UNITED STATES DISTRICT COURT

MIDDLE DISTRICT OF LOUISIANA

ELZIE BALL, ET AL	**CIVIL ACTION NO. 13-CV-368**
VERSUS	**JUDGE BRIAN A. JACKSON**
JAMES M. LEBLANC, ET AL	**MAGISTRATE JUDGE REIDLINGER**

DEFENDANTS' SUBMISSION OF HEAT REMEDIATION PLAN

NOW INTO COURT, through undersigned counsel, come BURL CAIN, Warden, Louisiana State Penitentiary ("LSP"); JAMES LEBLANC, Secretary of the Louisiana Department of Public Safety and Corrections; ANGELIA NORWOOD, Assistant Warden, Louisiana State Penitentiary and LOUISIANA DEPARTMENT OF PUBLIC SAFETY AND CORRECTIONS; (referred to jointly as "Defendants"), who make the following submission as Defendants' heat remediation plan ("Plan") as ordered by this Court. [Doc. 87, pages 97 and 98.]

A. PROCEDURAL HISTORY

On December 19, 2013, this Court ordered, among other things, that the Defendants prepare and submit a Plan, which will immediately lower and maintain the heat index in the Angola death row tiers at or below 88 degrees Fahrenheit from April 1 through October 31, monitor, record, and report the temperature, humidity, and heat index in each of the death row tiers every two hours on a daily basis from April 1 through October 31, provide Plaintiffs, and other death row inmates who are at risk of developing heat-related illnesses, with at least one "cold" shower per day, and direct access to clean, uncontaminated ice and/or cold drinking water during their tier time and the remainder of their time in which they are confined to their cells. The last section of that portion of the Order was an omnibus provision to cover "any and all relief that is necessary to comply with the Court's order and the prevailing constitutional

standards." The order dictated that the Plan shall be submitted to the Court no later than 5:00 p.m. on February 17, 2014.

B. HEAT AND HUMIDITY REDUCTION AND MONITORING

Defendants have retained Mr. Frank Thompson, P.E., Thompson Luke & Associates, LLC, to promulgate a plan to maintain the heat index in the Angola death row tiers at or below 88 degrees Fahrenheit from April 1 through October 31, and monitor, record, and report the temperature, humidity, and heat index in each of the death row tiers every two hours on a daily basis from April 1 through October 31. Mr. Thompson's CV is attached hereto as Exhibit "A" and his heat remediation and monitoring plan, with exhibits B1-B4, is attached hereto as Exhibit "B" *in globo*.

In short, Mr. Thompson's calculations show that the death row building would require approximately nine tons of air conditioning system capacity for each of the eight tiers. Mr. Thompson proposes use of a ten ton capacity system for each tier. A ninth ten ton capacity AC unit would be purchased and stored onsite should a unit fail. The AC units would utilize the existing heating, ventilation, and air conditioning ("HVAC") system in the building. As shown by Mr. Thompson's calculations, the proposed HVAC system would be capable of maintaining the heat index below 88 degrees Fahrenheit for each tier.

In addition, the temperature and humidity would be automatically monitored and recorded by a hard wired climate monitoring system for each tier. The data would be transmitted and stored as part of the LSP computer network system. The heat and humidity sensors will transmit their readings to the building's existing Johnson Control energy management system every 15 minutes. The system is capable of producing graphs showing temperature/humidity

conditions over any time period. The reports can be generated on an as-requested basis, such as daily, for example. The data can be accessed and provided to any parties with an interest in same.

The HVAC temperature and humidity monitoring system does not calculate the heat index using the formula established by the National Weather Service ("NWS"). To determine the heat index used by the NWS simply requires taking the recorded temperature and humidity data and utilizing the NWS heat index calculator found on the NWS website at http://www.hpc.ncep.noaa.gov/html/heatindex.shtml. Inputting those numbers into the formula would provide the NWS heat indices at the relevant time periods. LSP can provide the heat index calculations to the Court and other interested parties.

C. ONE "COLD" SHOWER PER DAY

From April 1 through October 31 the Defendants submit that each inmate will receive one "cold" shower per day. The Court did not set a benchmark for what temperature a "cold" shower should be. The water temperature is (and has been) regulated by LSP staff by way of a mixing valve. The mixing valve can adjust the water temperature at the shower head. LSP follows facility standards as established by the American Correctional Association ("ACA"). The relevant ACA standard requires that shower head water temperature range from 100 to 120 degrees Fahrenheit. See Exhibit "C," ACA Standard 4-4139, *Showers*, attached hereto. LSP staff would just need to know what temperature or temperature range the Court requires.

D. ICE AND/OR COLD DRINKING WATER

From April 1 through October 31 the Defendants submit that each inmate will receive an ice chest which will be filled and replenished with clean ice as needed by LSP staff during their regular security rounds through each tier.

WHEREFORE, defendants, BURL CAIN, Warden, Louisiana State Penitentiary; JAMES LEBLANC, Secretary of the Louisiana Department of Public Safety and Corrections; ANGELIA NORWOOD, Warden, Death Row and THE LOUISIANA DEPARTMENT OF PUBLIC SAFETY AND CORRECTIONS, respectfully pray that this Plan as required by this Court in its December 19, 2013 order be deemed good and sufficient.

Respectfully Submitted:

s/ James L. Hilburn
E. Wade Shows, La. Bar Roll No. 7637
James L. Hilburn, La. Bar Roll No. 20221
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Baton Rouge, Louisiana 70809
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CERTIFICATE OF SERVICE

I HEREBY CERTIFY that on **February 17, 2014** a copy of the foregoing was filed electronically with the Clerk of Court using the CM/ECF system and notice will be sent to all counsel for Plaintiffs by operation of the court's electronic filing system.

/s/ James L. Hilburn
JAMES L. HILBURN

FRANK THOMPSON / Thompson Luke and Associates, LLC

Principal / Professional Engineer

Frank Thompson is the Principal Engineer and Founder of Thompson Luke and Associates (TLA). Mr. Thompson has provided cost estimates, design services and has performed construction administration on many sizeable projects for commercial buildings including general office space, hospitals, laboratories, educational facilities, municipal buildings, commercial kitchens, churches, etc. While in design, Mr. Thompson and his firm are responsible for cost estimates, engineering, design and preparation of contract documents for the mechanical, plumbing, and fire suppression systems. During the construction phase of the project TLA is responsible for construction observation and works with the design team to insure that the project is completed per construction documents. His experience with LEED certification includes the design of Beaux Box office building, Baton Rouge La., Brown Stone mixed use building, downtown Baton Rouge La. Both have been designed to meet the U.S. Green Building Council LEED Silver Standard. He is familiar with all of the current applicable codes associated with the HVAC, plumbing and fire protection systems for commercial buildings and all continuing education classes are up to date. Frank Thompson has eighteen years of professional experience with the design of nearly 2,000 projects.

TLA has provided Services for the Following Organizations:
Commercial Properties, Baton Rouge, Louisiana
Louisiana Department of Health and Hospital
Louisiana Department of Environmental Quality
Louisiana Department of Corrections
Louisiana Department of Justice
Louisiana Department of Public Works
Louisiana Department of Public Safety
Southern University and A&M College, Baton Rouge, Louisiana
East Baton Rouge Parish School Board
State of Louisiana Facility Planning and Control
Louisiana State University
City of Baton Rouge - East Baton Rouge Parish

Reference:
Tony Polatta, State of Louisiana, FP&C, 225-342-0827
Earl Kern, CSRS | Garrard Program Management, 225-226-3708
Eli G. Guillory II, Southern University, 225-771-4740

Frank Thompson holds the Following Licenses and Certifications:

Education Background:

Institution	Degree	Year	Specialization
Louisiana State University	B.S.	1995	Mechanical Engineering

Active Registration:

Year First Registered,	Discipline,	Registration No.
2000,	PE, Mechanical Engineering,	LA - 28854
2008,	PE, Mechanical Engineering,	OK - 22899
2012,	PE, Mechanical Engineering,	MS - 20890

Continuing Education, Seminars/Institution:

Ventilation System Design and Operation for Healthcare Facilities
Airflow Measurement for Acceptable IAQ
VSDs and their Effect on System Components
LEED Design
ADA Standard for Accessible Design 28 CFR part 36
Ethics and Standards of Professional Conducts

Representative Projects include:

- Department of Justice Building – New Building – Mechanical Engineer
- Department of Health and Hospitals OPH – New Laboratory – Mechanical Engineer
- Department of Environmental Quality – New Laboratory – Mechanical Engineer
- Department of Corrections - Angola Death Row Complex – Mechanical Engineer
- West Baton Rouge Parish Courthouse – New HVAC System – Mechanical Engineer
- DPS Trustee Compound Support Facility – New Dormitory Building – Mechanical Engineer
- Department of Public Safety – Cafeteria Renovations – Mechanical Engineer

