

Natural Refrigerant Training Summit

Building a Sustainable Workforce

Micro Thermo® Alliance

Application, Navigation, Tools, Case Control Tuning

Charlie Cunliffe - MicroThermo

Parker Hannifin – Sporlan Division



NORTH AMERICAN
Sustainable
Refrigeration
Council

Natural Refrigerant Training Summit

Thank you to our sponsors!

Premium Sponsors



Basic Sponsors



Who We Are

A 501c3 nonprofit working to create a sustainable future for supermarket refrigeration by removing barriers to natural refrigerant adoption.




160+
member
companies



55K+
food retail
locations



Goals

-  Build a sustainable technician workforce
-  Increase funding for natural refrigerant equipment
-  Improve technology options, education, and awareness

What are Natural Refrigerants?

CO₂

R744
Carbon Dioxide

C₃H₈

R290
Propane

NH₃

R717
Ammonia

What is Micro Thermo Alliance?

- State-of-the-art facility management software platform
- Control, monitoring, information, historical graphs and data
- More than just control or monitoring...a true management tool
- Windows[®] based graphical format



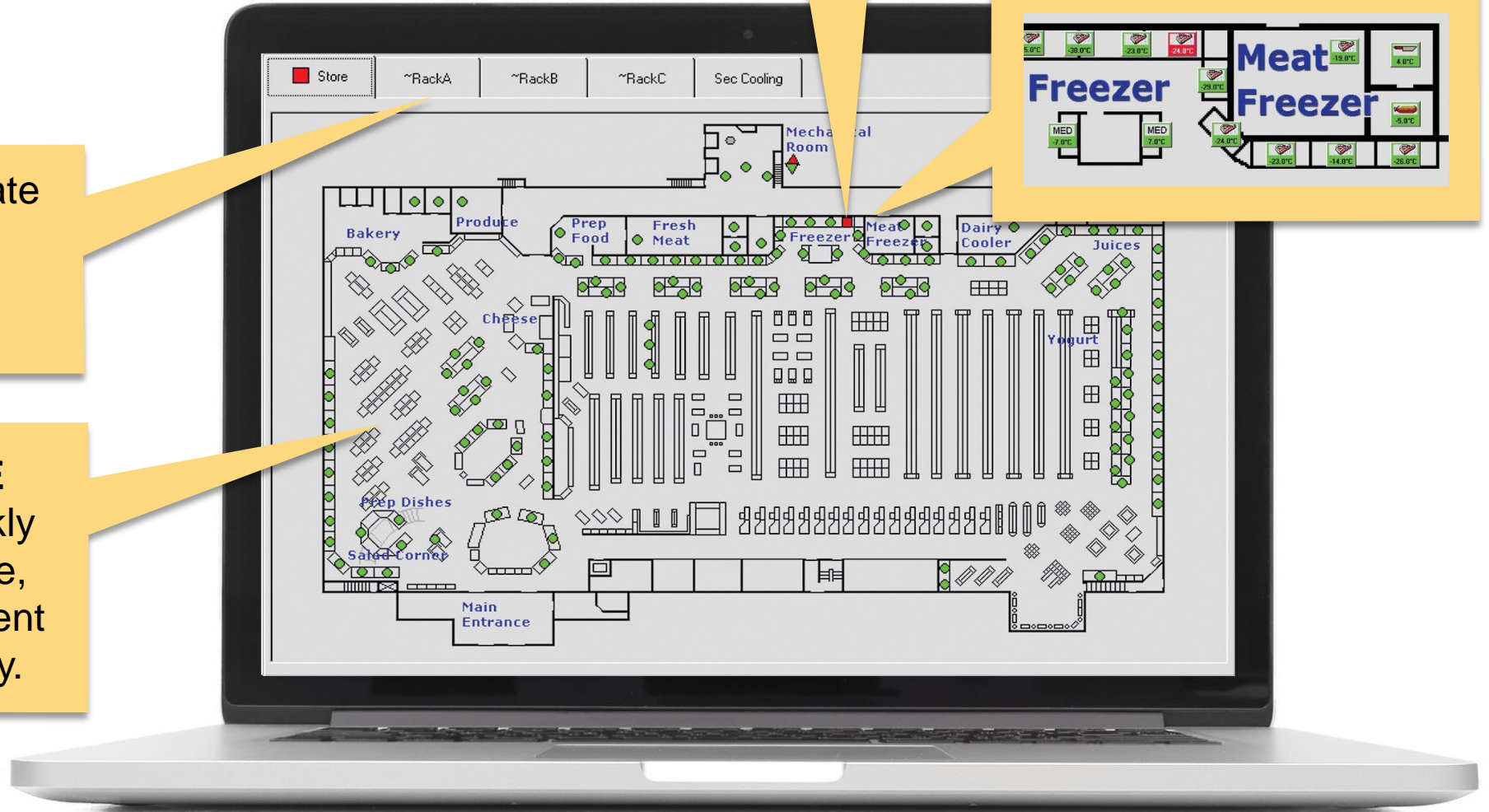
It's All Connected

MENU TABS - Navigate to other screens to monitor your entire refrigeration system.

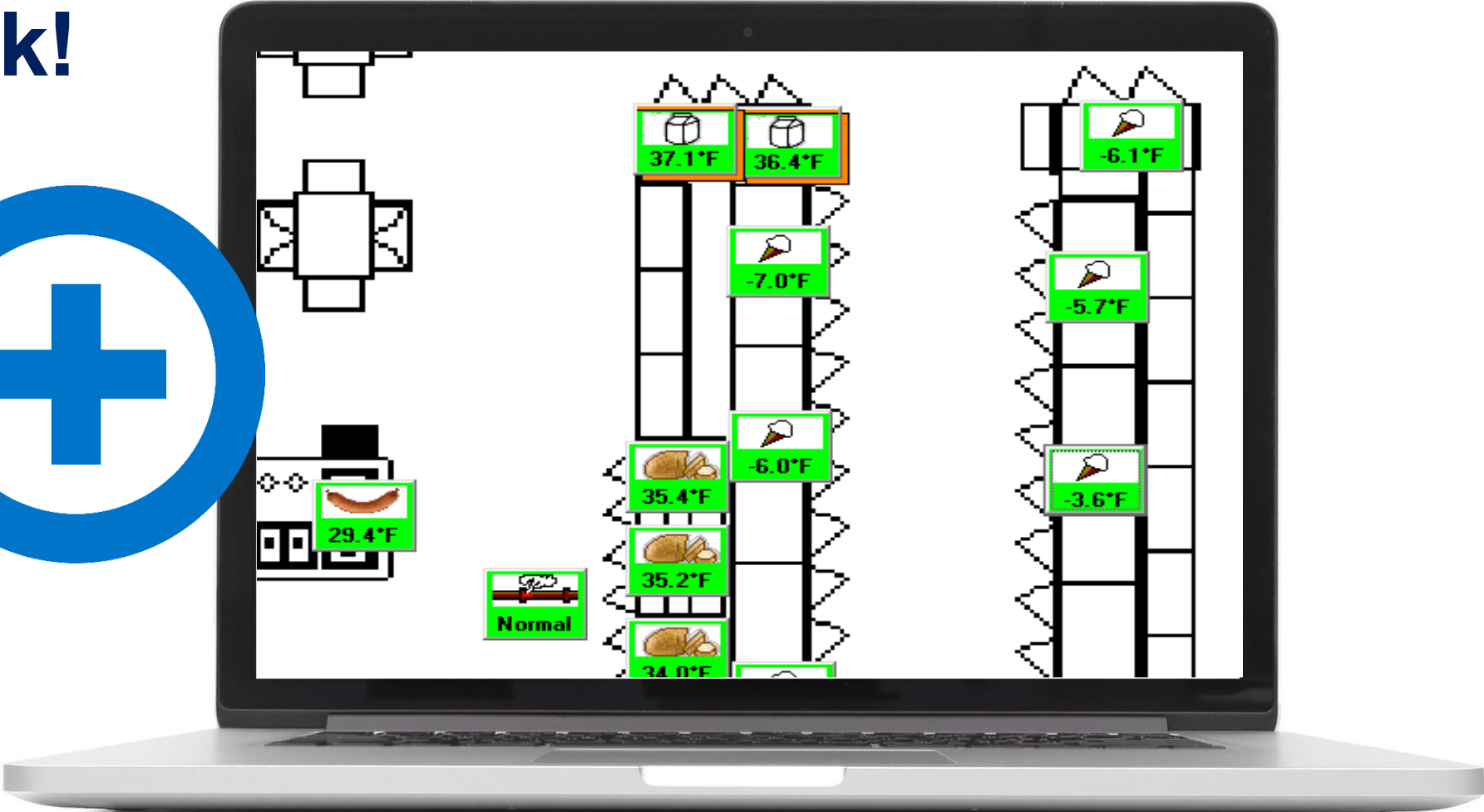
COMPREHENSIVE OVERVIEW - Quickly scan the entire store, see that all equipment is operating properly.

COLOR-CODED INDICATORS - Identifies alarm situations.

ZOOM IN - For detailed, real-time operating data.

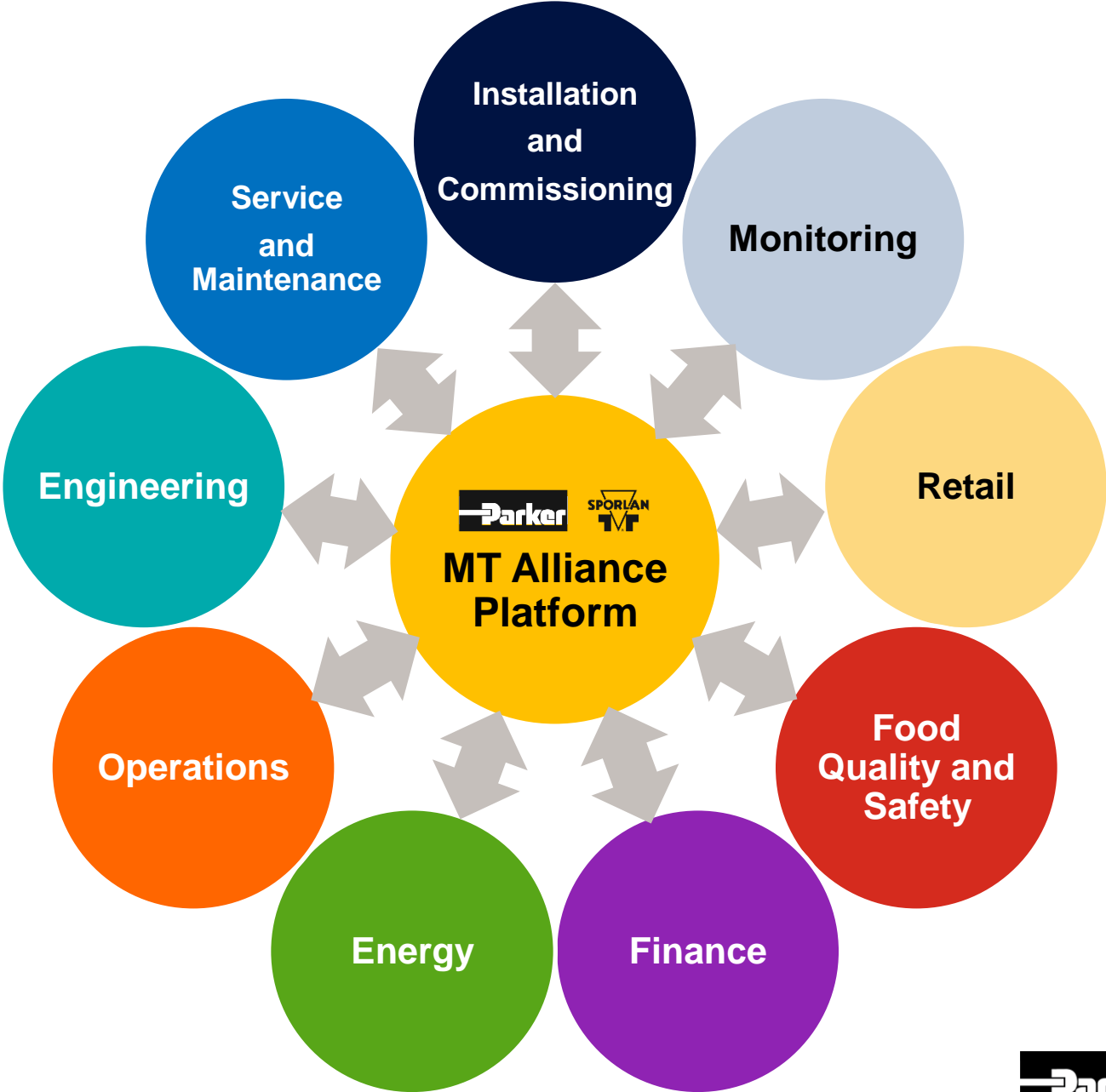


Zoom In for a Closer Look!



Micro Thermo Alliance

The power of information!



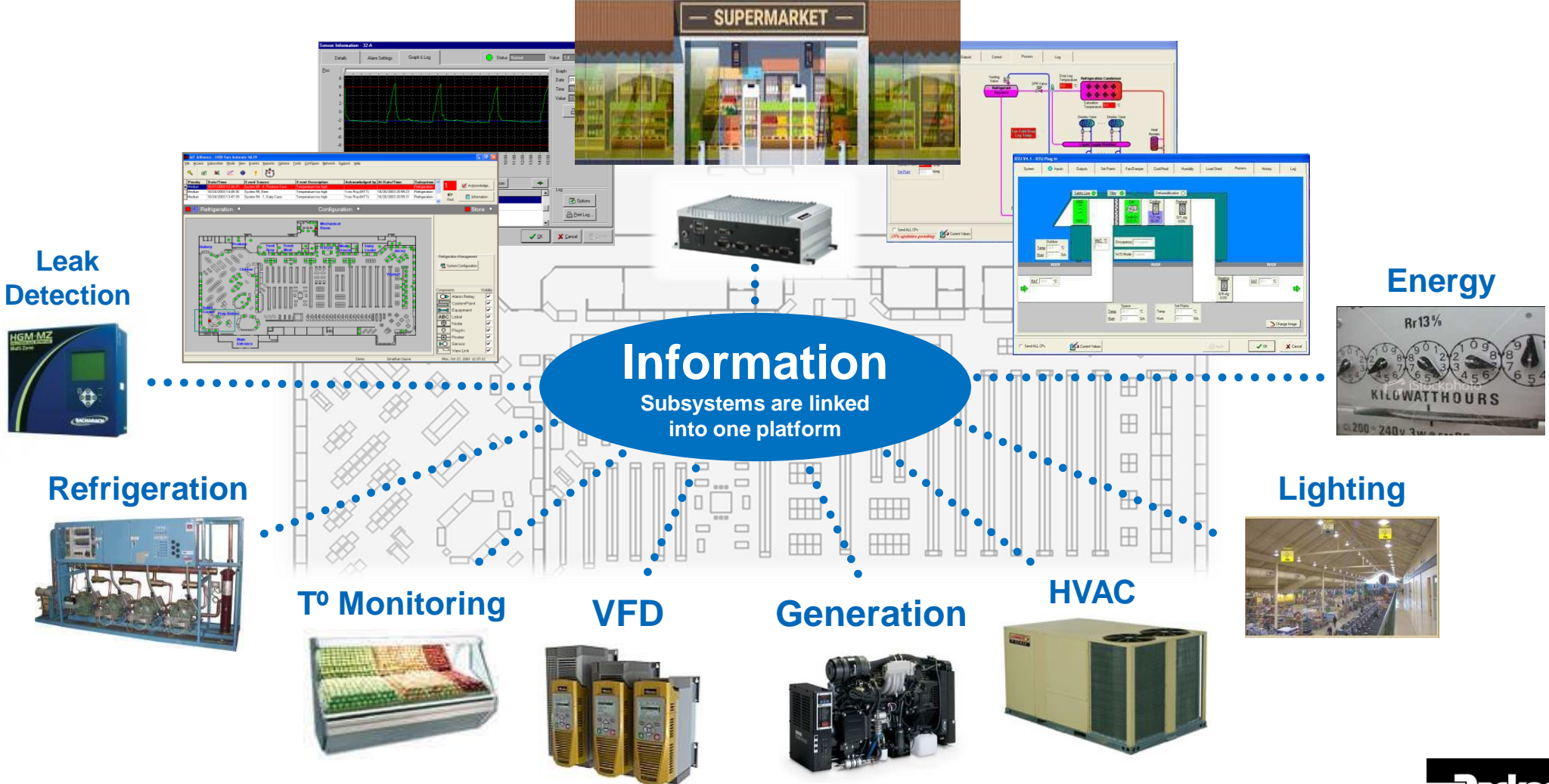
FACILITY Control

- Supermarkets
- 300+ CO₂ installations in North America
- Frozen and refrigerated warehouses
- Ice skating rinks
- Marine refrigeration
- Food processing and preparation facilities
- Ice cream processing and production
- Pharmaceutical process and storage



MICRO THERMO ALLIANCE

Graphical User Interface Front End



Accountability - Traceability - Security

- ✓ **Access Accountability**
 - Requires individual username and password
- ✓ **Individual Security**
 - Different levels of access for Technicians and End-Users
- ✓ **Individual Traceability**
 - Activity and history is tracked and retained
- ✓ **No back-door usernames or generic passwords**
- ✓ **Eliminates Re-commissioning**
 - Prevents the Energy Profile of a store degrading over time
- ✓ **Eliminates Unauthorized Set-Points changes, component jump-out, device disabling**



MICRO THERMO ALLIANCE Menus



Tool/Icon Bar

Menu Bar

Events & Alarm List

Subsystems

Permission Modes

Store Views

From the main window, every function of Alliance is just a few clicks away!

