MICRO CONTROL SYSTEMS

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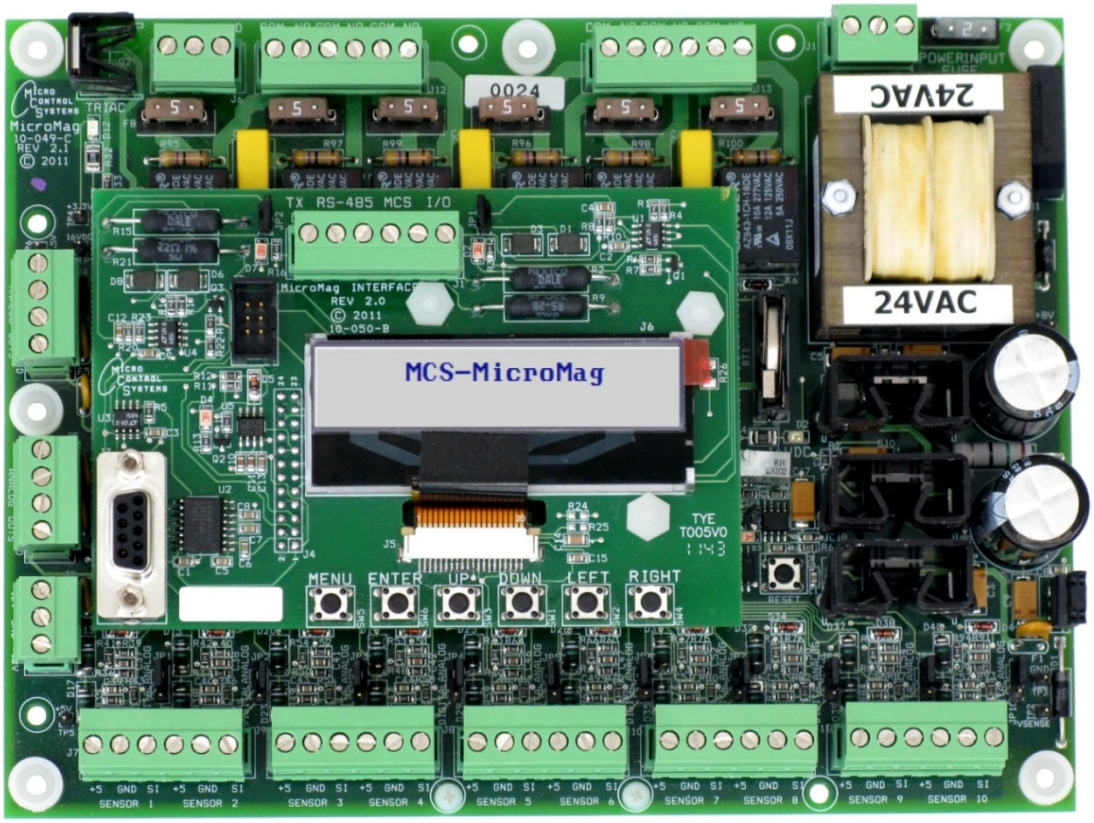
MicroMag Manual Rev. 3.1



The MicroMag is a rugged microprocessor based controller designed for the hostile environment of the HVAC/R industry. It is designed to be the primary manager of the package it is controlling.

MCS Total Solution for all your Control Needs

Energy Efficient and RoHS Compliant

1. Revision Page

Date	Author	Description of Changes
07-06-12	JGW	• Created MicroMag Manual Rev1.0
03-20-13	JGW	• Added Setpoints, Alarms & Graphing 2.0
03-21-13	JGW	• Corrected history sample chart 2'1
04-01-13	JGW	• Added RBA changes
04-05-13	JGW	• Corrections
04-10-13	JGW	• Added Internet Communications Options
06-20-13	JGW	• Added States (Revision 2.7)
01-03-14	CJM	• Updated All Setpoints (Revision 2.8)
05-01-14	JWP	• Updated BMS Setpoints (14.2.5) and Setpoint Options Chart (6.3); (Revision 2.9)
02-19-15	DEW	• Added new cover – changed table of content look

The MCS Commitment: Our commitment is to provide practical solutions for the industry's needs and to be both a leader and partner in the effective use of microprocessor controls.

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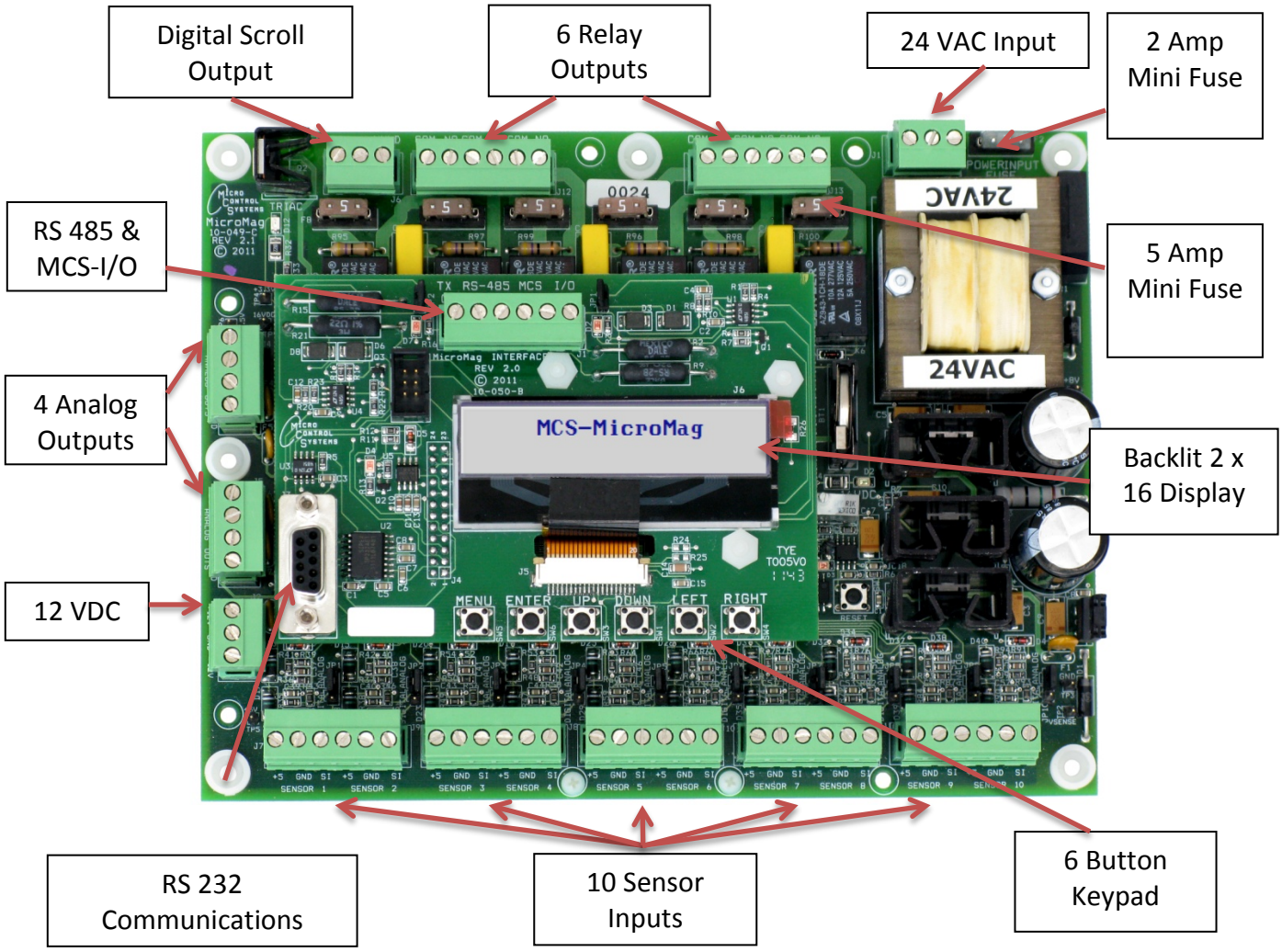
3. MicroMag Hardware

The MicroMag is a 24 VAC system supported by a Micro-RO6 relay output boards and a Micro-SI8-AO4 sensor input/analog output boards. The system can support the following:

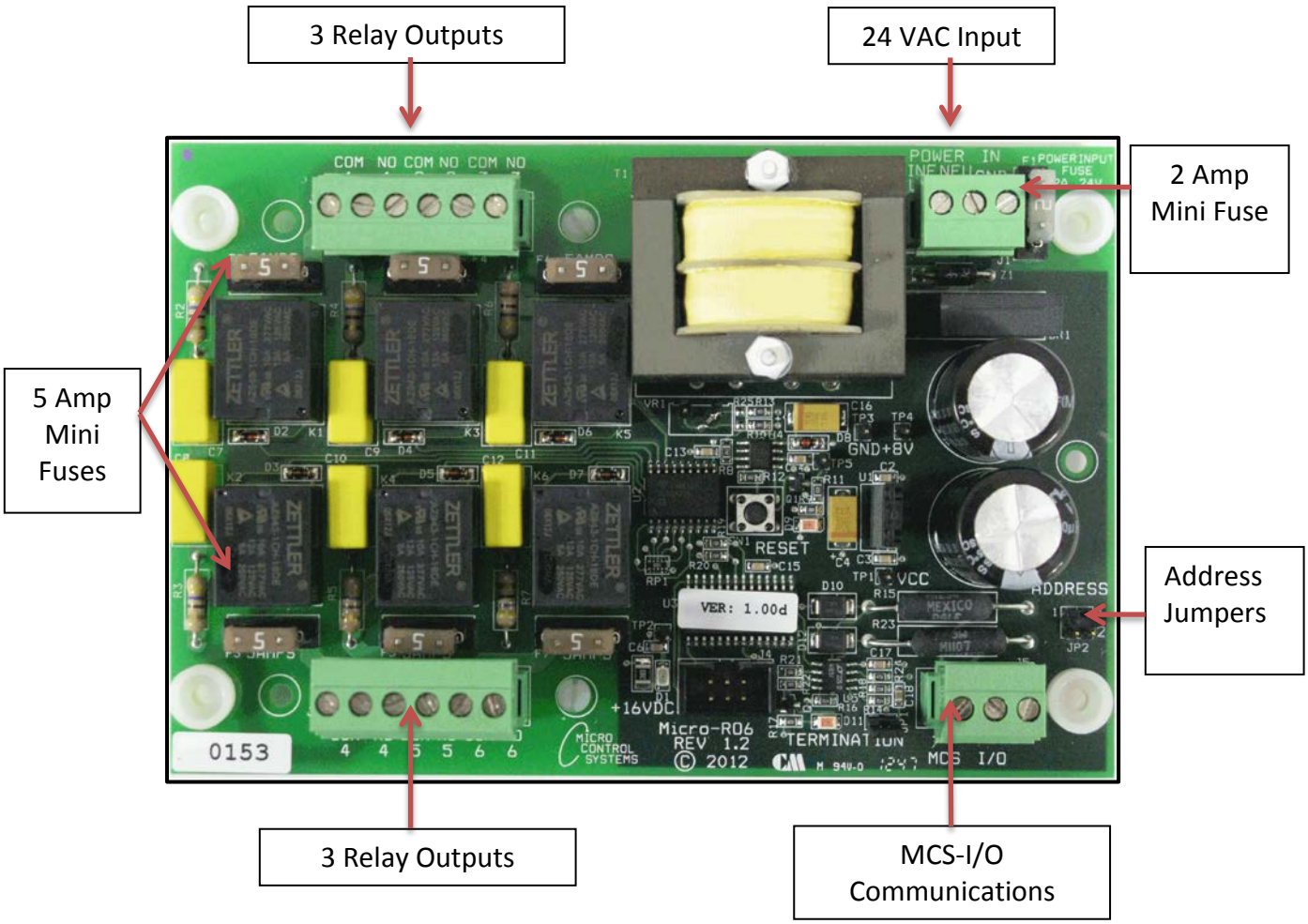
- Triac Output for a Digital Scroll.
- 18 Relay Outputs fused at 5 Amps.
- 26 Sensor Inputs either Analog or Digital.
- 12 Analog Outputs (0/10 VDC or 10/0 VDC).

3.1 MCS-MicroMag



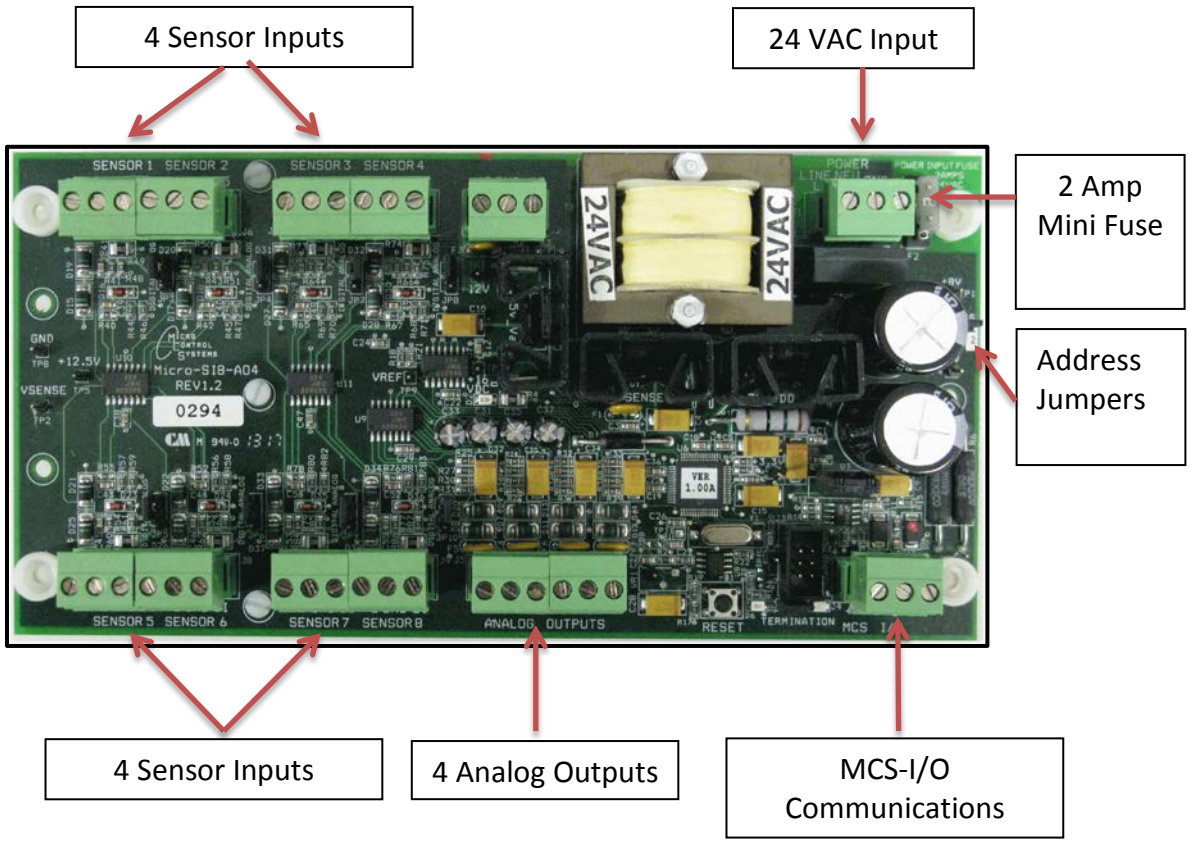
- Four Layer Printed Circuit Board with Power & Ground Plane for Noise Protection
- Six Relay Outputs, Fused @ 5 amps, Common & Normally Open Terminals Provided
- Ten Sensor Inputs (Analog or Digital) +5 VDC Power, Polyfuse Protected
- Four Analog Outputs provided, 0 to 10 VDC or 10 to 0 VDC, Polyfuse Protected
- +12 VDC provided for sensors where required, Polyfuse Protected
- RS 485 for BACnet MSTP or Modbus RTU built in Communications
- MCS-I/O communications port to communicate to other I/O boards on this system
- RS 232 communications port that allows MCS-Connect to communicate
- A built in Boot Loader that allows MCS-Connect to load Firmware and Config's
- Program Flash = 512K, Aux Flash = 24K, Ram = 52K, DMA Ram = 4K, E^2 = 64K

3.2 Micro-RO6



- Four Layer Printed Circuit Board with Power & Ground Plane for Noise Protection
- Six Relay Outputs, Fused @ 5 amps, Common & Normally Open Terminals Provided
- And MCS-I/O communications port to communicate to other I/O boards on this system

3.3 Micro-SI8-AO4



- Four Layer Printed Circuit Board with Power & Ground Plane for Noise Protection
- Eight Sensor Inputs (Analog or Digital) Polyfuse protected
- Four Analog Outputs provided, 0 to 10 VDC or 10 to 0 VDC, Polyfuse Protected
- MCS-I/O communications port to communicate to other I/O boards on this system

4. Windows Software Support

MCS-Connect provides both local and remote communications to the MicroMag independent of software type. Local communications is through and RS 232 connection. This program displays the status of the controller, and changes can be made to the system with proper authorization. Configuration files can be transmitted to or received from a MicroMag unit. The MicroMag automatically performs history logging and this program allows the data to be presented in a useful graph form.

MCS-Config provides the current method of building a unique config to describe the RTU we are controlling. It allows specifying each feature and building each Setpoint value with its options.

Requirements for PC Software

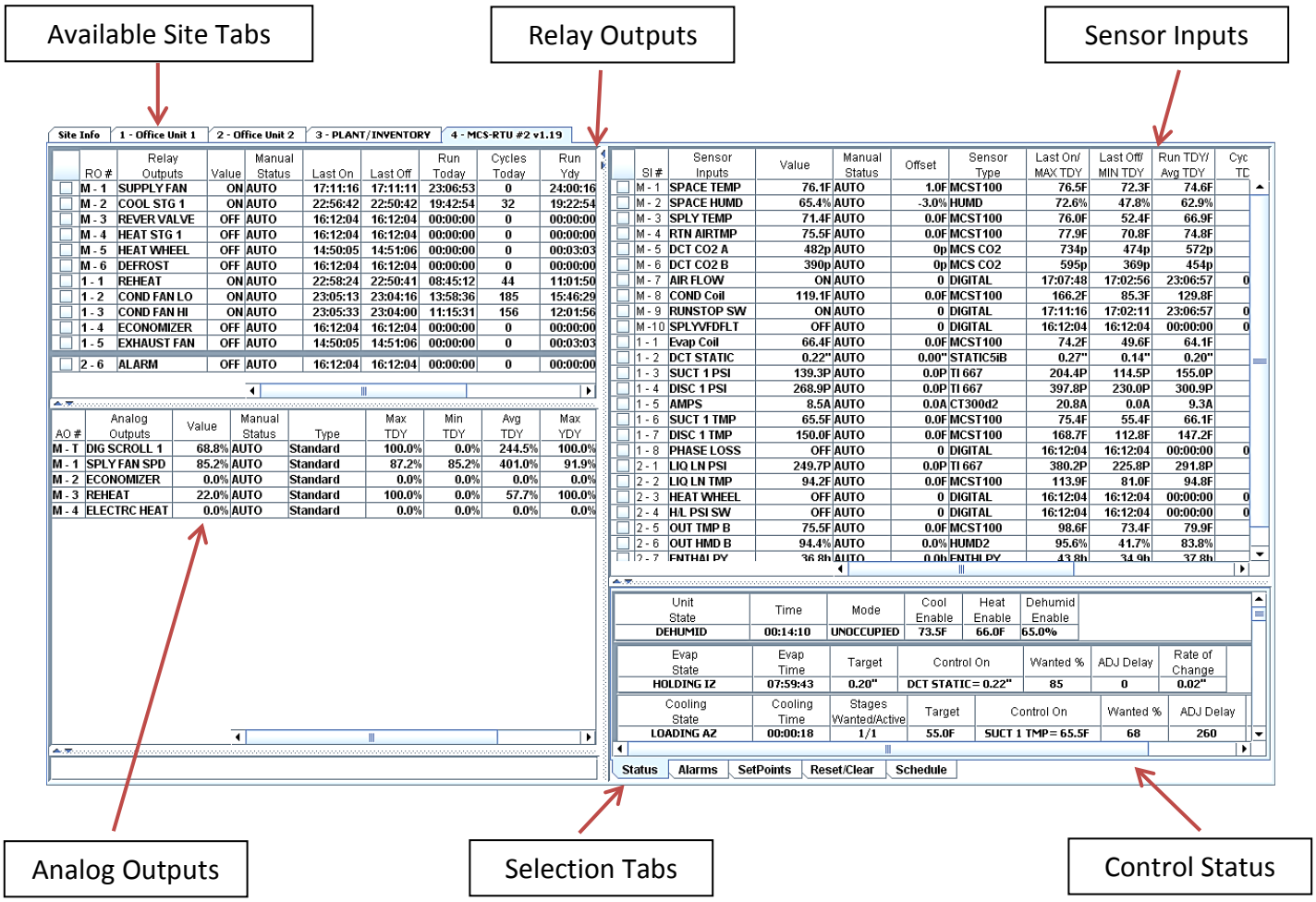
To install and run the MCS-Connect program we suggest the following system requirements:

Minimum System Required to Run Program

- Windows 2000 or higher
- Pentium processor
- 20 Gigabyte Available Hard Disk space
- Super VGA Display capable of displaying 256 colors
- 512 Megabytes RAM
- A RS 232 serial connection or a Black Box USB to RS 232 adapter
- And MCS-PC9 RS 232 communications cable

5. MCS-CONNECT

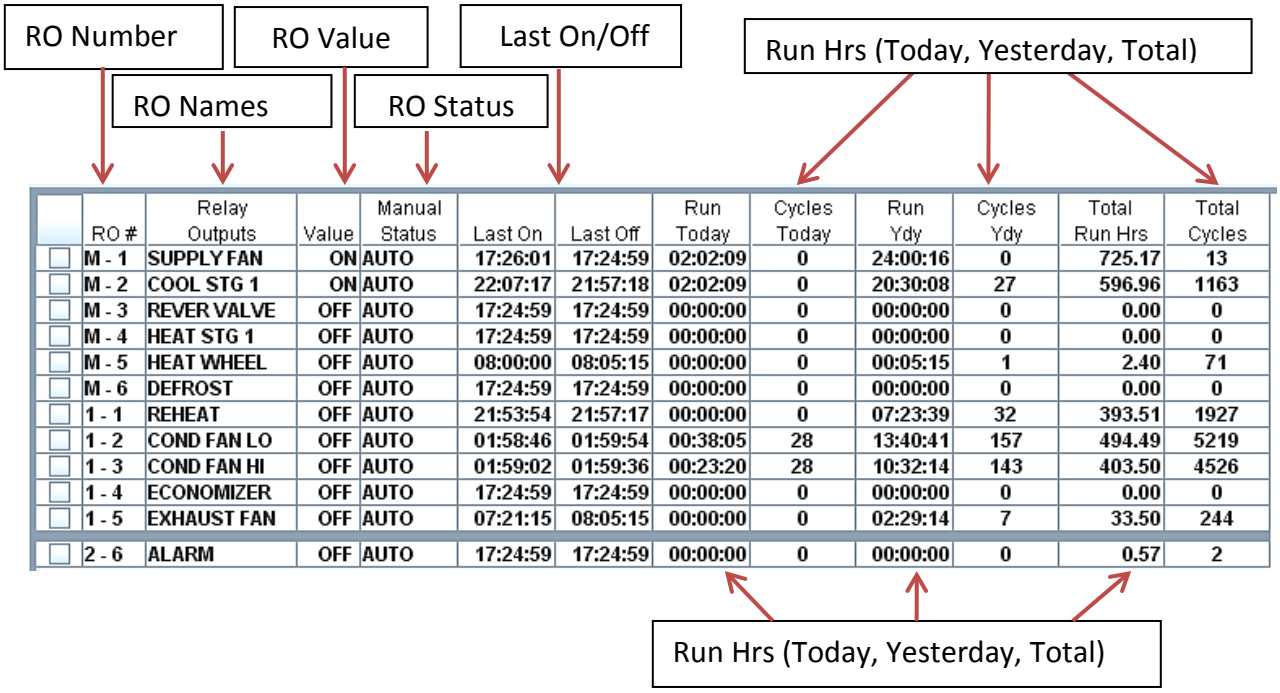
5.1 RTU STATUS



The screenshot above shows the following features:

- Across the top is a row of tabs. The first is the Site Information screen which will show you details of all the MCS controllers available to establish a connection. The remaining tabs allow you to access each unit one by one respectively.
- There are four quadrants of information displayed for each MCS controller, namely: Relay Outputs, Analog Outputs, Sensor Inputs, and Unit Status (with six sub-menus of Status, Alarms, Setpoints, Reset/Clear, Schedule, and Service). Note: these screens may not always be displayed in the same position; MCS-Connect will automatically adjust the screen arrangement for optimum display information.

5.2 RTU RELAY OUTPUTS



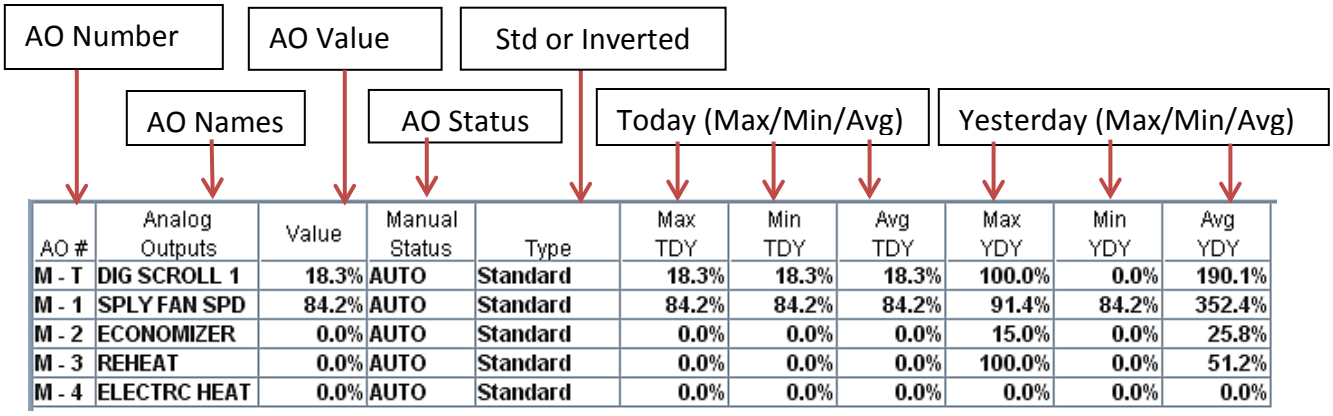
	RO #	Relay Outputs	Value	Manual Status	Last On	Last Off	Run Today	Cycles Today	Run Ydy	Cycles Ydy	Total Run Hrs	Total Cycles
☐	M - 1	SUPPLY FAN	ON	AUTO	17:26:01	17:24:59	02:02:09	0	24:00:16	0	725.17	13
☐	M - 2	COOL STG 1	ON	AUTO	22:07:17	21:57:18	02:02:09	0	20:30:08	27	596.96	1163
☐	M - 3	REVER VALVE	OFF	AUTO	17:24:59	17:24:59	00:00:00	0	00:00:00	0	0.00	0
☐	M - 4	HEAT STG 1	OFF	AUTO	17:24:59	17:24:59	00:00:00	0	00:00:00	0	0.00	0
☐	M - 5	HEAT WHEEL	OFF	AUTO	08:00:00	08:05:15	00:00:00	0	00:05:15	1	2.40	71
☐	M - 6	DEFROST	OFF	AUTO	17:24:59	17:24:59	00:00:00	0	00:00:00	0	0.00	0
☐	1 - 1	REHEAT	OFF	AUTO	21:53:54	21:57:17	00:00:00	0	07:23:39	32	393.51	1927
☐	1 - 2	COND FAN LO	OFF	AUTO	01:58:46	01:59:54	00:38:05	28	13:40:41	157	494.49	5219
☐	1 - 3	COND FAN HI	OFF	AUTO	01:59:02	01:59:36	00:23:20	28	10:32:14	143	403.50	4526
☐	1 - 4	ECONOMIZER	OFF	AUTO	17:24:59	17:24:59	00:00:00	0	00:00:00	0	0.00	0
☐	1 - 5	EXHAUST FAN	OFF	AUTO	07:21:15	08:05:15	00:00:00	0	02:29:14	7	33.50	244
☐	2 - 6	ALARM	OFF	AUTO	17:24:59	17:24:59	00:00:00	0	00:00:00	0	0.57	2

Run Hrs (Today, Yesterday, Total)

The screenshot above shows the following features:

- RO Number – Relay's M-1 is on and 1-1 is on.
- RO Names – Are up to 10 character and selected by the OEM for each output.
- RO Value – Can be On or Off.
- RO Status – Can be Auto, Manual or Locked off.
- Last On/Off – Last time turned on and off.
- Run Hrs Tdy, Ydy, Total – Run hours for Today, Yesterday and Total.
- Cycles Tdy, Ydy, Total – Cycles for Today, Yesterday and Total.