Lead Consultant to State Awarded Projects

- Hurricane Katrina Damages Repairs, Temporary Dehumidification, Nine Campus Buildings, Southern University-New Orleans Campus, New Orleans, LA, State Project: 01-107-05B-13, Part 23
- Hurricane Katrina Damages Repairs, Air Handling Replacement for Cafeteria Building, Southern University-New Orleans Campus, New Orleans, LA, State Project: 01-107-05B-13. Part X2
- HVAC Replacements for Allen Correctional Center, Kinder, LA, State Project: 08-408-06B-01, Part 01
- HVAC Replacements for Lurline Smith Mental Health Center, Mandeville, LA, State Project: 01-107-06B-11, Part 27
- Library HVAC System Modifications, UNO, New Orleans, LA, State Project: 19-603-99B04, Part 01
- A.R. Choppin Hall HVAC Repairs, Louisiana State University, Baton Rouge, LA, State Project: 19-601-07B-03, Part 01
- Hurricane Gustav Related Damages, Replacement of Stadium Lighting, Guidry Football Stadium, Nicholls State University, Thibodaux, LA, State Project: G19-621-09-ORM, Part 01
- Mechanical Modifications Wetland Resource Bldg, (CCEER) LSU, Baton Rouge, LA, State Project: 19-601-93-01, Part 07
- Replacement of AHU, Ag Administration Building, LSU, Baton Rouge, LA, State Project: 01-107-06B-11, Part LX
- Remove and Replace Mold Infested Chilled Water Pipe Insulation Basement Level, Claiborne State Office Building
- Baton Rouge, LA, State Project: 01-107C-10-OFC, Part 01
- Replacement of Fume Hoods, James W. Lee Hall, SU Baton Rouge, LA, State Project: 01-107-06B-11, Part PY

Thompson Luke & Associates, L.L.C.
3071 Teddy Dr. Baton Rouge, LA 70809
Phone 225-293-9474
Fax 225-293-4171

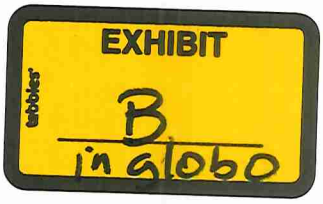
MECHANICAL

PROPOSED MECHANICAL SYSTEMS FOR THE BUILDING

Goal of the Addition:
The existing HVAC system for the four wings will be modified to maintain indoor conditions below an 88 degree heat index in these areas. Attached are the calculations that support the sizing of the new equipment. The calculations call for 17.43 tons for each wing. This will require two 10 ton cooling system to be added to each wing. This solution will exceed the requirement of the mandated maximum heat index. The ability of monitoring and trending of the conditions in these spaces will be in place after the modifications are complete.

Existing HVAC Air Distribution System for Cellblock Wings:
The wings are currently heated and ventilated only. The heating for each wing is currently accomplished by two air handling units with heat only. These systems utilize the onsite heating hot water that is delivered to each of the eight air handling units. Two air handling units are located in the mechanical room at the end of each of the four wings. Each of these air handling units supplies one half of a wing. Air is distributed to each cell and tier via security type supply air grilles that are fed by externally insulated ductwork in the ceiling space. The existing air distribution ductwork system will be utilized to provide the cooling to the wings. The general exhaust ventilation is provided by two variable speed exhaust fans located above the chase for each wing. Each cell has an exhaust grille at the rear of each cell.

HVAC Modifications to Accomplish for Cooling of the Wings:
The cooling for each wing will be provided by two 10 ton constant volume packaged units with DX coils. One of these units will supply each side of the wing as it is currently divided. Two packaged air conditioning units will be installed on an elevated steel platform located outside of each of the four wing's mechanical room. The condensate from these units will be drained to new exterior wet wells at each location. The air conditioning units will be ducted and tied into each of the existing supply and return air ductwork of each heating unit. The holes in the security wall will be cut by a third party contractor. The existing heating ductwork will be utilized for the cooling system. New isolation dampers will be installed at the existing heating units and the new cooling units to switch from heating to cooling mode. The supply and return air will be fully ducted from the packaged air conditioning units to the occupied space below via low pressure ductwork with internal fiberglass insulation. The air distribution in the cells and tiers will be accomplished by the existing ductwork system that is in place. The new packaged units will be cooling only. The heating will be provided by the existing heating system. The air conditioning units will be controlled by temperature sensors located in the return air ductwork. The sensors will be set by thermostats located in the guard station. The air conditioning units will have dedicated outside air intakes that will provide the required outside air. The fresh air will be at a rate to meet all International Building Code (IBC) requirements. A filter rack with pleated filters will be inside each unit. Refer to the attached schematic sketch of the modification. The owner will purchase and store onsite a ninth spare 10 ton packaged air conditioning unit as backup if one of these units fails.



Thompson Luke & Associates, L.L.C.
3071 Teddy Dr. Baton Rouge, LA 70809
Phone 225-293-9474
Fax 225-293-4171

Building Exhaust System:
The existing building exhaust system will be turned down to meet the exhaust requirements of the International Mechanical Code. The exhaust fans will no longer be necessary for comfort. The exhaust fans can serve as odor and toxin control. The existing exhaust fans are controlled by individual variable frequency drives and can be adjusted to the new exhaust rates.

Testing and Balancing of the New System:
An independent third party Test and Balance contractor will provide a report that verifies the cooling capacity and the performance of the system once all modifications are complete.

Monitoring of Space Temperature and Humidity:
The monitoring of the space temperature and humidity of the cellblock area will be accomplished with three monitors in each space. The building has a Johnson Controls energy management system. This system can be expanded to add temperature and humidity sensors in the wings. Three sensors will be added to each tier. One will be installed at each end on the wall and one will be installed in the center on the ceiling. A new controller will be installed in each mechanical room. This controller will integrate the sensors into the existing energy management system. The cut sheet for the sensors and the controller are attached. These sensors will take temperature and humidity readings in the space every 15 minutes. The Johnson Control energy management system is capable of producing graphs charting the temperature/humidity conditions over any time period. The reports can be generated on an as-requested basis, such as daily, for example. The data can be accessed and provided to any parties with proper security access.

Electrical System:
The power in the existing mechanical rooms will be modified to accommodate these new units. According to the Maintenance staff on site, there is plenty of spare power to feed the new equipment. The department of Corrections will use onsite skilled labor or a third party to perform all of the electrical work.

If you have any questions, do not hesitate to call.

Sincerely,

Frank Thompson, P.E.
Thompson Luke & Associates, LLC
February 17, 2014

Angola Death Row Tier AC
HVAC Load Analysis

for

Department Of Corrections

Elite Software

CHVAC COMMERCIAL HVAC LOADS

Prepared By:

Frank Thompson, PE
Thompson Luke And Associates, LLC
3071 Teddy Drive
Baton Rouge, LA

General Project Data Input

General Project Information

Project file name:	P:\Active Projects\14-024 STATE_Air Conditioning Angola Death Row\14-024 LOAD\14-024 Tier Angola Death Row HVAC Load.CHV
Project title:	Angola Death Row Tier AC
Project address:	Louisiana State Penitentiary
Project city, state, ZIP:	Angola, Louisiana
Designed by:	FST
Project date:	Sunday, February 16, 2014
Weather reference city:	BATON ROUGE, LOUISIANA, USA
Client name:	Department Of Corrections
Company name:	Thompson Luke And Associates, LLC
Company representative:	Frank Thompson, PE
Company address:	3071 Teddy Drive
Company city:	Baton Rouge, LA

Barometric pressure:	29.852	in.Hg.
Altitude:	64	feet
Latitude:	31	Degrees
Mean daily temperature range:	20	Degrees
Starting & ending time for HVAC load calculations:	1am - 12am	
Number of unique zones in this project:	4	

Building Default Values

Calculations performed:	Both heating and cooling loads	
Lighting requirements:	2.00	Watts per square foot
Equipment requirements:	0.00	Watts per square foot
People sensible load multiplier:	230	Btuh per person
People latent load multiplier:	190	Btuh per person
Zone sensible safety factor:	10	%
Zone latent safety factor:	10	%
Zone heating safety factor:	10	%
People diversity factor:	100	%
Lighting profile number:	1	
Equipment profile number:	1	
People profile number:	1	
Building default ceiling height:	9.50	feet
Building default wall height:	9.50	feet

Internal Operating Load Profiles (C = 100)

	hr 1	hr 2	hr 3	hr 4	hr 5	hr 6	hr 7	hr 8	hr 9	hr 10	hr 11	hr 12	hr 13	hr 14	hr 15	hr 16	hr 17	hr 18	hr 19	hr 20	hr 21	hr 22	hr 23	hr 24
1	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
2	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
3	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
4	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
5	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
6	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
7	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
8	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
9	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
10	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C

General Project Data Input (cont'd)

Building-Level Design Conditions

Design Month	Outdoor Dry Bulb	Outdoor Wet Bulb	Indoor Rel.Hum	Indoor Dry Bulb	Grains Diff	In/Outdoor Correction
August	95	80	50%	80	54.61	-2
Winter	25			75		

Master Roofs

Roof No.	ASHRAE Roof#	Roof U-Fac	Dark Color	Susp. Ceil
1	1	0.100	No	No

Master Walls

Wall No.	ASHRAE Group	Wall U-Fac	Wall Color
1	C	0.450	M

Master Partitions

Partition No.	Partition U-Factor	Cool T-D	Heat T-D
1	0.400	18	25

Master Glass

Glass No.	Summer U-Factor	Winter U-Factor	Glass Shd.Coef.	Interior Shading	Interior Shd.Coef
1	1.040	1.100	0.880	2	0.000