Priority	Date/Time	Event Source	Event Description	Acknowledged by	At Date/Time	Subsystem
Medium	09/27/2011 20:17:14	~RackCO\SGr1\Cmp1, Safety L	Alarm	(Klimfax) Francis Jalbert	09/27/2011 20:17:58	Refrigeration
Medium	09/27/2011 19:31:15	~RackCO\SGr1\Cmp1, Safety L	Alarm	(Klimfax) Francis Jalbert	09/27/2011 19:52:06	Refrigeration

Support Technique
Micro Thermo
1-888-664-1406
poste # 106

Doina

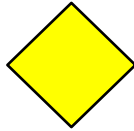
Color Codes

- **RED SQUARE**
TAKE ACTION



- Active Alarm

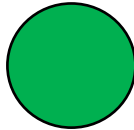
- **YELLOW DIAMOND**
CAUTION



- Alarm in Recall

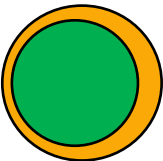
- Node not fully commissioned

- **GREEN CIRCLE**
All Systems GO



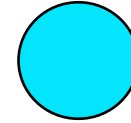
- Temps and Nodes OK

- **ORANGE**



Fixture or Circuit in **DEFROST**

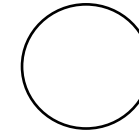
- **TEAL**



Fixture, Fan, Valve,
Compressor in **OVERRIDE**

- **WHITE**

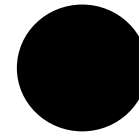
UNCONFIGURED



- Not commissioned

- **BLACK**

Node **OFFLINE**



Alarm Acknowledgement and Resolution

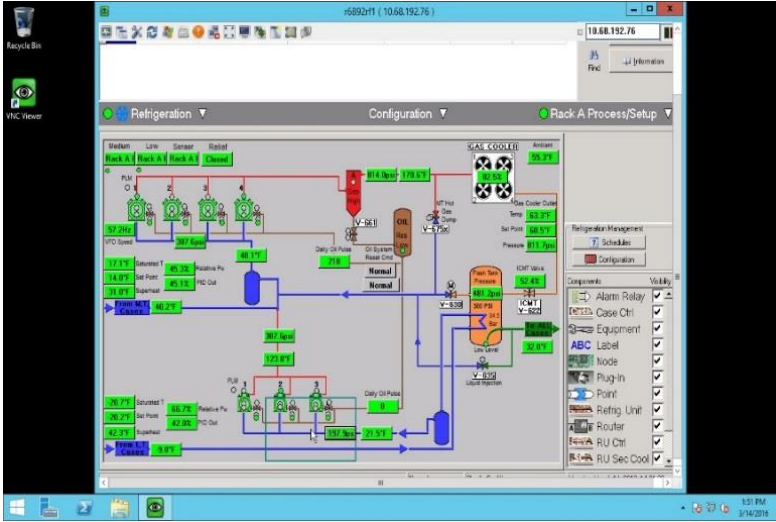
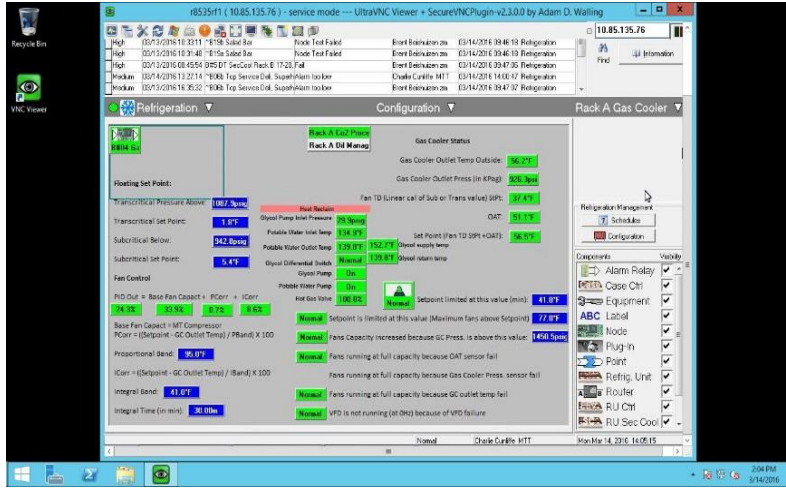
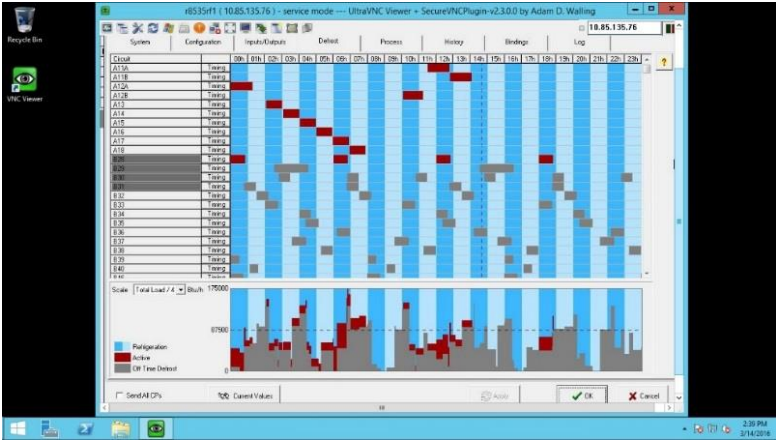
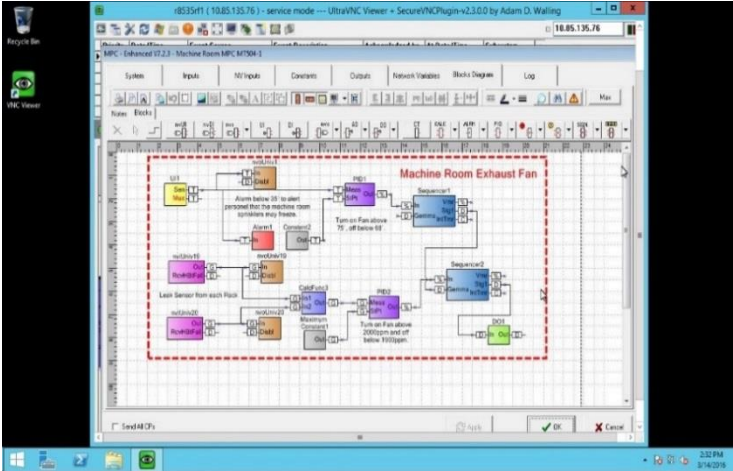
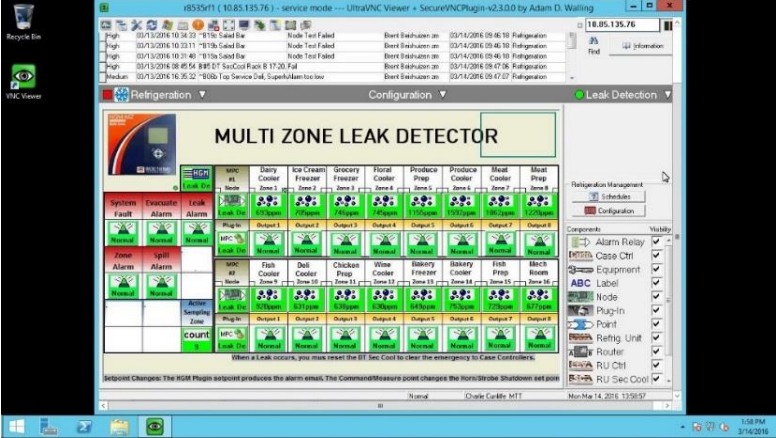


The screenshot displays the Micro Thermo Alliance software interface. At the top, a menu bar includes File, Access, Subsystem, Mode, View, Events, Reports, Options, Tools, Configure, Network, Support, Language, and Help. Below the menu is a toolbar with various icons. The main window is divided into several sections:

- Event Log:** A table showing recent events. The top event is highlighted in red.
- Navigation:** Buttons for 'Acknowledge', 'Find', and 'Information' are visible on the right side of the event log.
- Configuration:** A central area showing a floor plan of a store layout with various zones labeled: Fresh Produce, Freezer, Fresh Meat, Fish and Sea Food, Mechanical Room, Beer and Wine, and Food Court. A yellow box labeled 'MVC' is highlighted in the Beer and Wine area.
- Monitoring Panel:** On the right side of the floor plan, there are several monitoring buttons: 'Monitor', 'Rack A', 'Leak an', and 'HVAC AI'.
- Refrigeration Management:** A panel on the right side of the interface with buttons for 'Schedules' and 'Configuration'.
- Components List:** A list of components with visibility checkboxes, including Alarm Relay, Equipment, Label (ABC), Node, Plug-In, Point, Refrig. Unit, Router (A/B), RU Ctrl, RU Sec Cool, and Sensor.

Priority	Date/Time	Event Source	Event Description	Acknowledged by	At Date/Time	Subsystem
High	1/25/2012 23:41:03	SN5 Sensor 3, Fish Case	Temperature too high [1]			Refrigeration
High	1/23/2012 17:38:03	SN3 Sensor 3, Fresh Meat Cools	Temperature too high [1]	demo	1/23/2012 17:38:42	Refrigeration

MICRO THERMO ALLIANCE Subsystem Access

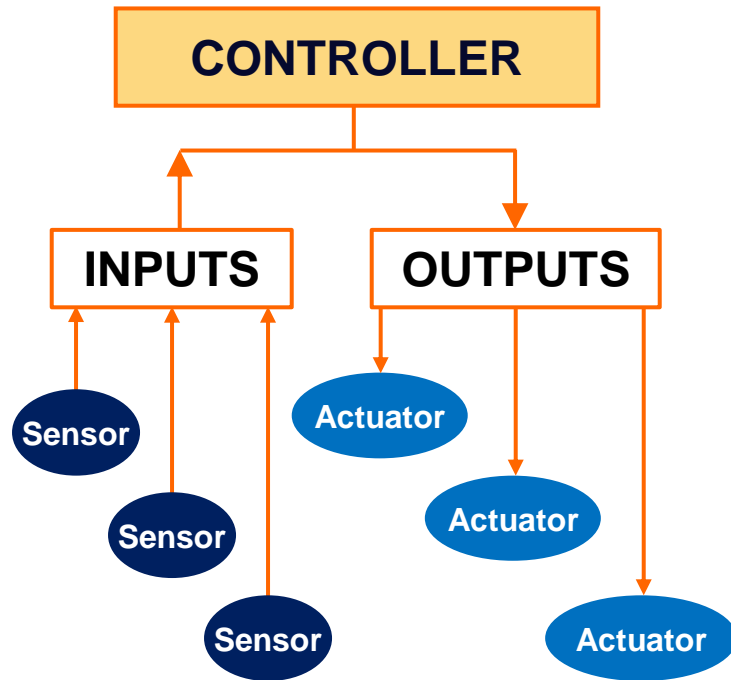


The Power of Information

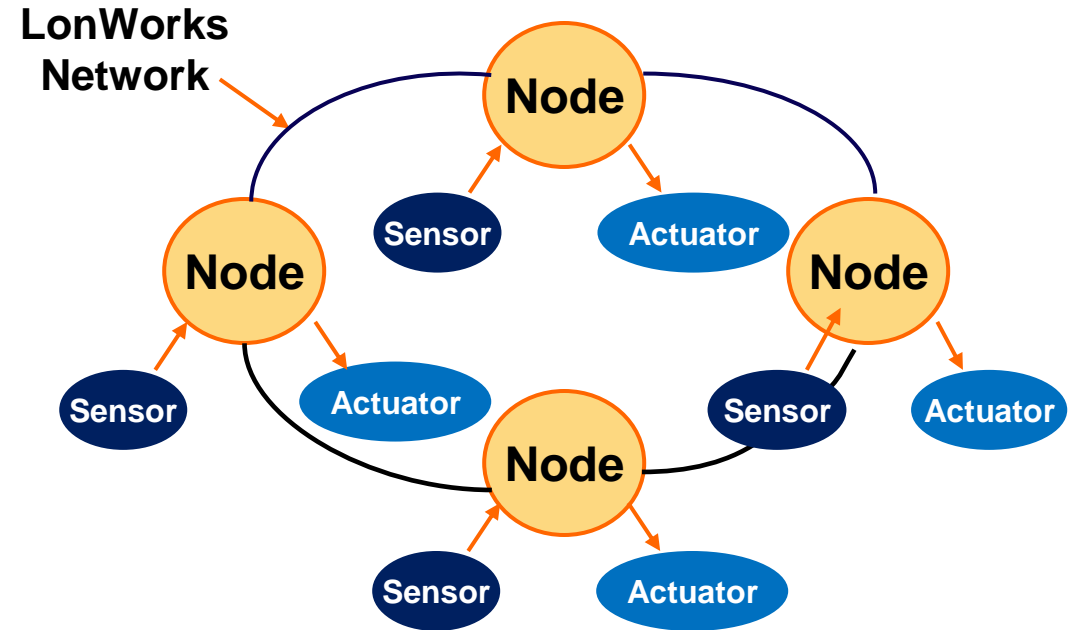
- ✓ **Intelligent Distributed Control**
- ✓ **Intuitive Windows® based graphical user interface**
- ✓ **Up to 8 Workstations per store**
- ✓ **History retains system data up to 5 years**
- ✓ **CO2 control, both Transcritical & Subcritical; 300+ North America installations in last 8 years**
- ✓ **Integrated subsystems managed through an integrated front-end**
- ✓ **Colorful visual indicators enable facility management at-a-glance**
- ✓ **Customizable icons and templates make set-up and commissioning easy**
- ✓ **Open standard LonWorks communications - free topology**