5.3 RTU ANALOG OUTPUTS



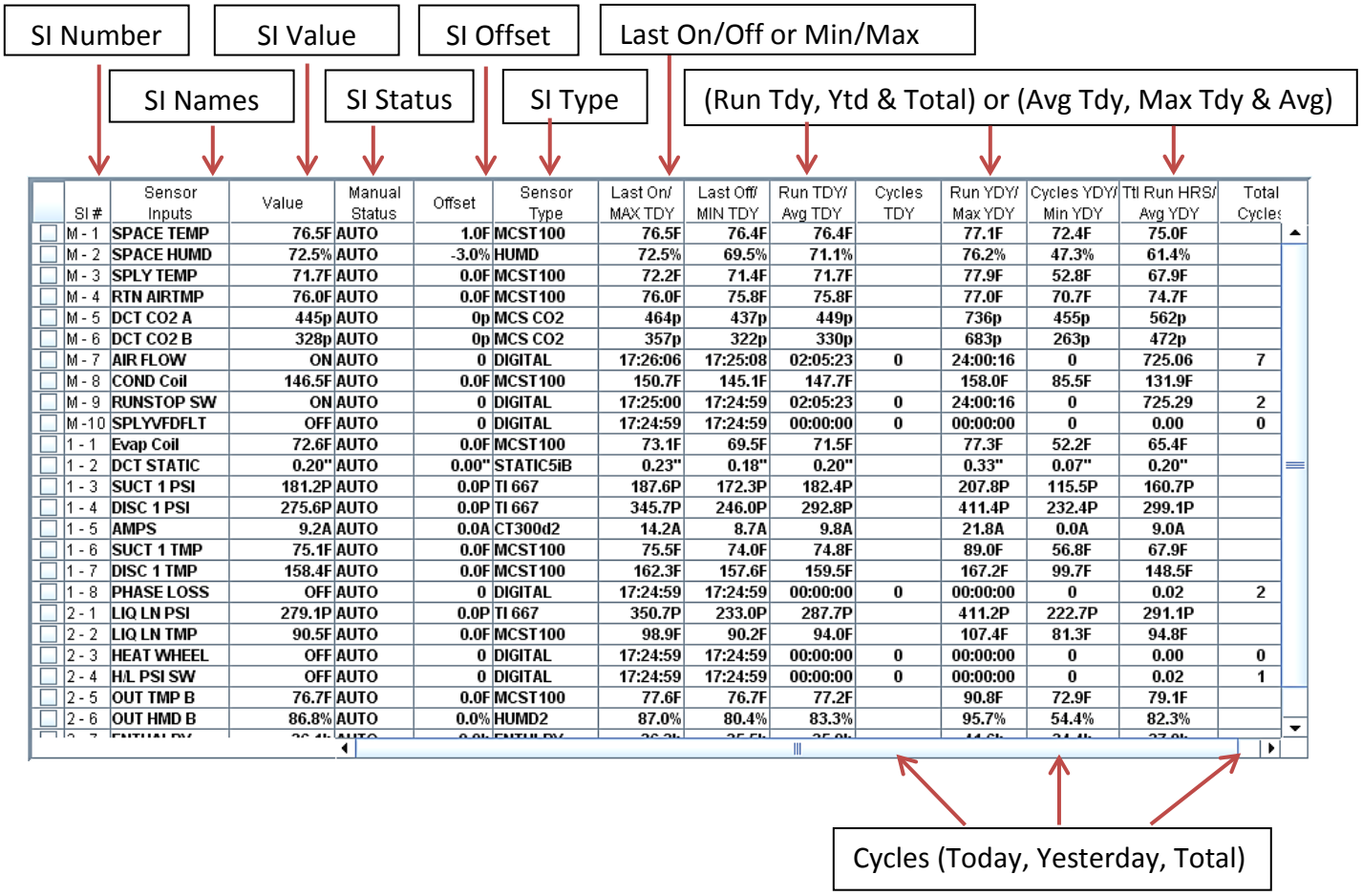
AO #	Analog Outputs	Value	Manual Status	Type	Max TDY	Min TDY	Avg TDY	Max YDY	Min YDY	Avg YDY
M - T	DIG SCROLL 1	18.3%	AUTO	Standard	18.3%	18.3%	18.3%	100.0%	0.0%	190.1%
M - 1	SPLY FAN SPD	84.2%	AUTO	Standard	84.2%	84.2%	84.2%	91.4%	84.2%	352.4%
M - 2	ECONOMIZER	0.0%	AUTO	Standard	0.0%	0.0%	0.0%	15.0%	0.0%	25.8%
M - 3	REHEAT	0.0%	AUTO	Standard	0.0%	0.0%	0.0%	100.0%	0.0%	51.2%
M - 4	ELECTRC HEAT	0.0%	AUTO	Standard	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%

The screenshot above shows the following features:

- AO Number – M-T is on MicroMag, it is a triac output for a digital scroll compressor.
- AO Number – M-1 is the first analog output on the MicroMag.
- AO Names – A 10 character selected by the OEM for each output.

- AO Value – The current analog output value. (0 to 10 VDC or 10 to 0 VDC)
- AO Status – Auto or Manual.
- AO Type – Can be standard, inverted.
- Min/Max & Avg – For today and yesterday.

5.4 RTU SENSOR INPUTS



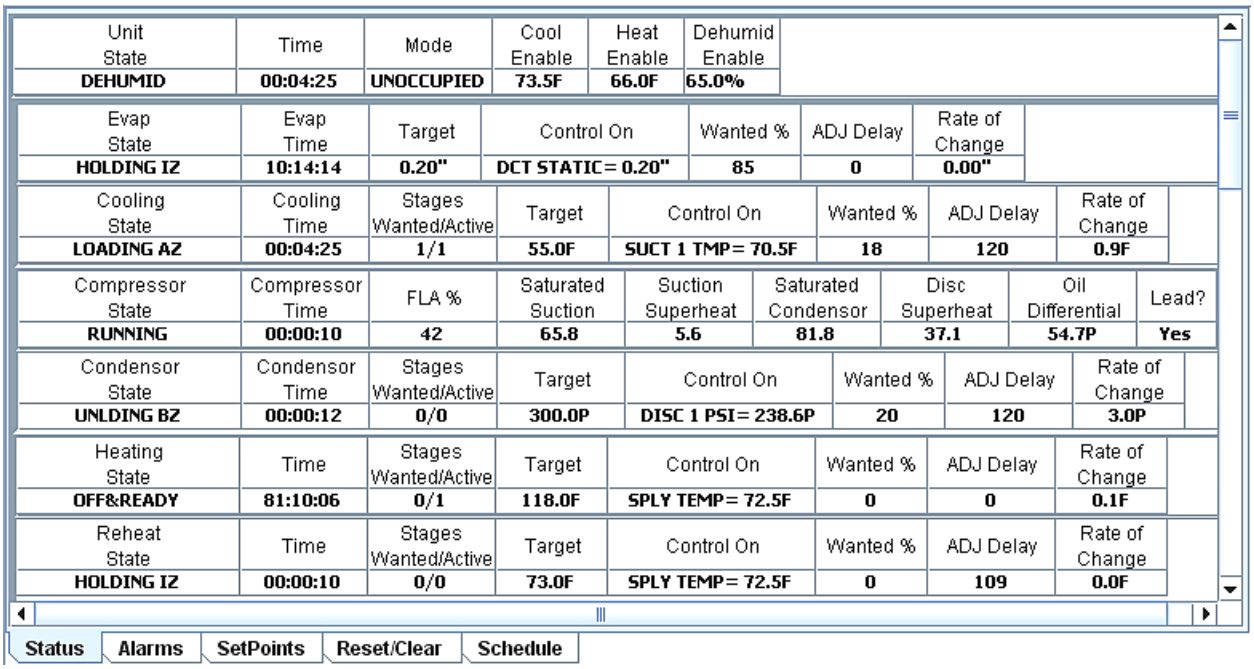
SI #	Sensor Inputs	Value	Manual Status	Offset	Sensor Type	Last On/ MAX TDY	Last Off/ MIN TDY	Run TDY/ Avg TDY	Cycles TDY	Run YDY/ Max YDY	Cycles YDY/ Min YDY	Ttl Run HRS/ Avg YDY	Total Cycles
M - 1	SPACE TEMP	76.5F	AUTO	1.0F	MCST100	76.5F	76.4F	76.4F		77.1F	72.4F	75.0F	
M - 2	SPACE HUMD	72.5%	AUTO	-3.0%	HUMD	72.5%	69.5%	71.1%		76.2%	47.3%	61.4%	
M - 3	SPLY TEMP	71.7F	AUTO	0.0F	MCST100	72.2F	71.4F	71.7F		77.9F	52.8F	67.9F	
M - 4	RTN AIRTMP	76.0F	AUTO	0.0F	MCST100	76.0F	75.8F	75.8F		77.0F	70.7F	74.7F	
M - 5	DCT CO2 A	445p	AUTO	0p	MCS CO2	464p	437p	449p		736p	455p	562p	
M - 6	DCT CO2 B	328p	AUTO	0p	MCS CO2	357p	322p	330p		683p	263p	472p	
M - 7	AIR FLOW	ON	AUTO	0	DIGITAL	17:26:06	17:25:08	02:05:23	0	24:00:16	0	725.06	7
M - 8	COND Coil	146.5F	AUTO	0.0F	MCST100	150.7F	145.1F	147.7F		158.0F	85.5F	131.9F	
M - 9	RUNSTOP SW	ON	AUTO	0	DIGITAL	17:25:00	17:24:59	02:05:23	0	24:00:16	0	725.29	2
M -10	SPLYVFDFLT	OFF	AUTO	0	DIGITAL	17:24:59	17:24:59	00:00:00	0	00:00:00	0	0.00	0
1 - 1	Evap Coil	72.6F	AUTO	0.0F	MCST100	73.1F	69.5F	71.5F		77.3F	52.2F	65.4F	
1 - 2	DCT STATIC	0.20"	AUTO	0.00"	STATIC5iB	0.23"	0.18"	0.20"		0.33"	0.07"	0.20"	
1 - 3	SUCT 1 PSI	181.2P	AUTO	0.0P	TI 667	187.6P	172.3P	182.4P		207.8P	115.5P	160.7P	
1 - 4	DISC 1 PSI	275.6P	AUTO	0.0P	TI 667	345.7P	246.0P	292.8P		411.4P	232.4P	299.1P	
1 - 5	AMPS	9.2A	AUTO	0.0A	CT300d2	14.2A	8.7A	9.8A		21.8A	0.0A	9.0A	
1 - 6	SUCT 1 TMP	75.1F	AUTO	0.0F	MCST100	75.5F	74.0F	74.8F		89.0F	56.8F	67.9F	
1 - 7	DISC 1 TMP	158.4F	AUTO	0.0F	MCST100	162.3F	157.6F	159.5F		167.2F	99.7F	148.5F	
1 - 8	PHASE LOSS	OFF	AUTO	0	DIGITAL	17:24:59	17:24:59	00:00:00	0	00:00:00	0	0.02	2
2 - 1	LIQ LN PSI	279.1P	AUTO	0.0P	TI 667	350.7P	233.0P	287.7P		411.2P	222.7P	291.1P	
2 - 2	LIQ LN TMP	90.5F	AUTO	0.0F	MCST100	98.9F	90.2F	94.0F		107.4F	81.3F	94.8F	
2 - 3	HEAT WHEEL	OFF	AUTO	0	DIGITAL	17:24:59	17:24:59	00:00:00	0	00:00:00	0	0.00	0
2 - 4	H/L PSI SW	OFF	AUTO	0	DIGITAL	17:24:59	17:24:59	00:00:00	0	00:00:00	0	0.02	1
2 - 5	OUT TMP B	76.7F	AUTO	0.0F	MCST100	77.6F	76.7F	77.2F		90.8F	72.9F	79.1F	
2 - 6	OUT HMD B	86.8%	AUTO	0.0%	HUMD2	87.0%	80.4%	83.3%		95.7%	54.4%	82.3%	

The screenshot above shows the following features:

- SI Number – M-1 is on MicroMag relay 1, 1-1 is on RO board 1 relay 1.
- SI Names – A 10 character selected by the OEM for each input.
- SI Value – Actual analog value or for digital On or Off.
- SI Status – Auto or Manual
- SI Offset – Value to calibrate sensor..
- SI Type – Pressure, Temperature, Amps, etc.
- Last On/Last Off or Max Tdy/Min Tdy
- Run Tdy or Avg Tdy – Depending on analog or digital sensor.
- Cycles Today/Yesterday & Total.

5.5 RTU CONTROL STATES

The status of the control states of the unit can be viewed from MCS-Connect by clicking the "Status" screen in the Unit Status quadrant. The following screen will be displayed:



Unit State	Time	Mode	Cool Enable	Heat Enable	Dehumid Enable
DEHUMID	00:04:25	UNOCCUPIED	73.5F	66.0F	65.0%

Evap State	Evap Time	Target	Control On	Wanted %	ADJ Delay	Rate of Change
HOLDING IZ	10:14:14	0.20"	DCT STATIC= 0.20"	85	0	0.00"

Cooling State	Cooling Time	Stages Wanted/Active	Target	Control On	Wanted %	ADJ Delay	Rate of Change
LOADING AZ	00:04:25	1/1	55.0F	SUCT 1 TMP= 70.5F	18	120	0.9F

Compressor State	Compressor Time	FLA %	Saturated Suction	Suction Superheat	Saturated Condensor	Disc Superheat	Oil Differential	Lead?
RUNNING	00:00:10	42	65.8	5.6	81.8	37.1	54.7P	Yes

Condensor State	Condensor Time	Stages Wanted/Active	Target	Control On	Wanted %	ADJ Delay	Rate of Change
UNLDING BZ	00:00:12	0/0	300.0P	DISC 1 PSI= 238.6P	20	120	3.0P

Heating State	Time	Stages Wanted/Active	Target	Control On	Wanted %	ADJ Delay	Rate of Change
OFF&READY	81:10:06	0/1	118.0F	SPLY TEMP= 72.5F	0	0	0.1F

Reheat State	Time	Stages Wanted/Active	Target	Control On	Wanted %	ADJ Delay	Rate of Change
HOLDING IZ	00:00:10	0/0	73.0F	SPLY TEMP= 72.5F	0	109	0.0F

Status | Alarms | SetPoints | Reset/Clear | Schedule

System (unit) information is shown in this section:

- **Unit State** - State of unit.
  (DEHUMID STATE, EVAP STATE, COOLING STATE, COMPRESSOR STATE, CONDENSER STATE, HEATING STATE, REHEAT STATE)
  - **Time** - Time spent in current state. If the state is UNIT IN POWER UP time will count down to zero.
  - **Mode** – Whether occupied or unoccupied..
  - **Enable Setpoints** – These are the Setpoints values that when controlling sensor is above or below enables function.

- **Evap State** – Can be Loading Below Zone (BZ), Unloading Above Zone (AZ) or Holding In Zone (IZ). Control is on duct static pressure and we have a modulating supply fan.
  - **Time** - Time spent in current state.
  - **Target** – The current value of the controlling Setpoint.
  - **Control On** – The controlling Setpoint and its current value.
  - **Wanted %** - The current value the computer has set for the evap fan.
  - **ADJ Delay** – The time in seconds until the next possible adjustment.
  - **Rate of Change** - The current slope of the controlling sensor over the time specified in the Setpoint.

- **Cooling State –** Can be loading AZ (above Zone, unloading BZ (below zone) or Holding IZ (in zone.
  - **Time** - Time spent in current state.
  - **Stages (Wanted/Active)** – Stages wanted on and stages currently on.

- **Target** – The current target in the Setpoint.
- **Control On** – The controlling sensor and it's current value.
- **Wanted %** - For a digital scroll this is the % capacity wanted.
- **ADJ Delay –** This is the accumulator for the integration controlling the next capacity change.
- **Rate of Change** - The current slope of the controlling sensor over the time specified in the Setpoint.

- **Compressor State –** Can be Off or Running.
- **Time** - Time spent in current state
- **FLA %** - Percent of full load amps as specified in Setpoint.
- **Saturated Suction** – Calculated Suction Saturated Temperature.
- **Suction Superheat** – Calculated Suction Superheat, only available if both the Suction Temperature and the Suction Pressure are used. Suction Superheat = Suction Temperature - Suction Saturated Temperature.
- **Saturated Condenser -** Calculated Suction Saturated Temperature.
- **Discharge Superheat –** Discharge Superheat is available only if both the Discharge Temperature and the Discharge Pressure are used. Discharge Superheat = Discharge Temperature - Discharge Saturated Temperature.
- **Oil Differential –** Differential oil pressure is calculated if both suction pressure and discharge pressure are available.
- **Lead** - YES will be displayed for the lead compressor in this column.
- **Heating State –** Can be Off & Ready, Loading BZ (below zone), Unloading AZ (above zone), Holding IZ (in zone).
- **Time** - Time spent in current state.
- **Stages (Wanted/Active)** – Stages wanted on and stages currently on.
- **Target** – The current target in the Setpoint.
- **Control On** – The controlling sensor and it's current value.
- **Wanted %** - For modulating heating this is the % capacity wanted.
- **ADJ Delay –** This is the time delay until the next capacity change.
- **Rate of Change** - The current slope of the controlling sensor over the time specified in the Setpoint.

- **Reheat State –** This feature is used in Dehumidification to maintain the zone temperature.
- **Time** - Time spent in current state.
- **Stages (Wanted/Active)** – Stages wanted on and stages currently on.
- **Target** – The current target in the Setpoint.
- **Control On** – The controlling sensor and it's current value.
- **Wanted %** - For modulating heating this is the % capacity wanted.
- **ADJ Delay –** This is the time delay until the next capacity change.
- **Rate of Change** - The current slope of the controlling sensor over the time specified in the Setpoint.

5.6 RTU RESET/CLEAR

The screenshot above shows the Reset and Clear features:

- Reset Lockouts – This does not require being authorized. However only a limited number of lockouts can be reset in one day without a higher authorization level.
- Clear Alarms - This funcion is limited to MCS or OEM.
- Clear Points - This funcion is limited to MCS or OEM.

5.7 RTU ALARMS

#	Alarm	Date	Time	Value
1	HI BLDG PSI	JUL 11	7:37:39	
2	HI BLDG PSI	JUL 10	18:07:38	
3	StptChg: 22	JUL 10	17:25:16	
4	UNIT PWR ON	JUL 10	17:24:59	
5	HI BLDG PSI	JUL 09	7:45:31	
6	StptChg: 7	JUL 03	21:39:46	
7	SI CHG @ M - 9	JUL 03	17:11:15	
8	RO CHG @ M - 1	JUL 03	17:11:10	
9	AO CHG @ M - 1	JUL 03	17:11:08	
10	AO CHG @ M - 1	JUL 03	17:09:11	
11	AO CHG @ M - 1	JUL 03	17:08:39	
12	AO CHG @ M - 1	JUL 03	17:07:42	
13	RO CHG @ M - 1	JUL 03	17:07:35	
14	SI CHG @ M - 9	JUL 03	17:02:10	
15	StptChg: 12	JUL 03	17:00:07	
16	StptChg: 12	JUL 03	16:59:57	
17	RO CHG @ M - 2	JUL 03	16:36:22	
18	AO CHG @ M - T	JUL 03	16:36:19	
19	StptChg: 14	JUL 03	16:32:12	
20	RO CHG @ M - 2	JUL 03	16:25:52	

The screenshot above shows the 1st 20 Alarms. There are a maximum of 100 of the most current.

- The alarms are numbered and the most current presented first.
- The alarms are named, this could be the name of a Setpoint or a specific alarm name.
- The alarms are date stamped.
- The alarms are time stamped.
- The alarms record a value where it's informative.

5.8 RTU SCHEDULES

Day	#1 Time On	#1 Time Off	#2 Time On	#2 Time Off
Sunday	8:00	8:00	8:00	8:00
Monday	8:00	18:30	8:00	18:00
Tuesday	8:00	18:30	8:00	18:00
Wednesday	8:00	18:30	8:00	18:00
Thursday	8:00	18:30	8:00	18:00
Friday	8:00	18:30	8:00	18:00
Saturday	8:00	8:00	8:00	8:00
Holiday	8:00	17:00	8:00	17:00

Holiday #	Start Month	Start Day	End Month	End Day
1	December	15	December	21
2	December	15	December	21
3	December	15	December	21
4	December	15	December	21
5	December	15	December	21
6	December	15	December	21
7	December	15	December	21
8	December	15	December	21

Status | Alarms | SetPoints | Reset/Clear | Schedule

The screenshot above shows the schedules.

- There are 2 on/off schedules per day.
- There are 7 days and 1 holiday schedule.
- There are 8 holiday dates.

5.9 RTU COMMUNICATIONS PAD

1. The Sensor Input Value, Manual Status, Type and Offset Value can be changed by clicking on the cell.
2. Information on Control States and the status of the system.
3. The Sensor Input Value, Manual Status, Type and Offset Value can be changed by clicking on the cell.
4. Information on the Schedule for this Magnum
5. The Sensor Input Value, Manual Status, Type and Offset Value can be changed by clicking on the cell.

The screenshot above shows the communications pad acknowledging action taken.

- Information is provided.
- Confirmation is given that a function has been done.

6. Displaying Setpoints

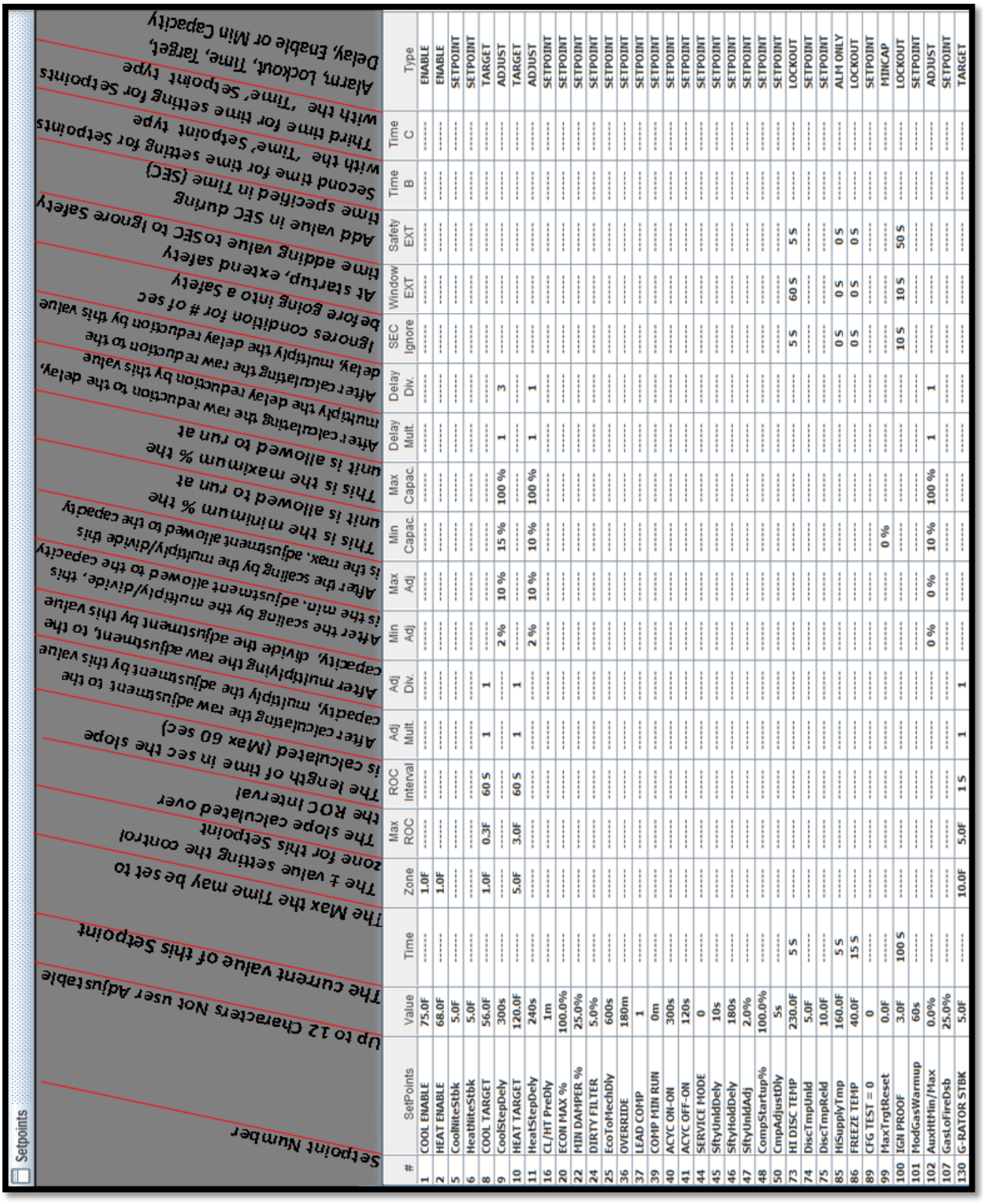
6.1 Keypad/Display

6.1.1 Press ‘MENU’ button
6.1.2 Press ‘DOWN’ button until the Setpoints screen appears
6.1.3 Press ‘ENTER’ button

6.2 MCS-Connect

6.2.1 Using MCS-Connect, connect to the MicroMag using the RS 232 port
6.2.2 If multiple units select tab for this MicroMag and you will get a status display
6.2.3 In the bottom of the control section, of the status display, select Setpoints

6.3 Setpoint Options



#	SetPoints	Value	Time	Zone	Max ROC	ROC Interval	Adj Mult.	Adj Div.	Min Adj	Max Adj	Min Capac.	Max Capac.	Delay Mult.	Delay Div.	SEC Ignore	Window EXT	Safety EXT	Time B	Time C	Type
1	COOL ENABLE	75.0F	------	1.0F	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	ENABLE
2	HEAT ENABLE	68.0F	------	1.0F	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	ENABLE
5	CoolNiteStbk	5.0F	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	SETPOINT
6	HeatNiteStbk	5.0F	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	SETPOINT
8	COOL TARGET	56.0F	------	1.0F	0.3F	60 S	1	1	------	------	------	------	------	------	------	------	------	------	------	TARGET
9	CoolStepDely	300s	------	------	------	------	------	------	2 %	10 %	15 %	100 %	1	3	------	------	------	------	------	ADJUST
10	HEAT TARGET	120.0F	------	5.0F	3.0F	60 S	1	1	------	------	------	------	------	------	------	------	------	------	------	TARGET
11	HeatStepDely	240s	------	------	------	------	------	------	2 %	10 %	10 %	100 %	1	1	------	------	------	------	------	ADJUST
16	CL/HT PreDly	1m	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	SETPOINT
20	ECON MAX %	100.0%	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	SETPOINT
22	MIN DAMPER %	25.0%	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	SETPOINT
24	DIRTY FILTER	5.0%	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	SETPOINT
25	EcoToMechDly	600s	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	SETPOINT
36	OVERRIDE	180m	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	SETPOINT
37	LEAD COMP	1	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	SETPOINT
39	COMP MIN RUN	0m	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	SETPOINT
40	ACYC ON-ON	300s	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	SETPOINT
41	ACYC OFF-ON	120s	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	SETPOINT
44	SERVICE MODE	0	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	SETPOINT
45	SftyUnldDely	10s	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	SETPOINT
46	SftyHoldDely	180s	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	SETPOINT
47	SftyUnldAdj	2.0%	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	SETPOINT
48	CompStartup%	100.0%	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	SETPOINT
50	CmpAdjustDly	5s	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	SETPOINT
73	HI DISC TEMP	230.0F	5 S	------	------	------	------	------	------	------	------	------	------	------	5 S	60 S	5 S	------	------	LOCKOUT
74	DiscTmpUnld	5.0F	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	SETPOINT
75	DiscTmpReld	10.0F	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	SETPOINT
85	HiSupplyTmp	160.0F	5 S	------	------	------	------	------	------	------	------	------	------	------	0 S	0 S	0 S	------	------	ALM ONLY
86	FREEZE TEMP	40.0F	15 S	------	------	------	------	------	------	------	------	------	------	------	0 S	0 S	0 S	------	------	LOCKOUT
89	CFG TEST = 0	0	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	SETPOINT
99	MaxTrgtReset	0.0F	------	------	------	------	------	------	------	------	0 %	------	------	------	------	------	------	------	------	MINCAP
100	IGN PROOF	3.0F	100 S	------	------	------	------	------	------	------	------	------	------	------	10 S	10 S	50 S	------	------	LOCKOUT
101	ModGasWarmup	60s	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	SETPOINT
102	AuxHtHin/Max	0.0%	------	------	------	------	------	------	0 %	0 %	10 %	100 %	1	1	------	------	------	------	------	ADJUST
107	GasLoFireDsb	25.0%	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	SETPOINT
130	G-RATOR STBK	5.0F	------	10.0F	5.0F	1 S	1	1	------	------	------	------	------	------	------	------	------	------	------	TARGET

6.4 RTU SETPOINTS

#	Name	Type	Description
1	COOL ENABLE	ENABLE	Enable cooling mode if the controlling sensor rises above this value. When the cooling target capacity control and the mode enable utilize the same sensor, this Setpoint should be non-active. Value: Enables cooling when the control sensor rises above this value. Zone: Subtracted from the value to disable cooling.
2	HEAT ENABLE	ENABLE	Enable heating mode if the controlling sensor falls below this value. When the heating target capacity control and the mode enable utilize the same sensor, this Setpoint should be non-active. Value: Enables heating when the control sensor falls below this value. Zone: Added to the value to disable heating.
3	DEH ENABLE	ENABLE	When cooling mode and heating mode are satisfied, this Setpoint will determine if the unit should go into Dehumidification mode. Value: Controls when the MicroMag will switch into Dehumidification. Zone: Subtracted from the value to disable dehumidification.
4	DehCmpMinOvr	Minimum	If the system is in Cooling Mode and the humidity is greater than DEH ENABLE plus the value of this Setpoint, the cooling minimum capacity will be changed to the new minimum capacity value included in this Setpoint. Value: OFFSET to Setpoint #3 “DEH ENABLE” to determine whether the unit goes in Cooling minimum capacity override. MIN Capacity % Value: New cooling min capacity if cooling is in min capacity override.
5	CoolNiteStbk	SETPOINT	This is the Cooling Night Setback. This occurs when the system is in unoccupied mode. Value: The amount by which Cooling enable will be OFFSET.
6	HeatNiteStbk	SETPOINT	This is the Heating Night Setback. This occurs when the system is in unoccupied mode. Value: The amount by which the Heating enable will be OFFSET.
7	DehNiteStbk	SETPOINT	This is the Dehumidification Night Setback. This occurs when the system is in unoccupied mode. Value: The amount by which Dehumidification will be OFFSET.
8	COOL TARGET	TARGET	When in Cooling mode the system will maintain this value for the sensor selected. Value: The temperature that Cooling Capacity Control will maintain.