Air Handler Input

Air Handler Number 1 Input Data

Name:	AHU-1
Terminal type:	Constant Volume
Method for CV	Sum of Peaks
Supply fan type:	Draw-thru fan
Calculations performed:	Both heating and cooling loads
Excess supply air:	Reheat
Occurrences:	1
People profile number:	0
Lighting profile number:	0
Equipment profile number:	0
Exhaust may not exceed supply air:	Yes
Leaving heating coil temp (deg.F):	95.0
Leaving cooling coil RH (%):	95
Cooling coil CFM	0
Misc. Btuh gain - supply side:	0
Misc. Btuh gain - return side:	0
Combined fan & motor efficiency:	70
Static pressure across fan (in.wg.):	1.50
Summer supply duct temp rise (deg.F):	1.000
Summer return duct temp rise (deg.F):	0.250
Winter supply duct temp drop (deg.F):	2.000
Winter return duct temp drop (deg.F):	1.000
Chilled water temp difference (deg.F):	10.000
Hot water temp difference (deg.F):	20.000
Cooling ventilation:	800 Direct
Cooling infiltration:	0 Direct
Heating ventilation:	800 Direct
Heating infiltration:	0 Direct
Pretreated outside air:	none
Pretreated air Summer DB (deg.F):	0
Pretreated air Summer WB (deg.F):	0
Pretreated air Winter DB (deg.F):	0

Design Month	Outdoor Dry Bulb	Outdoor Wet Bulb	Indoor Rel.Hum	Indoor Dry Bulb	Grains Diff	In/Outdoor Correction
August	95	80	50%	80	54.61	-2
Winter	25			75		

Building Envelope Report

Envelope Report Using Summer U-Factors

Material Types		Gross Area	Glass Area	Net Area	-U-Factor	Area x U-Factor	Average U-Factor
Roof	1	5,068.1	0.0	5,068.1	0.100	506.814	0.100
Tot.Roof		5,068.1	0.0	5,068.1	N/A	506.814	0.100
Wall	1	2,375.0	380.7	1,994.3	0.450	897.435	0.450
Tot.Wall		2,375.0	380.7	1,994.3	N/A	897.435	0.450
Glass	1	380.7	N/A	380.7	1.040	395.928	1.040
Tot.Glass		380.7	N/A	380.7	N/A	395.928	1.040
Totals				7,443.1		1,800.177	0.242

Wall Direction	Wall Area	Glass Area	Wall Net Area	Wall Avg U-Factor	Glass Avg U-Factor	Glass Avg Shd.Coef
N	0.0	0.0	0.0	0.000	0.000	0.000
NE	0.0	0.0	0.0	0.000	0.000	0.000
E	1,187.5	190.4	997.2	0.450	1.040	0.880
SE	0.0	0.0	0.0	0.000	0.000	0.000
S	0.0	0.0	0.0	0.000	0.000	0.000
SW	0.0	0.0	0.0	0.000	0.000	0.000
W	1,187.5	190.4	997.2	0.450	1.040	0.880
NW	0.0	0.0	0.0	0.000	0.000	0.000
Totals	2,375.0	380.7	1,994.3	0.450	1.040	0.880

Building Summary Loads

Building peaks in August at 5pm.

Bldg Load Descriptions	Area Quan	Sen Loss	%Tot Loss	Lat Gain	Sen Gain	Net Gain	%Net Gain
Roof	5,068	27,875	15.91	0	15,087	15,087	7.21
Wall	1,994	49,359	28.17	0	18,407	18,407	8.80
Glass	381	23,032	13.15	0	39,494	39,494	18.88
Floor Slab	250	11,138	6.36	0	0	0	0.00
Skin Loads		111,404	63.59	0	72,988	72,988	34.89
Lighting	10,136	0	0.00	0	38,045	38,045	18.19
Equipment	4,000	0	0.00	0	15,013	15,013	7.18
People	30	0	0.00	6,270	7,590	13,860	6.63
Partition	165	1,818	1.04	0	1,309	1,309	0.63
Cool. Pret.	0	0	0.00	0	0	0	0.00
Heat. Pret.	0	0	0.00	0	0	0	0.00
Cool. Vent.	800	0	0.00	31,432	11,414	42,845	20.48
Heat. Vent.	800	43,100	24.60	0	0	0	0.00
Cool. Infil.	0	0	0.00	0	0	0	0.00
Heat. Infil.	0	0	0.00	0	0	0	0.00
Draw-Thru Fan	0	0	0.00	0	6,377	6,377	3.05
Blow-Thru Fan	0	0	0.00	0	0	0	0.00
Reserve Cap.	0	0	0.00	0	0	0	0.00
Reheat Cap.	0	0	0.00	0	8,738	8,738	4.18
Supply Duct	0	12,580	7.18	0	8,199	8,199	3.92
Return Duct	0	6,290	3.59	0	1,830	1,830	0.87
Misc. Supply	0	0	0.00	0	0	0	0.00
Misc. Return	0	0	0.00	0	0	0	0.00
Building Totals		175,192	100.00	37,702	171,504	209,206	100.00

Building Summary	Sen Loss	%Tot Loss	Lat Gain	Sen Gain	Net Gain	%Net Gain
Ventilation	43,100	24.60	31,432	11,414	42,845	20.48
Infiltration	0	0.00	0	0	0	0.00
Pretreated Air	0	0.00	0	0	0	0.00
Zone Loads	113,222	64.63	6,270	143,684	149,954	71.68
Plenum Loads	0	0.00	0	0	0	0.00
Fan & Duct Loads	18,870	10.77	0	16,406	16,406	7.84
Building Totals	175,192	100.00	37,702	171,504	209,206	100.00

Check Figures

Total Building Supply Air (based on a 19° TD):	7,471	CFM
Total Building Vent. Air (10.71% of Supply):	800	CFM
Total Conditioned Air Space:	5,068	Sq.ft
Supply Air Per Unit Area:	1.4741	CFM/Sq.ft
Area Per Cooling Capacity:	290.7	Sq.ft/Ton
Cooling Capacity Per Area:	0.0034	Tons/Sq.ft
Heating Capacity Per Area:	34.57	Btuh/Sq.ft
Total Heating Required With Outside Air:	175,192	Btuh
Total Cooling Required With Outside Air:	17.43	Tons

Air Handler #1 - AHU-1 - Summary Loads

Zn No	Description Zone Peak Time	Area People Volume	Htg.Loss Htg.CFM CFM/Sqft	Sen.Gain Clg.CFM CFM/Sqft	Lat.Gain S.Exh W.Exh	Htg.O.A. Req.CFM Act.CFM	Clg.O.A. Req.CFM Act.CFM
1	239 (Tier) 5pm August	1,184 0 11,249	49,186 2,536 2.14	55,951 2,909 2.46	0 0 0	Direct 187 348	Direct 187 312
2	West Cells 2pm August	1,350 15 12,825	7,425 383 0.28	19,433 1,010 0.75	3,135 0 0	Direct 213 52	Direct 213 108
3	East Cells 2pm August	1,350 15 12,825	7,425 383 0.28	19,433 1,010 0.75	3,135 0 0	Direct 213 52	Direct 213 108
4	219 (Tier) 10am August	1,184 0 11,249	49,186 2,536 2.14	48,876 2,541 2.15	0 0 0	Direct 187 348	Direct 187 272
	Zone Peak Totals: Total Zones: 4 Unique Zones: 4	5,068 30 48,147	113,222 5,838 1.15	143,693 7,471 1.47	6,270 0 0	800 800	800 800

Air Handler #1 - AHU-1 - Total Load Summary

Air Handler Description:	AHU-1 Constant Volume - Sum of Peaks
Supply Air Fan:	Draw-Thru with program estimated horsepower of 2.52 HP
Fan Input:	70% motor and fan efficiency with 1.5 in. water across the fan
Sensible Heat Ratio:	0.96 --- This system occurs 1 time(s) in the building. ---

Air System Peak Time:	5pm in August.
Outdoor Conditions:	Clg: 93° DB, 80° WB, 134.55 grains, Htg: 25° DB
Indoor Conditions:	Clg: 80° DB, 50% RH, Htg: 75° DB

Summer: Ventilation controls outside air, ----- Winter: Ventilation controls outside air.