Distributed Control

CENTRALIZED CONTROL



DISTRIBUTED INTELLIGENT CONTROL

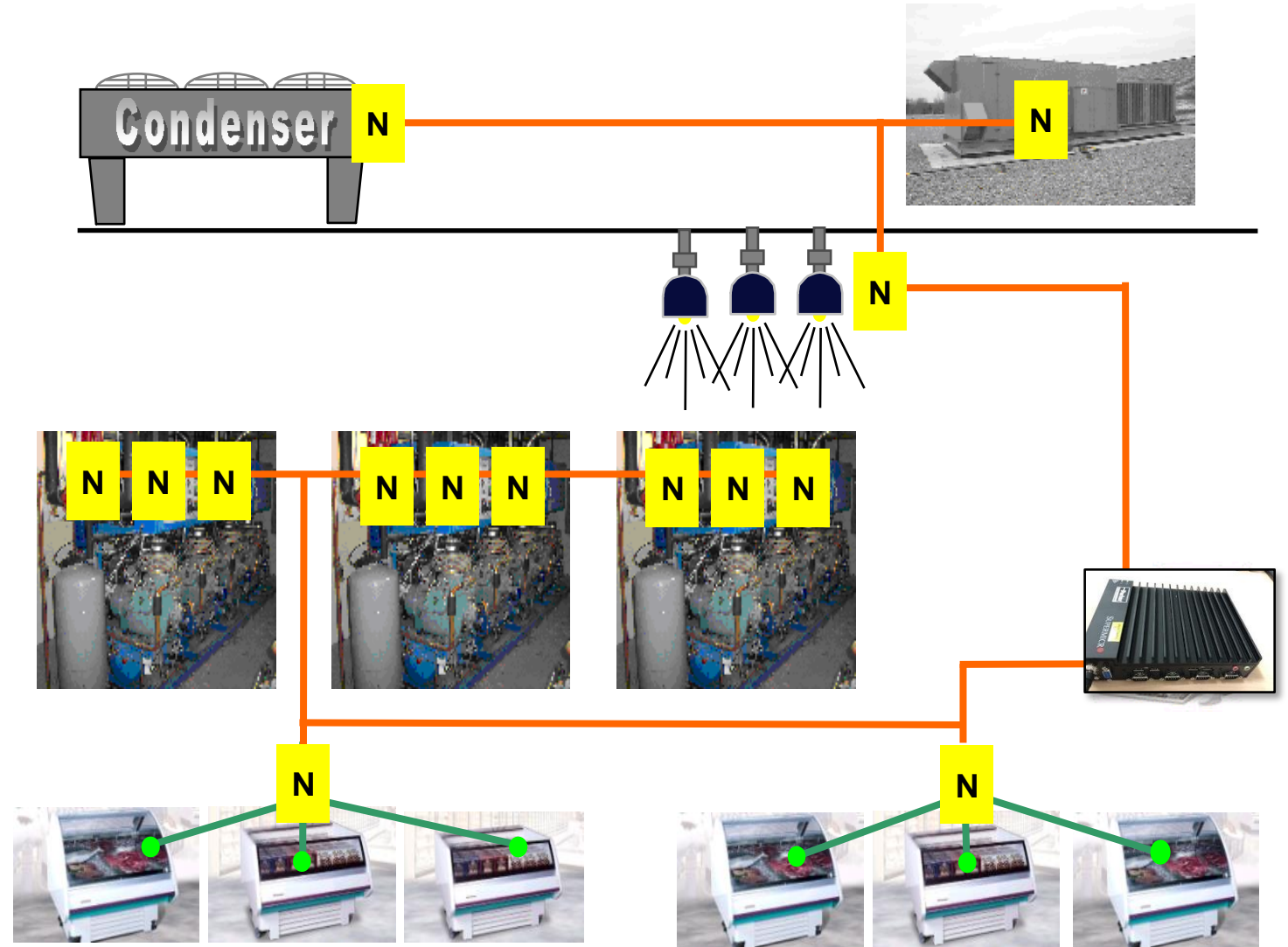


Open and flexible

Distributed Control System

MICRO THERMO DISTRIBUTED NETWORK

- Simplified system integration
- Intelligent LonWorks **Smart Nodes**
- Open LonWorks network
- Simplified wiring
- Simplified 3rd Party Integration





ALLIANCE

On-Board Tools & Reports

FACILITY MANAGEMENT

Changes Made by Users



MT Alliance V7.5.1.621 , Aldi's Amsterdam

File Access Subsystem Mode View Events Reports Options Tools Configure Network Support Language Help

Changes Made By Users V7.5.1

Move the columns and/or click on their headers to change the sorting.

Date and Time	User name	Identification	Component	Description
05/24/2018 16:31:...	ABC Tech	Log Book	Equipment	changed A04 to meat cooler set point of 32 degress as per manager .
05/24/2018 16:27:...	ABC Tech	A04 Meat Cooler	Plug-in	Set 1 Alarm High Set Time changed from 2h 0m to 1h 30m for all Case Ctrl's of the lineup
05/24/2018 16:27:...	ABC Tech	A04 Meat Cooler	Plug-in	Set 1 Alarm Low Set Time changed from 2h 0m to 1h 30m for all Case Ctrl's of the lineup
05/24/2018 16:26:...	ABC Tech	A04 Meat Cooler	Plug-in	Evaporator Pressure - Send On Delta [Fast] changed from 2.6psi to 2.7psi for all Case Ctrl's of the lineup
05/24/2018 16:26:...	ABC Tech	A04 Meat Cooler	Plug-in	Set 1 Alarm High Set Time changed from 1h 30m to 2h 0m for all Case Ctrl's of the lineup
05/24/2018 16:26:...	ABC Tech	A04 Meat Cooler	Plug-in	Set 1 Alarm Low Set Time changed from 1h 30m to 2h 0m for all Case Ctrl's of the lineup
05/24/2018 16:26:...	ABC Tech	A04 Meat Cooler	Plug-in	Set 1 Description changed from "" to "Fresh Meat Cooler" for all Case Ctrl's of the lineup
05/24/2018 16:26:...	ABC Tech	A04 Meat Cooler	Plug-in	Set 1 High Limit changed from 38.0°F to 42.8°F for all Case Ctrl's of the lineup
05/24/2018 16:26:...	ABC Tech	A04 Meat Cooler	Plug-in	Set 1 Low Limit changed from 24.0°F to 17.6°F for all Case Ctrl's of the lineup
05/24/2018 16:26:...	ABC Tech	A04 Meat Cooler	Plug-in	Set 1 Setpoint changed from 28.0°F to 32.0°F for all Case Ctrl's of the lineup
05/21/2018 14:08:...	Evan Aschow - MTT	LT-TC Rack (MT5...	Plug-in	Floating Suction Pressure-Float Limit changed from 2.0°F to 3.0°F
05/17/2018 09:28:...	Ray McWayne - ABC ...	Log Book	Equipment	Oil level alarm 04:00, attributed to low-load condition, no fill cycles from separator. Added one gallon oi...
05/14/2018 15:27:...	ABC Tech	A05a Dairy Cooler	Plug-in	Cleaning Until set to 05/14/2018 16:26:59
05/14/2018 15:25:...	ABC Tech	A05b Dairy Cooler	Plug-in	Cleaning Until set to 05/14/2018 16:25:54
05/13/2018 17:27:...	Evan Aschow - MTT	B#1 Defrost 722F	Plug-in	Circuit 1-Maximum active Defrost duration changed from 45m to 56m
05/13/2018 17:27:...	Evan Aschow - MTT	B#1 Defrost 722F	Plug-in	Circuit 1-Minimum active Defrost duration changed from 44m to 55m
05/13/2018 13:26:...	Evan Aschow - MTT	B#1 Defrost 722F	Plug-in	Start Circuit 1 Defrost
05/13/2018 13:26:...	Evan Aschow - MTT	B#1 Defrost 722F	Plug-in	Start Circuit 1 Defrost
05/13/2018 13:08:...	Evan Aschow - MTT	LT-TC Rack (MT5...	Plug-in	Capacity-Suction Temp Integral Band Time Constant changed from 20m to 8m
05/13/2018 13:08:...	Evan Aschow - MTT	LT-TC Rack (MT5...	Plug-in	Floating Suction Pressure-Float Interval changed from 10m 0s to 5m 0s
05/13/2018 13:08:...	Evan Aschow - MTT	LT-TC Rack (MT5...	Plug-in	Suction Saturated Temp Alarm-Low Limit changed from -35.0°F to -39.9°F
05/13/2018 02:58:...	Evan Aschow - MTT	A01b Grocery Free...	Plug-in	Superheat - Band changed from 4.0°F to 7.0°F for all Case Ctrl's of the lineup
05/13/2018 02:52:...	Evan Aschow - MTT	A01a Grocery Free...	Plug-in	Superheat - Band changed from 4.0°F to 7.0°F for all Case Ctrl's of the lineup
05/13/2018 02:12:...	Evan Aschow - MTT	B#1 Defrost 722F	Plug-in	Start Circuit 1 Defrost
05/13/2018 02:09:...	Evan Aschow - MTT	A09b 24' Deli	Plug-in	Defrost - Drip Time After End Defrost changed from "03:00" to "00:00" for all Case Ctrl's of the lineup
05/13/2018 02:09:...	Evan Aschow - MTT	A09a 24' Deli	Plug-in	Defrost - Contributes changed from "False" to "True" for all Case Ctrl's of the lineup
05/13/2018 02:09:...	Evan Aschow - MTT	A09a 24' Deli	Plug-in	Defrost - Drip Time After End Defrost changed from "03:00" to "00:00" for all Case Ctrl's of the lineup
05/13/2018 02:09:...	Evan Aschow - MTT	A09a 24' Deli	Plug-in	Defrost - End Defrost Temperature changed from 621.81°F to 52.00°F for all Case Ctrl's of the lineup

Found 67 changes

Filters

From-To Day

From: 05/01/2018 To: 06/01/2018

User name: All user names Component: All components

Where Description contains: []

Changes Maintenance Both

Print Apply OK

Normal Charles J Cunliffe - MTT Fri Jun 01, 2018 12:13:24

FACILITY MANAGEMENT

Acknowledged Events

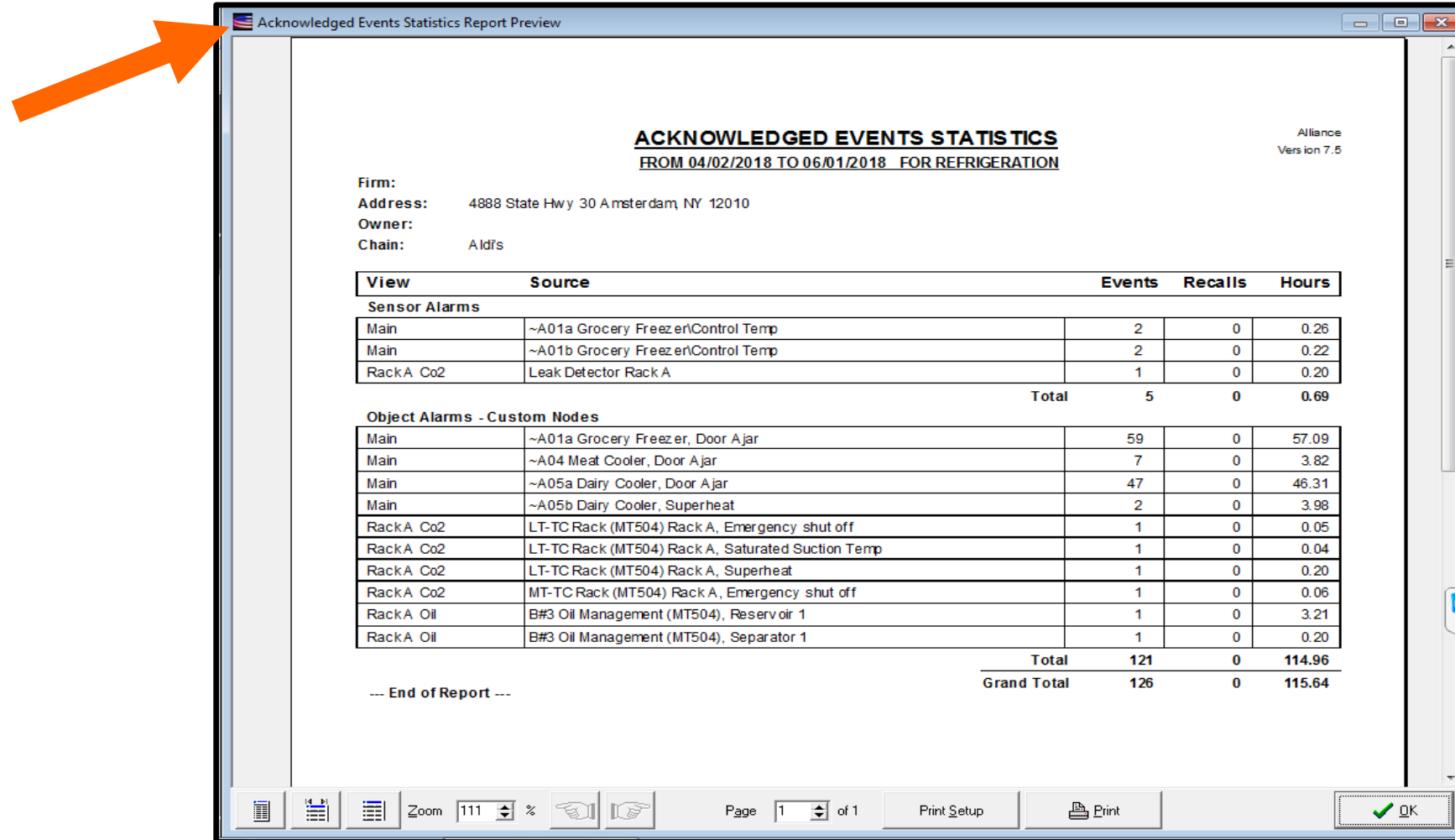
The screenshot displays a software interface for facility management, specifically focusing on refrigeration events. The main window is titled 'Refrigeration' and shows a list of 'Acknowledged Events'. An orange arrow points to the 'Acknowledged Events' tab in the left-hand navigation pane.

Priority	Date/Time	Event Source	Event Description	Acknowledged by	At Date/Time	After	Subsystem
High	03/13/2016 10:33:11	~B19b Salad Bar	Node Test Failed	Brent Beishuizen zm	03/14/2016 09:46:18		Refrigeration
High	03/13/2016 10:31:48	~B19a Salad Bar	Node Test Failed	Brent Beishuizen zm	03/14/2016 09:46:18		Refrigeration
High	03/13/2016 08:45:54	B#5 DT SecCool Rack B 17-20, Fail		Brent Beishuizen zm	03/14/2016 09:47:06		Refrigeration
Medium	03/14/2016 13:27:14	~B06b Top Service Deli, SuperhAlarm too low		Charlie Cunliffe MTT	03/14/2016 14:00:47		Refrigeration
Medium	03/13/2016 16:35:32	~B06b Top Service Deli, SuperhAlarm too low		Brent Beishuizen zm	03/14/2016 09:47:07		Refrigeration

The interface also includes a search bar at the top right with the value '10.85.135.76', a 'Find' button, and an 'Information' button. Below the event list, there are controls for the 'Period' (From-To and Day), 'Refresh', 'Information', 'Export to XML', and 'Print' buttons. At the bottom, the status bar shows 'Normal', 'Charlie Cunliffe MTT', and 'Mon Mar 14, 2016 14:08:42'.