			Zone: Deadband around target temp. MAX ROC Value: The MAX Rate of Change that the capacity control will allow to determine loading or unloading. ROC Interval: The Time Interval over which the rate of change is calculated. Adjust multiplier/divider value: Scales any calculated changes to the cooling capacity.
9	CoolStepDely	DELAY	This Setpoint determines how quickly to adjust the cooling capacity. The farther the sensor is from target the quicker the step delay will work to reach the Setpoint. Value: The adjustment delay for the cooling capacity control. MIN Adjust % Value: Cooling capacity will not be adjusted less than this value. MAX Adjust % Value: Cooling capacity will not be adjusted more than this value. MIN Capacity % Value: Cooling capacity will not be less than this value. MAX Capacity % Value: Cooling capacity will not be more than this value. Delay multiplier/divider value: Scales any calculated changes to the cooling step delay.
10	HEAT TARGET	TARGET	When in Heating mode the system will maintain this value for the sensor selected. Value: The temperature that Heating Capacity Control will maintain. Zone: Will adjust the capacity control to maintain the temperature and target range for Heating. MAX ROC Value: The MAX Rate of Change that the capacity control will allow to determine loading or unloading. ROC Interval: The Time Interval that the rate of change is calculated over. Adjust multiplier/divider value: Scales any calculated changes to the Heating Capacity.
11	HeatStepDely	DELAY	This Setpoint determines how quickly to adjust the heating capacity. The farther the sensor is from target the quicker the step delay will work to reach the Setpoint. Value: The adjustment delay for the heating capacity control. MIN Adjust % Value: Heating capacity will not be adjusted less than this value. MAX Adjust % Value: Heating capacity will not be adjusted more than this value. MIN Capacity % Value: Heating capacity will not be less than this value. MAX Capacity % Value: Heating capacity will not be more than

			this value. Delay multiplier/divider value: Scales any calculated changes to the heating step delay.
12	REHT TARGET	TARGET	When in Reheating mode the system will maintain this value for the supply air temperature sensor. Value: The temperature the reheating capacity control will maintain. Zone: Will adjust the capacity control to maintain the temperature and target range for reheating. MAX ROC Value: The MAX rate of change that the capacity control will allow to determine loading or unloading. ROC Interval: The time Interval that the rate of change is calculated over. Adjust multiplier/divider value: Scales any calculated changes to the Reheating Capacity.
13	RehtStepDely	DELAY	This Setpoint determines how quickly to adjust the reheating capacity. The farther the sensor is from target the quicker the step delay will work to reach the Setpoint. Value: The adjustment delay for the reheating capacity control. MIN Adjust % Value: Reheating capacity will not be adjusted less than this value. MAX Adjust % Value: Reheating capacity will not be adjusted more than this value. MIN Capacity % Value: Reheating capacity will not be less than this value. MAX Capacity % Value: Reheating capacity will not be more than this value. Delay multiplier/divider value: Scales any calculated changes to the Reheating Step Delay.
14	SplyStatcTrg	TARGET	When the supply fan is needed, this Setpoint will maintain a duct static pressure. Value: The pressure the supply fan capacity control will maintain. Zone: Will adjust the capacity control to maintain the supply fan static Setpoint. MAX ROC Value: The MAX rate of change that the supply fan control will allow to determine increase or decrease to the supply fan speed. ROC Interval: The time interval the rate of change is calculated. Adjust multiplier/divider value: Scales any calculated changes to the Supply Static Target. If this Setpoint is Non-Active, the Micro-Mag will treat the Supply Fan as ON/OFF.
	S-FanSpd %	SETPOINT	Value: The speed of the Supply Fan for a constant volume arrangement.

	S-FanSpd %	TARGET	Controls the fan speed when the MicroMag is a single zone VAV controller and the unit is in evaporator fan only mode. This option additionally provides parameters for the single zone VAV capacity control function. Zone and target of the VAV control algorithm will be based on the cooling and heating enable Setpoints. Target of control algorithm will be halfway between the enable Setpoint and the upper bound of the zone value (lower for heating) of the appropriate enable Setpoint. Value: will be the speed of the supply fan when the unit is in evap fan only mode. MAX ROC Value: The MAX rate of change that the capacity control will allow to determine loading or unloading. ROC Interval: The time Interval the rate of change is calculated over. Adjust multiplier/divider value: Scales any calculated changes to the Supply Fan Capacity.
15	SplyStatcDly	DELAY	This Setpoint determines how quickly to adjust the supply fan capacity. The farther the sensor is from target the quicker the step delay will work to reach the Setpoint. Value: The adjustment delay for the supply fan capacity control. MIN Adjust % Value: Supply fan capacity will not be adjusted less than this value. MAX Adjust % Value: Supply fan capacity will not be adjusted more than this value. MIN Capacity % Value: Supply fan capacity will not be less than this value. MAX Capacity % Value: Supply fan capacity will not be more than this value. Delay multiplier/divider value: Scales any calculated changes to the supply fan step delay.
	S-FanSpd Dly	DELAY	This Setpoint determines how quickly to adjust the supply fan capacity. The farther the sensor is from target the quicker the step delay will work to reach the Setpoint. Value: The adjustment delay for the supply fan capacity control. MIN Adjust % Value: Supply fan capacity will not be adjusted less than this value. MAX Adjust % Value: Supply fan capacity will not be adjusted more than this value. Delay multiplier/divider value: Scales any calculated changes to the supply fan step delay. Note: the MIN Capacity and the MAX Capacity % values are not used as they are provided in Setpoints #29 “SFanMin%Cool” & #30 “SFanMin%Heat”.

			This Setpoint is used on a single zone VAV system.
16	CL/HT PreDly	SETPOINT	When this Setpoint is ACTIVE it will determine the minimum supply fan ON time before going into cooling or heating mode.
17	CND TRGT PSI	TARGET	When a compressor is running, this Setpoint is the target discharge pressure for the condenser fans. Value: The discharge pressure the condenser capacity control will maintain. Zone: Is the deadband around target psi. MAX ROC Value: The MAX rate of change that the capacity control will allow to determine loading or unloading of condenser fans. ROC Interval: The time Interval that the rate of change is calculated over. Adjust multiplier/divider value: Scales any calculated changes to the Reheating Capacity.
18	CND STEP DLY	DELAY	This Setpoint determines how quickly to adjust the condenser fan capacity. The farther the sensor is from target the quicker the step delay will work to reach the Setpoint. Value: The adjustment delay for the condenser fan capacity control. MIN Adjust % Value: Condenser fan capacity will not be adjusted less than this value. MAX Adjust % Value: Condenser fan capacity will not be adjusted more than this value. MIN Capacity % Value: Condenser fan capacity will not be less than this value. MAX Capacity % Value: Condenser fan capacity will not be more than this value. Delay multiplier/divider value: Scales any calculated changes to the Condenser fan step delay.
19	EconAmbEnabl	ENABLE	This Setpoint determines the maximum temperature or enthalpy (depending on how the unit is configured) at which the economizer will be ENABLED. Value: Maximum Temperature or Enthalpy.
20	ECON MAX %	SETPOINT	This defines the maximum opening of the economizer.
21	HiCO2MinDmpr	SETPOINT	This defines the minimum damper position when the CO2 is

			high (See SETPOINT #32 “HI CO2 LEVEL”).
22	MIN DAMPER %	SETPOINT	If the CO2 levels are satisfied this is the minimum damper position.
23	DehSucTmpTrg	TARGET	When in dehumidification mode the system will maintain this value for the target suction temperature (or saturated suction temperature if there is no suction temperature sensor) and use Setpoint #9 “CoolStepDely” as the cooling capacity delay Setpoint. Value: The temperature that Cooling Capacity Control will maintain. Zone: Will adjust the capacity control to maintain the suction temperature and target range for Cooling. MAX ROC Value: The MAX Rate of Change that the capacity control will allow to determine loading or unloading. ROC Interval: The Time Interval over which the rate of change is calculated. Adjust multiplier/divider value: Scales any calculated changes to the cooling capacity.
24	DIRTY FILTER	ALARM	This Setpoint creates an ALARM if the clogged filter indicator is ON.
		LOCKOUT	This Setpoint will LOCKOUT the unit if this clogged filter indicator is ON.
25	EcoToMechDly	SETPOINT	If ECONOMIZER is enabled this Setpoint determines how many seconds after the ECONOIMIZER is fully open before mechanical cooling is permitted to run. Value: Number of seconds before mechanical cooling is enabled.
26	BldgStatcTrg	TARGET	This Setpoint is used to maintain a building static pressure. Value: The pressure that building static capacity control will maintain. Zone: Deadband around target in which the exhaust fan will modulate to maintain. MAX ROC Value: The MAX rate of change that capacity control will allow to determine loading or unloading. ROC Interval: The time Interval the rate of change is calculated over. Adjust multiplier/divider value: Scales any calculated changes to the Building Static Capacity.
27	BldgStatcDly	DELAY	This Setpoint determines how quickly to adjust the building static capacity control. Value: The adjustment delay for the building static capacity control. MIN Adjust % Value: Building static capacity will not be adjusted less than this value. MAX Adjust % Value: Building Static capacity will not be

			adjusted more than this value. MIN Capacity % Value: Building Static capacity will not be less than this value. MAX Capacity % Value: Building Static capacity will not be more than this value. Delay multiplier/divider value: Scales any calculated changes to the Building Static Capacity.
28	ExhFanMinRun	SETPOINT	Minimum run time for exhaust Fan (in seconds).
29	SFanMin%Cool	DELAY	When this Setpoint is enabled the single zone VAV will be allowed for cooling. Value: The minimum supply fan speed during cooling load. MIN Capacity % Value: Minimum fan speed when high CO2 is detected. MAX Capacity % Value: Maximum fan speed when the unit is in cooling mode. NOTE: When constant air volume is desired in cooling mode the value and maximum capacity shall be set to the same value.
30	SFanMin%Heat	DELAY	When this Setpoint is enabled the single zone VAV will be allowed for heating. Value: The minimum supply fan speed during heating load. MIN Capacity % Value: Minimum fan speed when the heat pump is operating. MAX Capacity % Value: Maximum fan speed when the unit is in heating mode. NOTE: When constant air volume is desired in heating mode the value and maximum capacity shall be set to the same value.
31	HiBldgStatic	ALARM	This Setpoint creates an ALARM if high building static pressure is detected. Value: Will trigger and alarm when setpoint is reached. Time: Time in seconds the Building Static pressure is allowed above Setpoint value before the ALARM is tripped.
32	HI CO2 LEVEL	SETPOINT	This Setpoint determines a high CO2 condition has occurred. Value: High CO2 level in PPM.
33	HI CO2 ZONE	SETPOINT	This Setpoint is the dead band for the high CO2 level. When the CO2 level has dropped below the high CO2 level minus this amount, the high CO2 condition is cleared. Value: CO2 Zone in PPM.
34	LoAmbCompOff	ENABLE	If ambient temperature is below this Setpoint, the compressor will be disabled until the ambient temperature reaches the zone value degrees above the value of the Setpoint. Value: The ambient temperature the compressor will be disabled. Zone: The ambient temperature deadband.
		SETPOINT	If ambient temperature is below this Setpoint, the compressor will be disabled until the ambient temperature rises 2 degrees

			above the value. Value: The ambient temperature the compressor will be disabled.
35	HiAmbHeatOff	ENABLE	If ambient temperature is above this Setpoint, the heating will be disabled until the ambient temperature is lower than Setpoint value minus the enable zone. Value: The ambient temperature above which heating will be disabled. Zone: Degrees below the value that ambient temperature must reach before heating will be re-enabled.
		SETPOINT	If ambient temperature is above this Setpoint, the heating will be disabled until the ambient temperature is lower than Setpoint value minus 2 degrees. Value: The ambient temperature above which heating will be disabled.
36	OVERRIDE	SETPOINT	This Setpoint will determine how long the Micro-Mag will be in override. When the override switch is depressed the unit will exit “Un-occupied” mode and enter “Override” mode. Value: The number of minutes that the Micro-Mag will be in override.
37	LEAD COMP	ALARM	Identifies the lead compressor. If set to “0” the automatic rotation will be enabled. Value: Lead compressor (If set to “0” automatic rotation will be enabled). Time: If the compressor is in automatic rotation and the value of Setpoint #38 “CompRotation” is set to greater than“0”, then compressor will rotate according to run time. If set to “0” the compressors will rotate each cycle.
38	CompRotation	SETPOINT	If compressor rotation is enabled (Value of Setpoint #37 “LEAD COMP” is “0”), then this Setpoint determines the number of days for rotation. Value: The number of days that compressor will be in rotation.
39	COMP MIN RUN	SETPOINT	The minimum number of minutes the compressor must run. Value: The number of minutes the compressor must run before it is allowed to shut off.
40	ACYC ON-ON	SETPOINT	The time difference between the compressor ON cycle and when the compressor can restart. This limits the number of starts per hour. Value: The number of seconds the compressor has to wait before it can turn ON again.
41	ACYC OFF-ON	SETPOINT	The time the compressor must be OFF before restarting. Value: The number of seconds that the compressor must be OFF before it will turn ON.
42	PMP DOWN PSI	SETPOINT	If this Setpoint is active the system will PUMP DOWN, running compressors to this Setpoint before turning OFF. A PUMP

			DOWN is also performed at startup. Value: This is the suction pressure value for turning OFF the compressor when in the PUMP DOWN or for opening the liquid line solenoid during the PRE-PUMP DOWN state.
43	PmpDownDealy	SETPOINT	The PUMP DOWN timer limits the length of time a compressor can be in PUMP DOWN. Value: Specifies the maximum number of seconds that the compressor will remain in PUMP DOWN mode before going into anti-cycle.
		LOCKOUT	The PUMP DOWN timer limits the length of time a compressor can be in PUMP DOWN. If this time is reached, the compressor will lockout. Value: Specifies the maximum number of seconds that the compressor can remain in PUMP DOWN mode. If this time is reached, the compressor will lockout.
44	SERVICE MODE	SETPOINT	If non-zero, then a compressor being disabled by the PUMP DOWN switch will continue to run until its suction pressure is zero. The compressor will be turned ON to perform the PUMP DOWN the number of times indicated in this Setpoint. This is in preparation for service to be performed on the compressor. Value: If the value is zero, then service mode is OFF. IF the value is greater than zero the active compressor will be pumped down to zero PSI this number of times before shutting OFF.
45	SftyUnldDely	SETPOINT	If a compressor is in a safety unload, the compressor will wait this amount between unload adjustments. Value: Seconds between unload adjustments.
46	SftyHoldDely	SETPOINT	This is how long the unit will stay in the safety hold state. Value: Seconds the compressor will stay in safety hold.
47	SftyUnldAdj	SETPOINT	When a compressor is unloading because of safety, this Setpoint will determine the percent of compressor capacity that will be adjusted every unload cycle. Value: The percent the compressor will be adjusted.
48	CompStartup%	SAFETY	This is the starting percent for a compressor whether it is a Digital or Frequency Drive Controlled. Value: The starting compressor speed percentage.
49	SPARE		NOT USED.
50	CmpAdjustDly	SETPOINT	The number of seconds between compressor adjustments. Value: The delay in seconds between compressors adjustments.
51	COMP 1 FLA	SETPOINT	This Setpoint is a reference of the Full Load AMPS for Compressor 1. This value is used to calculate the high and the low amperage safety limits. Value: Full Load AMPS of Compressor 1.
52	COMP 2 FLA	SETPOINT	This Setpoint is a reference of the Full Load AMPS for Compressor 2. This value is used to calculate the high and the

			low amperage safety limits. Value: Full Load AMPS of Compressor 2.
53	COMP 3 FLA	SETPOINT	This Setpoint is a reference of the Full Load AMPS for Compressor 3. This value is used to calculate the high and the low amperage safety limits. Value: Full Load AMPS of Compressor 3.
54	COMP 4 FLA	SETPOINT	This Setpoint is a reference of the Full Load AMPS for Compressor 4. This value is used to calculate the high and the low amperage safety limits. Value: Full Load AMPS of Compressor 4.
55	LOW AMP %	ALARM	This alarm uses the FLA of the compressor to determine what percent the Low Amp alarm is posted. At startup if the motor amperage of the compressor does not achieve this percent, the compressor is shut down and a 'LOW AMPS' Alarm is posted. Value: The value is the LOW AMP percentage for compressors. Time: The number of seconds before the Alarm is tripped. Lockout Delay: The compressor will Lockout if this Alarm occurs more than once within this many hours. Safety Down Time: The amount of time that the compressor will remain in safety when the LOW AMPS Alarm is posted. SEC to Ignore Safety: Will ignore safety for this number of seconds. Window to EXT. Safety Time (SEC): At startup, for the first window to extend Safety Time seconds, allow the Safety Time to be extended. Safety Time Extension (SEC): If Safety Time extension is allowed, extend the Trip Delay by this many seconds.
		LOCKOUT	This alarm uses the FLA of the compressor to determine at what percent the Low Amp alarm is posted. At startup if the motor amps of the compressor do not achieve this percent the compressor will LOCKOUT and a 'LOW AMPS' Alarm is posted. Value: The value is the LOW AMP setting for the compressors. Time: The number of second(s) before the Alarm is tripped and the compressor shall LOCKOUT. SEC to Ignore Safety: Will ignore safety for this number of seconds. Window to EXT. Safety Time (SEC): At startup, for the first window to extend Safety Time seconds, allow the Safety Time to be extended. Safety Time Extension (SEC): If Safety Time extension is allowed, extend the Trip Delay by this many seconds.
56	HIGH AMP %	ALARM	This alarm uses FLA of the compressor to determine at what percent the High Amperage alarm is posted. If the motor amps of the compressor rises above this Setpoint, the compressor is shut down and a 'HIGH AMPS' Alarm is posted.

			Value: The value is the HIGH AMP % setting for compressors. Time: The number of second(s) before the Alarm is tripped. Lockout Delay: The compressor shall Lockout if this Alarm occurs more than once in this many hours. Safety Down Time: The amount of time that the compressor will remain in safety when the HIGH AMPS Alarm is posted. SEC to Ignore Safety: Will ignore safety for this number of seconds. Window to EXT. Safety Time (SEC): At startup, for the first window to extend Safety Time seconds, allow the Safety Time to be extended. Safety Time Extension (SEC): If Safety Time extension is allowed at start up, extend the Trip Delay by this many seconds.
		LOCKOUT	This alarm uses FLA of the compressor to determine at what percent the High Amperage alarm is posted. If the motor amps of the compressor rise above this Setpoint, the compressor shall LOCKOUT and a 'HIGH AMPS' Alarm is posted. Value: The value is the HIGH AMP % setting for the compressors. Time: The number of second(s) before the Alarm is tripped and the compressor will LOCKOUT. SEC to Ignore Safety: Will ignore safety for this number of seconds. Window to EXT. Safety Time (SEC): At startup, for the first window to extend Safety Time seconds, allow the Safety Time to be extended. Safety Time Extension (SEC): If Safety Time extension is allowed at start up, extend the Trip Delay by this many seconds.
57	HiAmpUnldHld	SETPOINT	This Setpoint determines whether a compressor will go into High Amp Hold or Unload due to High Motor Amps. If the motor Amps are above this Setpoint, the compressor will go into High Amp Unloading. Once the current reduces below this Setpoint, the compressor will go into High Amp Hold until the load is below 100%. Value: Load percentage to determine High Amp Unload.
58	NoCompProof	ALARM	This Setpoint will shut down a compressor and post a Compressor Proof Alarm if the Compressor Proof SI is not true. Time: The number of seconds before the Alarm is sent. Lockout Delay: The compressor will Lockout if this Alarm occurs more than once in this many hours. Safety Down Time: The compressor will be in safety for this amount of minutes when the NO CMP PRF Alarm is posted. SEC to Ignore Safety: Will ignore safety for this number of seconds. Window to Ext. Safety Time (SEC): At startup, for the first

			window to extend Safety Time seconds, allow the Safety Time to be extended. Safety Time Extension (SEC): If Safety Time extension is allowed, extend the Trip Delay by this many seconds.
		LOCKOUT	This Setpoint will LOCKOUT a compressor and post a Compressor Proof Alarm, if the Compressor Proof SI is not true. Time: The number of second before the Alarm is tripped and the compressor will LOCKOUT. SEC to Ignore Safety: Will ignore safety for this number of seconds. Window to EXT. Safety Time (SEC): At startup, for the first window to extend Safety Time seconds, allow the Safety Time to be extended. Safety Time Extension (SEC): If Safety Time extension is allowed, extend the Trip Delay by this many seconds.
59	HI MOTOR TMP	SETPOINT	Currently NOT USED.
60	COMP FAULT	ALARM	This Setpoint will shut down a compressor and post a Compressor Fault Alarm, if the Compressor Fault SI is true. Time: The number of seconds before the Alarm is tripped. Lockout Delay: The compressor shall Lockout if this Alarm occurs more than once in this many hours. Safety Down Time: The compressor will be in safety for this amount of minutes when the CMP FAULT Alarm is posted. SEC to Ignore Safety: Will ignore safety for this number of seconds. Window to EXT. Safety Time (SEC): At startup, for the first window to extend Safety Time seconds, allow the Safety Time to be extended. Safety Time Extension (SEC): If Safety Time extension is allowed, extend the Trip Delay by this many seconds.
		LOCKOUT	This Setpoint will LOCKOUT a compressor and post a Compressor Fault Alarm if the Compressor Fault SI is true. Time: The number of second(s) before the Alarm is tripped and the compressor will LOCKOUT. SEC to Ignore Safety: Will ignore safety for this number of seconds. Window to EXT. Safety Time (SEC): At startup, for the first window to extend Safety Time seconds, allow the Safety Time to be extended. Safety Time Extension (SEC): If Safety Time extension is allowed, extend the Trip Delay by this many seconds.
61	COND FAULT	ALARM	This Setpoint will post a COND FAULT Alarm, if the Condenser Fault SI has been tripped for certain amount of time. Value: The number of seconds the Condenser Fault must be tripped before posting a COND FAULT Alarm.

		LOCKOUT	This Setpoint will post a COND FAULT Alarm and LOCKOUT the condensers, if the Condenser Fault SI has been tripped for certain amount of time. Value: The number of seconds the Condenser Fault must be tripped before posting a COND FAULT Alarm setting LOCKOUT of the condensers.
62	LOW SUCT PSI	ALARM	This Alarm uses the Suction Pressure sensor to determine whether a compressor has low suction pressure. If the compressor has low suction pressure, it will be put in Safety and a LO SUC PSI Alarm will be posted. Value: The value is the Low Suction Pressure setting for the Compressors. Time: The number of second(s) before the Alarm is posted. Lockout Delay: The compressor will Lockout if this Alarm occurs more than once in this many hours. Safety Down Time: The amount of time that the compressor will remain in safety when the alarm is posted. SEC to Ignore Safety: Will ignore safety for this number of seconds. Window to EXT. Safety Time (SEC): At startup, for the first window to extend Safety Time seconds, allow the Safety Time to be extended. Safety Time Extension (SEC): If Safety Time extension is allowed during startup, extend the Trip Delay by this many seconds.
		LOCKOUT	This Alarm uses the Suction Pressure sensor to determine whether a compressor has low suction pressure. If the compressor has low suction pressure, it will LOCKOUT and a LO SUC PSI Alarm will be posted. Value: The value is the Low Suction Pressure setting for the Compressors. Time: The number of second(s) before the Alarm is posted and the compressor will LOCKOUT. SEC to Ignore Safety: Will ignore safety for this number of seconds. Window to EXT. Safety Time (SEC): At startup, for the first window to extend Safety Time seconds, allow the Safety Time to be extended. Safety Time Extension (SEC): If Safety Time extension is allowed at startup, extend the Trip Delay by this many seconds.
63	HP SUCT OFST	SETPOINT	When in heat pump enable and this Setpoint is enabled, the low suction pressure Setpoint is reduced by this value. Value: Suction pressure to reduce Setpoint #62 “LOW SUCT PSI” by.
64	UNSAFE SUCT	LOCKOUT	This Alarm uses the Suction Pressure sensor to determine whether a compressor has unsafe suction pressure. If the

			compressor has unsafe suction pressure, it will LOCKOUT and UNSAFE SUC Alarm will be posted. Value: The value is the Unsafe Suction Pressure setting for the Compressors. Time: The number of second(s) before the Alarm is tripped and the compressor will LOCKOUT. SEC to Ignore Safety: Will ignore safety for this number of seconds. Window to EXT. Safety Time (SEC): At startup, for the first window to extend Safety Time seconds, allow the Safety Time to be extended. Safety Time Extension (SEC): If Safety Time extension is allowed at startup, extend the Trip Delay by this many seconds.
65	LO SUCT UNLD	ALARM	This Setpoint will unload compressors with variable capacity to prevent a low suction safety. Value: The PSI above Setpoint #62 “LOW SUCT PSI” in which unloading will be active. Tripped Delay: The number of seconds the compressor will wait before unloading.
66	LO SUCT RELD	SETPOINT	If the system has had a low suction unload, after the safety period, it will reload if the suction pressure has gone above the reload Setpoint. Value: The number of PSI above Setpoint #62 “LOW SUCT PSI” that reload will be active, if unload was active.
67	LO SUCT SPHT	ALARM	This Alarm uses the suction superheat calculation to determine whether a compressor has low suction superheat. If the compressor has low suction superheat, it will be put in Safety and a LO SUC SPHT Alarm will be posted. Value: The value is the Low Suction Superheat setting for the Compressors. Time: The number of second(s) before the Alarm is posted. Lockout Delay: The compressor will Lockout if this Alarm occurs more than once in this many hours. Safety Down Time: The amount of time the compressor will remain in safety when the alarm is posted. SEC to Ignore Safety: Will ignore safety for this number of seconds. Window to EXT. Safety Time (SEC): At startup, for the first window to extend Safety Time seconds, allow the Safety Time to be extended. Safety Time Extension (SEC): If Safety Time extension is allowed during startup, extend the Trip Delay by this many seconds.
		LOCKOUT	This Alarm uses the suction superheat calculation to determine whether a compressor has low suction superheat. If the compressor has low suction superheat, it will LOCKOUT and LO

			SUC SHT Alarm will be posted. Value: The value is the low suction superheat setting for the Compressors. Time: The number of second(s) before the Alarm is tripped and the compressor will LOCKOUT. SEC to Ignore Safety: Will ignore safety for this number of seconds. Window to EXT. Safety Time (SEC): At startup, for the first window to extend Safety Time seconds, allow the Safety Time to be extended. Safety Time Extension (SEC): If Safety Time extension is allowed at startup, extend the Trip Delay by this many seconds.
68	HI SUCT SPHT	ALARM	This Alarm uses the suction superheat calculation to determine whether a compressor has high suction superheat. If the compressor has high suction superheat, it will be put in Safety and a HI SUC SPHT Alarm will be posted. Value: The value is the high suction superheat setting for the Compressors. Time: The number of second(s) before the Alarm is posted. Lockout Delay: The compressor will Lockout if this Alarm occurs more than once in this many hours. Safety Down Time: The amount of time the compressor will remain in safety when the alarm is posted. SEC to Ignore Safety: Will ignore safety for this number of seconds. Window to EXT. Safety Time (SEC): At startup, for the first window to extend Safety Time seconds, allow the Safety Time to be extended. Safety Time Extension (SEC): If Safety Time extension is allowed during startup, extend the Trip Delay by this many seconds.
		LOCKOUT	This Alarm uses the suction superheat calculation to determine whether a compressor has high suction superheat. If the compressor has low suction superheat, it will LOCKOUT and HI SUC SHT Alarm will be posted. Value: The value is the high suction superheat setting for the Compressors. Time: The number of second(s) before the Alarm is tripped and the compressor will LOCKOUT. SEC to Ignore Safety: Will ignore safety for this number of seconds. Window to EXT. Safety Time (SEC): At startup, for the first window to extend Safety Time seconds, allow the Safety Time to be extended. Safety Time Extension (SEC): If Safety Time extension is allowed at startup, extend the Trip Delay by this many seconds.