Zone Space sensible loss:	113,222 Btuh		
Infiltration sensible loss:	0 Btuh	0 CFM	
Outside Air sensible loss:	43,100 Btuh	800 CFM	
Supply Duct sensible loss:	12,580 Btuh		
Return Duct sensible loss:	6,290 Btuh		
Return Plenum sensible loss:	0 Btuh		
Total System sensible loss:			175,192 Btuh
Heating Supply Air: 125,802 / (.998 X 1.08 X 20) =		5,838 CFM	
Winter Vent Outside Air (13.7% of supply) =		800 CFM	
Zone space sensible gain:	134,946 Btuh		
Infiltration sensible gain:	0 Btuh		
Draw-thru fan sensible gain:	6,377 Btuh		
Supply duct sensible gain:	8,199 Btuh		
Reheat sensible gain:	8,738 Btuh		
Total sensible gain on supply side of coil:			158,261 Btuh
Cooling Supply Air: 158,261 / (.998 X 1.1 X 19) =		7,471 CFM	
Summer Vent Outside Air (10.7% of supply) =		800 CFM	
Return duct sensible gain:	1,830 Btuh		
Return plenum sensible gain:	0 Btuh		
Outside air sensible gain:	11,414 Btuh	800 CFM	
Blow-thru fan sensible gain:	0 Btuh		
Total sensible gain on return side of coil:			13,244 Btuh
Total sensible gain on air handling system:			171,504 Btuh
Zone space latent gain:	6,270 Btuh		
Infiltration latent gain:	0 Btuh		
Outside air latent gain:	31,432 Btuh		
Total latent gain on air handling system:			37,702 Btuh
Total system sensible and latent gain:			209,206 Btuh

Check Figures

Total Air Handler Supply Air (based on a 19° TD):	7,471	CFM
Total Air Handler Vent. Air (10.71% of Supply):	800	CFM
Total Conditioned Air Space:	5,068	Sq.ft
Supply Air Per Unit Area:	1.4741	CFM/Sq.ft
Area Per Cooling Capacity:	290.7	Sq.ft/Ton
Cooling Capacity Per Area:	0.0034	Tons/Sq.ft
Heating Capacity Per Area:	34.57	Btuh/Sq.ft
Total Heating Required With Outside Air:	175,192	Btuh
Total Cooling Required With Outside Air:	17.43	Tons

Zone Detailed Loads (At Zone Peak Times)

Load Description	Unit Quan	-SC- CFAC	CLTD SHGF	U.Fac -CLF-	Sen. Gain	Lat. Gain	Htg. Mult.	Htg. Loss
Zone 1-239 (Tier) peaks (sensible) in August at 5pm, Air Handler 1 (AHU-1), Group 1, 8.7 x 136.1, Construction Type: 1 (Light)								
Roof-1-1-No.Clg-L	1,184	0.50	27.1	0.100	3,204		5.000	5,920
Wall-1-W-C-M	997	0.83	14.5	0.450	6,505		22.500	22,436
Partition-2-1	82.65		18/25	0.400	595		10.000	827
Gls-W-1-90-Tran	190.4	1.000	11	1.040	2,178		55.000	10,469
0%S-0-NS-Solar	190.4	0.880	219	0.640	23,478			
Lights-Prof=1	2,368	1.000			8,080			
Equipment-Prof=1	2,000	1.000			6,824	0		
Floor slab	125						40.500	5,063
Sub-total					50,864	0		44,714
Safety factors:					+10%	+10%		+10%
Total w/ safety factors:					55,951	0		49,186
Zone 2-West Cells peaks (sensible) in August at 2pm, Air Handler 1 (AHU-1), Group 1, 135.0 x 10.0, Construction Type: 1 (Light)								
Roof-1-1-No.Clg-L	1,350	0.50	37.1	0.100	5,003		5.000	6,750
Lights-Prof=1	2,700	1.000			9,213			
People-Prof=1	15.0	1.000			3,450	2,850		
Sub-total					17,666	2,850		6,750
Safety factors:					+10%	+10%		+10%
Total w/ safety factors:					19,433	3,135		7,425
Zone 3-East Cells peaks (sensible) in August at 2pm, Air Handler 1 (AHU-1), Group 1, 135.0 x 10.0, Construction Type: 1 (Light)								
Roof-1-1-No.Clg-L	1,350	0.50	37.1	0.100	5,003		5.000	6,750
Lights-Prof=1	2,700	1.000			9,213			
People-Prof=1	15.0	1.000			3,450	2,850		
Sub-total					17,666	2,850		6,750
Safety factors:					+10%	+10%		+10%
Total w/ safety factors:					19,433	3,135		7,425
Zone 4-219 (Tier) peaks (sensible) in August at 10am, Air Handler 1 (AHU-1), Group 1, 8.7 x 136.1, Construction Type: 1 (Light)								
Roof-1-1-No.Clg-L	1,184	0.50	22.1	0.100	2,612		5.000	5,920
Wall-1-E-C-M	997	0.83	11.2	0.450	5,015		22.500	22,436
Partition-2-1	82.65		18/25	0.400	595		10.000	827
Gls-E-1-90-Tran	190.4	1.000	2	1.040	396		55.000	10,469
0%S-0-NS-Solar	190.4	0.880	219	0.570	20,910			
Lights-Prof=1	2,368	1.000			8,080			
Equipment-Prof=1	2,000	1.000			6,824	0		
Floor slab	125						40.500	5,063
Sub-total					44,433	0		44,714

Zone Detailed Loads (At Zone Peak Times) (cont'd)

Load Description	Unit Quan	-SC- CFAC	CLTD SHGF	U.Fac -CLF-	Sen. Gain	Lat. Gain	Htg. Mult.	Htg. Loss
Safety factors:					+10%	+10%		+10%
Total w/ safety factors:					48,876	0		49,186

Air System #1 (AHU-1) Psychrometric Analysis

System Load Analysis	Latent	Grains	Sensible	Temp	CFM
Leaving Coil Condition		75.403		60.697	
Draw-Thru Fan			6,377	0.778	301
Misc Load on Supply Side			0	0.000	0
Supply Air Duct			8,199	1.000	387
Zone Loads	6,270	1.237	134,946	16.459	6,370
Reheat			8,738	1.066	412
Zone Condition	6,270	76.640	158,261	80.000	7,471
Return Air Duct			1,830	0.250	
Return Air Plenum			0	0.000	
Misc Load on Return Side			0	0.000	
Vent Air 800 CFM	31,432	6.201	11,414	1.365	
Blow-Thru Fan			0	0.000	
Entering Coil Condition	37,702	82.841	171,504	81.615	7,471

General Psychrometric Equations Used In Analysis:

PR = (Barometric pressure of site / Standard ASHRAE pressure of 29.921)
TSH = PR x 1.10 x CFM x (DB entering - DB leaving)
TLH = PR x 0.68 x CFM x (Grains entering - Grains leaving)
GTH = PR x 4.50 x CFM x (Enthalpy entering - Enthalpy leaving)

TSH	=	0.998	x	1.10	x	7,471	x (	81.615	-	60.697	) =	171,504	Btuh
TLH	=	0.998	x	0.68	x	7,471	x (	82.841	-	75.403	) =	37,700	Btuh
SUM	=											209,204	Btuh
GTH	=	0.998	x	4.50	x	7,471	x (	32.575	-	26.289	) =	210,855	Btuh
Total System Load											=	209,206	Btuh

Chilled and Hot Water Flow Rates and Steam Requirement

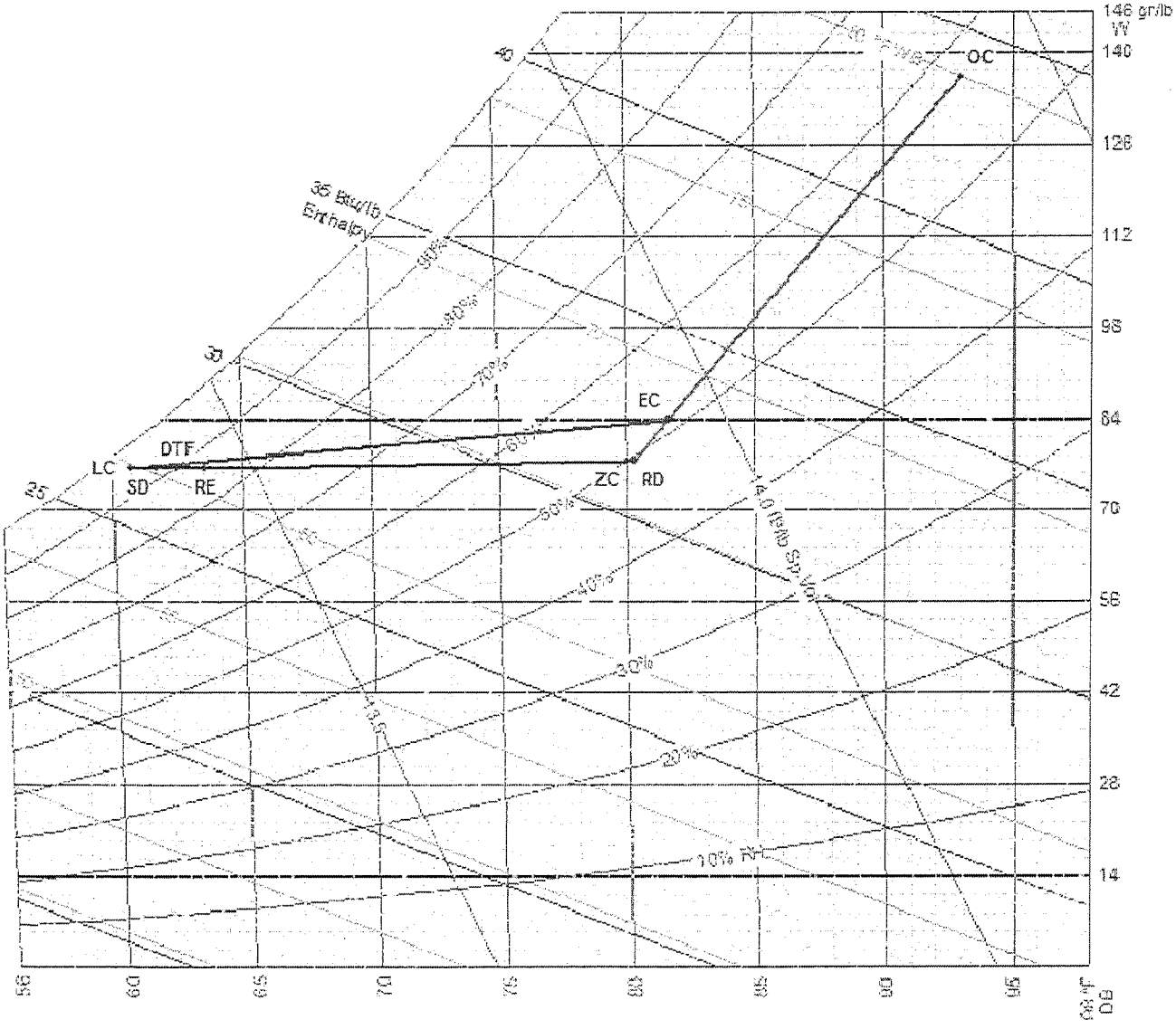
Cooling GPM	=	210,855	/ (	10.00	x	500	)	= 42.2 GPM
Heating GPM	=	175,192	/ (	20.00	x	500	)	= 17.5 GPM
Steam Req.	=	175,192	/	970				= 180.6 lb./hr