FACILITY MANAGEMENT

Acknowledged Events Statistics



ACKNOWLEDGED EVENTS STATISTICS
FROM 04/02/2018 TO 06/01/2018 FOR REFRIGERATION

Alliance
Version 7.5

Firm:
Address: 4888 State Hwy 30 Amsterdam, NY 12010
Owner:
Chain: Aldi's

View	Source	Events	Recalls	Hours
Sensor Alarms				
Main	~A01a Grocery Freezer/Control Temp	2	0	0.26
Main	~A01b Grocery Freezer/Control Temp	2	0	0.22
RackA Co2	Leak Detector Rack A	1	0	0.20
Total		5	0	0.69
Object Alarms - Custom Nodes				
Main	~A01a Grocery Freezer, Door Ajar	59	0	57.09
Main	~A04 Meat Cooler, Door Ajar	7	0	3.82
Main	~A05a Dairy Cooler, Door Ajar	47	0	46.31
Main	~A05b Dairy Cooler, Superheat	2	0	3.98
RackA Co2	LT-TC Rack (MT504) Rack A, Emergency shut off	1	0	0.05
RackA Co2	LT-TC Rack (MT504) Rack A, Saturated Suction Temp	1	0	0.04
RackA Co2	LT-TC Rack (MT504) Rack A, Superheat	1	0	0.20
RackA Co2	MT-TC Rack (MT504) Rack A, Emergency shut off	1	0	0.06
RackA Oil	B#3 Oil Management (MT504), Reservoir 1	1	0	3.21
RackA Oil	B#3 Oil Management (MT504), Separator 1	1	0	0.20
Total		121	0	114.96
Grand Total		126	0	115.64

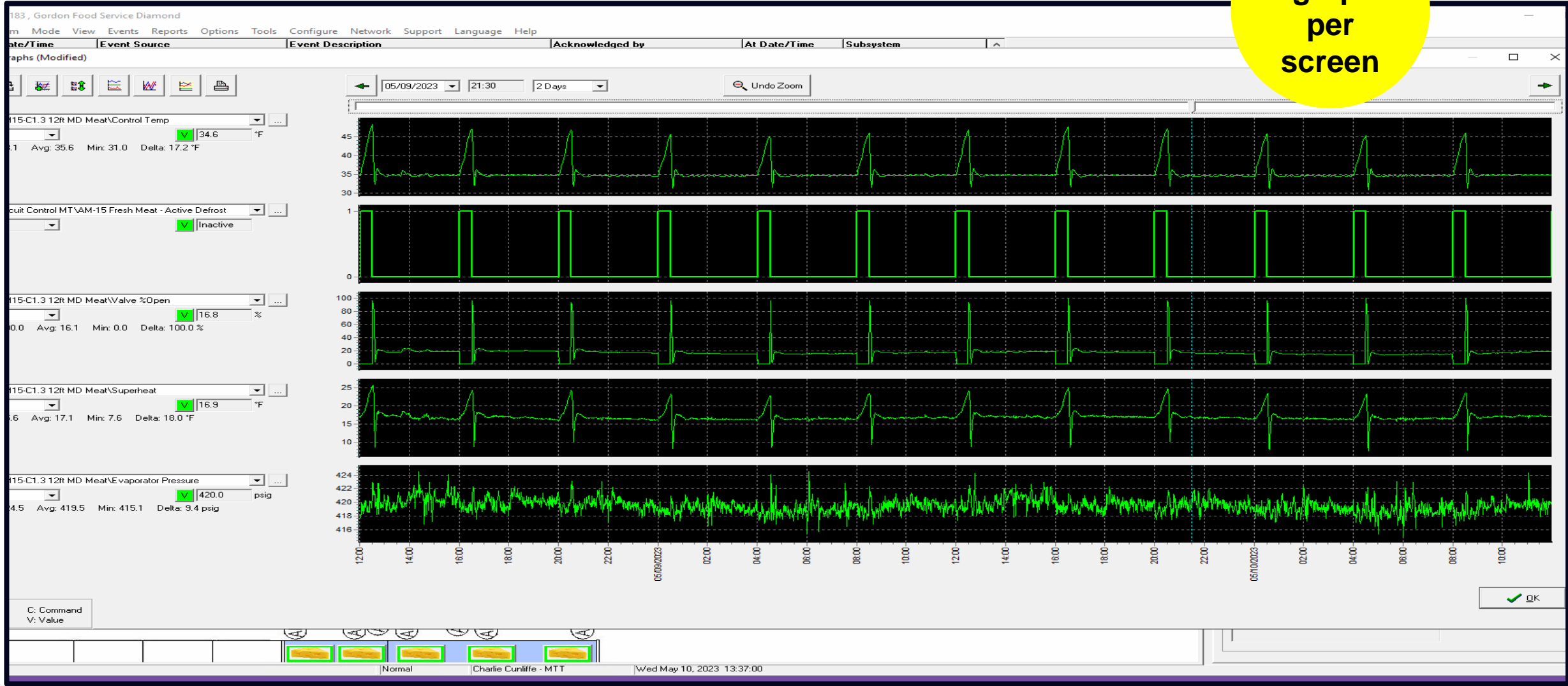
--- End of Report ---

Zoom 111 % Page 1 of 1 Print Setup Print OK

FACILITY MANAGEMENT

Trend Graphs

Max.
7 graphs
per
screen



FACILITY MANAGEMENT

System Log (Operating System)

MT Alliance V7.5.1.621, Aldi's Amsterdam

File Access Subsystem Mode View Events Reports Options Tools Configure Network Support Language Help

System Log V7.5.1

Date	Time	Severity	Message	Application
05/31/2018	10:44:55	Information	User "Amber Marriott Aldi Shift" logged in for 15 minutes.	Alliance
05/29/2018	08:19:27	Information	User "Heidi Meher-Aldi Shift" logged out automatically.	Alliance
05/29/2018	08:04:27	Information	User "Heidi Meher-Aldi Shift" logged in for 15 minutes.	Alliance
05/28/2018	12:21:50	Information	User "Joe Dudar - Aldi's" logged out automatically.	Alliance
05/28/2018	12:06:50	Information	User "Joe Dudar - Aldi's" logged in for 15 minutes.	Alliance
05/28/2018	09:35:14	Information	User "Joe Dudar - Aldi's" logged out automatically.	Alliance
05/28/2018	09:20:14	Information	User "Joe Dudar - Aldi's" logged in for 15 minutes.	Alliance
05/27/2018	11:14:39	Information	User "Heidi Meher-Aldi Shift" logged out automatically.	Alliance
05/27/2018	10:59:39	Information	User "Heidi Meher-Aldi Shift" logged in for 15 minutes.	Alliance
05/26/2018	09:45:30	Information	User "Heidi Meher-Aldi Shift" logged out automatically.	Alliance
05/26/2018	09:30:30	Information	User "Heidi Meher-Aldi Shift" logged in for 15 minutes.	Alliance
05/26/2018	09:16:58	Information	User "Heidi Meher-Aldi Shift" logged out automatically.	Alliance
05/26/2018	09:01:58	Information	User "Heidi Meher-Aldi Shift" logged in for 15 minutes.	Alliance
05/26/2018	08:08:21	Information	User "Heidi Meher-Aldi Shift" logged out automatically.	Alliance
05/26/2018	07:53:21	Information	User "Heidi Meher-Aldi Shift" logged in for 15 minutes.	Alliance
05/25/2018	16:21:14	Information	User "Heidi Meher-Aldi Shift" logged out automatically.	Alliance
05/25/2018	16:06:14	Information	User "Heidi Meher-Aldi Shift" logged in for 15 minutes.	Alliance
05/25/2018	13:47:37	Information	User "Heidi Meher-Aldi Shift" logged out automatically.	Alliance
05/25/2018	13:32:37	Information	User "Heidi Meher-Aldi Shift" logged in for 15 minutes.	Alliance
05/25/2018	13:32:27	Information	An unknown user tried to log on with account "dj37" while user "David Jackson" was logged on.	Alliance
05/25/2018	12:29:25	Information	User "David Jackson" logged out automatically.	Alliance
05/25/2018	12:14:25	Information	User "David Jackson" logged in for 15 minutes.	Alliance
05/25/2018	12:14:19	Information	An unknown user tried to log on with account "37dj" while user "ABC Tech" was logged on.	Alliance
05/24/2018	16:45:09	Information	User "ABC Tech" logged out automatically.	Alliance
05/24/2018	16:30:09	Information	User "ABC Tech" logged in for 15 minutes.	Alliance
05/24/2018	16:30:04	Information	User "ABC Tech" logged out automatically.	Alliance
05/24/2018	16:15:04	Information	User "ABC Tech" logged in for 15 minutes.	Alliance
05/24/2018	16:11:06	Information	User "ABC Tech" logged out.	Alliance
05/24/2018	15:36:30	Information	User "ABC Tech" logged in for 4 hours.	Alliance
05/24/2018	15:36:23	Information	User "ABC Tech" logged out automatically.	Alliance
05/24/2018	15:21:23	Information	User "ABC Tech" logged in for 15 minutes.	Alliance
05/24/2018	15:21:14	Information	User "ABC Tech" logged out automatically.	Alliance
05/24/2018	15:06:14	Information	User "ABC Tech" logged in for 15 minutes.	Alliance
05/24/2018	15:03:10	Information	User "Heidi Meher-Aldi Shift" logged out automatically.	Alliance
05/24/2018	14:48:10	Information	User "Heidi Meher-Aldi Shift" logged in for 15 minutes.	Alliance

Filters

From-To Day

From day: 05/02/2013

To day: 05/01/2018

Severity Level: All

Application: All

Print Log...

+ Add...

Clear Log...

Refresh

OK

Normal Charles J. Cunliffe - MTT Fri Jun 01, 2018 12:22:45



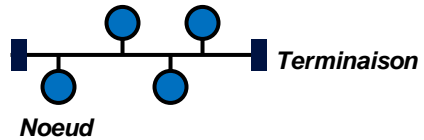
ALLIANCE

Echelon Network

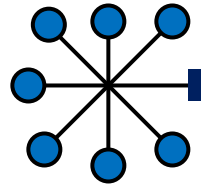


Network Topologies & Transceivers

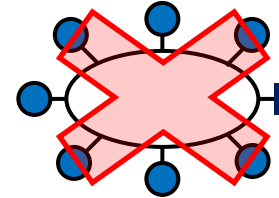
Bus



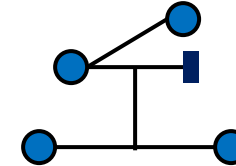
Star



Loop



Free



Types	Speed	Topology	Nodes	Distance
TPT/XF1250	1.25 Mbps	Bus	64	500 Meters
FTT-10	78 Kbps	Bus	64	2200 Meters
FTT-10	78 Kbps	Free & Star	64	500 Meters
Radio	19.5Kbps	RF		50 Meters
PLT-21	5 Kbps			

MICRO THERMO ALLIANCE

Echelon Communication Cable

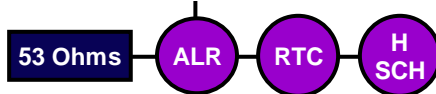
2 Wire Twisted Pair, NO Shield

- **BELDEN - #16 8471**
 - *Use for main Echelon communication drop for each channel home run to Data Logger*
- **BELDEN - #16 8471**
 - *Use for Node to Node Communication within each Echelon Channel*

LARGE SUPERMARKETS

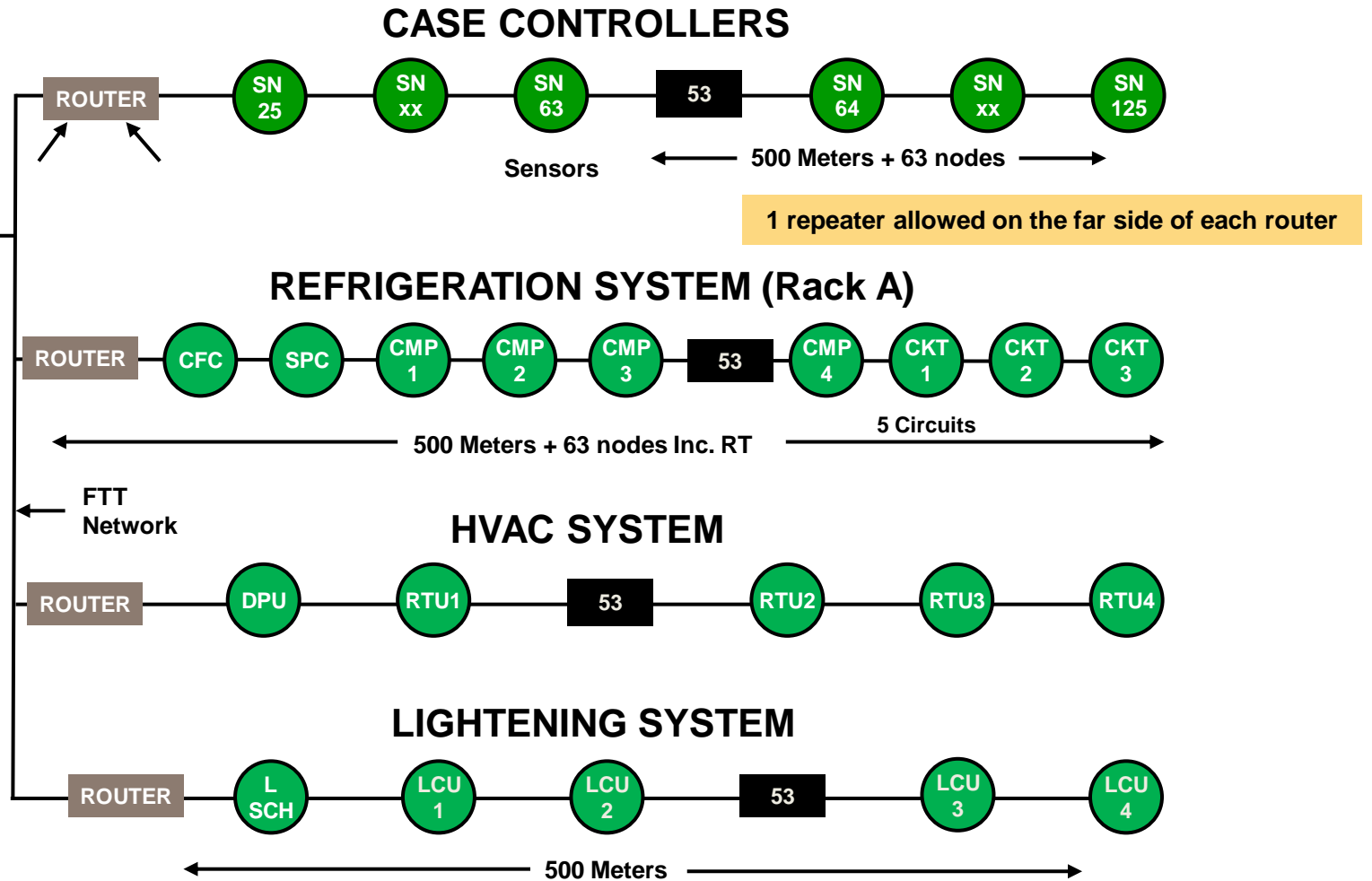
Network – Backbone and Channels

Total 315 Nodes
(Inc. PC & RTC)
2.5 Kilometers



Special Echelon Network Requirement

- Each network channel will begin with router/repeater
- Each channel will have termination resistor mounted on the router for shipping
- Check resistance at router
- Check resistance at end of each channel
- Resistance must be 53 – 58 ohms
- If high resistance is measured at the end of channel....move termination resistor to best location to balance network resistance