69	LOW DISC PSI	ALARM	This Alarm uses the discharge pressure sensor to determine whether a compressor has low discharge pressure. If the compressor has low discharge pressure, it will be put in Safety and a LO DIS PSI Alarm will be posted. Value: The value is the low discharge pressure setting for the Compressors. Time: The number of second(s) before the Alarm is posted. Lockout Delay: The compressor will Lockout if this Alarm occurs more than once in this many hours. Safety Down Time: The amount of time that the compressor will remain in safety when the alarm is posted. SEC to Ignore Safety: Will ignore safety for this number of seconds. Window to EXT. Safety Time (SEC): At startup, for the first window to extend Safety Time seconds, allow the Safety Time to be extended. Safety Time Extension (SEC): If Safety Time extension is allowed during startup, extend the Trip Delay by this many seconds.
		LOCKOUT	This Alarm uses the discharge pressure sensor to determine whether a compressor has low discharge pressure. If the compressor has low discharge pressure, it will LOCKOUT and a LO DIS PSI Alarm will be posted. Value: The value is the Low discharge Pressure setting for the Compressors. Time: The number of second(s) before the Alarm is posted and the compressor will LOCKOUT. SEC to Ignore Safety: Will ignore safety for this number of seconds. Window to EXT. Safety Time (SEC): At startup, for the first window to extend Safety Time seconds, allow the Safety Time to be extended. Safety Time Extension (SEC): If Safety Time extension is allowed at startup, extend the Trip Delay by this many seconds.
70	HI DISC PSI	ALARM	This Alarm uses the discharge pressure sensor to determine whether a compressor has high discharge pressure. If the compressor has high discharge pressure, it will be put in Safety and a HI DIS PSI Alarm will be posted. Value: The value is the high discharge pressure setting for the Compressors. Time: The number of second(s) before the Alarm is posted. Lockout Delay: The compressor will Lockout if this Alarm occurs more than once in this many hours. Safety Down Time: The amount of time that the compressor will remain in safety when the alarm is posted. SEC to Ignore Safety: Will ignore safety for this number of

			seconds. Window to EXT. Safety Time (SEC): At startup, for the first window to extend Safety Time seconds, allow the Safety Time to be extended. Safety Time Extension (SEC): If Safety Time extension is allowed during startup, extend the Trip Delay by this many seconds.
		LOCKOUT	This Alarm uses the discharge pressure sensor to determine whether a compressor has high discharge pressure. If the compressor has high discharge pressure, it will LOCKOUT and a HI DIS PSI Alarm will be posted. Value: The value is the high discharge pressure setting for the Compressors. Time: The number of second(s) before the Alarm is posted and the compressor will LOCKOUT. SEC to Ignore Safety: Will ignore safety for this number of seconds. Window to EXT. Safety Time (SEC): At startup, for the first window to extend Safety Time seconds, allow the Safety Time to be extended. Safety Time Extension (SEC): If Safety Time extension is allowed at startup, extend the Trip Delay by this many seconds.
71	HI DISC UNLD	ALARM	This Setpoint will unload compressors with variable capacity to prevent a high discharge pressure safety. Value: The PSI below Setpoint #70 “HI DISC PSI” in which unloading will be active. Tripped Delay: The number of seconds the compressor will wait before unloading.
72	HI DISC RELD	SETPOINT	If the system has had a high discharge pressure unload, after the safety period, it will reload if the discharge pressure has gone below the reload Setpoint. Value: The number of PSI below Setpoint #70 “HI DISC PSI” that reload will be active, if unload was active.
73	HI DISC TEMP	ALARM	This Alarm uses the discharge temperature sensor to determine whether a compressor has high discharge temperature. If the compressor has high discharge temperature, it will be put in Safety and a HI DIS TEMP Alarm will be posted. Value: The value is the high discharge temperature setting for the Compressors. Time: The number of second(s) before the Alarm is posted. Lockout Delay: The compressor will Lockout if this Alarm occurs more than once in this many hours. Safety Down Time: The amount of time that the compressor will remain in safety when the alarm is posted. SEC to Ignore Safety: Will ignore safety for this number of seconds.

			Window to EXT. Safety Time (SEC): At startup, for the first window to extend Safety Time seconds, allow the Safety Time to be extended. Safety Time Extension (SEC): If Safety Time extension is allowed during startup, extend the Trip Delay by this many seconds.
		LOCKOUT	This Alarm uses the discharge temperature sensor to determine whether a compressor has high discharge temperature. If the compressor has high discharge temperature, it will LOCKOUT and a HI DIS TEMP Alarm will be posted. Value: The value is the high discharge temperature setting for the Compressors. Time: The number of second(s) before the Alarm is posted and the compressor will LOCKOUT. SEC to Ignore Safety: Will ignore safety for this number of seconds. Window to EXT. Safety Time (SEC): At startup, for the first window to extend Safety Time seconds, allow the Safety Time to be extended. Safety Time Extension (SEC): If Safety Time extension is allowed at startup, extend the Trip Delay by this many seconds.
74	DiscTmpUnld	ALARM	This Setpoint will unload compressors with variable capacity to prevent a high discharge temperature safety. Value: The temperature below Setpoint #70 “HI DISC TEMP” in which unloading will be active. Tripped Delay: The number of seconds the compressor will wait before unloading.
75	DiscTmpReld	SETPOINT	If the system has had a high discharge pressure temperature unload, after the safety period, it will reload if the discharge temperature has gone below the reload Setpoint. Value: The number of degrees below Setpoint #73 “HI DISC TEMP” that reload will be active, if unload was active.
76	LO DISC SPHT	ALARM	This alarm uses the discharge superheat calculation to determine when a compressor has low discharge superheat. If the compressor has low discharge superheat, it will be put in Safety and a LO DIS SHT Alarm will be posted. Value: The value is the Low Discharge Superheat setting for the Compressors. Time: The number of second(s) before the Alarm is posted. Lockout Delay: The compressor will Lockout if this Alarm occurs more than once in this many hours. Safety Down Time: The amount of time the compressor will remain in safety when the alarm is posted. SEC to Ignore Safety: Will ignore safety for this number of seconds. Window to EXT. Safety Time (SEC): At startup, for the first

			window to extend Safety Time seconds, allow the Safety Time to be extended. Safety Time Extension (SEC): If Safety Time extension is allowed during startup, extend the Trip Delay by this many seconds.
		LOCKOUT	This Alarm uses the discharge superheat calculation to determine whether a compressor has low discharge superheat. If the compressor has low discharge superheat, it will LOCKOUT and LO DIS SHT Alarm will be posted. Value: The value is the low discharge superheat setting for the Compressors. Time: The number of second(s) before the Alarm is tripped and the compressor will LOCKOUT. SEC to Ignore Safety: Will ignore safety for this number of seconds. Window to EXT. Safety Time (SEC): At startup, for the first window to extend Safety Time seconds, allow the Safety Time to be extended. Safety Time Extension (SEC): If Safety Time extension is allowed at startup, extend the Trip Delay by this many seconds.
77	DisSprhtUnld	SETPOINT	This Setpoint will unload compressors with variable capacity to prevent a low superheat safety. Value: The discharge superheat setting for the Compressors. Tripped Delay: The number of seconds the compressor will wait before unloading.
78	DisSprhtReld	SETPOINT	If the system has experienced a discharge superheat unload, after the safety period, it will reload if the discharge superheat has gone above the reload Setpoint. Value: The discharge superheat setting for the compressors to reload.
79	LOW DIFF PSI	ALARM	This Alarm uses the differential pressure between the suction and the oil pressure to determine whether a compressor has low differential pressure. If the compressor has low differential pressure, it will be put in Safety and a LO DIF PSI Alarm will be posted. Value: The value is the low differential pressure setting for the Compressors. Time: The number of second(s) before the Alarm is posted. Lockout Delay: The compressor will Lockout if this Alarm occurs more than once in this many hours. Safety Down Time: The amount of time the compressor will remain in safety when the alarm is posted. SEC to Ignore Safety: Will ignore the safety for this number of seconds. Window to EXT. Safety Time (SEC): At startup, for the first

			window to extend Safety Time seconds, allow the Safety Time to be extended. Safety Time Extension (SEC): If Safety Time extension is allowed during startup, extend the Trip Delay by this many seconds.
80	UnsafeDifPSI	LOCKOUT	This Alarm uses the differential pressure between the suction and the discharge to determine whether a compressor has low differential pressure. If the compressor has low differential pressure, it will LOCKOUT and a LO DIF PSI Alarm will be posted. Value: The value is the unsafe differential pressure setting for the Compressors. Time: The number of second(s) before the Alarm is posted and the compressor will LOCKOUT. SEC to Ignore Safety: Will ignore safety for this number of seconds. Window to EXT. Safety Time (SEC): At startup, for the first window to extend Safety Time seconds, allow the Safety Time to be extended. Safety Time Extension (SEC): If Safety Time extension is allowed at startup, extend the Trip Delay by this many seconds.
81	HI PSI SW	ALARM	This Setpoint will shut down a compressor and post a HI PSI SW Alarm, if the Compressor High SI Off input is true. Time: The number of seconds before the Alarm is tripped. Lockout Delay: The compressor shall Lockout if this Alarm occurs more than once in this many hours. Safety Down Time: The compressor will be in safety for this amount of minutes when the HI PSI SW Alarm is posted. SEC to Ignore Safety: Will ignore safety for this number of seconds. Window to EXT. Safety Time (SEC): At startup, for the first window to extend Safety Time seconds, allow the Safety Time to be extended. Safety Time Extension (SEC): If Safety Time extension is allowed, extend the Trip Delay by this many seconds.
		LOCKOUT	This Setpoint will LOCKOUT a compressor and post a HI PSI SW if the High SI Off Fault SI is true. Time: The number of second(s) before the Alarm is tripped and the compressor will LOCKOUT. SEC to Ignore Safety: Will ignore safety for this number of seconds. Window to EXT. Safety Time (SEC): At startup, for the first window to extend Safety Time seconds, allow the Safety Time to be extended. Safety Time Extension (SEC): If Safety Time extension is allowed, extend the Trip Delay by this many seconds.
82	LO PSI SW	ALARM	This Setpoint will shut down a compressor and post a LO PSI

			SW Alarm, if the Compressor Low SI Off input is true. Time: The number of seconds before the Alarm is tripped. Lockout Delay: The compressor shall Lockout if this Alarm occurs more than once in this many hours. Safety Down Time: The compressor will be in safety for this amount of minutes when the LO PSI SW Alarm is posted. SEC to Ignore Safety: Will ignore safety for this number of seconds. Window to EXT. Safety Time (SEC): At startup, for the first window to extend Safety Time seconds, allow the Safety Time to be extended. Safety Time Extension (SEC): If Safety Time extension is allowed, extend the Trip Delay by this many seconds.
		LOCKOUT	This Setpoint will LOCKOUT a compressor and post a LO PSI SW if the “Low SI Off” Fault SI is true. Time: The number of second(s) before the Alarm is tripped and the compressor will LOCKOUT. SEC to Ignore Safety: Will ignore safety for this number of seconds. Window to EXT. Safety Time (SEC): At startup, for the first window to extend Safety Time seconds, allow the Safety Time to be extended. Safety Time Extension (SEC): If Safety Time extension is allowed, extend the Trip Delay by this many seconds.
83	PhasLossRset	ALARM	This alarm will Temporarily shut down the entire unit when a phase loss has occurred. Value: the number of seconds after the input is energized before the unit will be disabled. Safety Down Time: The number of minutes the phase loss must be off before the unit is reactivated.
		LOCKOUT/ SETPOINT	This lockout/Setpoint will shut down the entire unit when a phase loss has occurred. Value: the number of seconds after the input is energized before the unit will be locked out. Note: If this value is inactive then the Setpoint will be 2 seconds.
84	HEAT FAULT	ALARM	This Setpoint will shut down the heating mode and post a HEAT FAULT Alarm if the heater fault SI is true. Time: The number of seconds before the Alarm is sent. Lockout Delay: The compressor will Lockout if this Alarm occurs more than once in this many hours. Safety Down Time: The heating mode will be in safety for this amount of minutes when the HEAT FAULT Alarm is posted. SEC to Ignore Safety: Will ignore safety for this number of seconds.

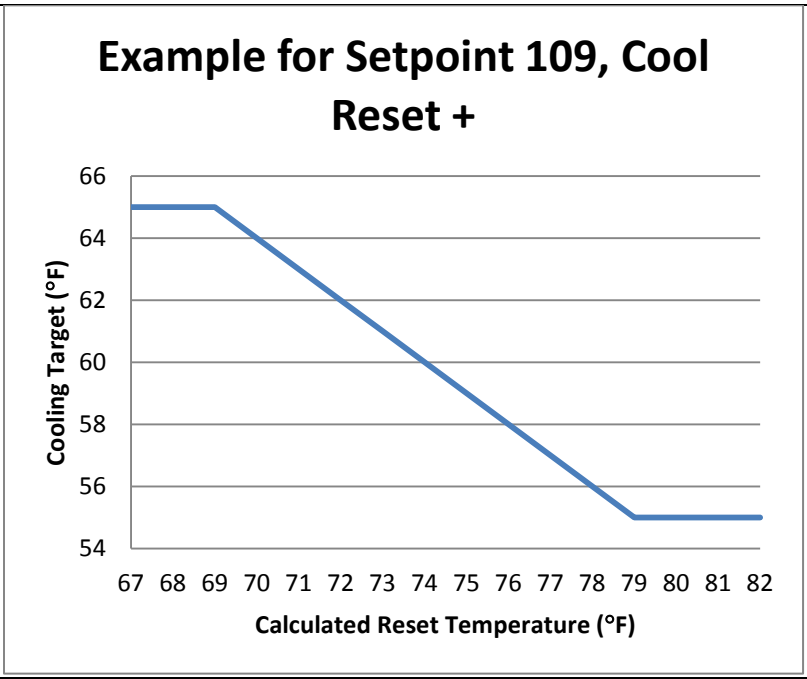
			Window to Ext. Safety Time (SEC): At startup, for the first window to extend Safety Time seconds, allow the Safety Time to be extended. Safety Time Extension (SEC): If Safety Time extension is allowed, extend the Trip Delay by this many seconds.
		LOCKOUT	Time: The number of seconds before the Alarm is sent. Lockout Delay: The compressor will Lockout if this Alarm occurs more than once in this many hours. Safety Down Time: The heating mode will be in safety for this amount of minutes when the HEAT FAULT Alarm is posted. SEC to Ignore Safety: Will ignore safety for this number of seconds. Window to Ext. Safety Time (SEC): At startup, for the first window to extend Safety Time seconds, allow the Safety Time to be extended. Safety Time Extension (SEC): If Safety Time extension is allowed, extend the Trip Delay by this many seconds.
85	HiSupplyTmp	ALARM	This alarm will temporarily disable the heating when the supply temperature sensor reaches Setpoint. Value: The value is the high supply temperature setting for the heating. Time: The number of second(s) before the Alarm is posted. Safety Down Time: The amount of time that the heating will remain in safety when the alarm is posted. Window to EXT. Safety Time (SEC): At startup, for the first window to extend Safety Time seconds, allow the Safety Time to be extended. Safety Time Extension (SEC): If Safety Time extension is allowed during startup, extend the Trip Delay by this many seconds.
		LOCKOUT	This alarm will disable the heating when the supply temperature sensor reaches Setpoint. Value: The value is the high supply temperature setting for the heating. Time: The number of second(s) before the Alarm is posted. Safety Down Time: The amount of time that the heating will remain in safety when the alarm is posted. SEC to Ignore Safety: Will ignore safety for this number of seconds. Window to EXT. Safety Time (SEC): At startup, for the first window to extend Safety Time seconds, allow the Safety Time to be extended. Safety Time Extension (SEC): If Safety Time extension is allowed during startup, extend the Trip Delay by this many seconds.
86	FREEZE TEMP	ALARM	If the supply air temperature goes below this value for the FREEZE TEMP's time then the alarm is posted.

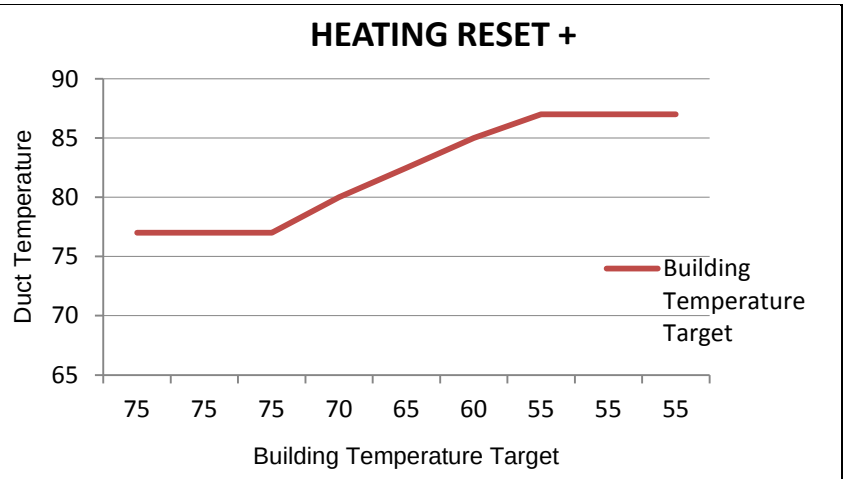
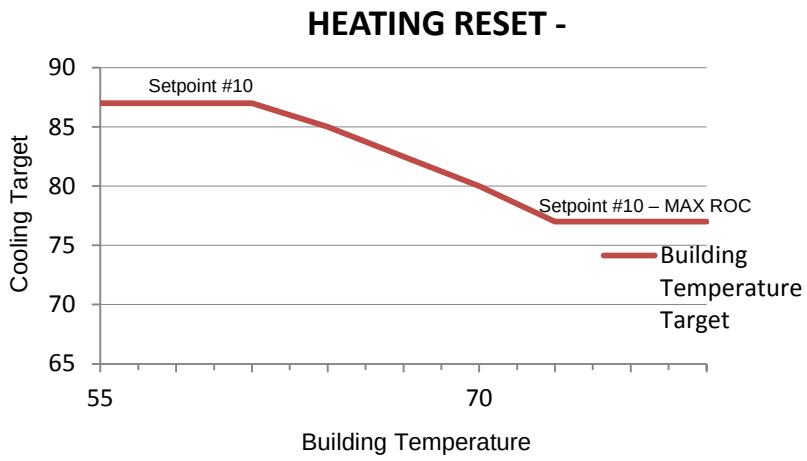
			Value: The value is the supply air temperature to cause the alarm Lockout Delay: The compressor shall Lockout if this Alarm occurs more than once in this many hours. Safety Down Time: The amount of time that the heating will remain in safety when the alarm is posted. Window to EXT. Safety Time (SEC): At startup, for the first window to extend Safety Time seconds, allow the Safety Time to be extended. Safety Time Extension (SEC): If Safety Time extension is allowed during startup, extend the Trip Delay by this many seconds.
		LOCKOUT	Value: The value is the supply air temperature to cause the lockout Time: The number of second(s) before the Alarm is posted. Safety Down Time: The amount of time that the heating will remain in safety when the alarm is posted. SEC to Ignore Safety: Will ignore safety for this number of seconds. Window to EXT. Safety Time (SEC): At startup, for the first window to extend Safety Time seconds, allow the Safety Time to be extended. Safety Time Extension (SEC): If Safety Time extension is allowed during startup, extend the Trip Delay by this many seconds.
87	SPARE STPT		For Future use
88	DIFF TEMP		This Setpoint is currently not used.
89	CFG TEST = 0	SETPOINT	If this value is “0” this Setpoint prevents lockout of the controller when communication is lost. This is primarily used for testing purposes.
90	HPLowAmbDsbl	TARGET	This Setpoint will prevent the compressor from running in heat pump when the ambient temperature is below this Setpoint’s value. Value: the ambient temperature.
91	RevValveDely	SETPOINT	This Setpoint will delay the rev valve when there is a call for heat pump. It also delays the rev valve when it goes from heat pump to cooling. Value: The number in seconds the compressor is delayed.
92	HPAmbDsblDef	SETPOINT	This Setpoint will prevent the system from going into defrost when the ambient is above the setting. Value: The ambient temperature settings to disable defrost.
93	DEF TERM TMP	SETPOINT	This Setpoint will terminate the defrost cycle when the input reaches this setting during a defrost. Value: the temperature where the defrost is terminated.
94	MaxDefRunTim	SETPOINT	Once a defrost is enabled this Setpoint limits the amount of time the system will remain in defrost. Value: the maximum number of minutes the system can remain

			in the defrost cycle.
95	WtdDefDur %	SETPOINT	This Setpoint is the target defrost time based on the percentage of the Maximum Defrost Run Time. Value: the percentage of the MaxDefRunTime that the system will work to remain in defrost.
96	BtweenDefAdj	SETPOINT	This Setpoint adjusts the delay between defrosts based on whether the system terminated early on temperature or later on time. Value: duration of seconds to adjust the time between defrosts.
97	DelayBtwnDef	SETPOINT	Upon startup, this Setpoint is the initial time in minutes between defrost cycles.
98	HPCndTrgOfst	TARGET	When in heat pump enabled, this target modifies the condenser fan cycling (outdoor coil) target pressure. Value: the pressure to offset Setpoint #17 “Condenser Target PSI” when the unit is in heat pump mode and the reversing valve is on. Zone: the pressure to offset Setpoint #17 “Condenser Target PSI” by when the unit is defrosting.
99	MaxTrgtReset	TARGET	This Setpoint limits the target reset allowed by the BMS. Value: the max/min cooling target reset allowed. Zone: the max/min heating target reset allowed. Max ROC: the max/min dehumidification target reset percentage allowed.
100	IGN PROOF	WARNING	This Setpoint looks for a proof of ignition through an increase in temperature of the ignition indicator SI to confirm the heating section is operational. If ignition has not been confirmed an “IGNITION FLT” alarm will be displayed. Value: the rise in supply temperature needed to confirm ignition has taken place. Time: Duration of time required to pass before the controller will look at the ignition temperature increase.
		ALARM	This Setpoint looks for a proof of ignition through an increase in temperature of the ignition indicator SI to confirm the heating section is operational. If ignition has not been confirmed an “IGNITION FLT” alarm will be displayed and it puts the gas valve in safety. Value: the rise in supply temperature needed to confirm ignition has taken place. Time: Duration of time required to pass before the controller will look at the ignition temperature increase. Safety Down Time: the amount in minutes the ignition valve will be put into safety. Lockout Delay: The ignition valve will Lockout if this Alarm occurs more than once in this many hours.

		LOCKOUT	This Setpoint looks for a proof of ignition through an increase in temperature of the ignition indicator SI to confirm the heating section is operational. If ignition has not been confirmed an "IGNITION FLT" alarm will be displayed and it puts the gas valve in lockout. Value: the rise in supply temperature needed to confirm ignition has taken place. Time: Duration of time required to pass before the controller will look at the ignition temperature increase.
101	ModGasWarmup	SETPOINT	When the heat is enabled and at start up, the modulating gas valve will remain at the maximum capacity position for the time period selected. Value: the amount of time the Modulating Gas Valve is in the maximum capacity position.
102	AuxHtMin/Max	DELAY	This Setpoint limits the minimum and maximum positions allowed for the modulating gas valve capacity control. Min Capacity Value: the minimum position the modulating gas valve will drive close. Max Capacity Value: the maximum position the modulating gas valve will drive open.
103	WARMUP TEMP	SETPOINT	When enabled in heating this is the maximum temperature the return sensor will be permitted during warm up mode.
104	WARMUP TIME	SETPOINT	When enabled in heating and the unit is in warm up mode this is the maximum amount of time the warm up will be permitted. Value: the amount of time in seconds the warm up state will be permitted.
105	ERW DEFROST	TIME	When the energy recovery wheel is on and the outdoor ambient falls below the value of this setpoint recovery wheel will go through a defrost function for the time period selected. Value: temperature the ambient reaches to enable the defrost function. Time "A": time between defrosts after the ambient enables defrost. Time "B": the amount of time the defrost is enabled once initiated.
106	REHEAT FLUSH	TIME	When reheat is enabled, this Setpoint will flush the reheat coils based on time. Value: when in reheat mode, a cycle will flush the reheat coils with 100% cooling if the valve is not at a specified value. Time "A": time between flush cycles. Time "B": flush duration of cooling when in reheat. Time "C": flush duration of reheat when in cooling.
107	GasLoFireDsb	SETPOINT	When heat enabled and modulating gas valve is below this percent, the gas low fire relay will be energized.
108	SMOKE ALARM	ALARM	This alarm will temporarily shut down the entire unit when a

			smoke alarm trip has occurred. Value: the number of seconds after the input is energized before the unit will be disabled. Safety Down Time: The number of minutes the smoke alarm must be off before the unit is reactivated.
		LOCKOUT/ SETPOINT	This lockout/Setpoint will shut down the entire unit when a smake alarm trip has occurred. Value: the number of seconds after the input is energized before the unit will be locked out. Note: If this value is inactive then the Setpoint will be 2 seconds.
109	COOL RESET +	TARGET	When cooling is ENABLED, the cooling target will be increased linearly based on how close the auto reset temperature is to cooling enable target. Value: The offset to the cool enable Setpoint (Setpoint #1 “COOL ENABLE”). Zone: Added and subtracted from the COOL RESET+ value plus the cool enable. If the sensor input for calculated reset is above the zone + value + cool enable Setpoint then no adjustment is made. Max ROC: The maximum amount to increase the cooling target by. Example: The following example graph assumes that the following setup. Cooling Enable: 68 °F Cooling Target: 55 °F Value for Cool Reset +: 6 °F Zone for Cool Reset +: 5 °F Max ROC for Cool Reset +: 10 °F

			
110	USER RESET	SETPOINT	This Setpoint controls the target adjustment between holding the reset button for three seconds. Value: Amount in degrees to increment the temperature by. Max: The maximum temperature that can be set from the user reset.
111	COOL RESET -	TARGET	When cooling is ENABLED, the cooling target will be decreased linearly based on how far away the auto reset temperature is to cooling enable target. Value: The offset to the cool enable Setpoint (Setpoint #1 “COOL ENABLE”). Zone: Added and subtracted from the COOL RESET- value plus the cool enable. If the sensor input for calculated reset is below the zone + value + cool enable Setpoint then no adjustment is made. Max ROC: The maximum amount to decrease the cooling target by.
112	HEAT RESET +	TARGET	When heating is ENABLED, the heating target will be increased linearly based on how far away the auto reset temperature is to heating enable target. Value: The offset to the heat enable Setpoint (Setpoint #2 “HEAT ENABLE”). Zone: Added and subtracted from the HEAT RESET+ value plus the heat enable. If the sensor input for calculated reset is above the zone + value + heat enable Setpoint then no adjustment is made. Max ROC: The maximum amount to increase the heat target by.