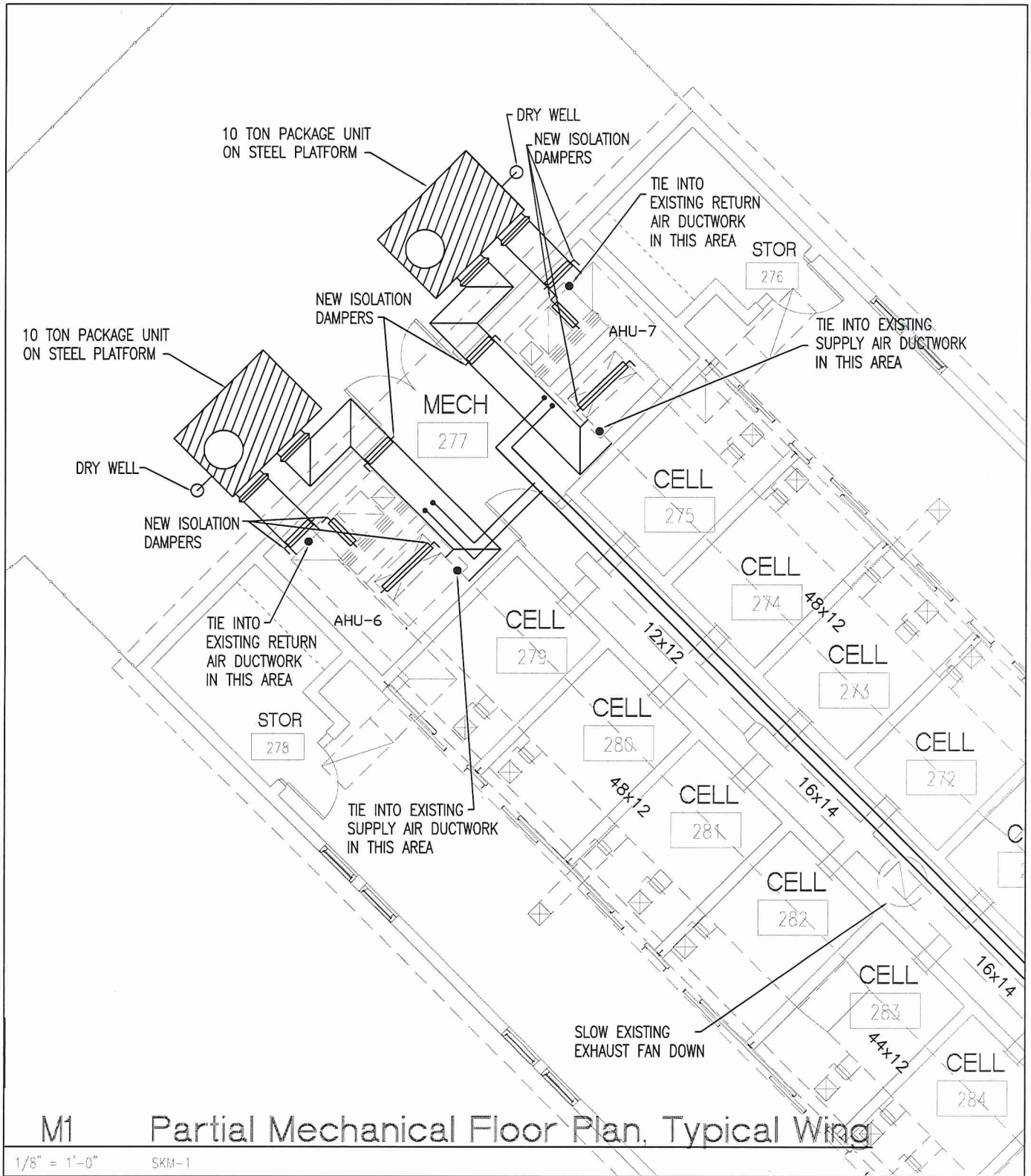
Entering Cooling Coil Conditions			Entering Heating Coil Conditions	
Dry bulb temperature:	81.62		Dry bulb temperature:	67.28
Wet bulb temperature:	68.35			
Relative humidity:	51.20			
Enthalpy:	32.58	Btu/lbm		

Leaving Cooling Coil Conditions			Leaving Heating Coil Conditions	
Dry bulb temperature:	60.70		Dry bulb temperature:	95.00
Wet bulb temperature:	59.79			
Relative humidity:	95.00			
Enthalpy:	26.29	Btu/lbm		

Air System #1 (AHU-1) Psychrometric Chart

ZC	Zone Condition	OC	Outdoor Condition
LC	Leaving Coil Condition	EC	Entering Coil Condition
SD	Supply Duct Temperature Rise	RD	Return Duct Temperature Rise
DTF	Draw Through Fan Sensible Gain	BTF	Blow Through Fan Sensible Gain
RE	Reserve or Reheat Sensible Gain	PL	Return Air Plenum Sensible Gain
SM	Supply Side Miscellaneous Sensible Gain	RM	Return Side Miscellaneous Gain
PRE	Pretreated Air Condition	HRV	Heat Recovery Ventilator Condition





M1 Partial Mechanical Floor Plan, Typical Wing

1/8" = 1'-0" SKM-1

SHEET NO.

STATE OF LOUISIANA
FACILITY PLANNING & CONTROL
DEPARTMENT OF CORRECTIONS

LOUISIANA STATE PENITENTIARY
DEATH ROW COMPLEX

FACILITY PLANNING & CONTROL
SITE I.D. NO.: 2-63-003

THOMPSON LUKE
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BATON ROUGE, LA 70809
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SKM1

EXHIBIT
tabbies
B2

Input/Output Module (IOM) Series Controllers Catalog Page

Code No. LIT-1900349
Issued November 1, 2013
Supersedes January 30, 2013

Refer to the QuickLIT website for the most up-to-date version of this document.

The Input/Output Module (IOM) Series Controllers are BACnet® Application Specific Controllers (B-ASCs) with integral RS-485 Master-Slave/Token-Passing (MS/TP) communications. IOM controllers integrate into the web-based Metasys® system.

IOMs can serve in one of two capacities, depending on where they are installed in the Metasys system. When installed on the Sensor/Actuator (SA) Bus of an Field Equipment Controller (FEC), Advanced Application Field Equipment Controller (FAC), or VMA controller, the IOMs expand the point count of these controllers. When installed on the Field Controller (FC) Bus, IOMs can be used as I/O point multiplexors to support monitoring and control from an Network Automation Engine (NAE) or Network Control Engine (NCE). The point multiplexor can also be useful for sharing points between other field controllers on the FC Bus using peer-to-peer connectivity.

A full range of FEC models combined with the IOM models can be applied to a wide variety of building applications ranging from simple fan coil or heat pump control to advanced central plant management.

Important:	You cannot purchase a similar third-party device and install it in a UL/ULC Listed smoke control system. Doing so voids the UL/ULC Smoke Control Listing. Third-party devices must be provided and labeled by the factory as described in the UL/ULC Smoke Control Listing.

Important:	Only those Johnson Controls products identified for use in smoke control applications have been tested and listed by UL for use in a Metasys System UL 864 9th Edition UUKL/ORD-C100-13 UUKLC Smoke Control System. Installation of a product that is not UL/ULC Listed and labeled for this application prevents the entire system from being UL/ULC Listed for smoke control.

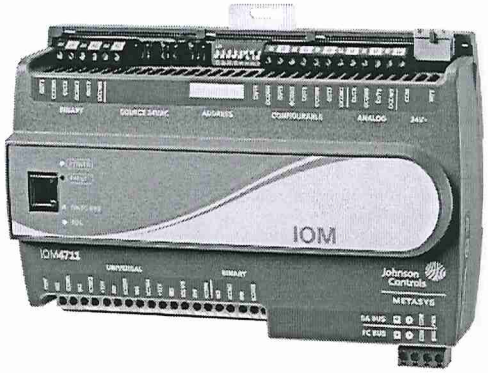
Refer to the *Metasys® System Field Equipment Controllers and Related Products Product Bulletin (LIT-12011042)* for product application details.