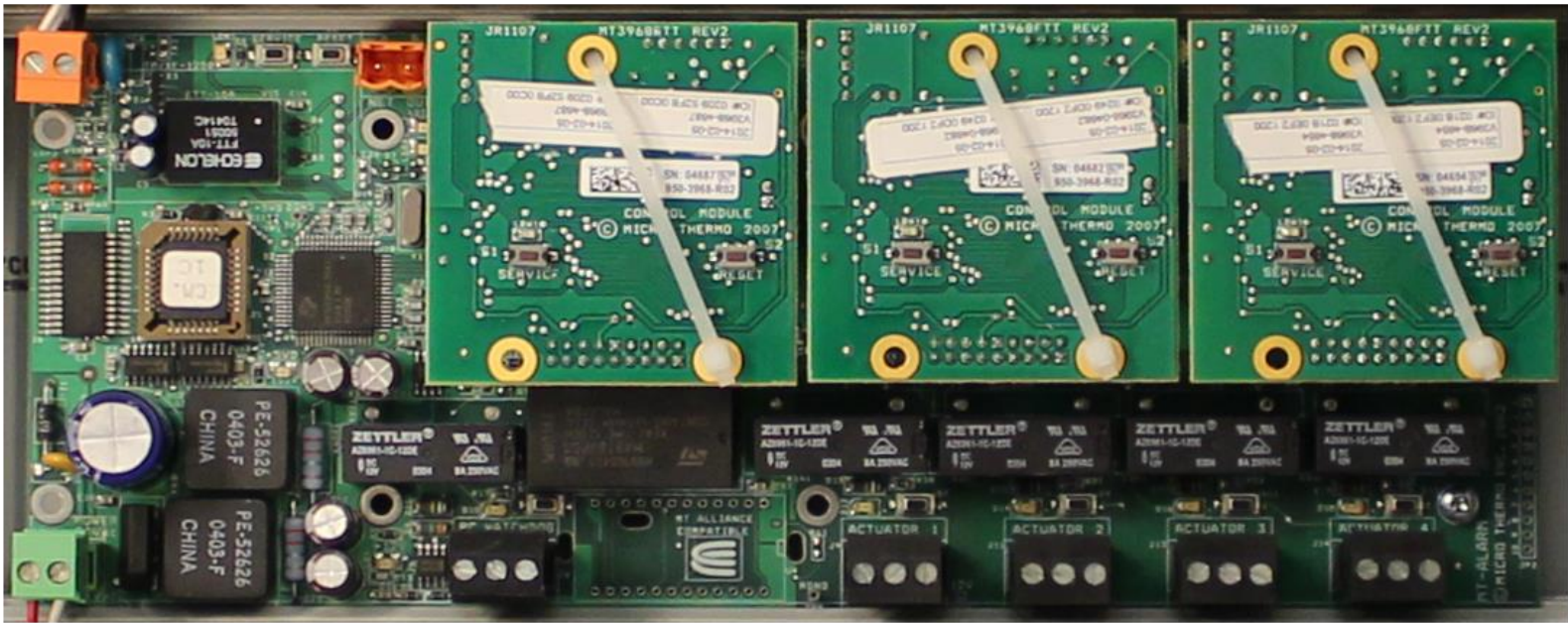
MICRO THERMO ALLIANCE

Industrial Computer



MICRO THERMO ALLIANCE

Backbone Components



MICRO THERMO ALLIANCE

Industrial Computer with KVM

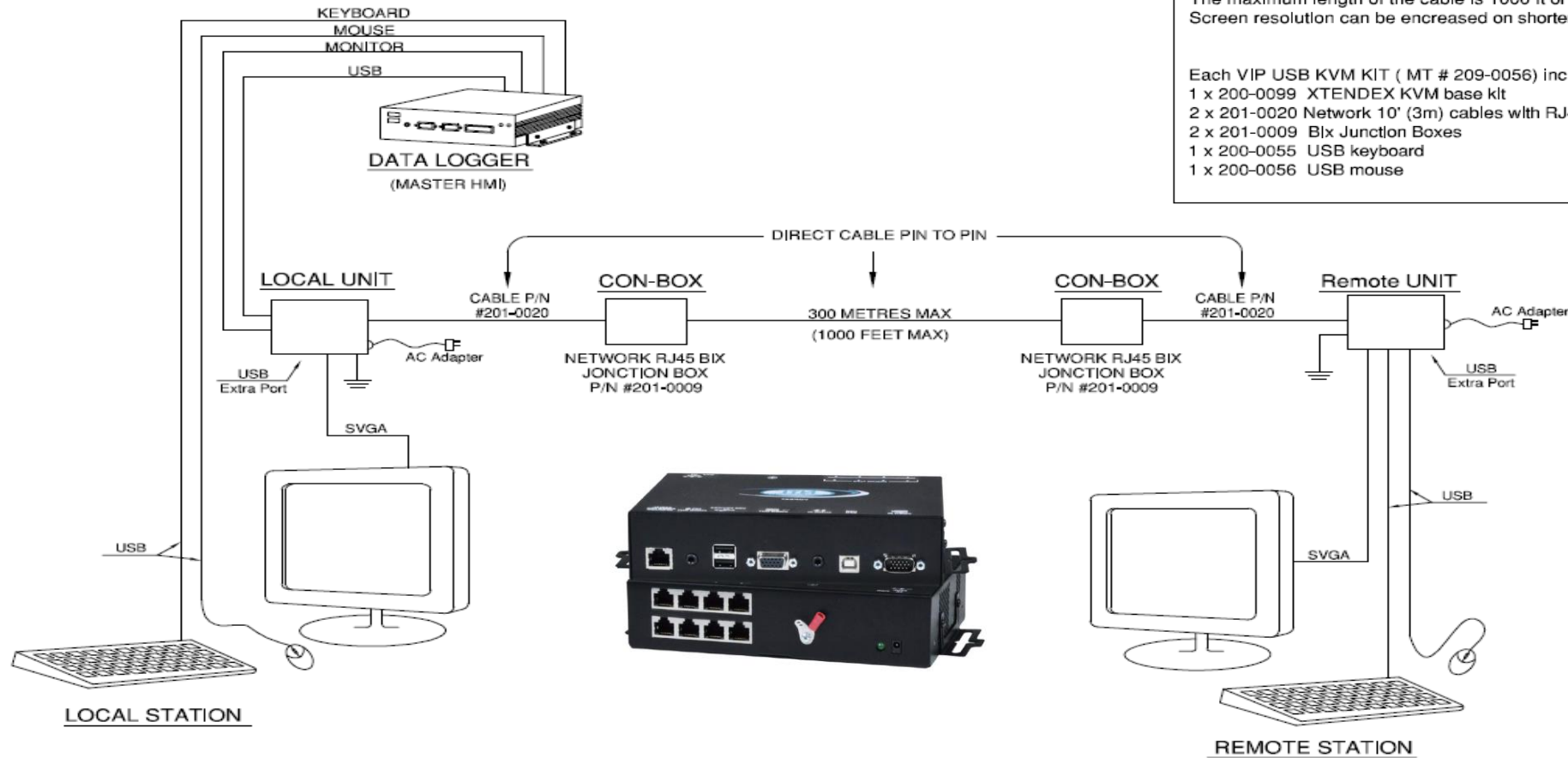
The XTENDEX (NTI) KVM base kit (MT # 200-0099) allows access to a computer system from an additional remote console (keyboard, monitor and mouse). It includes a local unit, a remote unit (URKVM), 1 cable kit and two power adapters. This kit does not include the required additional cable, mouse, keyboard and monitor.

Cascading XTENDEX KVM is not possible. For multiple remote station use the 4 or 8 port local unit and remote unit sold separately.

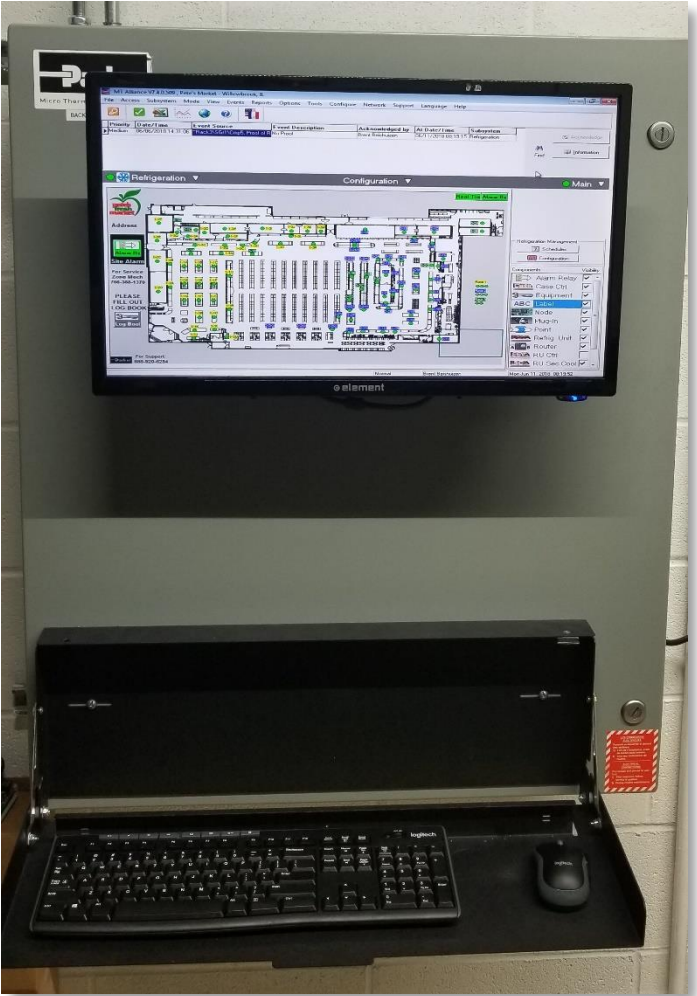
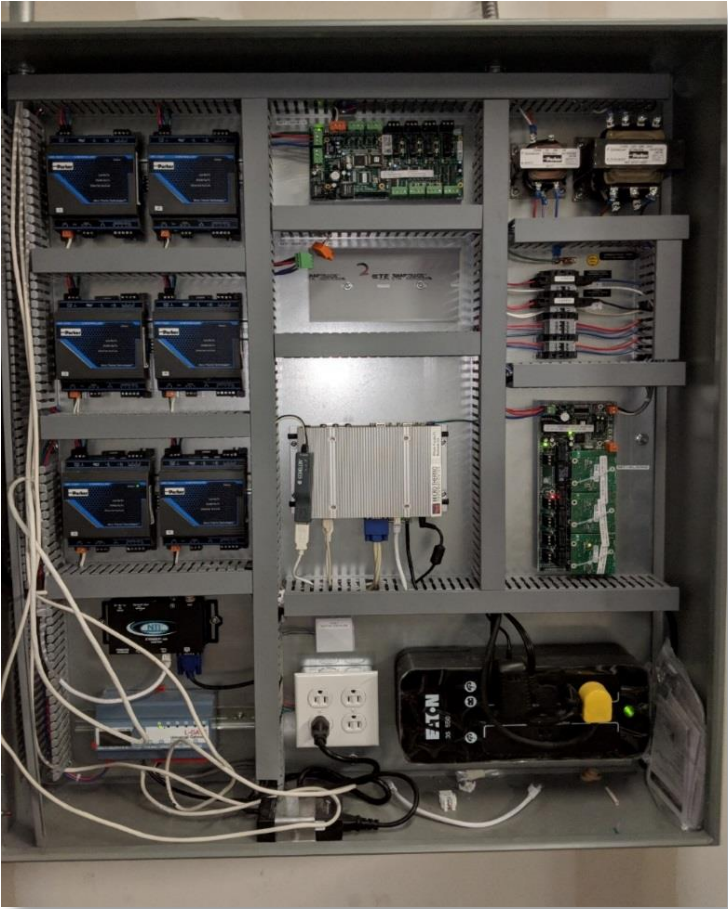
The cable used to interconnect the two control units must be of Category 5 UTP (MT # 600-0050). (4 pairs of wires connected to RJ45 connectors, pin to pin). The maximum length of the cable is 1000 ft or 300 meters away. Screen resolution can be increased on shorter distance.

Each VIP USB KVM KIT (MT # 209-0056) includes the following :

- 1 x 200-0099 XTENDEX KVM base kit
- 2 x 201-0020 Network 10' (3m) cables with RJ45 connectors
- 2 x 201-0009 Bix Junction Boxes
- 1 x 200-0055 USB keyboard
- 1 x 200-0056 USB mouse



MICRO THERMO ALLIANCE





Application of **ALLIANCE**

Intelligent Refrigeration Controls

Suction Group Control

- PID control for suction pressure
- Floating suction pressure
- Optimized algorithms for reducing compressor cycling
- Disregards faulty compressors in refrigeration control strategies

Compressor Control

- Fail-safe switch back
- Equalized Run Time
- Supports 2 un-loaders per compressor
- Supports VFD
- Digital Discus & Digital Scroll
- Inputs
 - Safety Line Monitoring
 - Proof-of-running
 - Xproof-of-running



MICRO THERMO ALLIANCE

Intelligent Controllers

Condenser Control

- PID or Sequential Control
- Air Cooled or Evaporative
- Fixed or Variable Speed Fans
- VFD application
- Split Logic on Outdoor Temp, Heat Reclaim or both
- Automatic fail-safe
- Floating Head strategies adaptable



Circuit Control

- Controls refrigeration, defrost, off-time and drip cycle
- Integrated scheduler for each refrigeration circuits
- Defrost types supported :Hot Gas, Electric, Off Cycle, Pulse, Warm Fluid
- Defrost termination on time or temperature

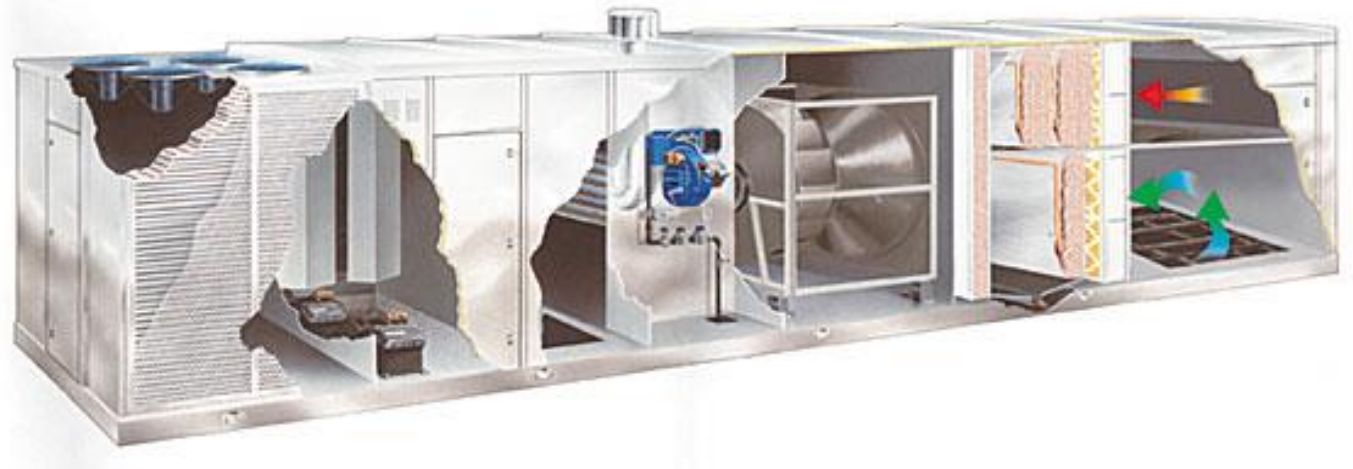


MICRO THERMO ALLIANCE

Intelligent Controllers

HVAC

- **Controls a wide variety of HVAC units**
RTU's, AHU's, DPU's, Make-up air, VAV's,
Custom applications, connectivity to 3rd Party
LON Devices
- **Humidity or Dew Point control**
- **Built-in Load Shed functions**
- **Heat Reclaim**
 - Reheat – Space Heat – Hot water
 - Monitored to prove application



MICRO THERMO ALLIANCE

Anti-Sweat Control

- **Modulation of anti-sweat heaters based on store Dew-point T° or RH%**
- **Built-in Load Shed functions**

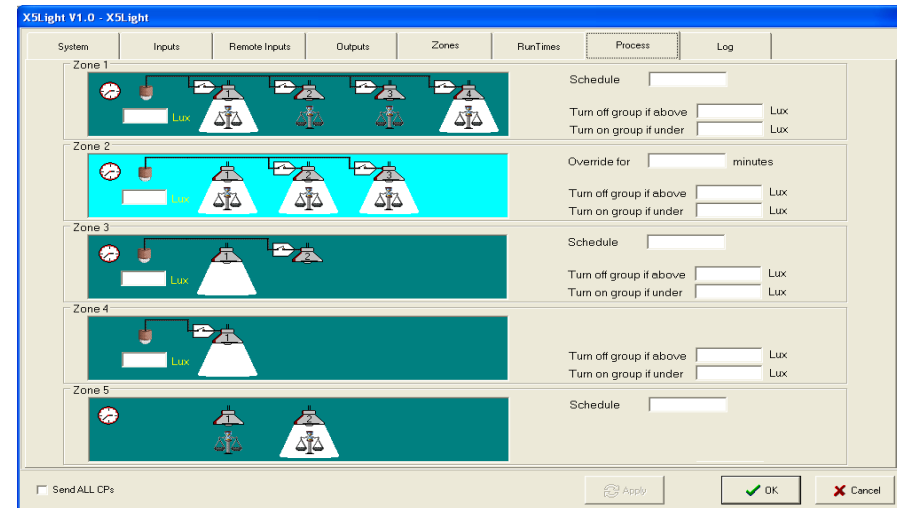


MICRO THERMO ALLIANCE

Intelligent Controllers

Lighting

- **Controls a wide variety of applications**
 - Dimmable lighting
 - Daylight harvesting
 - Multiple zone controls
- **Corporate scheduling capabilities**
- **Built-in Load Shed functions**
- **Astronomical clock**



MICRO THERMO ALLIANCE

ALLIANCE

Smart Nodes – MT-700

MICRO THERMO

NEW MT-700 Smart Nodes

Customizable... adaptable ...intelligent

- Each Smart-Train starts with MT-722G Brain
- Connect up to TEN additional Smart Nodes
- MT-784V
- MT-708R
- MT-748A
- MT-766A
- MT-716UI*



MICRO THERMO

Case Controller – MT-700 Series

- Easily configurable from a Windows[®] based front end
- Optimized for CO2 Control
- Smart Fan Control
- True P/T Superheat Control
- Case Temperature Control



MICRO THERMO

Case Controller

- **3 sets of temperature alarms**
 - Cumulative Alarm for improved food safety and reduced product shrinkage
- **Process model used with custom PID and intelligent algorithm**
 - Controls valve position based on evaporative load and predictive load along with smart fan control



Temperature Monitoring

- Case T° Monitoring with alarm capabilities
- Multiple sets of alarms from **one temperature input point**

SET 1 PRIMARY ALARM – Basic

- High and low set points
- User defined priority

SET 2 SECONDARY ALARM – Efficiency & Food Quality

- High and low set points
- User defined priority

SET 3 CUMULATIVE ALARM – Food Safety

- User defined alarm priority



Food Safety, Food Quality and Monitoring

Refrigerated Unit V5.1 - Fish Case 1

System | Sensors | Control | Alarm Settings | Process | Log

Global Alarm Activation
Status: Alarms enabled
 Enable Alarm Disable Alarm Permanently
 Disable Alarm Temporarily