			
113	HEAT RESET -	TARGET	When heating is ENABLED, the heating target will be decreased linearly based on how close the auto reset temperature is to heating enable target. Value: Max ROC: The maximum amount to decrease the heating target by Zone: 
114	PRECOOL TARG	TARGET	When in Precooling is active, the system will maintain this value for the precooling control sensor selected. Value: The temperature that Precooling Capacity Control will maintain. Zone: Will adjust the capacity control to maintain the temperature and target range for Precooling. MAX ROC Value: The MAX Rate of Change that the capacity control will allow to determine loading or unloading. ROC Interval: The Time Interval over which the rate of change is calculated. Adjust multiplier/divider value: Scales any calculated changes to the cooling capacity.
115	PRECOOL ADJ	DELAY	This Setpoint determines how quickly to adjust the precooling

			capacity. The farther the sensor is from target the quicker the precool Adjust will work to reach the Setpoint. Value: The adjustment delay for the precooling capacity control. MIN Adjust % Value: Precooling capacity will not be adjusted less than this value. MAX Adjust % Value: Precooling capacity will not be adjusted more than this value. MIN Capacity % Value: Precooling capacity will not be less than this value. MAX Capacity % Value: Precooling capacity will not be more than this value. Delay multiplier/divider value: Scales any calculated changes to the precooling step delay.
116	CFM TARGET	TARGET	When the supply fan is needed, this Setpoint will maintain a specified flow rate. Value: The cubic feet per minute that will be maintained. Zone: Will adjust the capacity control offset to maintain the CFM target Setpoint. MAX ROC Value: The MAX rate of change that the supply fan control will allow to determine increase or decrease to the supply fan offset. ROC Interval: The time interval the rate of change is calculated. Adjust multiplier/divider value: Scales any calculated changes to the CFM Target.
117	CFM STP DELY	DELAY	This Setpoint determines how quickly to adjust the supply fan capacity offset. The farther the sensor is from target the quicker the step delay will work to reach the Setpoint. Value: The adjustment delay for the supply fan capacity control. MIN Adjust % Value: Supply fan capacity offset will not be adjusted less than this value. MAX Adjust % Value: Supply fan capacity offset will not be adjusted more than this value. MIN Capacity % Value: set to 0% MAX Capacity % Value: Set to 100% Delay multiplier/divider value: Scales any calculated changes to the CFM STP DELY.
118	MaxStaticRst	SETPOINT	This Setpoint value defines the maximum change in either direction that the static target will be offset.
119	HOOD DEH ENB	SETPOINT	When hood switch is on, if there is an ambient dew point sensor, this Setpoint is used in place of the humidity enable value.
120	NO FLOW	SETPOINT	If a proof of air flow switch is present, then NO FLOW should be programmed as a Setpoint. Creates an alarm if air flow has not

			been proved for a number of second equal to the value of the Setpoint.
120	NO FLOW	ALARM	If there is not a proof of air flow switch is present, then NO FLOW must be programmed as an alarm. Value: The duct static pressure necessary to trigger a no flow state. Time: Duration of time required to pass while the duct static pressure is below the value before the alarm will trigger.
121	Cool UnldOff	SETPOINT	While in cooling mode, if the current cooling value is a number of degrees, defined by the value of this Setpoint, below the cooling target, it allows for the compressors to shut off until the capacity control calls for more capacity
122	Heat UnldOff	SETPOINT	While in heating mode, if the current heating value is a number of degrees, defined by the value of this Setpoint, above the heating target, it allows for the compressors to shut off until the capacity control calls for more capacity
123	DEH UnldOff	SETPOINT	While in dehumid mode, if the current suction temperature is a number of degrees, defined by the value of this Setpoint, below the target suction temperature defined in Setpoint 23, "DehSucTmpTrg", it allows for the compressors to shut off until the capacity control calls for more capacity
124	FREEZE UNLD	ALARM	This Setpoint will unload compressors with variable capacity to prevent a supply freeze alarm. Value: The degrees above Setpoint #86 "FREEZE TEMP" in which unloading will be active. Tripped Delay: The number of seconds the compressor will wait before unloading.
125	FREEZE RELD	SETPOINT	If the system has had a freeze unload, after the safety period, it will reload if the supply temperature has gone above the reload Setpoint. Value: The number of degrees above Setpoint #86 "FREEZE TEMP" that reload will be active, if unload was active.
126	CondStart %	SETPOINT	AAON only. Whenever the condensers are first started, the Setpoint value will determine the starting percentage of the condenser fans.
127	HI DUCT PSI	ALARM	This Setpoint will post a HI DUCT PSI Alarm if the Duct PSI SI has been tripped for certain amount of time. Value: The number in PSI that is reached before posting a HI DUCT PSI Alarm. Time: The number of seconds before the Alarm is sent.
		LOCKOUT	This Setpoint will lock out the unit and post a HI DUCT PSI if the HI DUCT PSI alarm has occurred. Value: The number in PSI that is reached before posting a HI DUCT PSI Alarm. Time: The number of seconds before the Lockout is sent.

7. AUTHORIZATION FUNCTION

The authorization code is a special four-character code that enables access to the MicroMag controller. The code may consist of any valid alpha/numeric characters if the system is being accessed through MCS-Connect, however, the code must be numeric with values between 0 and 9 if it is to be entered through the Keypad/Display. Each MicroMag can have up to 10 different authorization codes, with four levels of authorization which provide differing levels of functionality. The authorization code and the associated level cannot be viewed or changed through the Keypad/Display or MCS-Connect, but only when the configuration file is opened in MCS-Config. The authorization codes should be protected and remain confidential, or unauthorized personnel may gain access to the system and perhaps cause irreparable damage.

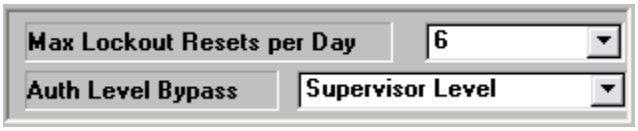
Based upon the authorization level the following changes can be made through the Keypad/Display:

FUNCTION	VIEW	USER	SERVICE	SUPERVISOR	FACTORY
Sensor offsets	NO	NO	YES	YES	YES
Sensor diagnostics	NO	NO	YES	YES	YES
Clear alarm history	NO	NO	NO	NO	NO
Clear point information	NO	NO	NO	NO	NO
Date and time set	YES	YES	YES	YES	YES
Day of week set	YES	YES	YES	YES	YES
Change rotate SP 37 & 38	NO	NO	YES	YES	YES
Change Manual/Auto settings	NO	NO	NO	YES	YES
Change Setpoint values	*	*	*	*	YES
Change operating schedules	NO	NO	YES	YES	YES
Change holiday dates	NO	NO	YES	YES	YES
Lockout Reset	**	**	**	**	YES
Change RS485 network settings	NO	NO	NO	YES	YES
Change Ethernet network settings	NO	YES	YES	YES	YES
Adjust Keypad/Display contrast	YES	YES	YES	YES	YES
Transmit Software	NO	NO	YES	YES	YES
Transmit/Receive Configuration	NO	NO	YES	YES	YES

* Setpoints may have individual authorization levels; you must have the proper authorization to view or edit them.

**See the Setup screen of the configuration for authorization level(s) that are allowed unlimited resets per day.

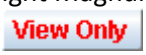
Authorization levels below 'Auth Level Bypass' are allowed only a limited number of resets. Authorization levels at and above 'Auth Level Bypass' are allowed unlimited lockout resets.



Authorized via the Keypad/Display

1. Press 'Menu'
2. Using ⬆, ⬇, ➡ or ⬅ keys, to 'Passwords'
3. Press ↲ key.
4. Enter 4 digit password and press↲
5. The authorization LEVEL will be displayed.
6. Press 'Menu' to make next selection.

Authorized via MCS-Connect

1. Highlight Magnum in the Site information screen.
2. Click 

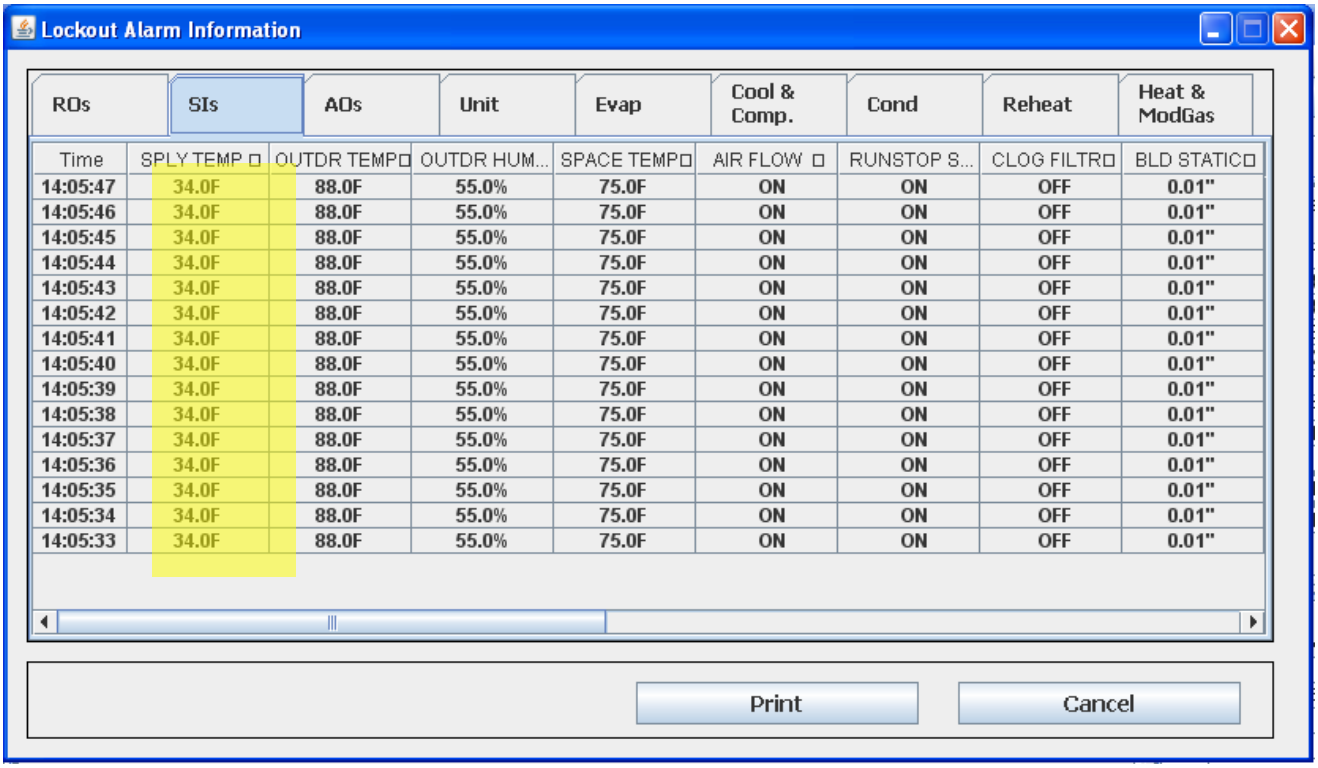
button.
3. Enter the 4 digit code into the pop-up box and click ok (or press the enter key).
4. The button will change to one of the following displays, indicating the code entered.

8. Alarms

- Last 100 Alarms are saved
- In print out below a Freeze was created. It posted Manual. (#3)
- The System responded with “SPLY FREEZE” Alarm & Info (#2)
- The Freeze was reset & it posted Alarm (#1)

#	Alarm	Date	Time	Value	Additional Info
1	SI CHG @ M - 1	MAR 20	14:06:01		
2	SPLY FREEZE	MAR 20	14:05:48		Info
3	SI CHG @ M - 1	MAR 20	14:05:31		
4	SI CHG @ M - 5	MAR 20	14:01:35		
5	SI CHG @ M - 5	MAR 20	14:01:06		
6	SI CHG @ M - 1	MAR 20	13:59:16		
7	StptChg: 41	MAR 20	13:58:20		
8	StptChg: 40	MAR 20	13:58:09		
9	SI CHG @ 1 - 8	MAR 20	13:53:51		
10	PNT INFO CLR	MAR 20	13:52:28		
11	ALARMS CLEAR	MAR 20	13:52:27		

- Click on ‘Info’.
- Click on the tab selecting the items you want to see.
- By selecting the “SI’s” you can see the freeze temperature at @ 34ºF.
- You can review all other info to see effect.



Time	SPLY TEMP	OUTDR TEMP	OUTDR HUM...	SPACE TEMP	AIR FLOW	RUNSTOP S...	CLOG FILTR	BLD STATIC
14:05:47	34.0F	88.0F	55.0%	75.0F	ON	ON	OFF	0.01"
14:05:46	34.0F	88.0F	55.0%	75.0F	ON	ON	OFF	0.01"
14:05:45	34.0F	88.0F	55.0%	75.0F	ON	ON	OFF	0.01"
14:05:44	34.0F	88.0F	55.0%	75.0F	ON	ON	OFF	0.01"
14:05:43	34.0F	88.0F	55.0%	75.0F	ON	ON	OFF	0.01"
14:05:42	34.0F	88.0F	55.0%	75.0F	ON	ON	OFF	0.01"
14:05:41	34.0F	88.0F	55.0%	75.0F	ON	ON	OFF	0.01"
14:05:40	34.0F	88.0F	55.0%	75.0F	ON	ON	OFF	0.01"
14:05:39	34.0F	88.0F	55.0%	75.0F	ON	ON	OFF	0.01"
14:05:38	34.0F	88.0F	55.0%	75.0F	ON	ON	OFF	0.01"
14:05:37	34.0F	88.0F	55.0%	75.0F	ON	ON	OFF	0.01"
14:05:36	34.0F	88.0F	55.0%	75.0F	ON	ON	OFF	0.01"
14:05:35	34.0F	88.0F	55.0%	75.0F	ON	ON	OFF	0.01"
14:05:34	34.0F	88.0F	55.0%	75.0F	ON	ON	OFF	0.01"
14:05:33	34.0F	88.0F	55.0%	75.0F	ON	ON	OFF	0.01"

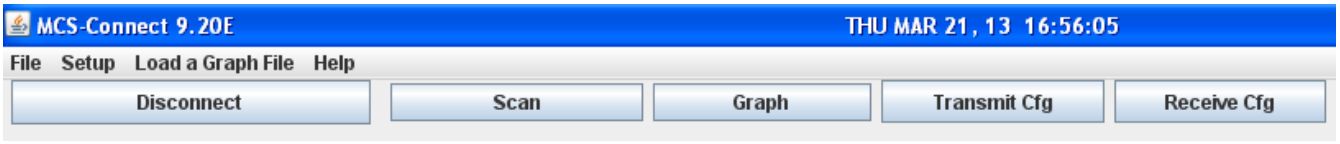
9. Trending Static & Dynamic

Graphing can be Static or Dynamic. All inputs & outputs are saved on an ongoing basic. There are 300 of the most current samples available when requested. The time period covered is based on the sample time selected.

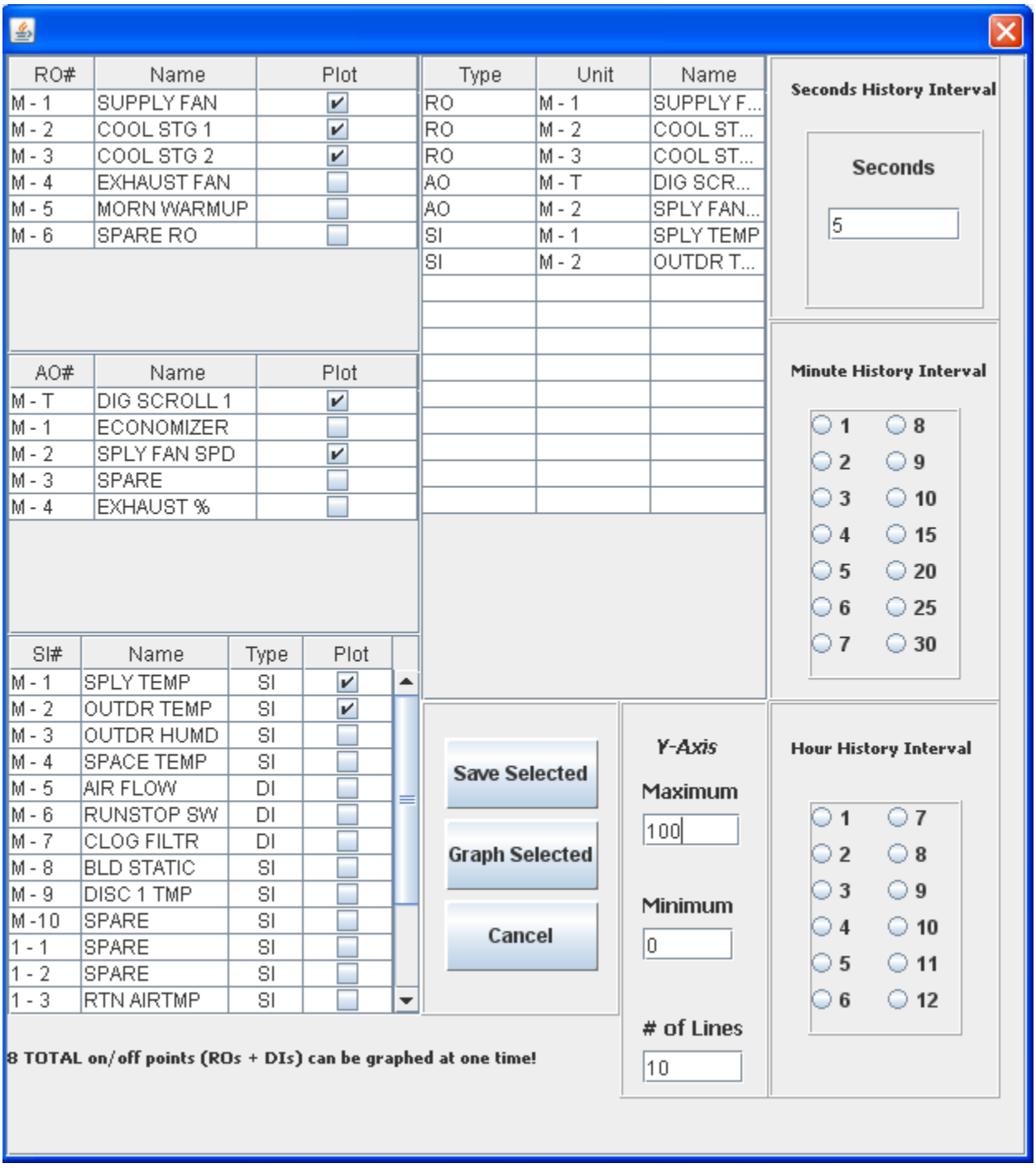
The chart below provides some indication of the time span covered based on the static time selected.

SAMPLE TIME	TIME COVERED
1 SEC	0 HR 5 MIN
6 SEC	0 HR 30 MIN
30 SEC	2 HR 30 MIN
1 MIN	5 HR 0 MIN
10 MIN	2 DAY 2 HRS
30 MIN	6 DAYS 6 HRS
60 MIN	12 DAYS 12 HRS

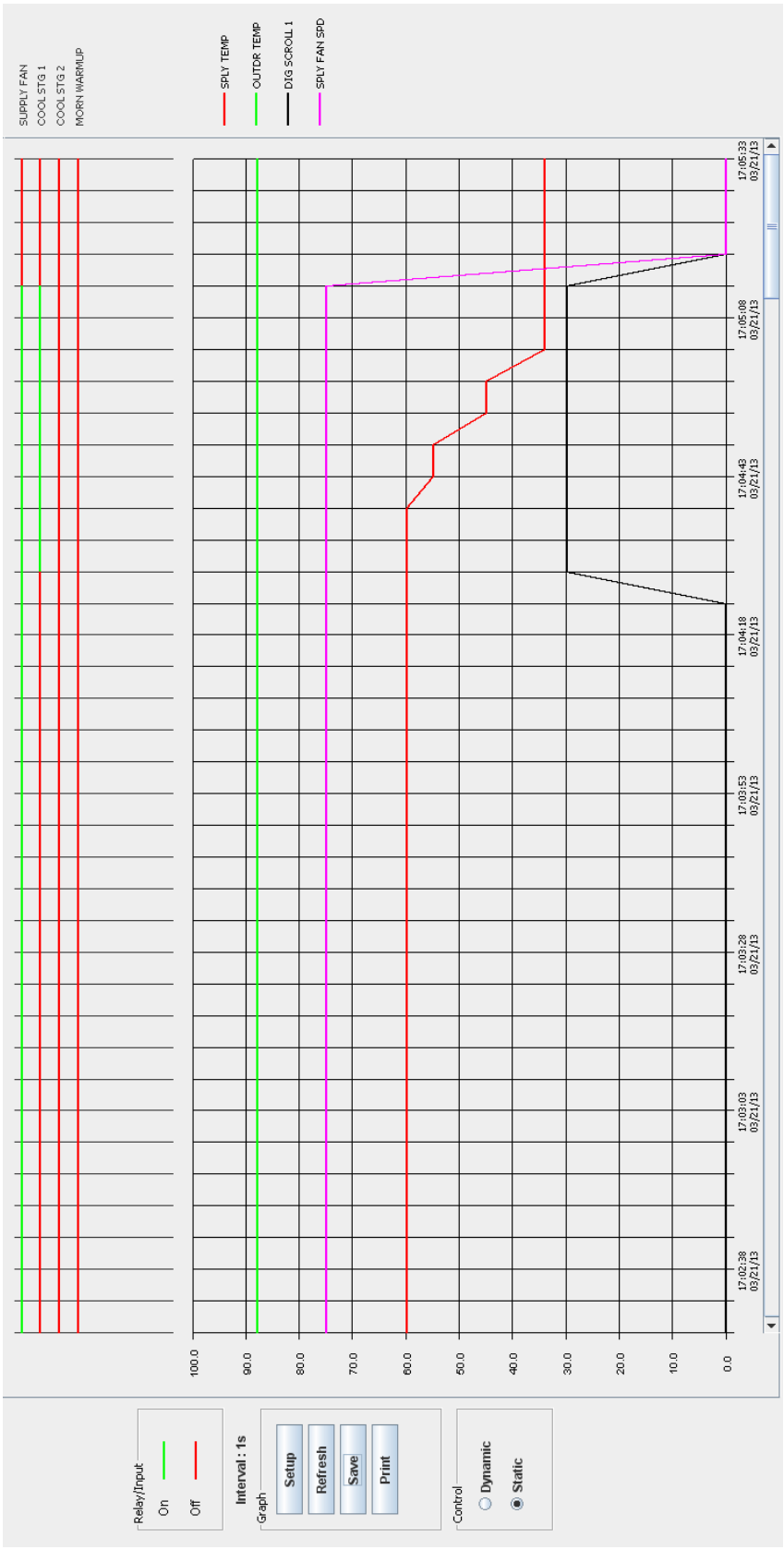
To pull back the current static data, from the status display in MCS-Connect, click the “Graph” tab.



Once the data has been pulled back select the “Setup” button on the left for the display and the following screen will appear. From this screen you select up to 8 binary inputs or outputs. You also select up to 8 analog inputs or outputs.



Select the information you want to display and press “Graph Selected” for the following results.



From the Graph Notice the Following:

- The Supply Fan is on
- It has modulated to 75% to maintain Duct Static
- The Digital Scroll compressor has started at 30%.
- The supply air tem has dropped from 60 °F to 34 °F.
- The Freeze Setpoint is 35 °F
- The Freeze time is 1 second, so at second 2 a lockout occurs.
- The Alarm is posted
- The “Info” data is saved

On the left side of the Graph Notice the Following:

- You can “Setup” the graph
- You can Refresh the graph
- You can save the graph
- You can print the graph
- You can switch from Static to Dynamic

10. MCS-CONFIG

The following options are specified in MCS-Config when building the configuration. These options are used to customize the system to meet the individual control requirements.

10.1 General Options

- Control method is based upon a control zone.
- The control temperature sensor can be either the returning or leaving sensor.
- Condenser control maintaining sufficient discharge superheat for good oil separation.
- Anti-cycle timers (OFF to ON and ON to ON).
- Maximum of 4 circuits per MicroMag, with selectable compressor rotation.
- Warning RO (turned on for low suction unload, high discharge unload, etc.).
- Alarm RO (turned on whenever an alarm is generated).
- Optional auto rotation for compressors.
- Low and/or high ambient temperature shut down.

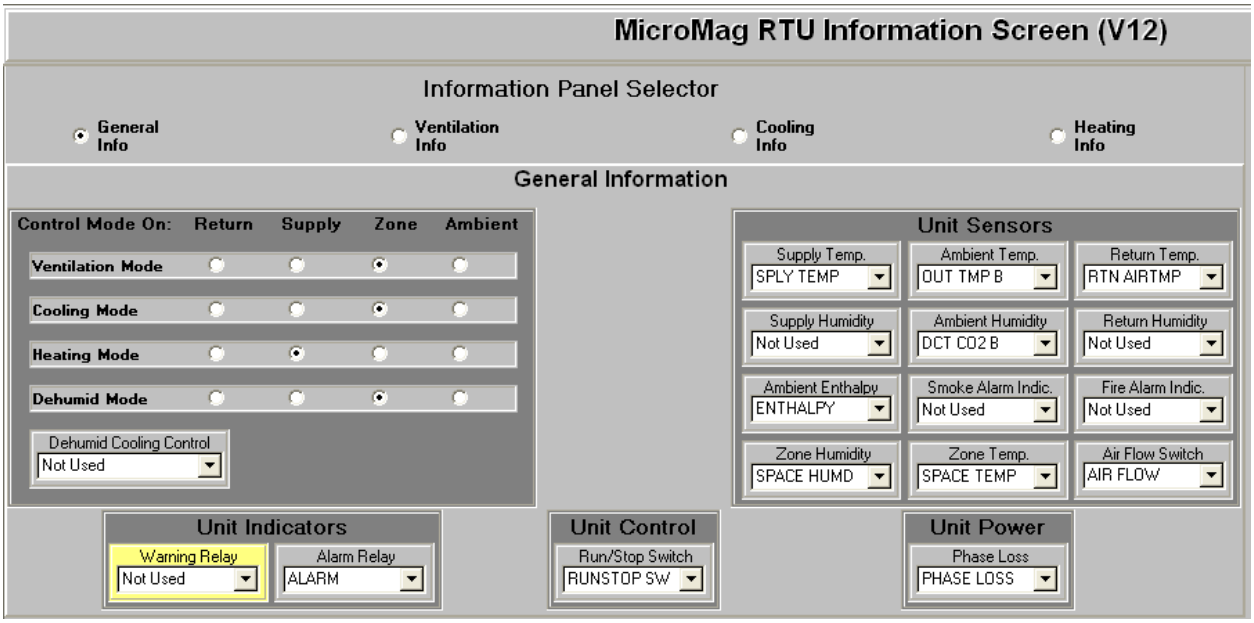
10.2 MicroMag MCS-Config

The MicroMag control is a function of the items selected during construction of the cfg. Shown below is the MicroMag RTU Information Screen.