Features

- Standard BACnet® Protocol - Provides interoperability with other Building Automation System (BAS) products that use the widely accepted BACnet standard.
- Standard Hardware and Software Platform - Uses a common hardware design throughout the family line to support standardized wiring practices and installation workflows. Also uses a common software design to support use of a single tool for control applications, commissioning, and troubleshooting to minimize technical training.
- ZigBee™ Wireless FC/SA Bus Interface - Provides a wireless alternative to hard-wired Metasys system counterparts, providing application flexibility and mobility with minimal disruption to building occupants.
- Bluetooth® Wireless Commissioning Interface - Provides an easy-to-use connection to the configuration and commissioning tool.
- Auto Tuned Control Loops - Reduce commissioning time, eliminate change-of-season re-commissioning, and reduce wear and tear on mechanical devices.
- Universal Inputs, Configurable Outputs, and Point Expansion Modules - Allow multiple signal options to provide input/output flexibility.
- Optional Local User Interface Display - Allows convenient monitoring and adjusting capabilities at the local device.
- BACnet Testing Laboratories™ (BTL) Listing - Ensures interoperability with other BTL-listed devices. BTL is a third-party agency which validates that BAS vendor products meet the BACnet industry-standard protocol.
- 32-bit microprocessor ensures optimum performance and meets industry specifications.
- BACnet Automatic Discovery support enables easy controller integration into Metasys BAS.
- Integral end-of-line (EOL) switch enables field controller as a terminating device on the communications bus.
- Pluggable communications bus and supply power terminal blocks expedite installation and troubleshooting.
- Wireless capabilities via a ZFR1800 Series Wireless Field Bus System enable wireless mesh connectivity between Metasys field controllers to WRZ Series Wireless Room Temperature Sensors and to supervisory controllers, facilitating easy initial location and relocation.
- Ability to reside on the FC Bus or SA Bus provides application flexibility.

If the product fails to operate within its specifications, replace the product. For a replacement product, contact the nearest Johnson Controls® representative.

Figure 1: IOM4711



Johnson Controls

Table 1: IOM Series Point Type Counts Per Model

Point Types	Signals Accepted	IOM 1711	IOM 2711	IOM 2721	IOM 3711	IOM 3721	IOM 3731	IOM 4711
Universal Input (UI)	Analog Input, Voltage Mode, 0–10 VDC Analog Input, Current Mode, 4–20 mA Analog Input, Resistive Mode, 0–2k ohm, RTD (1k NI [Johnson Controls], 1k PT, A99B SI), NTC (10k Type L, 2.252k Type 2) Binary Input, Dry Contact Maintained Mode		2	8	4			6
Binary Input (BI)	Dry Contact Maintained Mode Pulse Counter/Accumulator Mode (High Speed), 100 Hz	4				16	8	2
Analog Output (AO)	Analog Output, Voltage Mode, 0–10 VDC Analog Output, Current Mode, 4–20 mA			2				2
Binary Output (BO)[1]	24 VAC Triac						8	3
Universal Output (UO)	Analog Output, Voltage Mode, 0–10 VDC Binary Output Mode, 24 VAC/DC FET Analog Output, Current Mode, 4–20 mA		2		4			
Configurable Output (CO)	Analog Output, Voltage Mode, 0–10 VDC Binary Output Mode, 24 VAC Triac							4
Relay Output (RO)	120/240 VAC		2		4			

1 The BOs on the IOM3731-0A model require an external low-voltage power source.

Table 2: IOM Series Ordering Information

Product Code Number	Description
MS-IOM1711-0	4-Point IOM with 4 BI, FC Bus and SA Bus Support
MS-IOM2711-0	6-Point IOM with 2 UI, 2 UO, 2 BO, FC Bus, and SA Bus Support
MS-IOM2721-0	10-Point IOM with 8 UI, 2 AO, FC Bus, and SA Bus Support
MS-IOM3711-0	12-Point IOM with 4 UI, 4 UO, 4 BO, FC Bus, and SA Bus Support
MS-IOM3721-0	16-Point IOM with 16 BI, FC Bus, and SA Bus Support
MS-IOM3731-0	16-Point IOM with 8 BI, 8 BO, FC Bus, and SA Bus Support
MS-IOM3731-0A[1]	16-Point IOM with 8 BI, 8 BO, FC Bus, and SA Bus Support **Note:** Binary Outputs (BOs) on MS-IOM3731-0A controllers do not supply power for the outputs; the BOs require external low-voltage (<30 VAC) power sources.
MS-IOM4711-0	17-Point IOM with 6 UI, 2 BI, 3 BO, 2 AO, 4 CO, FC and SA Bus Support

1 This model is currently available only in Asia; contact your local Johnson Controls representative for more information.

Table 3: IOM Series for Smoke Control Ordering Information

Product Code Number[1], [2]	Description
MS-IOM1710-0U	4-Point IOM with 4 BI; 24 VAC; FC Bus and SA Bus Support
MS-IOM1711-0U	4-Point IOM with 4 BI; 24 VAC; FC Bus and SA Bus Support
MS-IOM2710-0U	6-Point IOM with 2 UI, 2 UO, 2 BO; 24 VAC; FC Bus and SA Bus Support
MS-IOM2711-0U	6-Point IOM with 2 UI, 2 UO, 2 BO; 24 VAC; FC Bus and SA Bus Support
MS-IOM3710-0U	12-Point IOM with 4 UI, 4 UO, 4 BO; 24 VAC; FC Bus and SA Bus Support
MS-IOM3711-0U	12-Point IOM with 4 UI, 4 UO, 4 BO; 24 VAC; FC Bus and SA Bus Support
MS-IOU4710-0U	17-Point IOM with 6 UI, 2 BI, 3 BO, 2 AO, 4 CO; 24 VAC; FC Bus and SA Bus Support with Mounting Base
MS-IOM4711-0U	17-Point IOM with 6 UI, 2 BI, 3 BO, 2 AO, 4 CO; 24 VAC; FC Bus and SA Bus Support with Mounting Base

1 These devices are UL/ULc 864 Listed, File S4977, 9th Edition UUKL/ORD-C100-13 UUKLC Smoke Control System.
2 All field controllers in a smoke control system must be mounted in Johnson Controls custom or standard UL 864 panels or in panels that are ordered from Johnson Controls. If these field controllers are used with panels that are not supplied by Johnson Controls, they are not compliant with the UL 864 9th Edition UUKL/ORD-C100-13 UUKLC Smoke Control System listing.

Accessories

Table 4: IOM Accessories

Product Code Number	Description
MS-BTCVT-1	Wireless Commissioning Converter with Bluetooth® Technology
TL-BRTRP-0	Portable BACnet IP to MS/TP Router
MS-ZFR1811-0	Wireless Field Bus Router, 10 mW Transmission Power. Functions with Metasys BACnet FECs, VMA16s, and WRZ-TTx Series Wireless Mesh Room Temperature Sensors
MS-BTCVTCBL-700	Cable Replacement Set for the MS-BTCVT-1 or the NS-ATV7003-0; Includes One 5 ft (1.5 m) Retractable Cable
Y64T15-0	Transformer, 120/208/240 VAC Primary to 24 VAC Secondary, 92 VA, Foot Mount, 30 in. Primary Leads and 30 in. Secondary Leads, Class 2
Y65A13-0	Transformer, 120 VAC Primary to 24 VAC Secondary, 40 VA, Foot Mount (Y65AS), 8 in. Primary Leads and 30 in. Secondary Leads, Class 2
Y65T42-0	Transformer, 120/208/240 VAC Primary to 24 VAC Secondary, 40 VA, Hub Mount (Y65SP+), 8 in. Primary Leads and Secondary Screw Terminals, Class 2
Y65T31-0	Transformer, 120/208/240 VAC Primary to 24 VAC Secondary, 40 VA, Foot Mount (Y65AR+), 8 in. Primary Leads and Secondary Screw Terminals, Class 2
AP-TBK4SA-0	Replacement MS/TP SA Bus Terminal, 4-Position Connector, Brown, Bulk Pack
AP-TBK4FC-0	Replacement MS/TP FC Bus Terminal, 4-Position Connector, Blue, Bulk Pack
AP-TBK3PW-0	Replacement Power Terminal, 3-Position Connector, Gray, Bulk Pack
ZFR-USBHA-0	USB Dongle with ZigBee™ Driver provides a wireless connection through CCT to allow wireless commissioning of the wirelessly enabled FEC, Advanced Application Field Equipment Controller (FAC), IOM, and VMA16 controllers. Also allows use of the ZFR Checkout Tool (ZCT) in CCT. **Note:** The ZFR-USBHA-0 replaces the IA OEM DAUBI_2400 ZigBee USB dongle. For additional information on the ZFR-USBHA-0 ZigBee dongle, refer to the *ZFR1800 Series Wireless Field Bus System Technical Bulletin (LIT-12011295)* or *ZFR1800 Series Wireless Field Bus System Quick Reference Guide (LIT-12011630)*.

