypass

- Refrigerant hot gas is bypassed from the high-pressure side to the low pressure side with injection between the TX valve and evaporator.
- The bypass valve is closed in high cooling demand. When demand falls, the valve opens with gas flowing to the evaporator inlet, raising the vaporization temperature, causing refrigeration output to fall. TX valve monitors superheat and adjust accordingly.
- Compressor power remains approximately constant in the partial load range
Electronic Capacity Control - Summary

- **Overall system efficiency** and comfort is improved by integrating the refrigeration system with the equipment capacity controls.
- **Electronic interfaces and valves** can usually be applied to existing DDC controls:
  - TX Valve
  - ESR Valve
  - Bypass Valves
  - Injection Valves
- **Potential equipment maintenance and energy savings:**
  - Minimize reheat caused by over cooling
  - Minimize compressor maintenance
  - Decrease energy consumption - demand charges
- **Refrigeration systems can be sized and built according to electronic refrigeration control**:
  - Less devices (solenoid valves)
  - Lower cost of compressors, coils, etc.
Energy Savings - Generally

As the work horses in any refrigeration plant, the compressors are the major power consumers. Two main factors affect their actual consumption:

- The level of the condensing pressure: each 1°C reduction of this value brings about 2-3% energy savings.
- The level of the suction pressure: each 1°C increase of this value also brings about 2-3% energy savings.

Consequently, an important means of saving energy is to reduce the condensing pressure and increase the suction pressure while still maintaining the required level of refrigeration.
Saving Strategies

“Energy Efficient Measures”

- Optimum Superheat Control
- Defrost Control
- Head Pressure Control
  - Fixed
  - Floating
  - Reset
Adaptive Superheat

- Superheat controlled (optimized) across the evaporator load conditions.
  - Optimum operation is based on a “minimum” stable superheat
  - Varies with the load
- Uses temperature and pressure transmitters with controller
- TX Valves (Electronic)
- No manual adjustment of expansion valve required
- Reduces compressor run times potentially saving up to 12 % energy
Adaptive Superheat

- Evaporator not utilized effectively
- Longer Compressor run times
Adaptive Superheat

Electronic TX Valve follows Optimum Superheat

Load range for evaporator

Minimum stable superheat
Actual superheat

WET

MSS = f (Qo, To etc.)
Defrost on Demand

- Defrost initiated only when needed. Not on a unnecessary “set” schedule
- Evaporator monitored with sensors
- Defrost can can trended and history comparison made to determine if defrost is required
- Humidity can be monitored and controlled
- Schedule can be adjusted based on RH %
Defrost on Demand - Benefits

- Reducing the number of defrost cycles improves food quality
- Energy savings as some studies show every 5th defrost is not required

*Savings vary 3 to 8%*
Fixed Head Pressure Control

• Allows for low ambient operation of condensers for year round refrigeration by controlling Head Pressure
  – Refrigerated Warehouses
  – Computer Rooms
  – Clean Rooms

• Current Operating Controls
  – On-OFF
  – Staged
  – Modulating
• Due to year round operation, VFD savings can be substantial
• Accurate Head Pressure Control increases system efficiency
• May need to convert existing single phase motor to 3 phase
Affinity Laws

Flow Volume:

\[
\frac{\text{Flow}_1}{\text{Flow}_2} = \frac{\text{RPM}_1}{\text{RPM}_2}
\]

Pressure Head:

\[
\frac{\text{Head}_1}{\text{Head}_2} = \left(\frac{\text{RPM}_1}{\text{RPM}_2}\right)^2
\]

Power:

\[
\frac{\text{Power}_1}{\text{Power}_2} = \left(\frac{\text{RPM}_1}{\text{RPM}_2}\right)^3
\]
Same Flow less Power

- Throttling Valve or Damper Control
- Energy Savings
- AFD

Power Consumption vs. Percent Flow
Head Pressure
VFD Savings Example

- 2 5 HP motors operating at 8,700 hours
- TOTAL SAVINGS $2100.00

- VFD Cost (FM100 x 2) $1,800.00
- PRESSURE SENSOR $100.00
- INSTALLATION $900.00
- Total Implementation $2,800.00
- Total with Markup (20%) $3,360.00

SIMPLE PAYBACK 1.6 YEARS
(NOT INCLUDING ANY NEW MOTORS)
Floating Head Pressure

• Condensing temperature does not remain fixed, but floats as the heat rejection load on the condenser changes

• Floating Head Pressure Control
  – System head pressure is allowed to float to equilibrate based on the heat rejection load and outdoor air conditions with the fans operating at maximum flow
  – Basic Strategy allows for the condensing temperature to fluctuate at a fixed difference above the ambient temperature

*Estimated Savings: 3% to 10%*
Floating Head Pressure Control

- Energy savings are realized if the condenser is operated at the lowest possible condensing temperature.
- Effect is significant during periods of low ambient temperature.
- VFD speed control for motors.
Figure 2: Energy savings from adjustment of head pressure control (schematic)

Percentage energy savings (%)

Ambient temperature (°C)
Floating Head Pressure

• Minimum allowable system head pressure must be maintained to ensure flow through expansion device, hot gas defrost and other system specific constraints
• Minimum is maintained by controlling the fans as in fixed head pressure control
• TX Valves with lower turndown should be used (electronic)
Head Pressure Reset

• Optimizing operation by accounting for the opposing effects of condenser and compressor power demand
  – As Head pressure set point is increased:
    • the condenser fans run less or at lower speeds
    • The compressor power increases (discharge pressure increases) to provide refrigeration

• Head Pressure is reset based on outdoor air conditions to minimize “system” energy consumption