10.2.1 General Info

The sensors are selected that will control the following modes:

-Ventilation Mode -Cooling Mode -Heating Mode -Dehumidification Mode



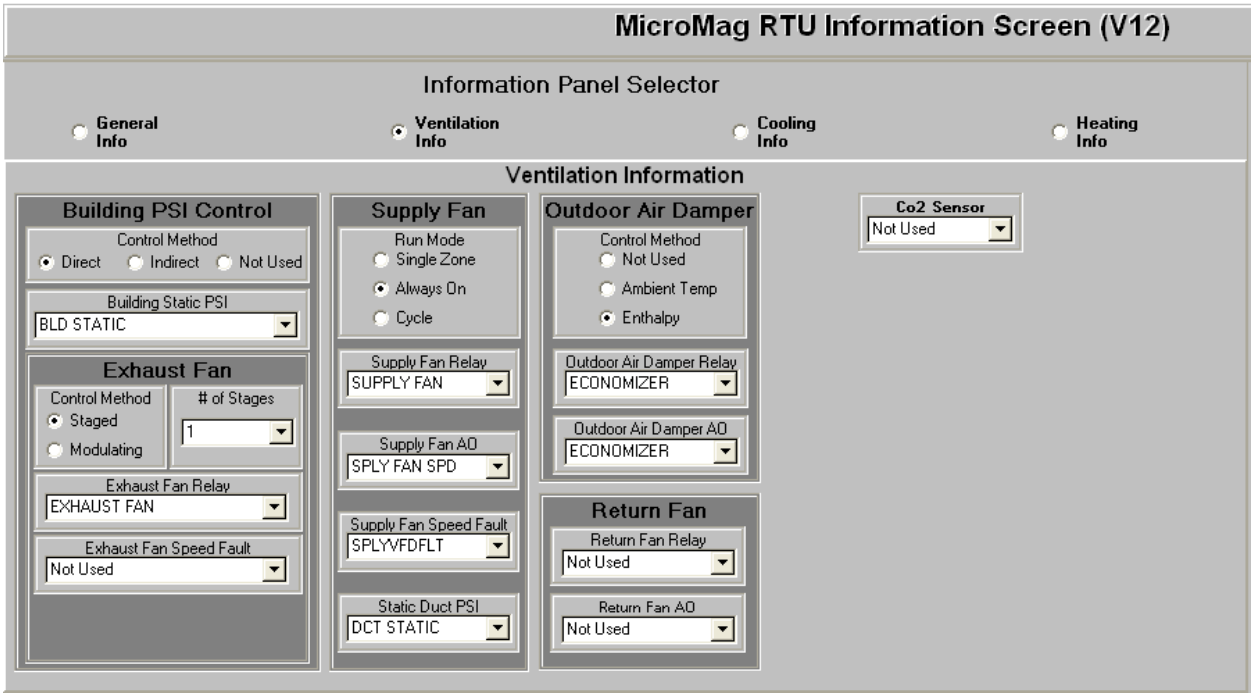
The following info and sensors are selected:

- Dehumid cooling control
- Unit Indicators – Warning & Alarm Outputs.
- Unit Control – RUN/STOP Input.
- Unit Power – Phase loss Input.

The following Unit Sensors are setup:

- Supply& Return Temp. & Humidity.
- Ambient Temp & Humidity.
- Air Flow sensor
- Smoke sensor if available
- Air Flow sensor
- Fire Alarm Sensor if available

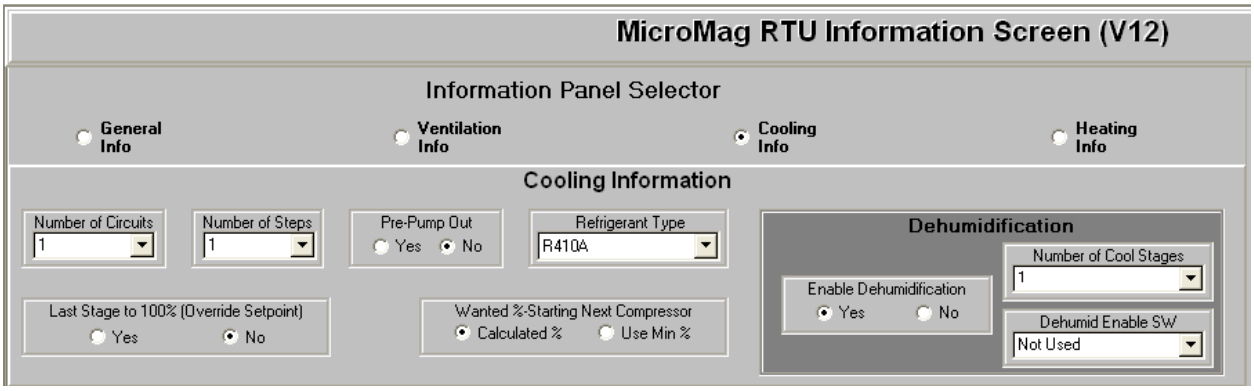
10.2.2 Ventilation Info



The following three (3) areas are specified in the Ventilation section:

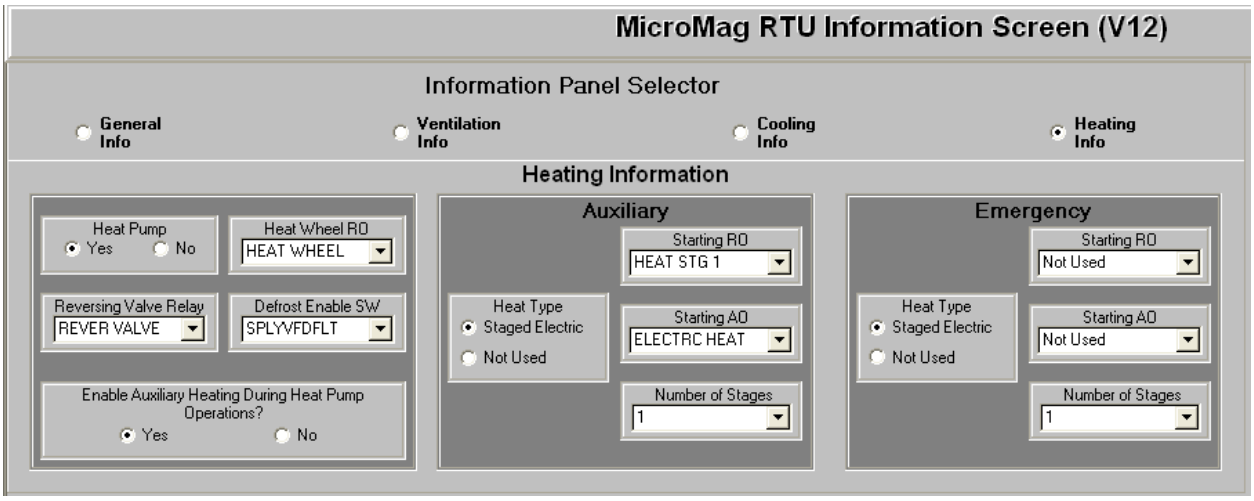
- Building PSI Control
  - Type Control
  - Building Static Pressure
- Supply Fan
  - Supply Fan Run Mode
  - Supply Fan Relay
- Outdoor Air Damper
  - Control Method
  - Outdoor Air Damper Relay

10.2.3 Cooling Info



- Specify number of circuits.
- Specify number steps.
- Specify Pre PUMP DOWN.
- Specify refrigerant type
- Specify refrigerant type
- Enable or Disable Dehumidification
- Specify # Cooling stages to use
- Do we have manual Dehumid enable switch

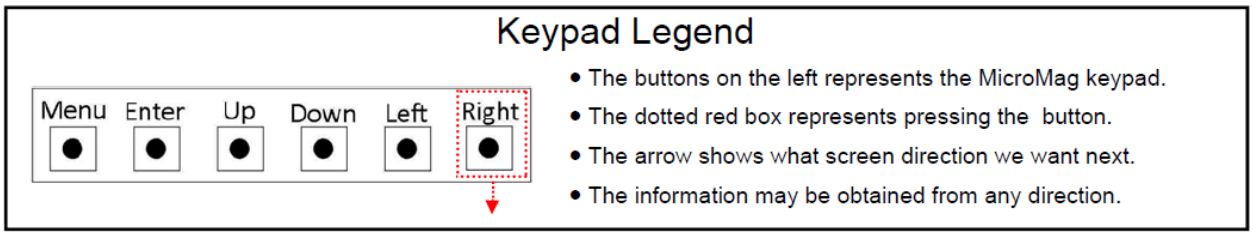
10.2.4 Heating Info



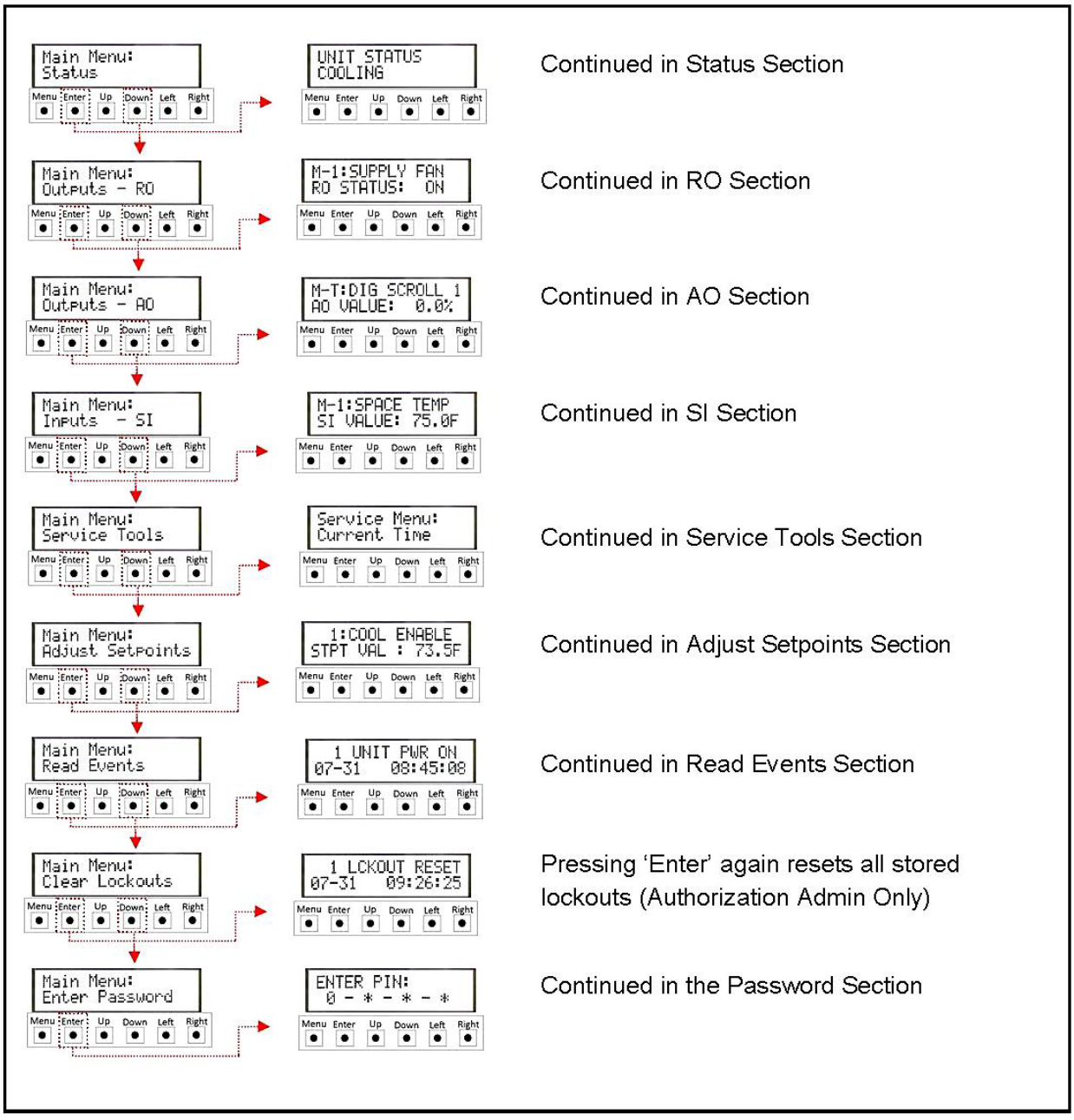
- Specify if a heat pump.
- If a heat pump RO to reversing valve.
- If a heat wheel is available point to RO.
- If a heat wheel point to fault if available.
- Do we enable Auxiliary heat?
- If auxiliary heating starting RO.
- If modulating heat provide AO.
- Specify heat type.
- Specify number stages Auxiliary heat.
- Do we have Emergency Heat?
- Specify type of Emergency heat.
- Specify starting RO.
- Specify starting AO.
- Specify number stages.

11. Keypad Display Screens

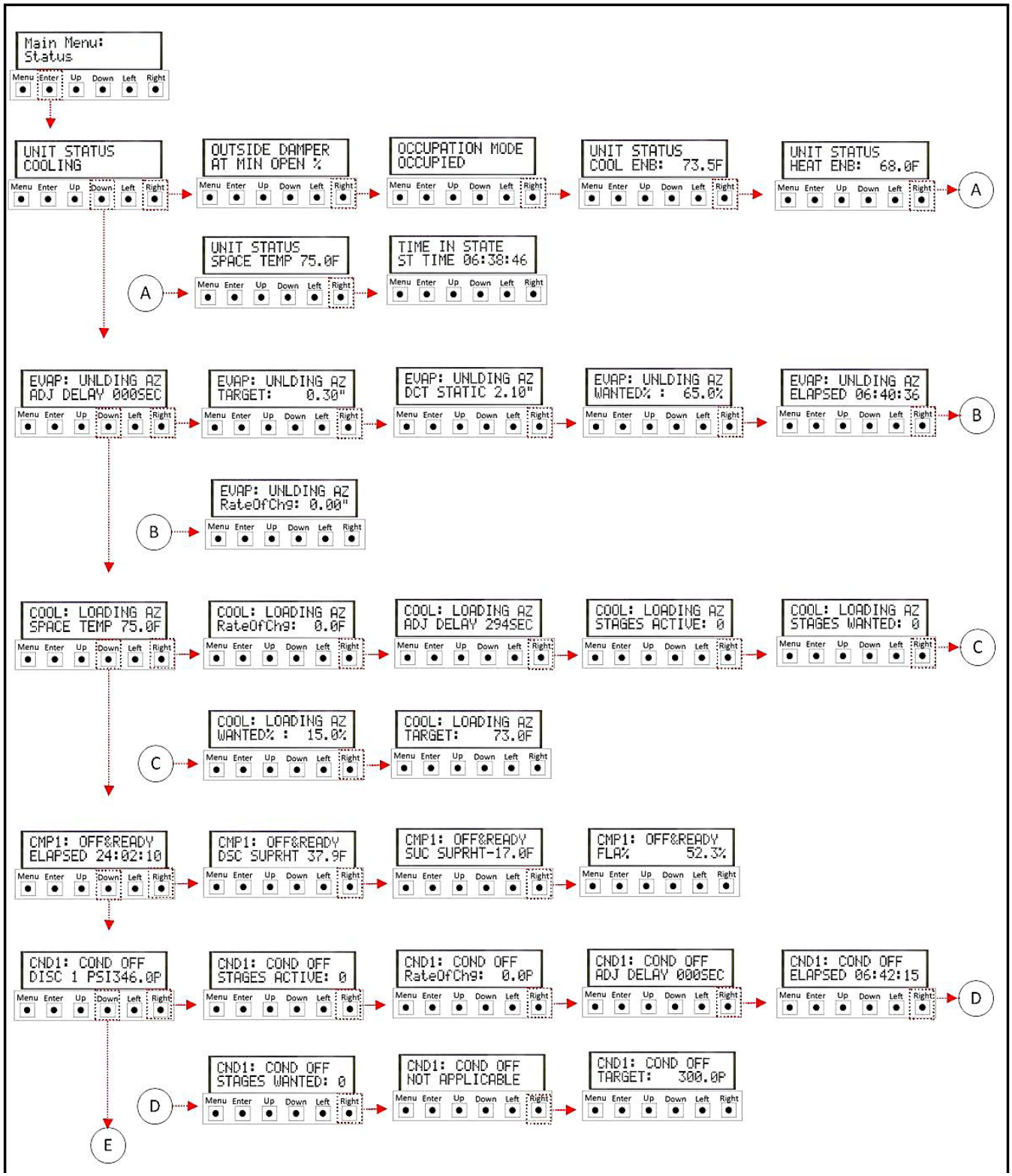
11.1 Keypad Symbol Legend



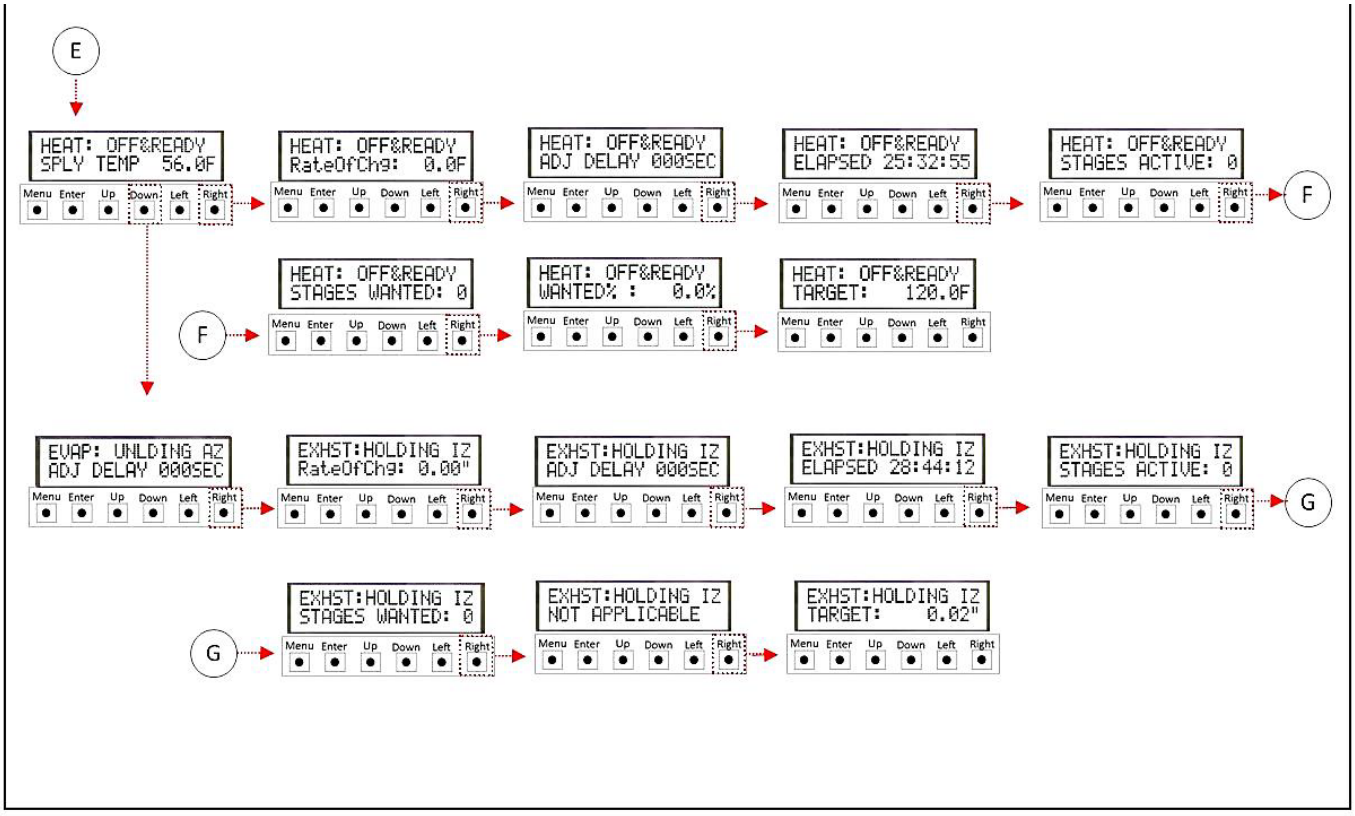
11.2 Keypad 'Main Menu'



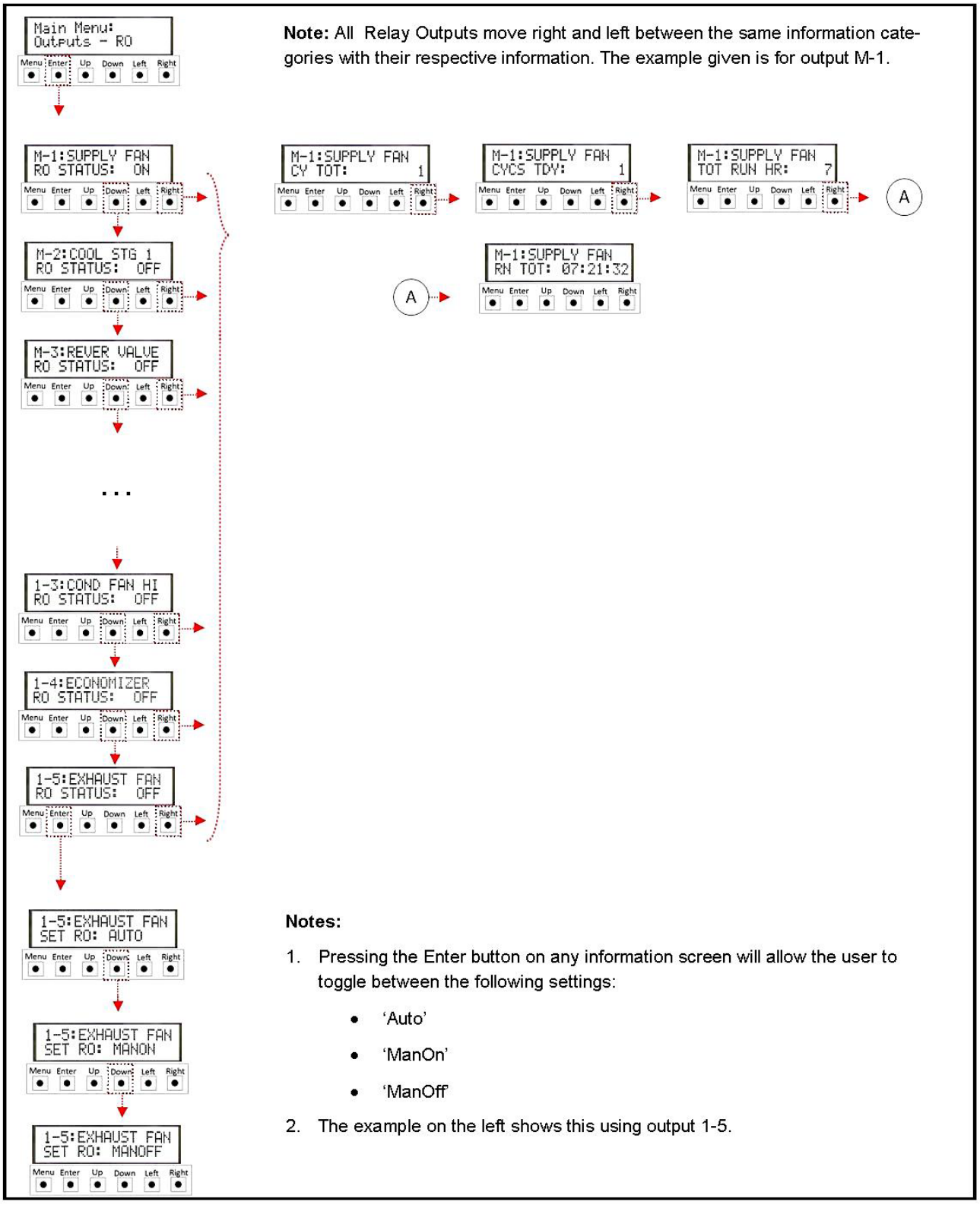
11.3 Keypad 'Status Part 1'



11.4 Keypad 'Status Part 2



11.5 Keypad 'RO'

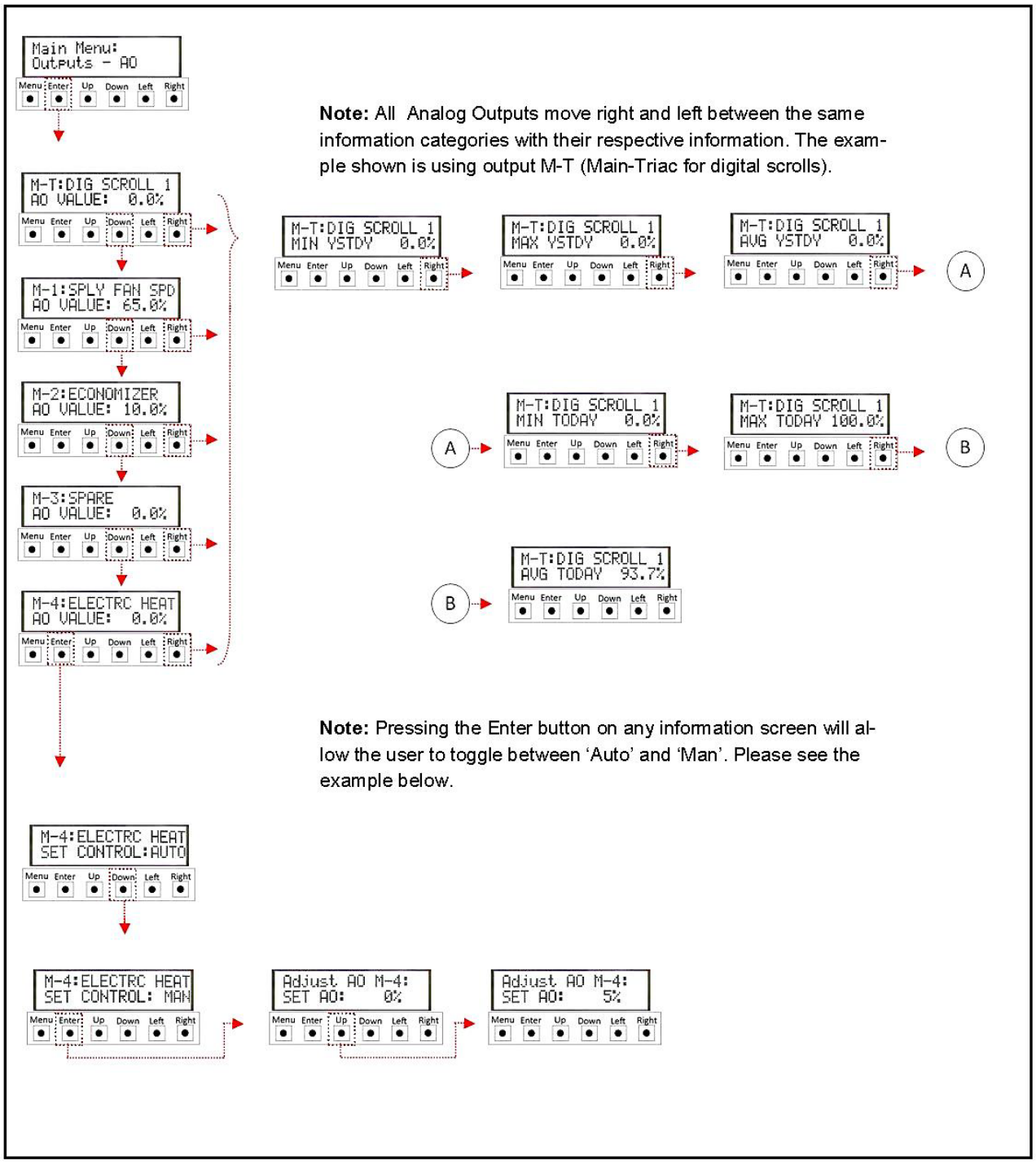


Note: All Relay Outputs move right and left between the same information categories with their respective information. The example given is for output M-1.