IOM Series Technical Specifications

Table 5: IOM Series

Product Code Numbers	**MS-IOM1711-0:** 4-Point IOM with 4 BI, FC Bus and SA Bus Support **MS-IOM2711-0:** 6-Point IOM with 2 UI, 2 UO, 2 BO, FC Bus, and SA Bus Support **MS-IOM2721-0:** 10-Point IOM with 8 UI, 2 AO, FC Bus, and SA Bus Support **MS-IOM3711-0:** 12-Point IOM with 4 UI, 4 UO, 4 BO, FC Bus, and SA Bus Support **MS-IOM3721-0:** 16-Point IOM with 16 BI, FC Bus, and SA Bus Support **MS-IOM3731-0:** 16-Point IOM with 8 BI, 8 BO, FC Bus, and SA Bus Support **MS-IOM3731-0A**[1]**:** 16-Point IOM with 8 BI, 8 BO, FC Bus, and SA Bus Support **MS-IOM4711-0:** 17-Point IOM with 6 UI, 2 BI, 3 BO, 2 AO, 4 CO, FC and SA Bus Support **Smoke Control Models:** **MS-IOM1710-0U:** 4-Point IOM with 4 BI, FC Bus and SA Bus Support **MS-IOM1711-0U:** 4-Point IOM with 4 BI, FC Bus and SA Bus Support **MS-IOM2710-0U:** 6-Point IOM with 2 UI, 2 UO, 2 BO, FC Bus, and SA Bus Support **MS-IOM2711-0U:** 6-Point IOM with 2 UI, 2 UO, 2 BO, FC Bus, and SA Bus Support **MS-IOM3710-0U:** 12-Point IOM with 4 UI, 4 UO, 4 BO, FC Bus, and SA Bus Support **MS-IOM3711-0U:** 12-Point IOM with 4 UI, 4 UO, 4 BO, FC Bus, and SA Bus Support **MS-IOU4710-0U:** 17-Point IOM with 6 UI, 2 BI, 3 BO, 2 AO, 4 CO, FC Bus and SA Bus Support with Mounting **MS-IOM4711-0U:** 17-Point IOM with 6 UI, 2 BI, 3 BO, 2 AO, 4 CO, FC Bus and SA Bus Support with Mounting
Supply Voltage	24 VAC (nominal, 20 VAC minimum/30 VAC maximum), 50/60 Hz, Power Supply Class 2 (North America), Safety Extra-Low Voltage (SELV) Europe
Power Consumption	14 VA maximum **Note:** VA ratings do not include any power supplied to the peripheral devices connected to Binary Outputs (BOs) or Configurable Outputs (COs), which can consume up to 12 VA for each BO or CO, for a possible total consumption of an additional 84 VA (maximum), depending on the IOM model.
Ambient Conditions	**Operating:** 0 to 50°C (32 to 122°F); 10 to 90% RH noncondensing **Storage:** -40 to 80°C (-40 to 176°F); 5 to 95% RH noncondensing

Table 5: IOM Series

Addressing	DIP switch set; valid field controller device addresses 4–127 (Device addresses 0–3 and 128–255 are reserved and not valid IOM addresses).
Communications Bus[2]	BACnet MS/TP, RS-485 3-wire FC Bus between the supervisory controller and field devices 4-wire SA Bus between field controller, network sensors, and other sensor/actuator devices. includes a lead source 15 VDC supply power (from field controller) to bus devices.
Processor	H8SX/166xR Renesas® 32-bit microcontroller
Memory	512 KB Flash Memory and 128 KB Random Access Memory (RAM)
Input and Output Capabilities	**IOM1711:** 4 - Binary Inputs: Defined as Dry Contact Maintained or Pulse Counter/ Accumulator Mode
	IOM2711: 2 - Universal Inputs: Defined as 0–10 VDC, 4–20 mA, 0–600k ohm, or Binary Dry Contact 2 - Universal Outputs: Analog Output: Voltage Mode, 0-10 VDC; Binary Output Mode: 24 VAC/DC FET; Analog Output: Current Mode, 4-20 mA 2 - Relay Outputs: (Single-Pole, Double-Throw); UL 916: 1/4 hp 120 VAC, 1/2 hp 240 VAC; 360 VA Pilot Duty at 120/240 VAC (B300); 3 A Non-inductive 24-240 VAC; EN 60730: 6 (4) A N.O. or N.C. only
	IOM2721: 8 - Universal Inputs: Defined as 0–10 VDC, 4–20 mA, 0–600k ohm, or Binary Dry Contact 2 - Analog Outputs: Defined as 0–10 VDC or 4–20 mA
	IOM3711 4 - Universal Inputs: Defined as 0–10 VDC, 4–20 mA, 0–600k ohm, or Binary Dry Contact 4 - Universal Outputs: Analog Output: Voltage Mode, 0-10 VDC; Binary Output Mode: 24 VAC/DC FET; Analog Output: Current Mode, 4-20 mA 4 - Relay Outputs: (Single-Pole, Double-Throw); UL 916:1/4 hp 120 VAC, 1/2 hp 240 VAC; 360 VA Pilot Duty at 120/240 VAC (B300); 3 A Non-inductive 24-240 VAC; EN 60730: 6 (4) A N.O. or N.C. only
	IOM3721: 16 - Binary Inputs: Defined as Dry Contact Maintained or Pulse Counter/Accumulator Mode
	IOM3731 8 - Binary Inputs: Defined as Dry Contact Maintained or Pulse Counter/Accumulator Mode 8 - Binary Outputs: Defined as 24 VAC Triac (Require external low-voltage power source.) **Note:** Binary Outputs (BOs) on MS-IOM3731-0A controllers do not supply power for the outputs; the BOs require external low-voltage (< 30 VAC) power sources.
Input and Output Capabilities (Cont.)	**IOM4711:** 6 - Universal Inputs: Defined as 0–10 VDC, 4–20 mA, 0–600k ohm, or Binary Dry Contact 2 - Binary Inputs: Defined as Dry Contact Maintained or Pulse/Counter Accumulator Mode 3 - Binary Outputs: Defined as 24 VAC Triac (selectable internal or external source power) 4 - Configurable Outputs: Defined as 0–10 VDC or 24 VAC Triac BO 2 - Analog Outputs: Defined as 0–10 VDC or 4–20 mA
Analog Input/Analog Output Resolution and Accuracy	**Analog Input:** 16-bit resolution **Analog Output:** 16-bit resolution and ±200 mV in 0–10 VDC applications
Terminations	Input/Output: Fixed Screw Terminal Blocks SA/FC Bus and Supply Power: 4-wire and 3-wire Pluggable Screw Terminal Blocks SA/FC Bus Port: RJ-12 6-Pin Modular Jacks
Mounting	Horizontal on single 35 mm DIN rail mount (preferred), or screw mount on flat surface with three integral mounting clips on controller
Housing	Enclosure material: ABS and polycarbonate UL94 5VB; self-extinguishing, Plenum-rated protection class: IP20 (IEC529)

Table 5: IOM Series

Dimensions (Height x Width x Depth)	**IOM171x-x and IOM271x-x Models:** 150 x 120 x 53 mm (5-7/8 x 4-3/4 x 2-1/8 in.) including terminals and mounting clips **IOM2721, IOM3721, and IOM3731 Models:** 150 x 164 x 53 mm (5-7/8 x 6-7/16 x 2-1/8 in.) including terminals and mounting clips **IOM371x-x and IOM471x-x Models:** 150 x 190 x 53 mm (5-7/8 x 7-1/2 x 2-1/8 in.) including terminals and mounting clips **Note:** Mounting space for all field controllers requires an additional 50 mm (2 in.) space on top, bottom, and front face of controller for easy cover removal, ventilation, and wire terminations.
Weight	0.5 kg (1.1 lb) maximum
Compliance CE	**United States:** UL Listed, File E107041, CCN PAZX, UL 916, Energy Management Equipment; UL/ULc 864 Listed, File S4977, 9th Edition UUKL/ORD-C100-13 UUKLC Smoke Control System (models with **U** product code suffix only); FCC Compliant to CFR47, Part 15, Subpart B, Class A
	Canada: UL Listed, File E107041, CCN PAZX7, CAN/CSA C22.2 No. 205, Signal Equipment; Industry Canada Compliant, ICES-003
	Europe: CE Mark – Johnson Controls, Inc., declares that this product is in compliance with the essential requirements and other relevant provisions of the EMC Directive 2004/108/EC. **Note:** For **IOM27 and IOM37**, Low Voltage Directive 2006/95/EC. For **IOM47xx Models**, Conducted RF Immunity within EN 61000-6-2 meets performance criteria B.
	Australia and New Zealand: C-Tick Mark, Australia/NZ Emissions Compliant
	BACnet International: BACnet Testing Laboratories (BTL) Protocol Revision 4 Listed BACnet Application Specific Controller (B-ASC)

1 This model is currently available only in Asia; contact your local Johnson Controls representative for more information.
2 For more information, refer to the *MS/TP Communications Bus Technical Bulletin (LIT-12011034)*.

The performance specifications are nominal and conform to acceptable industry standards. For application at conditions beyond these specifications, consult the local Johnson Controls office. Johnson Controls, Inc. shall not be liable for damages resulting from misapplication or misuse of its products.

Code No. LIT-1900655
Issued April 12, 2011

HE-6800 Series

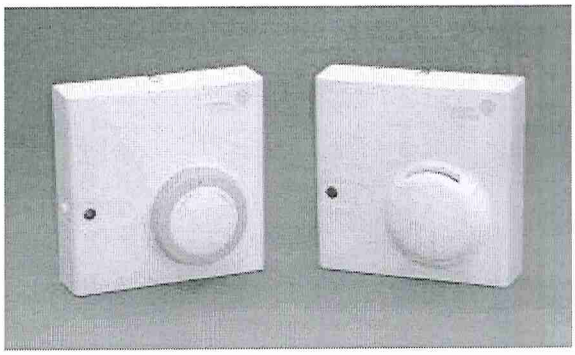
Humidity Transmitters with Temperature Sensor

Description

The HE-6800 Series Humidity Transmitters with Temperature Sensor provide both humidity and temperature sensing in room wall-mount applications. The transmitter offers local warmer/cooler temperature setpoint adjustment and temporary occupancy override. The humidity sensor provides Relative Humidity (RH) accuracy of ±2% or ±3% RH and measures RH over the entire range of 0 to 100%.