Cumulative Alarm
 Inactive Set 1 Set 2
Set Time: 4 h 0 m
Cumulative Period: Daily (Since Midnight) Within the last 24 h

Shared Alarm Settings
Show for: Discharge Air Temperature (Control) | Temp vs Location
Description: Fish Case
Optimal Temp: 28.4 °F

Set 1 Settings
High Limit: 42.8 °F | Set Time: 1 h 30 m
Low Limit: 17.6 °F | Set Time: 1 h 30 m
Recall Time: 1 h 0 m
Priority Level: High
Relay: Monitoring Alarm

Set 2 Active
High Limit: 39.2 °F | Set Time: 4 h 0 m
Low Limit: 24.8 °F | Set Time: 4 h 0 m
Recall Time: 1 h 0 m
Priority Level: Medium
Relay: Monitoring Alarm

Individual Alarm Activation
Discharge Air (Control):
Product:
Clean & Defrost Switches:
Defrost Temperature:

Update All Sensors | Ref. Unit Model: Island MT | Temp Control | Apply | OK | Cancel

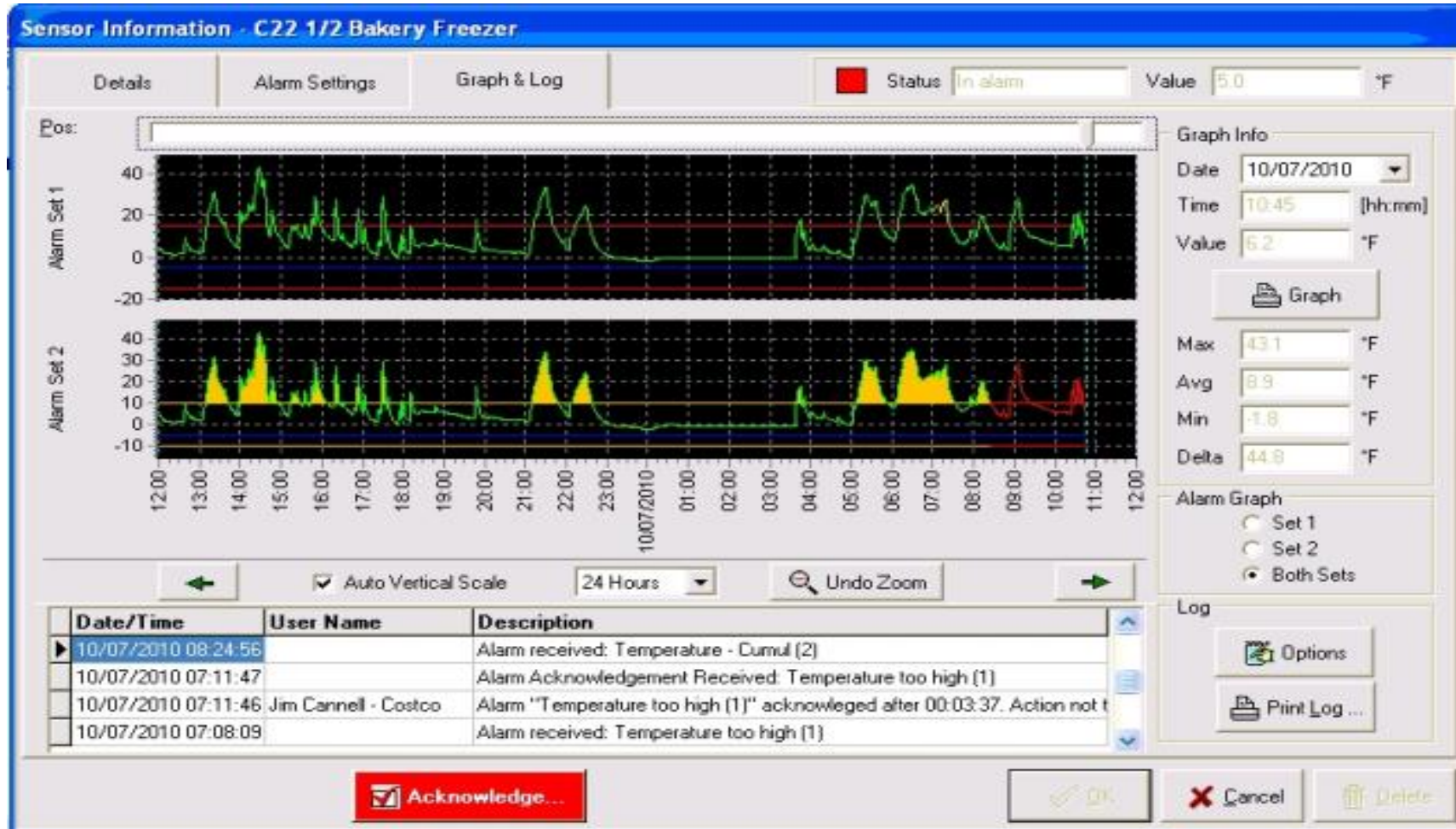
Food Safety with Cumulative Alarm function...

Food Quality and process efficiency with second set of alarm function...

Basic alarming and monitoring capabilities...

MICRO THERMO ALLIANCE

Food Safety



MICRO THERMO

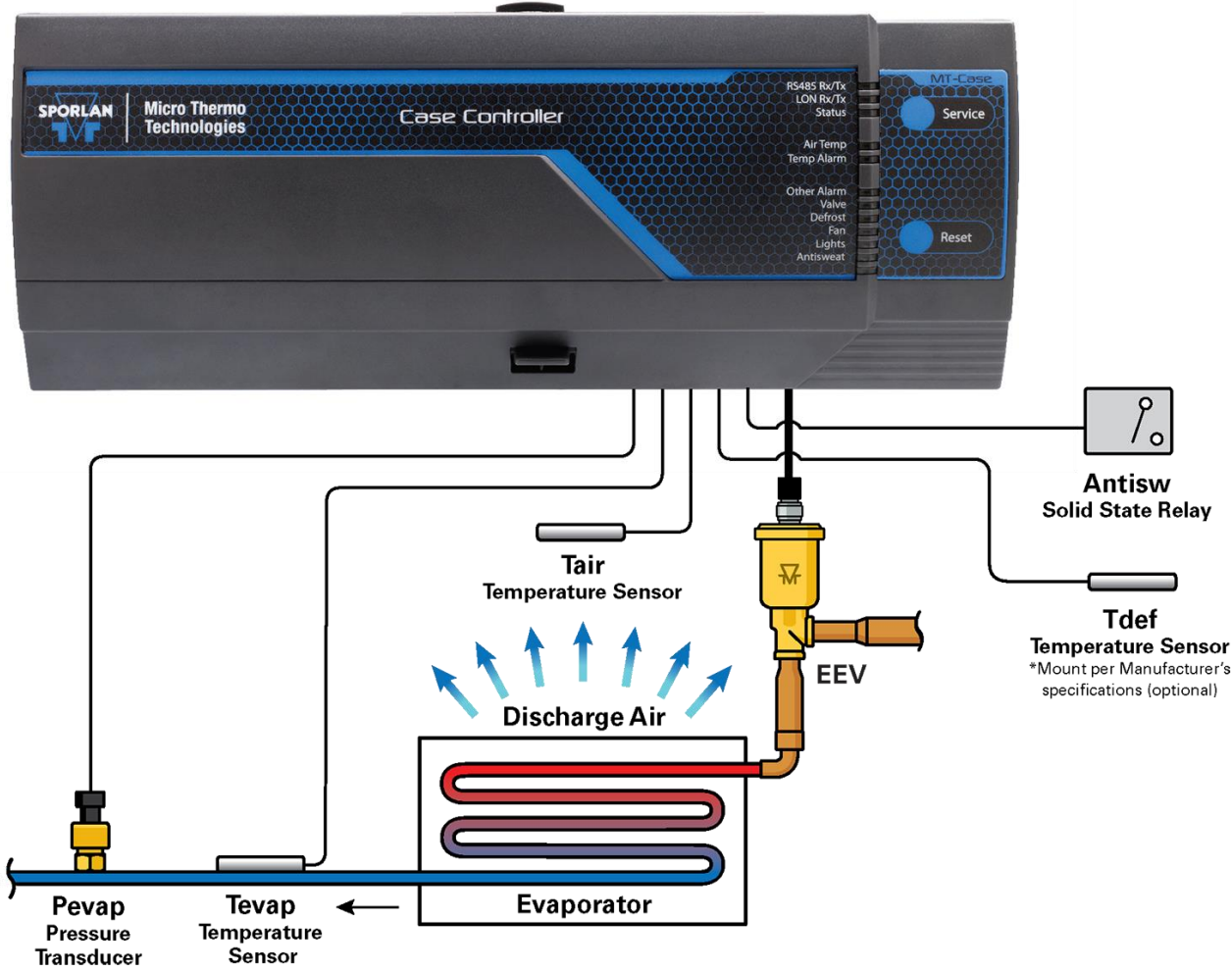
Case Controller

- **Temperature Control with Superheat limit**
- **Superheat Control with temperature limit**
- **Superheat Control priority**
- **Temperature Control priority**
- **Fans – Lights – Anti-sweat – Defrost**



MICRO THERMO CASE CONTROLLER

System Schematic - Example



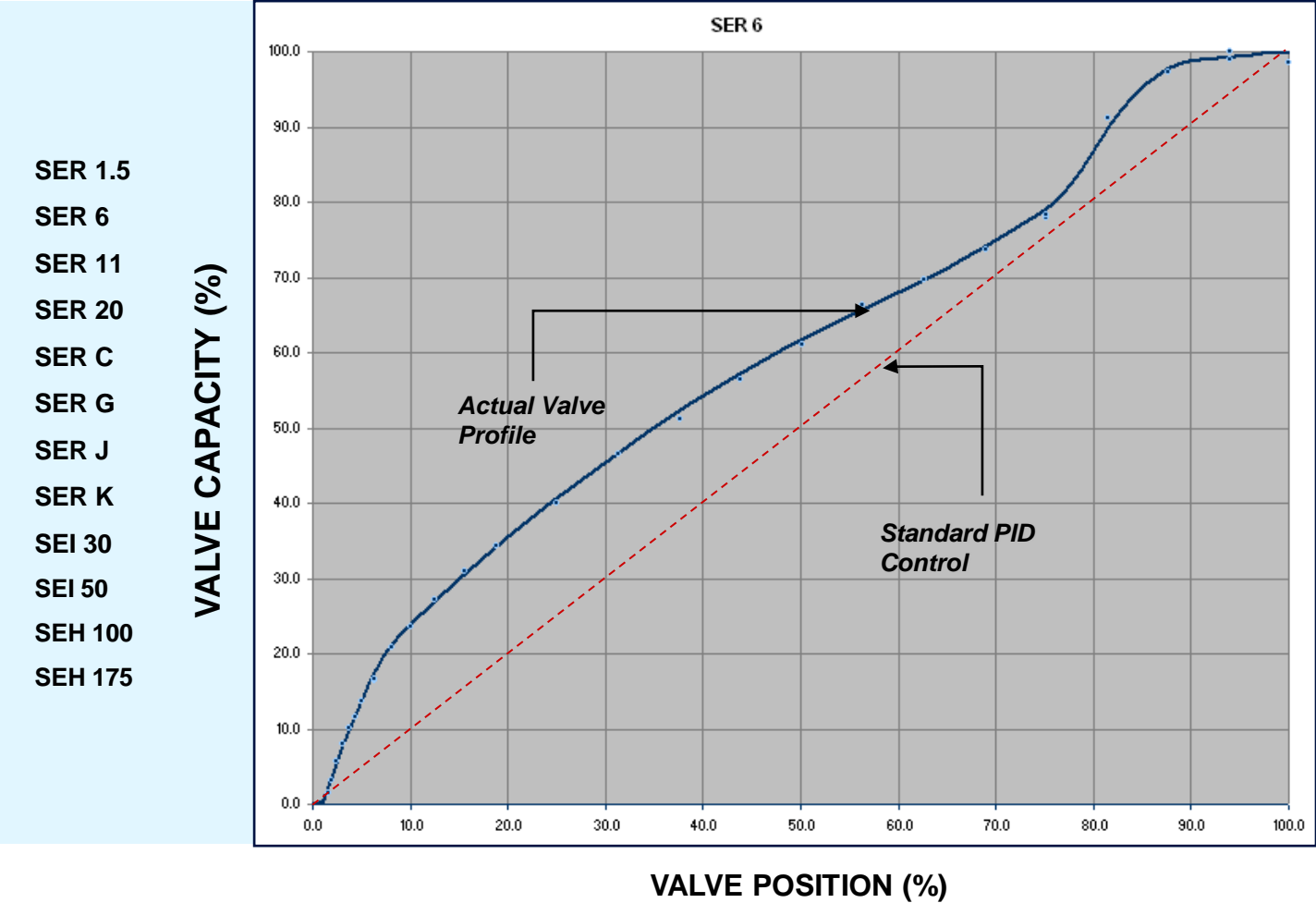
MICRO THERMO

EEV Case Control

- ✓ Stepper or P W M valve
- ✓ Trend Graph Analysis
- ✓ Optimized for Fixture
- ✓ Optimized by Valve Type
- ✓ Base Value Correction
- ✓ Maximum % OPEN
- ✓ Pulldown Correction
- ✓ Delayed Opening After Defrost
- ✓ Liquid Temperature Correction
- ✓ Pressure Drop Correction
- ✓ Flow Direction Correction*axial...radial
- ✓ Ambient Correction



MICRO THERMO EEV Superheat Control



MICRO THERMO CASE CONTROLLER

System Tab

Case Ctrl V7.0 - CCtrl1

System | Config | Inputs/Outputs | Alarm Settings | Control | Process | Graphs | History | Bindings | Log

Details

Identification: CCtrl1

Notes:

Appearance | Delete PlugIn

Configuration

Name: <Ad-hoc>

PlugIn Status: MODIFIED (10/25/2012 15:20:33)

Load | Import | Report | Save As | Export | Delete

Network Settings

Receive Heartbeat: 2 m 10 s

Min Send Time: 0 m 3 s

Max Send Time: 0 m 58 s

Warning:
Decreasing "Min Send Time" or "Max Send Time" will increase network traffic.

Advanced Settings | Restore Defaults

Vacuum / Refrig. Mode

Lineup

Lineup created | Lineup Size: 5 | Split Lineup

Lineup Identification: Lineup-1

Node

Install | Node Version

Thermal Load

Load Type: Other

Circuit Information

Circuit ID: <None> | Refrigerant: R407A

Circuit controller: N/A | Circuit #: N/A

Defrost strategy: N/A

Case Controller Association

CCtrl1-2
CCtrl1-3
CCtrl1-4
CCtrl1-5

Send All CPs | CP updates pending | Current Values | Vacuum Mode | Apply | OK | Cancel



MICRO THERMO CASE CONTROLLER

System Tab – *LOAD TYPE*

The screenshot shows the 'System Tab' configuration for 'Case Controller V8.5.1 - CCtrl2'. The interface includes several sections:

- System Navigation:** Tabs for System, Config, Inputs/Outputs, Alarm Settings, Control, Process (active), Graphs, History, Bindings, and Log.
- Details:** Identification field contains 'CCtrl2'. Notes field is empty. Buttons for 'Appearance' and 'Delete PlugIn' are present.
- Configuration:** Name field contains '<Ad-hoc>'. PlugIn Status is 'MODIFIED (2/3/2024 12:56:23)'. Buttons for 'Load', 'Import', 'Report', 'Save As', 'Export', and 'Delete' are available.
- Network Settings:** Receive Heartbeat (2 m 10 s), Min Send Time (0 m 5 s), and Max Send Time (0 m 58 s). A warning states: 'Warning: Decreasing "Min Send Time" or "Max Send Time" will increase network traffic.' Buttons for 'Advanced Settings' and 'Restore Defaults' are present.
- Fluid in Coil:** Radio buttons for 'HFC, CO2' (selected), 'Glycol, Brine', and 'Slave'. A note says: 'Once a selection has been made, you must delete and recreate a new CCtrl plug-in if you need to change this setting.'
- Lineup:** 'Ctrl created' button and 'Lineup Size' dropdown set to '1'. Lineup Identification field contains 'Lineup-13'.
- Node:** 'Information' button (highlighted in green) and 'Node Version' button.
- Thermal Load:** 'Load Type' dropdown menu is open, showing options: Coffin, Coffin, Fixed Load, HVAC Evaporator, Medium Temp with Doors, Open End Cap, Open Multi-Deck, Open Single Deck, Other, POS (Point of Sales) Freezer, POS (Point of Sales), Med Temp, Preparation Area 38°F (3.3°C), Reach-In Freezer/Doors, Reserve with Doors, Service Case, Walk-In Freezer, Walk-In, Fresh Food. 'Coffin' is selected. A note says: 'Can be used by a DT-EEPR'. Other fields include 'Control Temperature', 'Circuit Information', 'Circuit Controller Type', 'Circuit', 'Circuit Controller', 'Defrost Strategy', 'Defrost Direction', 'Suction Group', 'Suction Group Controller', and 'Rack'.
- Operating Mode:** 'Casa Operating Mode' button.
- Footer:** 'Send All CPs' checkbox, 'Current Values' button, 'Apply', 'OK', and 'Cancel' buttons.