• Strong linear correlation between outdoor wet bulb and optimum condensing pressure
Optimum Head Pressure
Finding Optimum Head Pressure

- Each system will have its own “reset” curve
- The Procedure:
  1. Measure OA temperature
  2. Note condensing pressure and electrical demand
  3. Reset condensing pressure down 5 psig and allow system to equalize
  4. Note new system electrical demand
  5. Continue steps 3 and 4 until the lower limit in condensing pressure set point is reached
  6. Plot system electrical demand versus condensing pressure
  7. Plot reset curve of OA wet bulb and condensing pressure
  8. Repeat Steps 1 to 7 for more days
Optimum Head Pressure

- Plot curve in a DDC system controller
- NOTES:
  - Head pressure must be stopped from dropping below a lower limit
  - OA wet bulb changes throughout the day so the procedure should be executed within 1 to 2 hours
Customers “Need to Know”

• Examples
Remote User Software

- Windows™ Based Remote Access Software
- Displays Real Time Conditions, Alarms and System Performance
- Remote Set Point Adjustments and Programming
- Graphic Display of Store Fixtures Allow Quick and Easy Troubleshooting
Energy Consumption Profiler Software

- Web Based Power Profiling Provides
  - Aggregation of Data
    - Utility
    - Region
    - Chain
  - Tracking Store Performance and Efficiency
  - Enables Better Rate Negotiation
Reduce HVAC Run times
Cooler Control With Night Setback

Graph showing the control temperature for a beer cooler over a period from April 28 to May 1.
Pinpoint Problems With Logged Data
Sticking Head Valve Easy To Detect With Temperature Graph

![Graph showing temperature fluctuations over time](image)
Consistent Product Quality
Energy Waste With An Open Cooler Door
Electronic “Refrigeration”

- Integrating Refrigeration with overall control
  - Supply Air Control
- Refrigeration Energy Efficient Measures
- Government Rebate Programs
Office of Energy Efficiency – Incentive Programs

- Retrofit Planning Assistance for Commercial Property Owners, Managers or Occupants with Combined Energy Costs $ > $100,000
- Receive 50% up to $25,000 for:
  - Energy Audits
  - Energy Management Plans
  - Feasibility Studies
- Additional funding if project moves forward
Retrofit Planning Summary

Lower energy costs and reduce greenhouse gas emissions that contribute to climate change by working with Natural Resources Canada’s Office of Energy Efficiency. The Energy Innovators Initiative (EII) Energy Retrofit Assistance – Retrofit Planning or ERA (P) provides eligible commercial and institutional organizations with financial support to undertake activities that facilitate new energy retrofits.

Qualified organizations may receive up to 50 percent of approved costs for the development and planning of energy retrofits – up to $25,000.

Targeted Organizations

✓ Eligible commercial businesses or public institutions that own, manage or occupy facilities in Canada with combined energy bills of $100,000 or more

WHO ARE

✓ Members of the Energy Innovators Initiative (EII) and registered with Canada’s Climate Change Voluntary Challenge and Registry Inc. (VCR Inc.)

Eligible Planning Activities
Energy Retrofit Incentives

- Up to $250,000 or 25% towards project costs
- Eligible Costs:
  - HVAC Equipment
  - Controls
  - Monitoring and Tracking
  - Training, Employee Awareness
- Target Groups
  - 4 Buildings or more - $15 per gigajoule
  - 3 Buildings or less - $7.5 per gigajoule
  - Potential savings greater than 5,000 gigajoules

1 GJ = 277.8 ekWh
Save Money Through Energy Retrofits

Investing in your commercial and institutional facilities makes good sense for both your organization and the environment, but energy plans and retrofits compete with other budget priorities. That’s where we come in.

The Energy Innovators Initiative Can Help

The Energy Innovators Initiative (EII), a program of Natural Resources Canada’s Office of Energy Efficiency, provides products and services for commercial businesses and public institutions that consume large quantities of energy. As part of our goal to reduce energy consumption and greenhouse gas emissions that contribute to climate change, Energy Retrofit Assistance is designed to stimulate the development and implementation of energy retrofits in energy-intensive facilities.
Projects in Organizations with Four or More Buildings

Summary

Lower energy costs, shorten payback periods and reduce greenhouse gas emissions that contribute to climate change by working with Natural Resources Canada’s Office of Energy Efficiency. The Energy Innovators Initiative (EII) Energy Retrofit Assistance or ERA (4) provides eligible commercial and institutional organizations with financial support to implement or expand the scope of new energy retrofit projects. Limited funds are available, with priority and greatest contributions going to projects demonstrating the largest reductions in energy consumption.

Eligible organizations with four or more similar buildings may receive $15 per gigajoule saved in an energy retrofit pilot project – up to $250,000 or 25 percent of approved project costs. You commit to replicating the successful measures in at least 25 percent of your remaining similar facilities with equal or greater savings.

Targeted Organizations

To be eligible for Energy Retrofit Assistance (4), your organization must:

✓ Own, manage or occupy at least four similar buildings in Canada
Incentive for Energy Efficient Designs
Covers cost up to $60,000  ($80,000 for Industrial)

Estimated annual energy costs if constructed to MNECB requirements: $100,000

Estimated annual energy costs of CBIP approved design: $75,000

Estimated annual energy cost savings: $25,000

CBIP contribution: $50,000 ($25,000 X 2)

Recent specific focus on:
- Retail Food Stores
- Arenas
Electronic “Refrigeration”

• Integrating Refrigeration with overall control
  - Supply Air Control with DX cooling
• Refrigeration Energy Efficient Measures
• Government Rebate Programs
Refrigeration

- Arena Design
- Supermarket
- Industrial Refrigeration