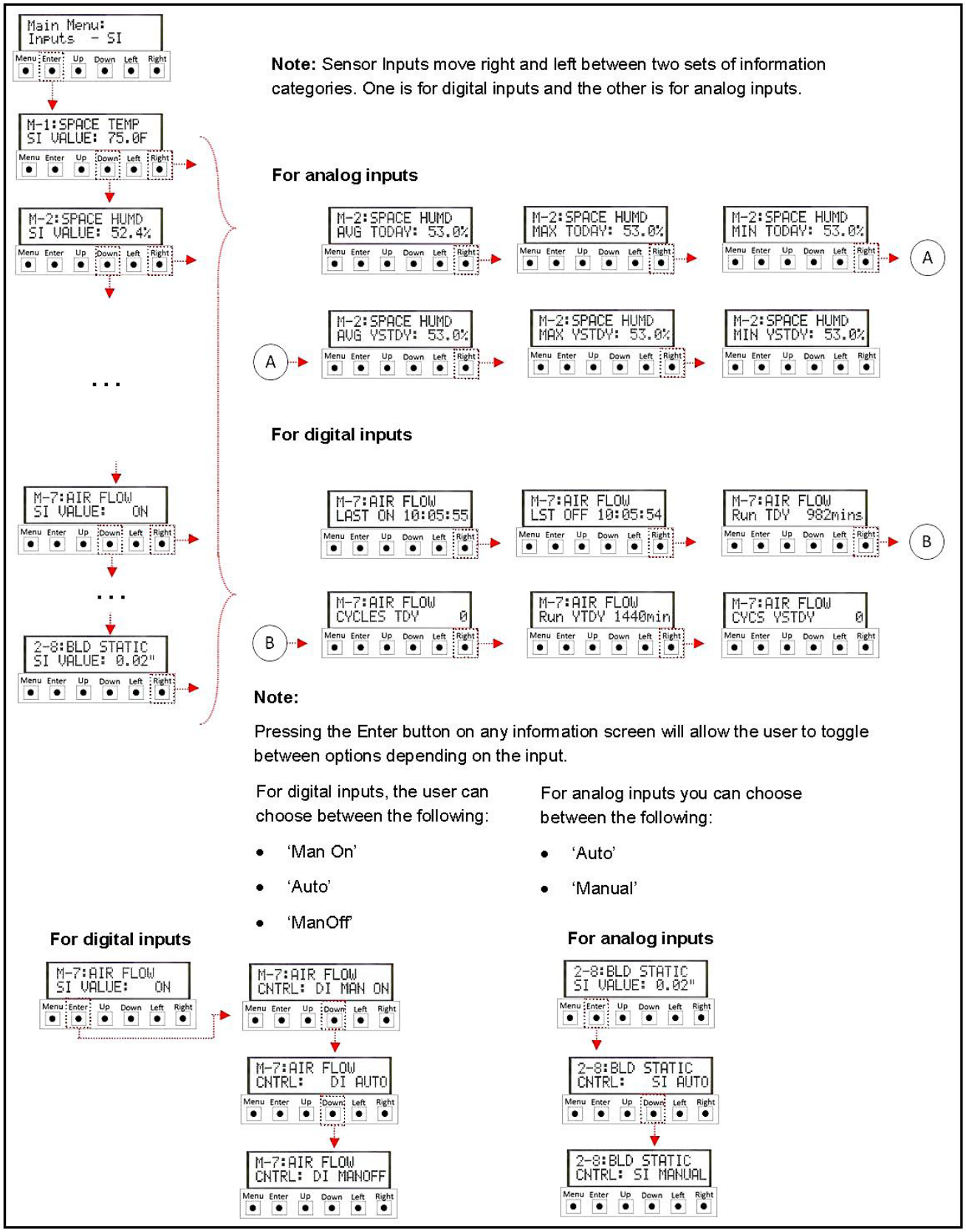
Notes:

1. Pressing the Enter button on any information screen will allow the user to toggle between the following settings:
   - 'Auto'
   - 'ManOn'
   - 'ManOff'
2. The example on the left shows this using output 1-5.

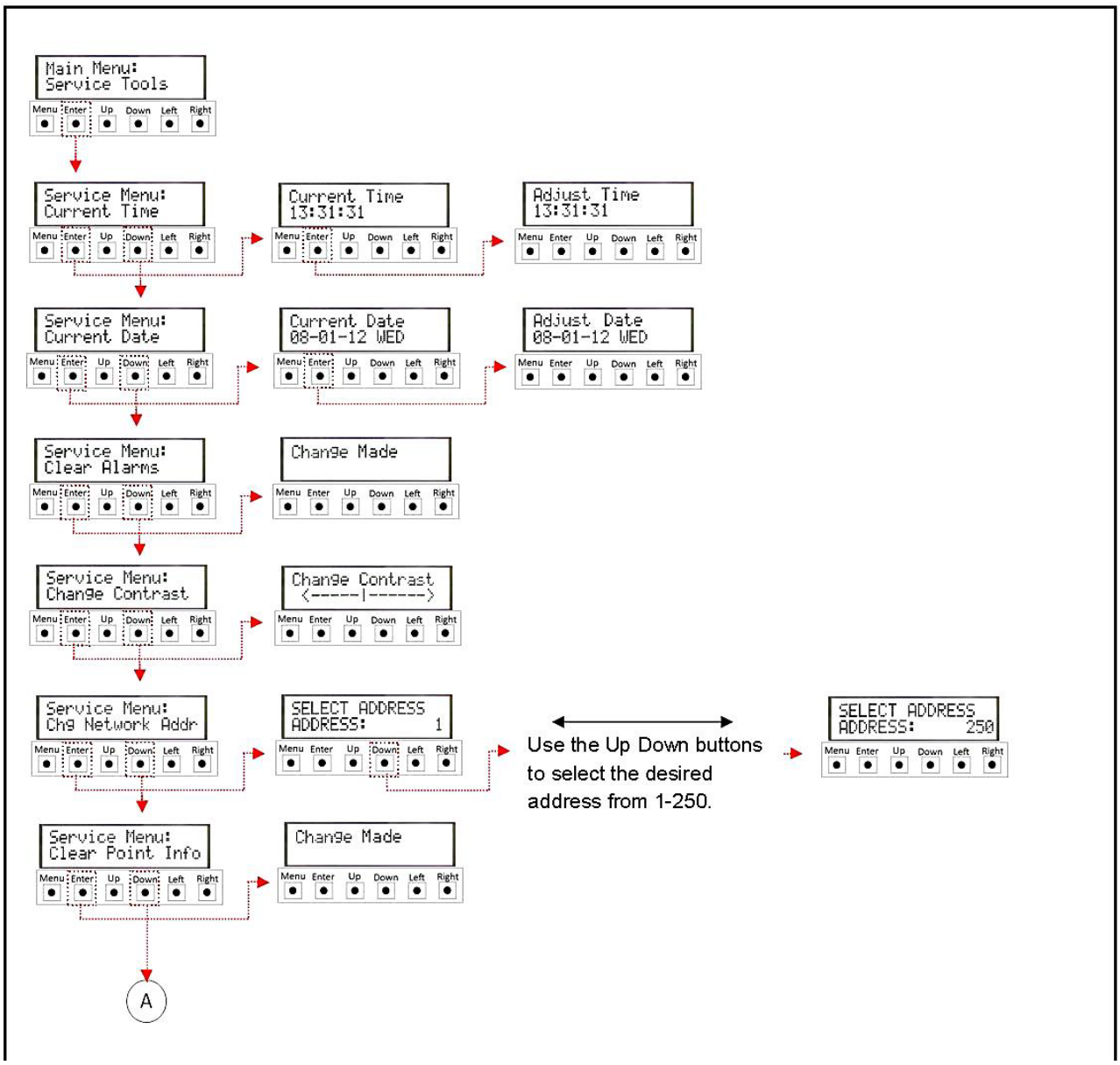
11.6 Keypad 'AO'



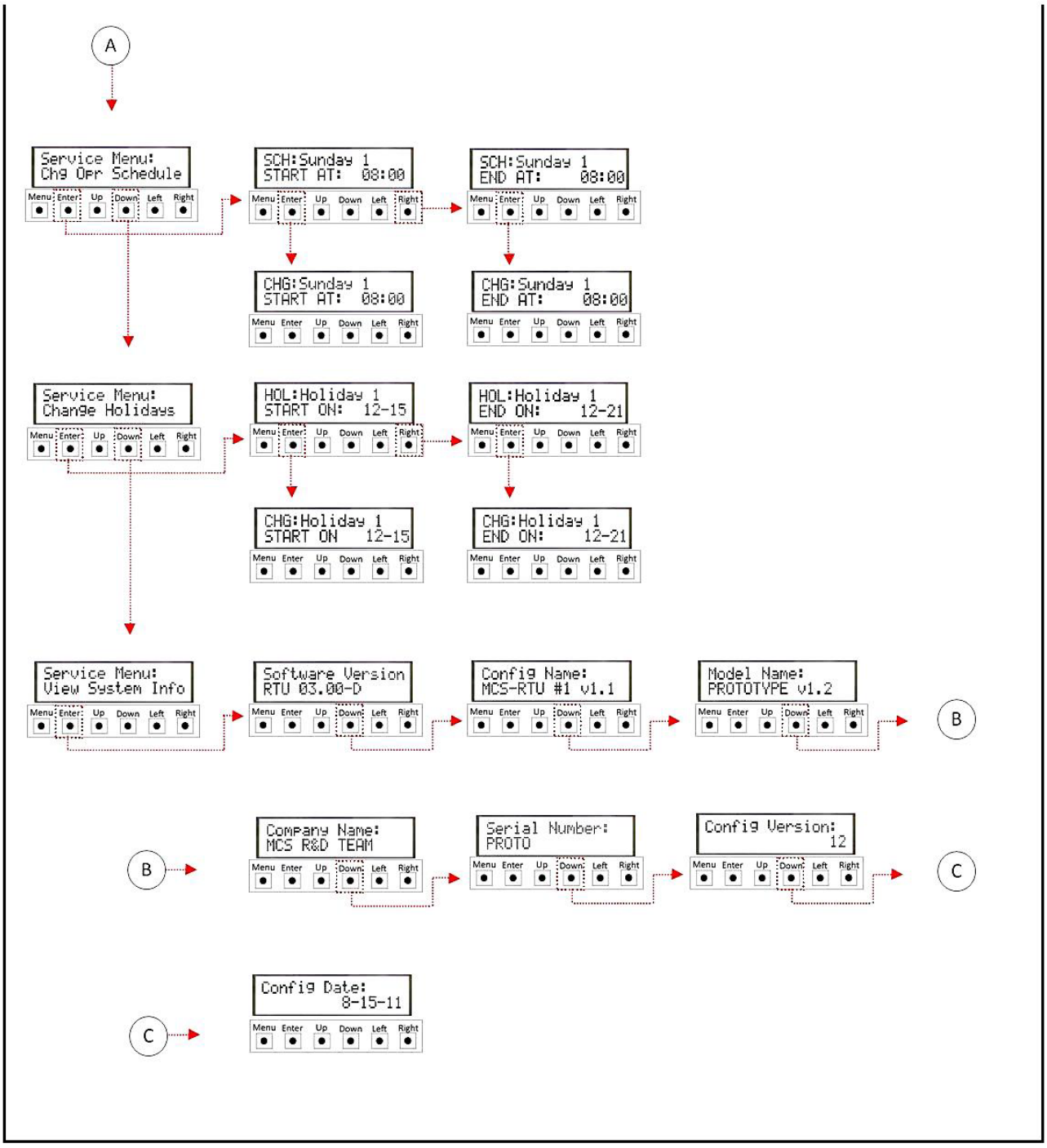
11.7 Keypad 'SI'



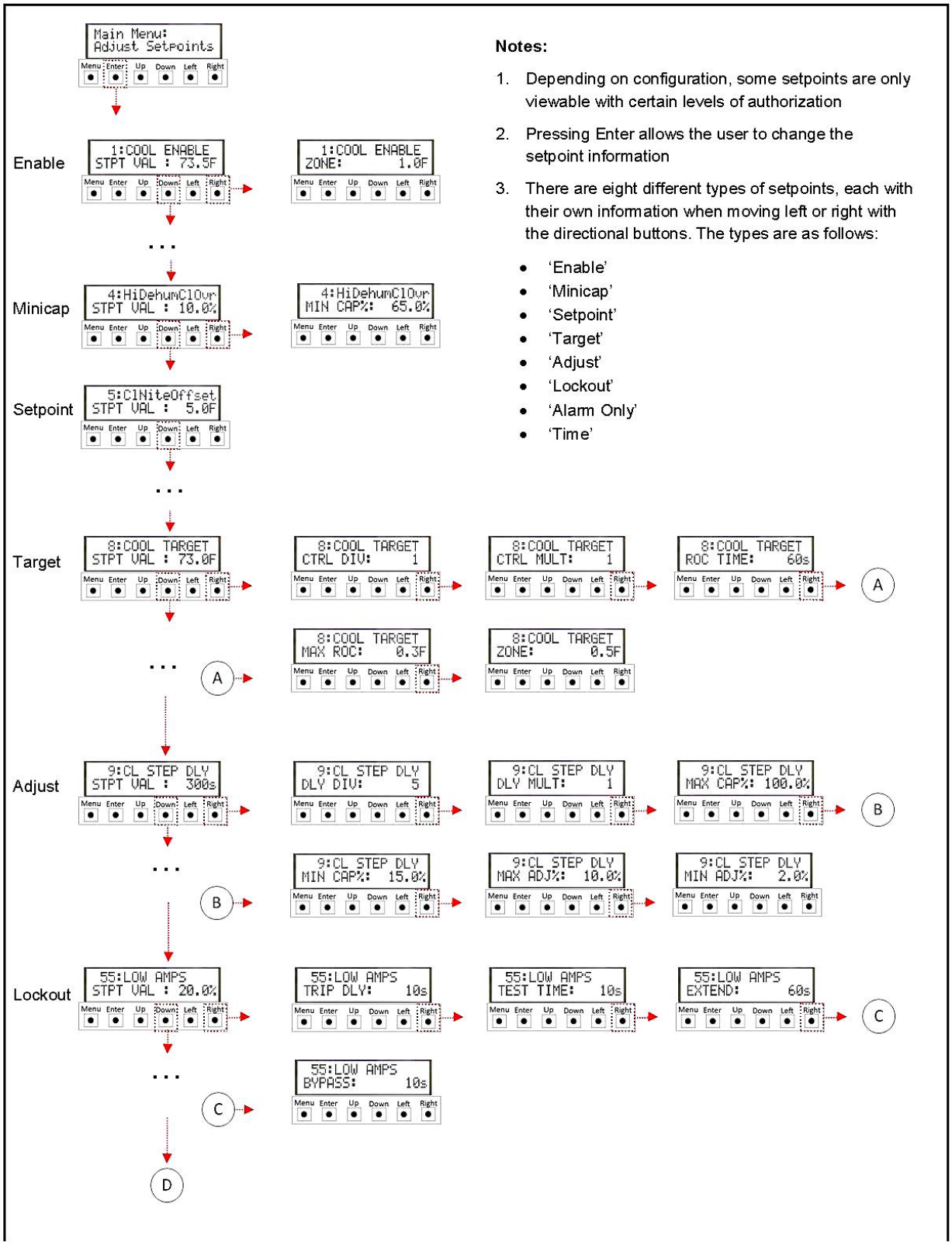
11.8 Keypad 'Service Tools Part 1'



11.9 Keypad 'Service Tools Part 2'



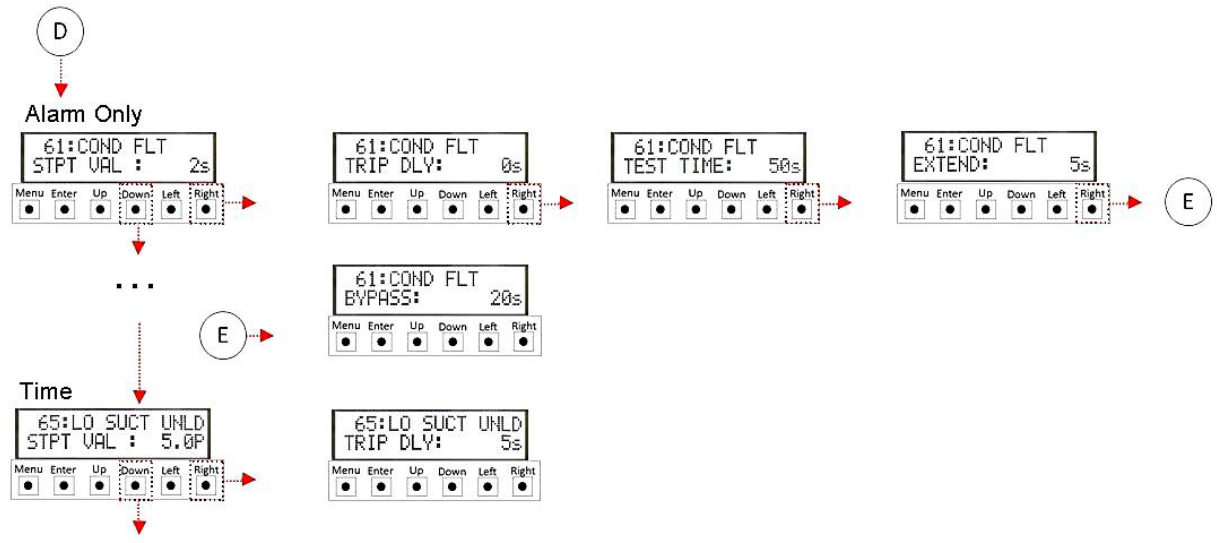
11.10 Keypad 'Adjust Setpoints Part 1'



Notes:

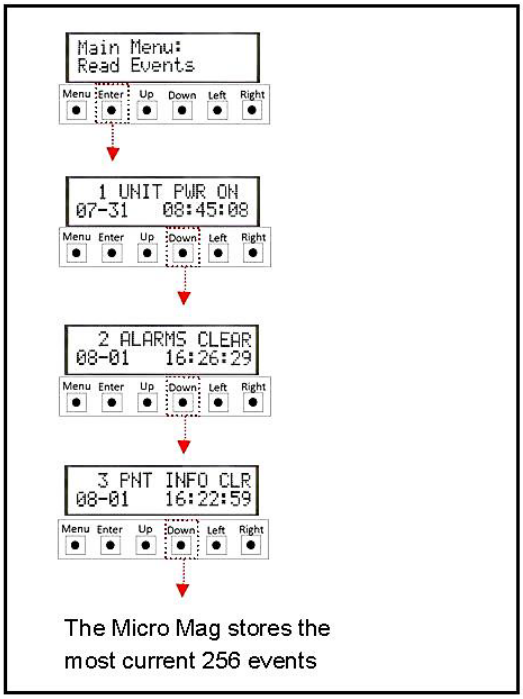
1. Depending on configuration, some setpoints are only viewable with certain levels of authorization
2. Pressing Enter allows the user to change the setpoint information
3. There are eight different types of setpoints, each with their own information when moving left or right with the directional buttons. The types are as follows:
   - 'Enable'
   - 'Minicap'
   - 'Setpoint'
   - 'Target'
   - 'Adjust'
   - 'Lockout'
   - 'Alarm Only'
   - 'Time'

11.11 Keypad 'Adjust Setpoints Part 2'



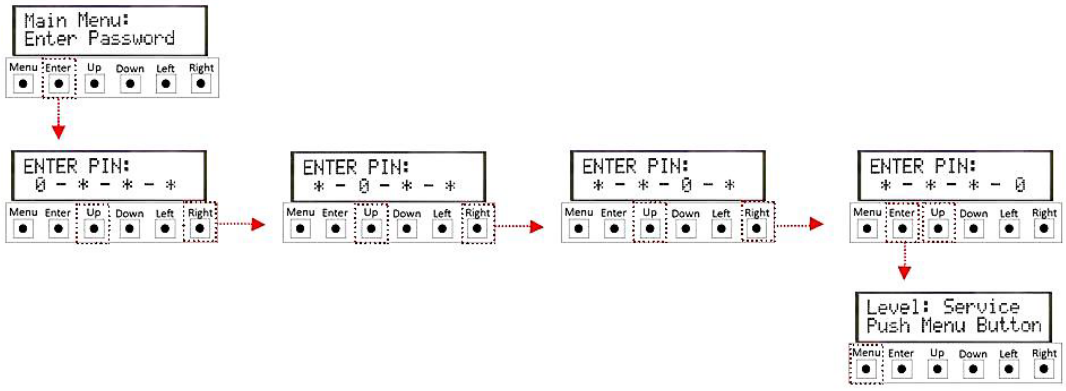
For full list of setpoints, see the MCS connect section of the manual

11.12 Keypad 'Read Events'



The Micro Mag stores the most current 256 events

11.13 Keypad 'Enter Passwords'



- Select Password & press 'Enter'. You are positioned on 1st password number.
- Use Up ⬆ & Down ⬇ to get number for this position.
- Use Right ➡ to move to next position.
- Repeat until you have entered the 4 position password.
- When complete press 'Enter'. Password level will be verified.
- If no key is pressed for 15 minutes you will be logged out.

12. Control Operations

12.1 Control Modes

12.1.1 Evaporator Mode
12.1.2 Cooling Mode
12.1.3 Heating Mode
12.1.4 Dehumidification Mode

12.2 Power up

If the unit is not in a LOCKOUT condition, it will start in the Power Up stage. After completing this stage the supply fan will be started. The fan will start and no other functions can be initialized until flow has been established and the minimum supply startup time has passed.

12.3 Determine Building mode

The system will determine if the building is occupied or unoccupied. The configuration file can be setup to use a schedule or an input to indicate occupied status. If unoccupied the night setback Setpoints will be applied. To view the current status you can do the following:

12.3.1 From MicroMag Display:
12.3.1.1 Press 'MENU' button
12.3.1.2 Press 'ENTER' button
12.3.1.3 Press 'RIGHT' button twice

12.3.2 From your laptop using MCS-Connect:
12.3.2.1 Using MCS-Connect connect to the MicroMag using the RS 232 port
12.3.2.2 If multiple units, select tab for this MicroMag and you will get a status display
12.3.2.3 In the control section, of the status display, in UNIT STATE is under MODE

12.4 Determine Unit mode

The setting of the unit mode will enable the cooling, heating or dehumidification functions to be executed. The setting of the control mode will be based on the control sensor for the Ventilation Mode. The following modes can be identified:

12.4.1 OFF

The Unit Mode will be OFF if the unit has experience a safety condition resulting in a LOCKOUT or the unit RUN/STOP indicates a STOP.

12.4.2 Cooling Mode

When the control sensor for the Ventilation Mode is above the value of Setpoint #1, Enable Cooling, the mode will be set to COOLING MODE. In this mode the cooling functions will be enabled. The control sensor provides the temperature data that has been selected in the Cooling Mode in the General Info section of the RTU Information Screen. If free cooling (economizer) has been specified and the ambient conditions allow, it will be used before mechanical cooling. (It is considered a stage of cooling.) The staging of the cooling steps is based on the same integration routine with ROC

override as used in the Magnum. The unit will stay in this mode until the Ventilation Mode control temperature drops below the value of Setpoint #1 minus its low zone value. If this is an outside air makeup unit and auto temperature reset has been selected in the config then the supply temperature will be modulated based on the change in the zone temperature. The unit will enter a SWITCHING state when the system is leaving the cooling mode. If the humidity is high at this point and the system is entering the VENT ONLY mode any compressors that are on will remain on in anticipation of entering the DEMUNIDITY mode; else all steps will be staged off.

12.4.3 Heating Mode

When the control sensor for the Ventilation Mode is below the value of Setpoint #2, 'Enable Heating' the mode will be set to HEATING MODE. If a heat pump is available the mode will be set to 'HP ONLY'. In this mode the reversing valve is turned based on based on Setpoint 92. After the time specified in Setpoint 92 the compressor will be started. If the compressor is a modulating unit it will be adjusted until it reaches 100% of capacity. The control sensor provides the temperature data that has been selected in the Heating Mode in the General Info section of the RTU Information Screen. When at 100% an additional capacity is available it will be started. If the next stage is a combustion module please refer to that section for startup sequence.

For non-heat pump systems the first stage of heating will be activated. If staged type of heating the stages will be added as heating is needed. Once a heating step is turned on a minimum on time can be specified in the ROs information screen if needed, default is 0 time. If stage 1 is a variable type of heating the associated analog output will be modulated to maintain the heating Setpoint value. If additional heating is required and stage 1 is at its maximum then stage 2, if available, will be enabled. If less heating is required the system will unload all heating steps in stage 2 prior to unloading stage 1.

For a heat pump system the first stage of heating will be the heat pump with the reversing valve on if the ambient conditions are met. The second stage of heating can be used if additional heating is required. The emergency heating, if specified, can only be used if the heat pump is not functioning as the first stage of heating.

The unit will stay in this mode until the Ventilation Mode control temperature rises above the value of Setpoint #219 plus its high zone value. The unit will enter a SWITCHING state when the system is leaving the heating mode if any heating stages are on.

12.4.4 Vent Mode

When the control sensor for the Ventilation Mode is below the value of Setpoint #1 minus its low zone value and above the value of Setpoint #2 plus its high zone the VENT ONLY mode will be entered. This indicates that neither heating nor cooling is

required. When in this mode and the Dehumid Mode sensor is greater than Setpoint #3, this Setpoint must be active, the DEHUMIDITY mode will be entered.

12.4.5 Dehumidification Mode

The dehumidification mode will use the number of cooling stages specified in the config to cool the air and the circuit-reheat function to heat the air if necessary to remove the humidity. The cooling state will be set to DEHUMID-COOL and the cooling stages will be staged on up to the number indicated in the Dehumidification Section. Note a compressor must be associated with a suction group that has reheat capabilities; refer to the Circuit Base screen, to be turned on.

If the control temperature is less than the value of Setpoint #1 the reheat function of all circuits that are on will be used to increase the control temperature.

For systems with multiple compressors per suction group, a compressor will be turned off or not allowed to be turned on if a low suction condition exists for that circuit. This is accomplished by using the High SI Off sensor in the Circuit SI screen.

The system will stay in this mode until the humidity decreases below the value of Setpoint 3 minus its low zone or heating or cooling is required.

12.5 Combustion Module Control

The following is the startup sequence of a modulating gas heat combustion module.

12.5.1 Ignition

12.5.1.1 The high speed blower is turned on

12.5.1.2 The gas is turned on at 100%

12.5.1.3 When the supply temperature increases by more than the value in set Point 100 (IGN SAFETY) the unit is moved to the Warm Up State. If we do not reach this within the time allotted in Setpoint 100 we go into a safety. We will then wait for the safety time and try a second time. If we fail a second time we will lockout this combustion module.

12.5.2 Warm up

12.5.1.4 We will remain in the Warm Up state for the time specified in Setpoint 101

12.5.3 Heating

12.5.2.1 After warm up the unit will be set to low blower speed and 10% gas

12.5.2.2 If additional capacity is required the gas will be increased.

12.5.2.3 When the gas % is greater the Setpoint 107 the blower is moved to high Speed. At 40%, if additional stages are available they are brought on and The modulating units return to 10% and low speed. If all stages are on and Additional capacity is required the modulating units are increased to 100% As required. (This sequence is followed because it is the most energy Efficient.

12.6 Override Button

The override button is usually mounted on the right side of the Zone temperature sensor housing. When in unoccupied mode (Scheduled off) and there is a need to go to occupied mode pressing the override button for 1 to 2 seconds shifts the unit back to the occupied mode for the time specified in Setpoint #36. (Override min)

12.7 Resets

There are three types of resets in the MicroMag, as follows:

12.7.1 MAX RESET (Setpoint #99)

This reset is inputted from the user. It can be a 0 to 5 vdc signal wired to a sensor input or a BMS communicated.

12.7.2 MAX CALC RESET (Setpoint #109)

If this Setpoint is active the MicroMag will vary the supply temperature proportionally, up or down to try to maintain the zone target.

12.7.3 USER RESET (Setpoint #110)

If this Setpoint is active the MicroMag will do the following:

12.7.3.1 A momentary push button switch, located on the left side of the zone temperature sensor will make a temporary change to the Mode enable & supply air Setpoints. At midnight the values are set back to their regular values.

12.7.3.2 When pressed for less than 3 sec it will lower the mode Setpoints by the value in the adjust Setpoint. This can be repeated until the max adjustment has been reached in the Setpoint.

12.7.3.3 When pressed for greater than 5 sec it will increase the mode Setpoints by the value in the adjust Setpoint. This can be repeated until the max adjustment has been reached in the Setpoint.