MICRO THERMO CASE CONTROLLER

Configuration Tab

Case Ctrl V7.0 - CCtrl2

System Config Inputs/Outputs Alarm Settings Control Process Graphs History Bindings Log

Node setup
Process Control Type: Temperature Control with Superheat Limit

FAN
Fan Output: Relay #1 N/A

Defrost
End Defrost Source: <None>
Electric Defrost Output: <None>

Lighting & Curtains
Local and Remote Lighting Schedule
 Local Remote Source: Schedule
 Remote Schedule: <None>
Lights Output: Relay #3 N/A
Curtains: <None>

Anti Sweat
Anti Sweat Source: <None>

Dual Use
 Dual Temp. Unit
DUS Config
DUS Source Type: Software Switch N/A

Cleaning
Clean Source: Local Switch N/A
Local Switch: DI1 Signal ON = Refrig. OFF = Cleaning

Door Ajar
Door Ajar Source Type: Local Switch N/A
Connector: DI2 Signal ON = Open OFF = Close

Send All CPs
CP updates pending Current Values Vacuum Mode

Local Clean Software DUS
Apply OK Cancel



MICRO THERMO CASE CONTROLLER

Inputs / Outputs Tab

Case Ctrl V7.0 - CCtrl2

System Config **Inputs/Outputs** Alarm Settings Control Process Graphs History Bindings Log

Inputs

	Source	Manufacturer / Node	Model / Network Variable	Broadcast Binding	Diagram	Calibration / Invert	Value	Pressure Range
Evaporator Pressure	Pevap	Micro Thermo	952-0008 652/4 psig (0.5-4.5V)	<input type="checkbox"/>		- +	N/A	psig <input checked="" type="checkbox"/> 4X
	<None>							
Evaporator Temperature	Temp	Micro Thermo	023-0076 Therm 10k T2 Blue Lead	<input type="checkbox"/>		- +	N/A	°F
Control Temperature	Tair	Micro Thermo	023-0073 Bullet Therm 10k T2 Green Lead	<input type="checkbox"/>		- +	N/A	°F
Auxiliary Temperature	<None>							
Input DI1 as Clean Switch	DI1	<Generic>	Low Side Switch for MT-500	<input type="checkbox"/>		<input checked="" type="checkbox"/>	<input type="radio"/>	
Input DI2 as Door Ajar	DI2	<Generic>	Low Side Switch for MT-500	<input type="checkbox"/>		<input checked="" type="checkbox"/>	<input type="radio"/>	

Relays

	Output	Invert	Value
FAN	Relay #1	<input type="checkbox"/>	<input type="radio"/>
Lighting	Relay #3	<input type="checkbox"/>	<input type="radio"/>

Outputs

Valve: VALVE, Sporlan, SER-C

Flow Direction: Axial Radial

Flow Diagram:

Calibration: - +

Value: N/A %

Environment Variables

	Source	Node	Network Variable	Broadcast Binding	Value	Pressure Range
Liquid Pressure	Network	<None>	<None>	<input checked="" type="checkbox"/>	N/A	psig <input checked="" type="checkbox"/> 4X
Liquid Temperature	Network	<None>	<None>	<input type="checkbox"/>	N/A	°F
Space Temperature	Network	<None>	<None>	<input type="checkbox"/>	N/A	°F
Space Humidity	Network	<None>	<None>	<input type="checkbox"/>	N/A	%rh
Grouped Envir. Variables	<None>					

Send All CPs

CP updates pending Current Values **Vacuum Mode**

Local Clean Software DUS

MICRO THERMO CASE CONTROLLER

Control Tab

The screenshot shows the 'Control' tab of the Case Ctrl V7.0 - CCtrl1-2 software. The interface includes a top navigation bar with tabs for System, Config, Inputs/Outputs, Alarm Settings, Control (active), Process, Graphs, History, Bindings, and Log. Below the navigation bar are 'Basic View' and 'Advanced View' buttons. The main area is divided into a left sidebar with menu items: Valve, Superheat, Pulldown, Temperature Control, Environmental Corrections, Defrost, Door Ajar, Fans, Lighting, Anti Sweat, and Emergency. The 'Valve' menu is expanded, showing a 'Settings' dialog box with the following values: Base %Open (40.0 %), Corrected (N/A %), and Max %Open (1.80 x, N/A % = N/A %). At the bottom of the window, there is a status bar with a checked 'Send All CPs' checkbox, a 'Current Values' button, a yellow 'Vacuum Mode' indicator, and 'Apply', 'OK', and 'Cancel' buttons. A red text message 'CP updates pending' is visible in the bottom left corner.

MICRO THERMO CASE CONTROLLER

Control Tab

The screenshot shows the 'Control' tab of the Case Controller V8.5.1 - CCtrl2 software. The interface includes a top navigation bar with tabs for System, Config, Inputs/Outputs, Alarm Settings, Control (active), Process, Graphs, History, Bindings, and Log. Below the navigation bar are buttons for 'Basic View' and 'Advanced View'. The main area is divided into a left sidebar with menu items: Valve, Superheat (with a right-pointing arrow), Pulldown, Temperature Control, Environmental Corrections, Defrost, Fans, Lighting, Anti Sweat, Emergency, and Energy. The 'Superheat' menu item is expanded to show a 'Settings' dialog box with three input fields: 'Cut Off' set to 3.0 °F, 'Band' set to +4.0 °F, and 'Threshold' set to =7.0 °F. At the bottom of the window, there is a checkbox for 'Send All CPs', a 'Current Values' button, and three buttons: 'Apply', 'OK', and 'Cancel'.



MICRO THERMO CASE CONTROLLER

Control Tab

The screenshot shows the 'Control' tab of the Case Controller V8.5.1 - CCtrl2 software. The interface includes a top navigation bar with tabs for System, Config, Inputs/Outputs, Alarm Settings, Control (active), Process, Graphs, History, Bindings, and Log. Below the navigation bar are 'Basic View' and 'Advanced View' buttons. A left sidebar contains a list of control functions: Valve, Superheat, Pulldown (selected with a right-pointing arrow), Temperature Control, Environmental Corrections, Defrost, Fans, Lighting, Anti Sweat, Emergency, and Energy. The main area displays the 'Settings' for the 'Pulldown' function, which is checked. The 'Initial %Open' is set to 3.0, and the 'Maximum Duration' is set to 07:00 mm:ss. A 'Start Pulldown' button is present. Below the settings is a 'Lock-Up Recovery' section with a checkbox for 'Reduce opening to'.

Case Controller V8.5.1 - CCtrl2

System | Config | Inputs/Outputs | Alarm Settings | Control | Process | Graphs | History | Bindings | Log

Basic View | Advanced View

Valve

Superheat

Pulldown >>

Temperature Control

Environmental Corrections

Defrost

Fans

Lighting

Anti Sweat

Emergency

Energy

Settings

Pulldown

Initial %Open

3.0 × N/A % = N/A %

Maximum Duration 07:00 mm:ss

Start Pulldown

Lock-Up Recovery

If valve sticks at maximum opening for more than 1 hour

Reduce opening to

Send All CPs

Current Values

Apply

OK

Cancel



MICRO THERMO CASE CONTROLLER

Control Tab

The screenshot displays the 'Control' tab of the Case Controller V8.5.1 - CCtrl2 software. The interface includes a top navigation bar with tabs for System, Config, Inputs/Outputs, Alarm Settings, Control (active), Process, Graphs, History, Bindings, and Log. Below this is a sub-menu with 'Basic View' and 'Advanced View' options. A left-hand sidebar lists various system components: Valve, Superheat, Pulldown, Temperature Control (highlighted with a double arrow), Environmental Corrections, Defrost, Fans, Lighting, Anti Sweat, Emergency, and Energy. The main area shows the 'Settings' window for the 'FID-A' strategy. Under 'PID Settings', three correction types are checked: 'Use Proportional Correction' (Band: 10.8 °F), 'Use Integral Correction' (Band: 3.01 °F, Time Constant: 25 m), and 'Use Long Term Correction' (Band: 0.90 °F, Time Constant: 6 h 0 m). A 'Restore Defaults' button and an unchecked 'Activate Minimum Opening' checkbox are also visible. At the bottom, there are buttons for 'Send All CPs', 'Current Values', 'Apply', 'OK', and 'Cancel'.



MICRO THERMO CASE CONTROLLER

Control Tab

Case Controller V8.5.1 - CCtrl2

System | Config | Inputs/Outputs | Alarm Settings | **Control** | Process | Graphs | History | Bindings | Log

Basic View | Advanced View

Valve

Superheat

Pulldown

Temperature Control

Environmental Corrections >>

Defrost

Fans

Lighting

Anti Sweat

Emergency

Energy

Settings

- Space Temperature N/A
- Space Humidity
 - New Air Ratio 4.0 %
- Night Correction N/A
 - Night Factor × 0.90
 - Start of Day 06:00 hh:mm
 - Start of Night 23:00 hh:mm
- Total Load Correction N/A
- Liquid Temperature N/A
- Liquid Pressure N/A
 - Liquid Pressure Reference 131.3 psi
- Total Environmental Correction N/A
- Hold last valid environment variable value
 - Hold Time 30 min
 - Effective holding time 00:00 mm:ss

Send All CPs

Current Values

Apply OK Cancel

MICRO THERMO CASE CONTROLLER

Alarms Tab

The screenshot shows the 'Alarms Tab' of the 'Case Ctrl V7.0 - CCtrl1-2' interface. The top navigation bar includes tabs for System, Config, Inputs/Outputs, Alarm Settings, Control, Process, Graphs, History, Bindings, and Log. The 'Alarm Settings' tab is active, displaying the 'Control Temperature Alarm' configuration.

Alarm Activation: Status is N/A. Options include Enable Alarm, Disable Alarm Permanently, and Disable Alarm Temporarily.

Cumulative Alarm: Inactive, Set 1, Set 2.

Alarm Settings: Description: Fresh Meat. Optimal Temp: 24.8 °F. A 'Pick Alarm Settings' button is present.

Set 1 Settings: High Limit: 39.2 °F, Low Limit: 17.6 °F, Recall Time: 1 h 0 m, Priority Level: High, Relay: ar1. Set Time: 0 h 0 m.

Set 2 Settings: Set 2 Active.

Indicator LEDs: A button labeled 'Indicator LEDs' is located at the bottom right of the settings area.

Alarm List: A list of alarms with checkboxes: Superheat (checked), Door Ajar (unchecked), Sensor Failure (checked), Missing Defrost Data (checked), Missing Net Refrig. Data (checked), and Missing Environmental Data (unchecked).

Notes: A yellow box states: 'In Vacuum Mode, all alarms are disabled except Temp Sensor Failure from local sensors.'

Footer: Includes 'Send All CPs' (checked), 'CP updates pending', 'Current Values', 'Vacuum Mode' (highlighted in yellow), 'Apply', 'OK', and 'Cancel' buttons.



MICRO THERMO CASE CONTROLLER

Process Tab

Case Ctrl V7.0 - CCtrl1

System | Config | Inputs/Outputs | Alarm Settings | Control | **Process** | Graphs | History | Bindings | Log