A warmer/cooler dial is included on certain models for minor temperature adjustments from the setpoint. All models feature an occupancy override button that allows the user to override time-of-day scheduling when the space is occupied outside of the normal occupied hours schedule. The transmitter also includes DIP switches to enable or disable override and Light-Emitting Diode (LED) functions. In addition, all models feature a user-selectable 0 to 5 VDC or 0 to 10 VDC humidity output switch, and a power supply selection switch.

The HE-6800 Series Humidity Transmitters include screw terminal block terminations that provide flexibility for field wiring. All models include a 6-pin modular jack access port for connecting accessories to the Zone Bus. This feature allows a technician to commission or service the controller via the transmitter.



HE-6800 Series Humidity Transmitters with Temperature Sensor

Features

- controller configuration DIP switch — allows users to adjust the room comfort and choose occupancy features that match the application and transmitter
- power supply selection switch — enables transmitter use in high input voltage applications
- user-selectable humidity output — provides either a 0 to 5 VDC or 0 to 10 VDC output for compatibility with various controllers
- occupancy Light-Emitting Diode (LED) indicator — displays the current operating mode of the controller (VMA12 and VMA14 Series only)
- manual override pushbutton (PB) — overrides time-of-day scheduling when the space is occupied outside of the normal occupied hours schedule
- warmer/cooler setpoint dial (select models) — allows for minor temperature adjustments from the setpoint

Repair Information

If the HE-6800 Series Humidity Transmitter fails to operate within its specifications, replace the unit. For a replacement transmitter, contact the nearest Johnson Controls® representative.

Selection Charts

HE-6800 Series Humidity Transmitter with Temperature Sensor Product Code Numbers

Product Code Number	Temperature Sensing Element	Humidity Accuracy (% RH)	Warmer/Cooler Temperature Setpoint Adjustment Override	Enclosure Dimensions (mm)
HE-68N2-0N00WS	Nickel	±2%	No	80 x 80
HE-68N3-0N00WS	Nickel	±3%	No	80 x 80
HE-68N2-1N00WS	Nickel	±2%	Yes	80 x 80
HE-68N3-1N00WS	Nickel	±3%	Yes	80 x 80
HE-68P2-0N00WS	Platinum	±2%	No	80 x 80
HE-68P3-0N00WS	Platinum	±3%	No	80 x 80
HE-68P2-1N00WS	Platinum	±2%	Yes	80 x 80
HE-68P3-1N00WS	Platinum	±3%	Yes	80 x 80

Optional Accessories

Product Code Number	Description
ACC-INSL-0[1]	Wallbox Mounting Pad (10 per Bag)
ACC-INSL-1[1]	Surface Mounting Pad (10 per Bag)
NS-WALLPLATE-0	Adapts an HE-6800 Series Humidity Transmitter (3-3/16 x 3-3/16 in. [80 x 80 mm]) to a Standard 3-3/16 x 3-3/16 in. (80 x 120 mm) Wallbox
T-4000-119	Allen-Head Adjustment Tool (30 per Bag)

1. These foam pads help prevent drafts from entering the unit through the wall, and make installation easier when mounting on an uneven surface.

EXHIBIT
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HE-6800 Series Humidity Transmitters with Temperature Sensor (Continued)

Technical Specifications

HE-6800 Series Humidity Transmitters with Temperature Sensor			
Power Requirements		4.5 to 7.5 mA at 14 to 30 VDC and 5K ohm Load, or 18 to 25 mA at 20 to 30 VAC and 5K ohm Load	
Terminations		9-Position Screw Clamp Terminal Block	
Wire Size		16 to 24 AWG (1.3 to 0.6 mm Diameter); 18 AWG (1.0 mm Diameter) Recommended	
Temperature Measurement Range		32 to 131°F (0 to 55°C)	
Humidity Measurement Range	Full Range	0 to 100% RH	
	Calibrated Range	10 to 90% RH	
Temperature Sensor	Nickel (HE-68Nx Models)	Sensor Type	1,000 ohm Thin Film Nickel
		Coefficient	Approximately 3 ohm per F° (5.4 ohm per C°)
		Reference Resistance	1,000 ohm at 70°F (0°C)
		Accuracy	±0.34F° at 70°F (±0.18C° at 21°C)
	Platinum (HE-68Px Models)	Sensor Type	1,000 ohm Thin Film Platinum
		Coefficient	Approximately 2 ohm per F° (3.9 ohm per C°)
		Reference Resistance	1,000 ohm at 32°F (0°C)
		Accuracy	±0.35F° at 70°F (±0.19C° at 21°C)
Humidity Sensor Type		Capacitive Polymer Sensor	
Humidity Element Accuracy	HE-68x2 Models	±2% RH for 20 to 80% RH at 50 to 95°F (10 to 35°C); ±4% RH for 10 to 20% RH and 80 to 90% RH at 50 to 95°F (10 to 35°C)	
	HE-68x3 Models	±3% RH for 20 to 80% RH at 77°F (25°C); ±6% RH for 10 to 20% RH and 80 to 90% at 77°F (25°C)	
Setpoint Range		Warmer/Cooler	
Temperature Sensor Time Constant		10 Minutes at 10 ft per Minute	
Manual Override		Integral Momentary Pushbutton (DIP Switch Selectable)	
LED		Green LED Indicates Three Modes of Operation (VMA12 and VMA14 Series Controllers Only)	
Ambient Operating Conditions		32 to 131°F (0 to 55°C), 10 to 95% RH Noncondensing; 86°F (30°C) Maximum Dew Point	
Ambient Storage Conditions		-40 to 140°F (-40 to 60°C), 5 to 95% RH Noncondensing; 86°F (30°C) Maximum Dew Point	
Materials		White Thermoplastic Protection: IP30 (EN 60529)	
Dimensions (H x W x D)	HE-68xx-0 Models	3-3/16 x 3-3/16 x 1-5/16 in. (80 x 80 x 32 mm)	
	HE-68xx-1 Models	3-3/16 x 3-3/16 x 1-7/16 in. (80 x 80 x 35 mm)	
Shipping Weight		0.44 lb (0.20 kg)	
Compliance CE	United States	UL Listed, File E107041, CCN PAZX, Under UL 916, Energy Management Equipment	
	Canada	UL Listed, File E107041, CCN PAZX7, Under CAN/CSA C22.2 No. 205, Signal Equipment	
	Europe	CE Mark – Johnson Controls, Inc., declares that this product is in compliance with the essential requirements and other relevant provisions of the EMC Directive 2004/108/EC. WEEE Directive 2002/96/EC RoHS Directive 2002/95/EC	
	Australia and New Zealand	C-Tick Mark, Australia/NZ Emissions Compliant	

Comment: Provision must be made for inmate access in cells or sleeping areas, dayrooms, and other parts of the facility. The requirement of an approved ratio is designed to assure that inmates have adequate access to meet their basic personal hygiene needs.

Showers

4-4139
(Ref. 3-4134)

Inmates have access to operable showers with temperature-controlled hot and cold running water, at a minimum ratio of one shower for every eight inmates, unless national or state building or health codes specify a different ratio. Water for showers is thermostatically controlled to temperatures ranging from 100 degrees Fahrenheit to 120 degrees Fahrenheit to ensure the safety of inmates and to promote hygienic practices.

Comment: Offenders can use scalding showers as a weapon against, or punishment for, other inmates. Also, accidental injury could occur when cold water is drawn in other areas, thereby unexpectedly elevating the hot water in showers to scalding temperatures. Water temperatures below 100 degrees Fahrenheit are uncomfortable and may deter an individual from pursuing good hygienic practices. The temperature controls should not preclude the use of water at higher temperatures, if needed, in other areas of the institution, such as kitchens.

Special Management Housing

4-4140
(Ref. 3-4135)

Segregation housing units provide living conditions that approximate those of the general inmate population; all exceptions are clearly documented. Segregation cells/rooms permit the inmates assigned to them to converse with and be observed by staff members.

Comment: None.

4-4141
(Ref. 3-4136)

4-4141
Interpretation August 2004

All cells/rooms in segregation provide a minimum of 80 square feet, of which 35 square feet is unencumbered space.

Comment: Segregated inmates are confined in cells/rooms for more extended periods during the day. Therefore the cell/room must provide additional space for in-cell activity.

Housing for the Disabled

4-4142
(Ref. 3-4137)

Inmates with disabilities are housed in a manner that provides for their safety and security. Housing used by inmates with disabilities is designed for their use and provides for integration with other inmates. Programs and services are accessible to inmates with disabilities who reside in the facility.

Comment: If the facility accepts individuals with disabilities, it must provide for their housing and use of facility resources. Housing includes, but is not limited to, rooms, sleeping areas, furnishings, dayrooms, toilets, washbasins,