Lights Override
Turn Lights OFF

Setpoint
Case 10.0°F **Case** 35.0°F
Clean

Control Temperature 8.3 °F
Refrigeration Circuit N/A

Door Open

Fan Override
 Anti Sweat Override
 EEV Override

Open 35.23 %

Temperature Control with Superheat Limit

Evaporator Pressure 11.0 psig
Evaporator Temperature -4.0 °F

Space RH Invalid %
Auxiliary Temperature 41.5 °F

Superheat Calculation


Evaporator Temperature -4.0 °F
Saturated Temperature -27.9 °F
 Superheat 23.9 °F

Dew Point Invalid °F
Anti Sweat 50.0 %

Notes

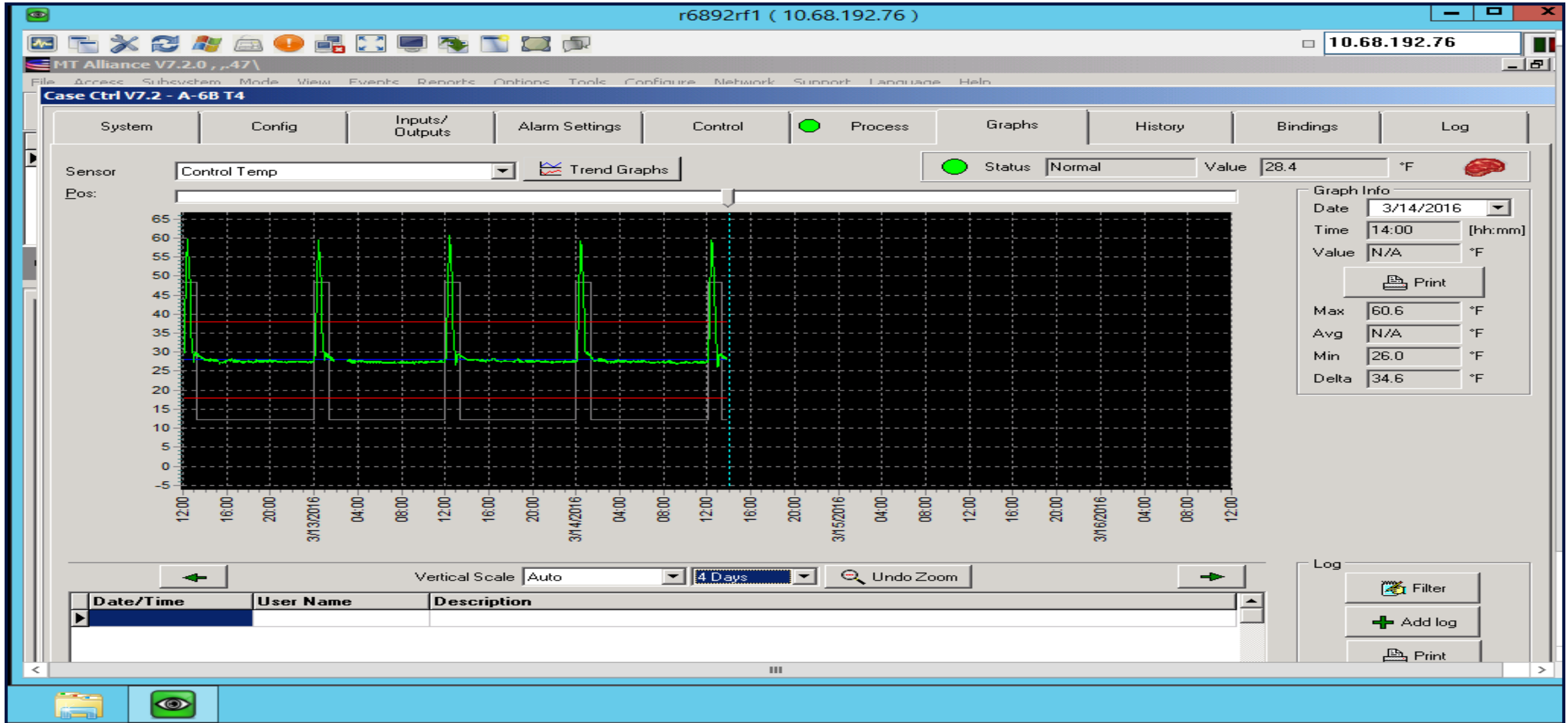
Liquid Temperature Invalid °F

Refrigeration Mode

Send All CPs Local DUS 

MICRO THERMO CASE CONTROLLER

Graphs Tab



MICRO THERMO CASE CONTROLLER

INITIAL SETUP

- ✓ BASE VALUE
- ✓ REFRIGERATION RANGE
- ✓ SUPERHEAT
- ✓ PULLDOWN
- ✓ TEMPERATURE CONTROL
- ✓ ENVIRONMENTAL CONDITIONS

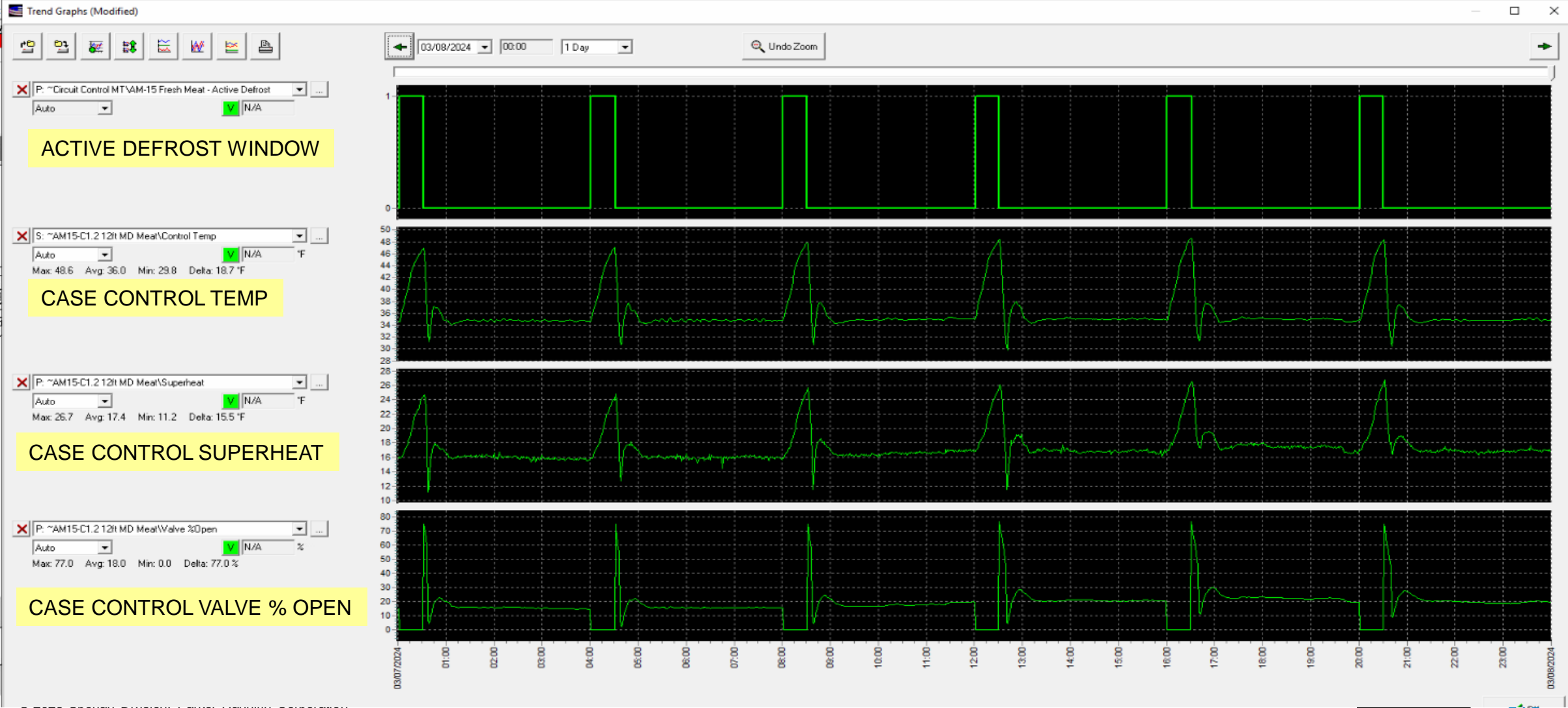
MICRO THERMO CASE CONTROLLER

INITIAL SETUP

- ✓ REFRIGERANT: CO2
- ✓ CASE TYPE: OPEN MULTIDECK
- ✓ LOAD: 13,125 BTUH
- ✓ TEMP: +20
- ✓ EEV: SER – A (39,480btu) 33% Loaded

MICRO THERMO – Case Control Tuning

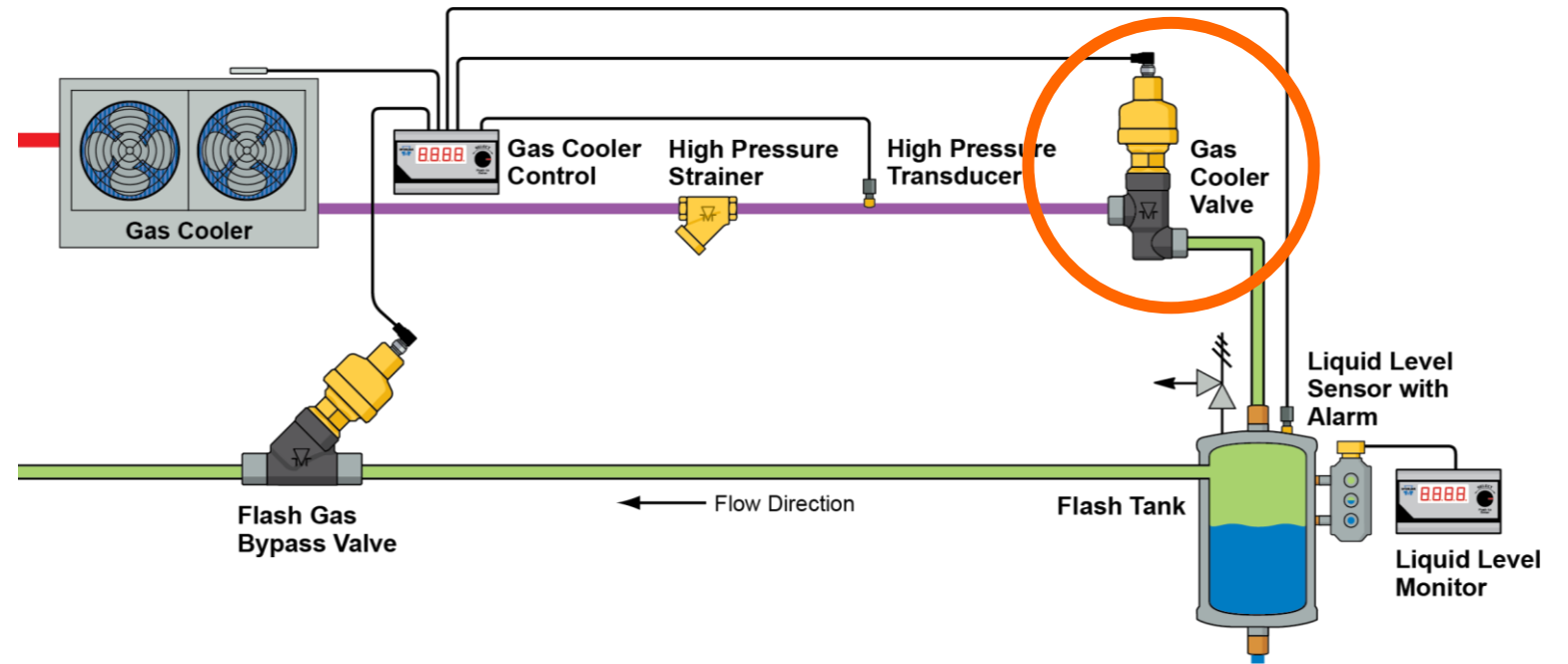
TREND GRAPH



Transcritical CO₂ Flow Controls

GAS COOLER VALVE

- Located on the high pressure side
- Regulates pressure in the condenser / gas cooler
- CO₂ through the valve port drops in pressure
- Valve outlet typically is connected to a flash tank receiver at an intermediate pressure



SPORLAN

Transcritical CO₂ Flow Controls

GC

GAS COOLER VALVE

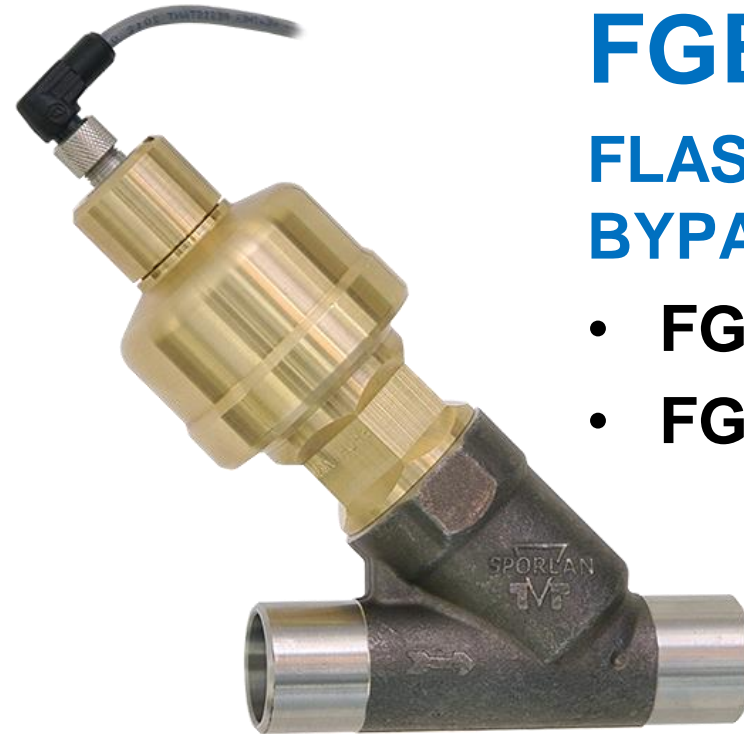
- GC-10
- GC-20
- GC-30
- GC-40
- GC-50



FGB

FLASH GAS BYPASS VALVE

- FGB-60
- FGB-70



MICRO THERMO

MT-700 2 Valve Controller

- Flash Gas Bypass Control
- GC and FGB control
- Main Defrost Valve Control
- Electronic Replacement of A8 and A9 Valves
- CDS Valve Control
- Heat Reclaim Control



MICRO THERMO

MT-700 Condenser / Gas Cooler Controller Train

- **Up to 8 Sections / 16 Fans**
- **Split: Main Valve – Fan Power Output – Vent Valve Output**
- **Fan Control: OAT / COT / COP / DLP / DP**
 - Entering Air
 - Ambient RH
 - Water Relay (Adiabatic)
- **Receiver / Flash Tank**
 - FGB Valve Digital Output
 - Holdback / HPV
 - Pressure Regulation
 - Receiver Pressure / Receiver Empty
 - Liquid Level
- **Heat Reclaim – up to 8 HR subsystems**
- **Up to 8 HR subsystems**



MICRO THERMO

MT-700 Condenser / Gas Cooler Controller Train



- **3 Plug-In Tabs**
 - Global
 - Configuration
 - Inputs
- **Control**
- **PID**
- **Staging**
- ▮ **Pressure Limits**

Global | **Config** | Inputs

Control >>

PID

Staging

Pressure Limits

Regulation Strategies

Control from Outside Air Temperature (OAT) only

Variable to regulate: CGC Outlet Temperature

Set Point Calculation: Floating

Set Point

Approach Temperature Set Point: 10.0 °F

Min / Max Outlet Temp Set Point value: 46.0 °F / 80.1 °F

Calculated Outlet Temperature Set Point: 52.5 °F

Fixed Set Point (when OAT is invalid): 60.0 °F

Alternative regulation Set Point

Fixed Set Point (when COT is invalid): 65.0 °F

Keeping a minimum cooling capacity until the Discharge Pressure falls below threshold:

OK Cancel

MICRO THERMO

MT-700 Suction Group Controller Train



- 4 Suction Groups
- 16 Compressors per Suction Group
- Compressor Digital Inputs:
 - Safety Line Alarm
 - Low Oil Level
 - Proof of Running
 - Oil Injection
 - Digital
 - 1 Alarm
 - VFD
 - 1 Alarm
 - 1 out each: Bypass / Reset / Enable

MT-700 Suction Group Controller V8.5.6 - Suction Controller

System Process I/O Assignments Bindings Log

Rack: Rack LMP Normal

Discharge Groups

DG1: Low Temp. Press: 417.6 psig Temp: 141.9 °F

DG2: Medium temp. Press: 809.0 psig Temp: 158.6 °F

Suction Groups

SG1: Group -20 Normal SetPt: -20.0 °F Value: -19.7 °F ReqCap: 68.9 % Actual: 50.0 %

SG2: Group +20 Normal SetPt: 20.0 °F Value: 20.0 °F ReqCap: 47.5 % Actual: 47.4 %

User Defined Inputs (3) Slave Outputs (0) Oil Management Main Defrost Valves (0) Flash Gas Bypass (0) Subcoolers (0) Edit Mode

Apply OK Cancel

MICRO THERMO

MT-700 Suction Group Controller Train

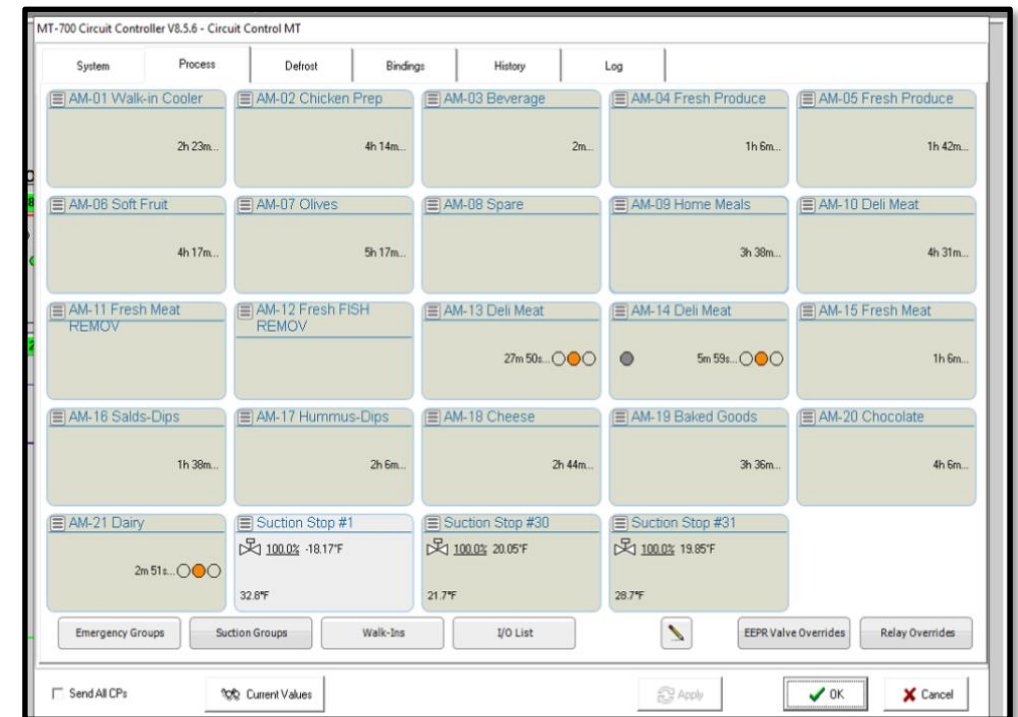


- 4 Discharge Groups
- Digital Inputs:
 - 1 discharge pressure/group
 - 1 discharge temperature/group
 - 1 High Pressure switch/group
 - 1 High Pressure re-set/group
 - 2 Sub Cool
 - 2 DO with 3 stages
 - 1 sub-cool inlet temperature
 - 1 sub-cool outlet temperature
 - Main Defrost Valve
 - Oil Control

MICRO THERMO

MT-700 Circuit Controller Train

- Configurable I/O
- Regulate up to 24 Circuits
- Control up to 80 relays
- Support for TEV or Case Controllers
- Dual-Temp EEPRs
- Circuit pressure regulation based on local or remote pressure, or based on case temperatures
- Floating circuit pressure and suction pressure set points
- Alarming on circuit superheats



MICRO THERMO ALLIANCE

Graphical User Interface

Leak Detection

Energy

Refrigeration

T° Monitoring

VFD

Generation

HVAC

Lighting

Micro Thermo
Manages your entire chain,
right from your desktop,
laptop, tablet, or smartphone!