13. Troubleshooting Quick Reference

PROBLEM	POTENTIAL SOLUTION
No Sensor + 5 vdc or sensor +5 vdc output is less than 4.90 vdc.	Indicates a possible shorted input sensor ■ Remove all sensor terminal blocks. ■ Wait about 15 seconds. If + 5 vdc returns, replace one sensor wire at a time until the + 5 vdc is lost again. This will be the shorted sensor.
A Sensor Input reads -99.9	This indicates an open Sensor Input signal or 5 VDC problem. ■ Check sensor wiring for missing wire or poor connection. ■ Check for faulty sensor. ■ Check + 5 vdc on Sensor Input to ground. If less than 5 VDC is on the sensor 5 VDC terminal block, the problem is probably a shorted sensor. (A poly fuse protects the board) ■ Remove all Sensor Input terminals. ■ Wait about 15 seconds or until 5 VDC restored at Sensor Input. ■ Connect terminals 1 at time until short reappears and fix bad sensor.
A Sensor Input reads +999.9	This indicates a shorted Sensor Input signal. ■ Check sensor wiring for +5VDC shorted to signal etc. ■ Check for faulty sensor.
A pressure sensor is reading more than 1 psi off (The temperature and humidity sensors do not require calibration.)	This indicates the transducer Sensor Input needs to be calibrated through the offset capability in the software. (Transducers by design need to be calibrated based on construction and altitude.) ■ You can use the MCS-Connect with a valid Authorization code to change sensor offsets or from MicroMag Keypad. ■ See MCS-Connect Interactive section for instructions. (Change SI Status, Manual Value and / or offset.)
Invalid reading on one Sensor Input.	This indicates an input problem with 1 sensor. ■ Verify jumper settings correct for that SI.
Lost I/O	Indicates communications problem. ■ Verify RS485 LED blinking. ■ Verify termination jumper J6 only on at Magnum and last I/O. ■ Verify Magnum and I/O address's set correctly. ■ Verify wiring from Magnum to each I/O correct. ■ Check fuses/120 VAC on I/O units
MCS-Connect cannot make changes	This indicates you are not at a proper authorization level. Follow steps below for proper authorization ■ From either the SITE INFO or STATUS screen in MCS-Connect, click the 'View Only' button at the top of the screen, or click on the 'Passwords' menu option on the lower right of your Keypad/LCD display. ■ Follow prompts and enter a valid 4-digit authorization number. ■ The authorization level is displayed at the top of the display and is reflected by the color of the Authorization button.

PROBLEM	POTENTIAL SOLUTION
	Red = View Only **Light Blue = User level** **Purple = Service level** **Dark Blue = Supervisor level** **Green = Factory level**
Invalid authorization	This indicates an invalid authorization number. Follow steps below for proper authorization ■ Press Menu key until the Password option appears ■ Press the Enter key ■ Follow the instructions in this manual. Section in Keypad labeled Enter Passwords.
SI from AMPS board 10 A low.	This indicates a problem with this SI only. ■ Jumper setting on this SI in wrong position. ■ Incorrect sensor type used.
INVALID CONFIG VER	Indicates layout of CFG wrong. ■ CFG layout for different version than software
INVALID CONFIG TYPE	Indicates CFG incompatible with software.
INVALID CONFIG CHECKSUM	Indicates Checksum invalid ■ Reload a valid CFG
Sensor input believed invalid	■ Verify Berg jumpers using Quick Reference Sheets ■ Check wiring of sensor
Communications to MCS-485-GATEWAY from MCS-Connect not working.	■ Verify red LED on the gate way is blinking. This indicates that MCS-Connect is talking to the gateway. ■ Verify that the two wire shielded cable is properly wired from the RS-485 connector to the gateway. ■ Verify red LED (Located just to the left of the RS-485 connector on the Magnum board is blinking. This indicates that the Magnum is responding to the gateway. ■ If both of these LED are blinking, check the address of the Magnum and any other Magnums that are on the network. Each must have a unique address. This address can be changed from the Magnum. Proper authorization is required. Enter the UNIT INFORMATION screen by pressing the SERVICE DIAGNOSTIC key and scrolling to this item. Press the enter key and scroll to the NETWORK ADDRESS screen. Change address if needed. ■ Verify + 12 vdc to MCS-485-GATEWAY
INVALID CONFIG	Indicates Checksum invalid ■ Either set to factory defaults on reset settings.

14. BMS Communication

14.1 BMS Properties

Property	AI	AV	AO	BO	MSV
PROP_OBJECT_IDENTIFIER	X	X	X	X	X
PROP_OBJECT_NAME	X	X	X	X	X
PROP_DESCRIPTION	X	X	X	X	X
PROP_OBJECT_TYPE	X	X	X	X	X
PROP_PRESENT_VALUE	X	X	X	X	X
PROP_STATUS_FLAGS	X	X	X	X	X
PROP_EVENT_STATE	X	X	X	X	X
PROP_OUT_OF_SERVICE	X	X	X	X	X
PROP_UNITS	X	X	X	X	
PROP_RELINQUISH_DEFAULT			X	X	
PROP_PRIORITY_ARRAY			X	X	
PROP_NUMBER_OF_STATES					X
PROP_STATE_TEXT					X

AI = Analog Inputs
AV = Analog Value
AO = Analog Outputs
BO = Binary or Relay Outputs
MSV = Multi State Values

14.2 BACnet MSTP

14.2.1 BACnet MSTP Relay Output Points

Type	BO #	Board & Position
BO	1	M-1
BO	2	M-2
BO	3	M-3
BO	4	M-4
BO	5	M-5
BO	6	M-6
BO	7	1-1
BO	8	1-2
BO	9	1-3
BO	10	1-4
BO	11	1-5
BO	12	1-6
BO	13	2-1
BO	14	2-2
BO	15	2-3
BO	16	2-4
BO	17	2-5
BO	18	2-6

14.2.2 BACnet MSTP Analog Output Points

Type	AO #	Board & Position
AO	0	M-T
AO	1	M-1
AO	2	M-2
AO	3	M-3
AO	4	M-4
AO	5	1-1
AO	6	1-2
AO	7	1-3
AO	8	1-4
AO	9	2-1
AO	10	2-2
AO	11	2-3
AO	12	2-4

14.2.3 BACnet MSTP Sensor Inputs

Type	AI #	Board & Position
AI	1	M-1
AI	2	M-2
AI	3	M-3
AI	4	M-4
AI	5	M-5
AI	6	M-6
AI	7	M-7
AI	8	M-8
AI	9	M-9
AI	10	M-10
AI	11	1-1
AI	12	1-2
AI	13	1-3
AI	14	1-4
AI	15	1-5
AI	16	1-6
AI	17	1-7
AI	18	1-8
AI	19	2-1
AI	20	2-2
AI	21	2-3
AI	22	2-4
AI	23	2-5
AI	24	2-6
AI	25	2-7
AI	26	2-8

14.2.4 BACnet MSTP Status & States

Type	MSV #	Name
MSV	0	UNIT STATUS
MSV	1	OCCUPATION MODE
MSV	2	EVAPORATOR STATE
MSV	3	COOLING STATE
MSV	4	COMPRESSOR 1 STATE
MSV	5	CONDENSER 1 STATE
MSV	6	HEATING STATE
MSV	7	REHEAT STATE

14.2.5 BACnet MSTP BMS Setpoints

Type	AV #	Name	Writeable
AV	1	COOL ENABLE	Yes
AV	2	HEAT ENABLE	Yes
AV	3	DEHUM ENABLE	Yes
AV	4	HiDehumClOvr	Yes
AV	5	ClNiteOffset	Yes
AV	6	HtNiteOffset	Yes
AV	7	DhNiteOffset	Yes
AV	8	COOL TARGET	Yes
AV	9	CL STEP DLY	No
AV	10	HEAT TARGET	Yes
AV	11	HT STEP DLY	No
AV	12	REHT TARGET	Yes
AV	13	REHT STP DLY	No
AV	14	EvpStaticTrg	Yes
AV	15	Evp Step DLY	No
AV	16	Evp MIN RUN	No
AV	17	COND TARGET	Yes
AV	18	COND STP DLY	No
AV	19	EconAmbAllow	No
AV	20	ECON MAX %	No
AV	21	MIN DMPR C02	No
AV	22	MIN DAMPER	No
AV	23	DehumSuctTrg	No
AV	25	EconCoolDly	No
AV	26	EXHS TARGET	Yes
AV	27	EXHS STP DLY	No
AV	28	EXHS MIN RUN	No
AV	29	EXHS ENB PRE	No
AV	30	EXHS ENB ZON	No
AV	31	HI BLDG PSI	No
AV	32	HI CO2 LEVEL	No
AV	33	HI CO2 ZONE	No
AV	34	LOW AMB OFF	No
AV	35	HIGH AMB OFF	No
AV	36	OVERRIDE MIN	No
AV	37	LEAD COMPRES	No
AV	38	LD COMP DAYS	No
AV	39	COMP MIN RUN	No
AV	40	AntiCycOn-On	No
AV	41	AntCycOff-On	No
AV	42	PMP DOWN PSI	No
AV	43	PMP DWN TIMR	No
AV	44	SERVICE MODE	No
AV	45	SftyUnld DLY	No
AV	46	SFTY HLD DLY	No
AV	47	SftyUnld ADJ	No

Type	AV #	Name	Writeable
AV	51	COMPR 1 FLA	No
AV	52	COMPR 2 FLA	No
AV	53	COMPR 3 FLA	No
AV	54	COMPR 4 FLA	No
AV	55	LOW AMPS	No
AV	56	HIGH AMPS	No
AV	57	HI AMP HOLD	No
AV	58	NO COMP PRF	No
AV	59	HI MOTOR TMP	No
AV	60	COMP VFD FLT	No
AV	61	COND FLT	No
AV	62	LOW SUCT PSI	No
AV	63	HP SucOffset	No
AV	64	UNSAFE SUCT	No
AV	65	LO SUCT UNLD	No
AV	66	LO SUCT RELD	No
AV	67	LO SUCT SPHT	No
AV	68	HI SUCT SPHT	No
AV	69	LOW DISC PSI	No
AV	70	HI DISC PSI	No
AV	71	HI DISC UNLD	No
AV	72	HI DISC RELD	No
AV	73	HI DISC TEMP	No
AV	74	HiDscTmpUnld	No
AV	75	HiDscTmpReld	No
AV	76	LO DISC SPHT	No
AV	77	DIC SH UNLD	No
AV	78	DIC SH RELD	No
AV	79	LOW DIFF PSI	No
AV	80	UnsafeDifPSI	No
AV	81	HI PRESS SW	No
AV	82	LO PRESS SW	No
AV	83	PHASE LOSS	No
AV	84	HEATER FAULT	No
AV	85	HI SupplyTmp	No
AV	86	FREEZE TEMP	No
AV	87	FREEZE DIFF	No
AV	88	DIFF TEMP	No
AV	89	CONFIG TEST	No
AV	90	HP MinAmbTmp	No
AV	91	Rev Vlve Dly	No
AV	92	HiAmbDefrost	No
AV	93	DefrTermTemp	No
AV	94	MAX DEFR DUR	No
AV	95	DEFROST DUR%	No
AV	96	DYN DEFR ADJ	No

AV	97	DelayBtwnDefsp	No
AV	98	HPCndTrgOfst	No
AV	99	MaxTrgtReset	No
AV	100	IGNPROOF	No
AV	101	ModGasWarmup	No
AV	102	AuxHtMin_Max	No
AV	103	WARMUPTEMP	No
AV	104	WARMUPTIME	No
AV	105	ERWDEFROST	No
AV	106	REHEATFLUSH	No
AV	107	GasLoFireDsb	No
AV	108	SMOKEALARM	No
AV	109	COOLRESET_	No
AV	110	USERRESET	No
AV	111	COOLRESET_	No
AV	112	HEATRESET_	No
AV	113	HEATRESET_	No
AV	114	PRECOOLTARG	Yes
AV	115	PRECOOLADJ	No
AV	116	CFMTARGET	No
AV	117	CFMSTPDELY	No
AV	118	MaxStaticRst	No
AV	119	HOODDEHENB	No
AV	120	NOFLOW	No
AV	121	CoolUnldOff	No
AV	122	HeatUnldOff	No
AV	123	DEHUnldOff	No
AV	124	DEHUnldOff	No
AV	125	FREEZEUNLD	No
AV	126	FREEZERELD	No
AV	127	CondStart_	No
AV	128	HIDUCTPSI	No
AV	129	WtrVlvFreeze	No
AV	130	ERWMINDIFF	No

14.3 Modbus RTU

The Modbus RTU address can be verified and changed (with the proper authorization code) from the keypad/LCD. The following steps will display the Modbus RTU Network address, and the Baud Rate:

- Press the Menu key, select Serv Tools, and then press the Enter key.
- Select RS485 Network then press Enter.
- Select Protocol then press Enter. Change the protocol to Modbus.
- Select address then press Enter. Change the address then press Enter.
- Select Baud then press Enter. Set the baud rate then press Enter.
- Connect the communication wires to the TX RS485 three position portion of the six position terminal block located above the display.

ADDITIONAL DATA TO BE ADDED

14.4 Network inputs to MicroMag

The **MicroMag** can receive changes from the network to enable or disable the Network Run/Stop & Network Target Reset.

The **MicroMag** has a large number of Setpoints that can be written to from the BMS. They are identified in the Setpoint chart in this section.

Net Run/Stop – Does not need a virtual SI or to be pointed to it.

Net OCC SW- Can write 4 values:

0 = Unoccupied
1 = Occupied
2 = Override: Puts unit into override amount of time in specified in the Setpoint. Only needs to write 2 for a few seconds to force override, then it writes to a 1.
3 = Schedule: Uses schedule input in MicroMag.

14.5 MicroMag BMS protocols settings

The BACNET DEVICE ID is a five-digit number. The first three digits are based on our BACnet vendor ID 181, and the last two are set by the BACnet/MSTP address.

189	XX
↓	↓
Bacnet Vendor ID	Bacnet MS/TP Address

The BACnet address can be verified and changed (with the proper authorization code) from the Keypad/Display. The following steps will display the BACnet MSTP Network address, and the Baud Rate:

14.6 Modbus RTU

The Modbus RTU address can be verified and changed (with the proper authorization code) from the keypad/LCD. The following steps will display the Modbus RTU Network address, and the Baud Rate:

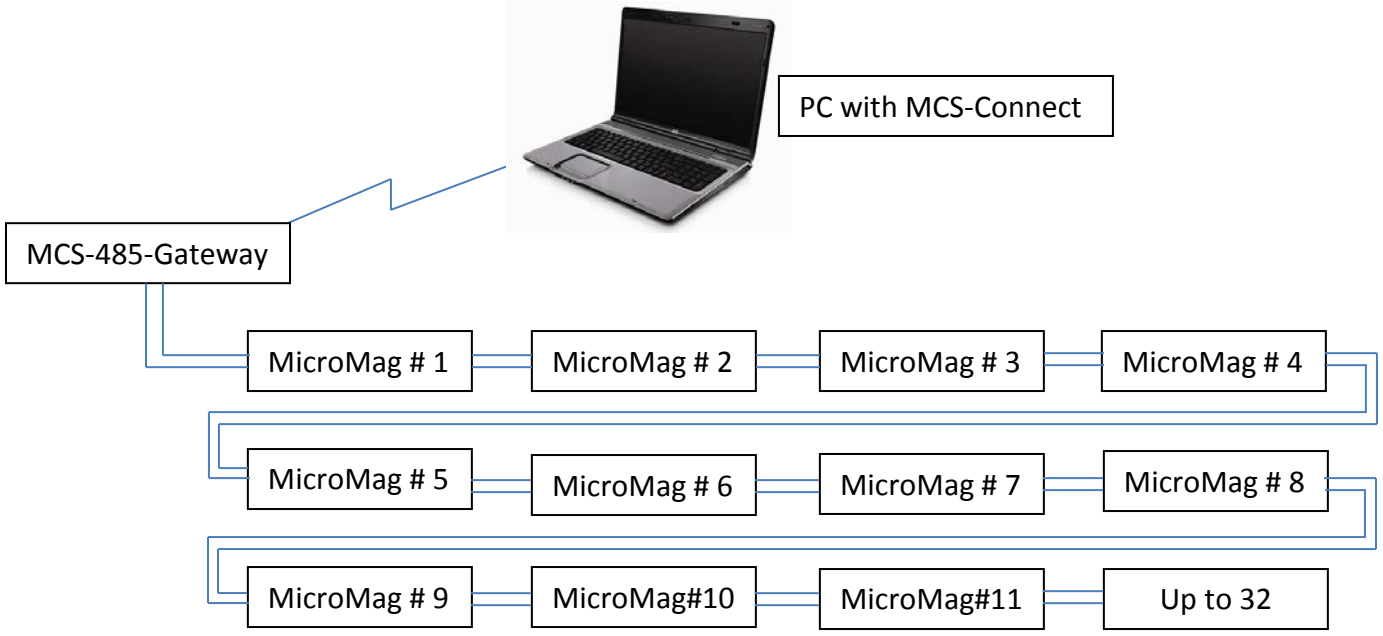
- Press the Menu key, select Serv Tools, and then press the Enter key.
- Select RS485 Network then press Enter.

- Select Protocol then press Enter. Change the protocol to Modbus.
- Select address then press Enter. Change the address then press Enter.
- Select Baud then press Enter. Set the baud rate then press Enter.
- Connect the communication wires to the TX RS485 three-position terminal located above the Ethernet connector.

15. MicroMag Communications Options

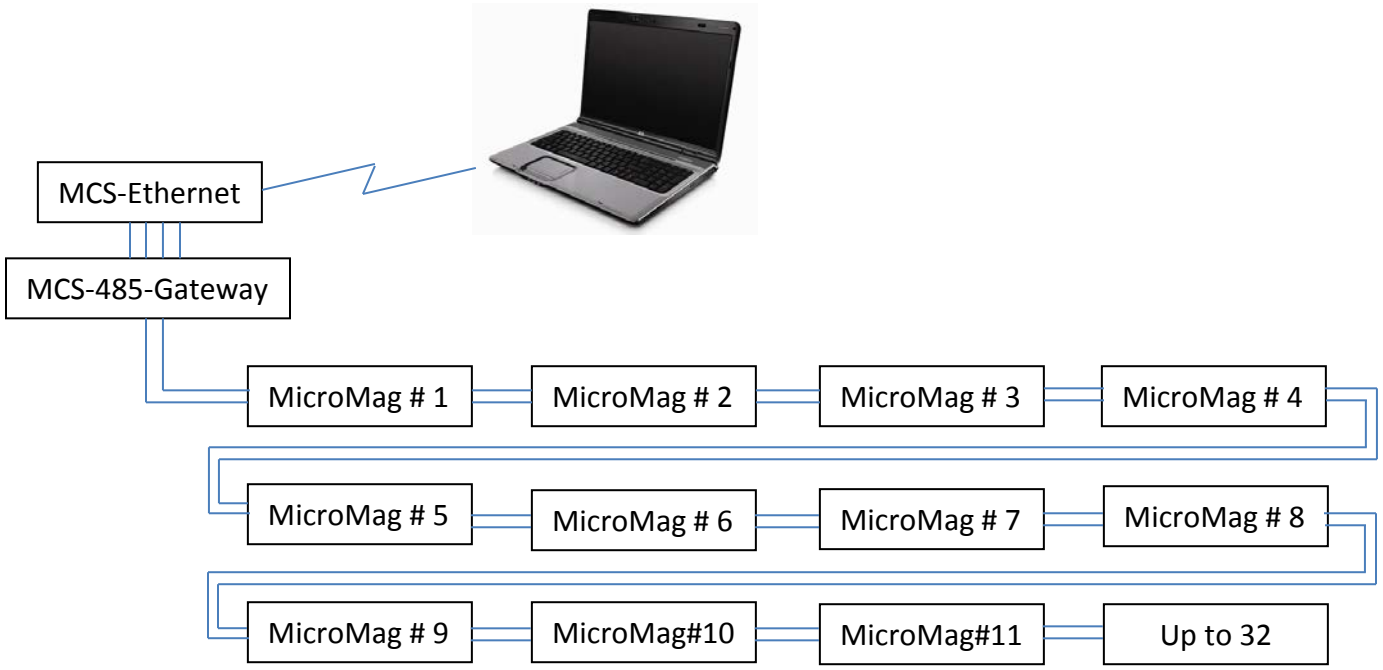
15.1 Multiple MicroMag's using MCS-Connect

- Current MCS-Connect maximum is 32 MicroMag's (Can be expanded to 64)
- Uses MicroMag RS 485 Communications Terminal located above LCD
- Two wire shielded cable wired in straight line (NO STAR)
- At either end of RS 485 install MCS-485-Gateway to convert to RS 232
- See tab for each MicroMag
- Select tab for a unit to see details of that MicroMag



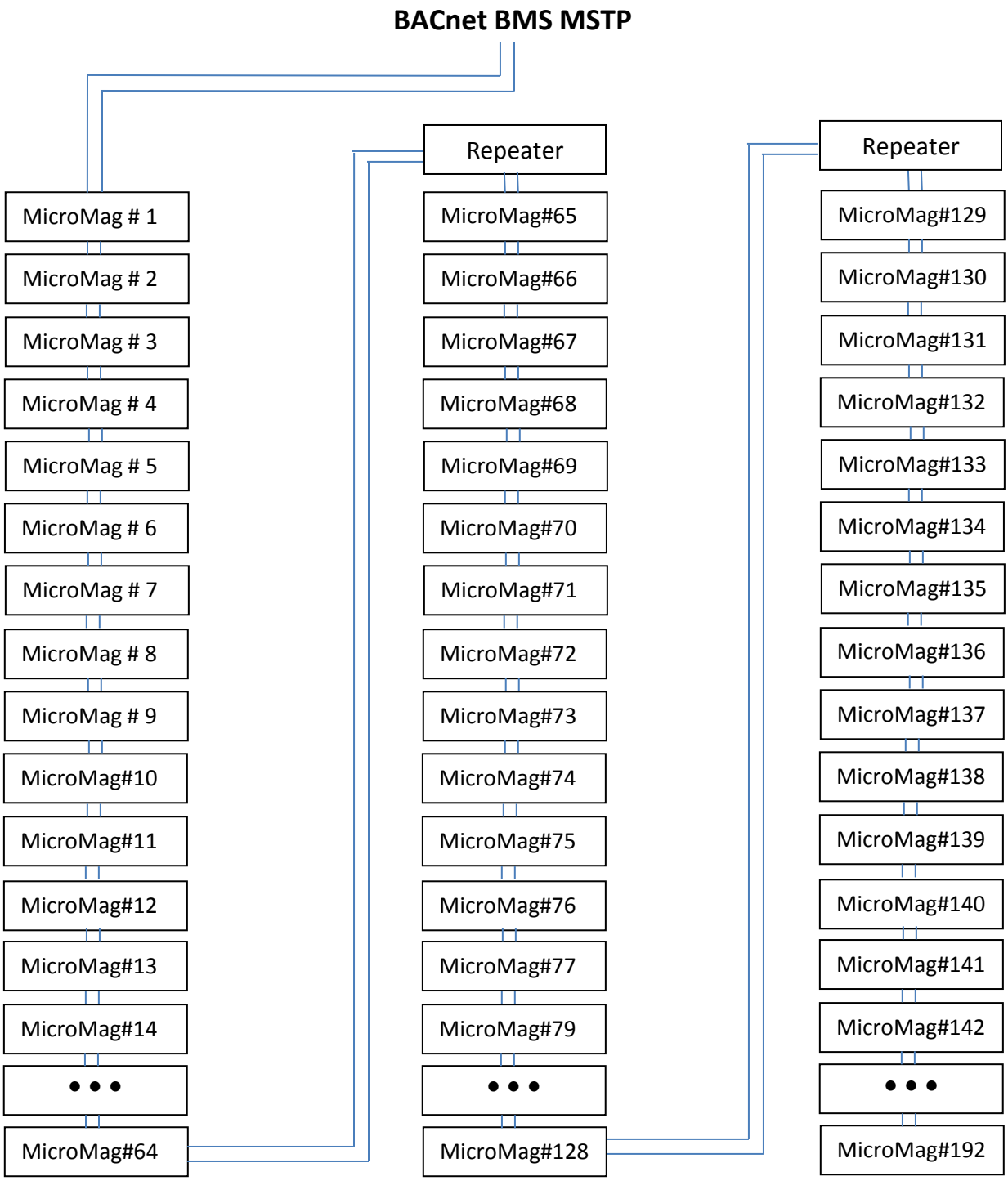
15.2 Multiple MicroMag's, over Internet using MCS-Connect

- Current MCS-Connect maximum is 32 MicroMag's (Can be expanded to 64)
- Uses MicroMag RS 485 Communications Terminal located above LCD
- Two wire shielded cable wired in straight line (NO STAR)
- At either end of RS 485 install MCS-485-Gateway to convert to RS 232
- Install MCS-Ethernet to RS 232 on MCS-Gateway
- Obtain IP address for MCS-Ethernet
- Connect to MCS-Ethernet using MCS-Connect via IP Address
- See tab for each MicroMag
- Select tab for a unit to see details of that MicroMag



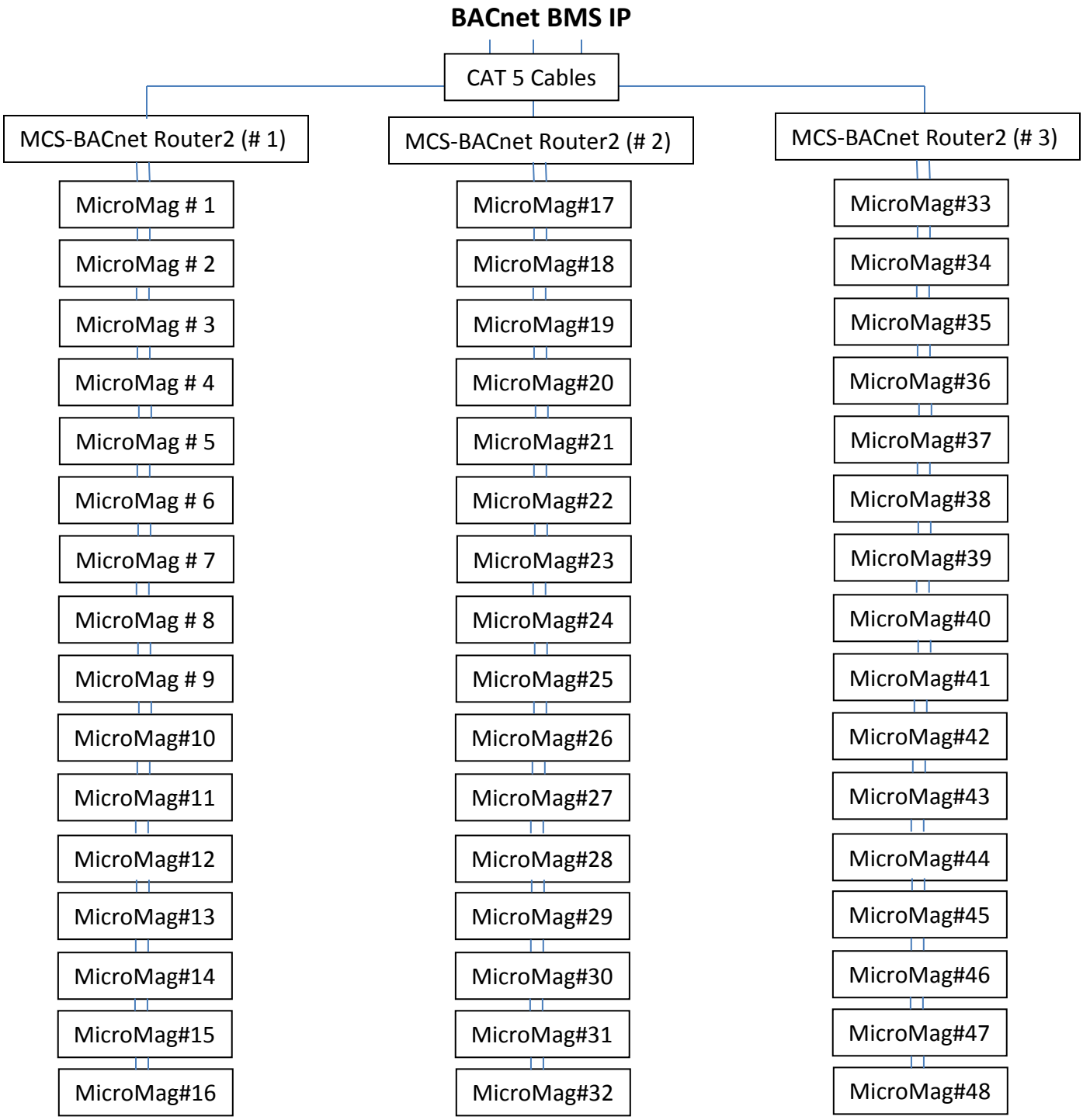
15.3 Multiple MicroMag's, BACnet MSTP

- Uses MicroMag RS 485 Communications Terminal located above LCD
- Two wire shielded cable wired in straight line (NO STAR)
- Up to 64 MicroMag's connected to BACnet MSTP BMS
- Requires a repeater for each additional 64 MicroMag's added



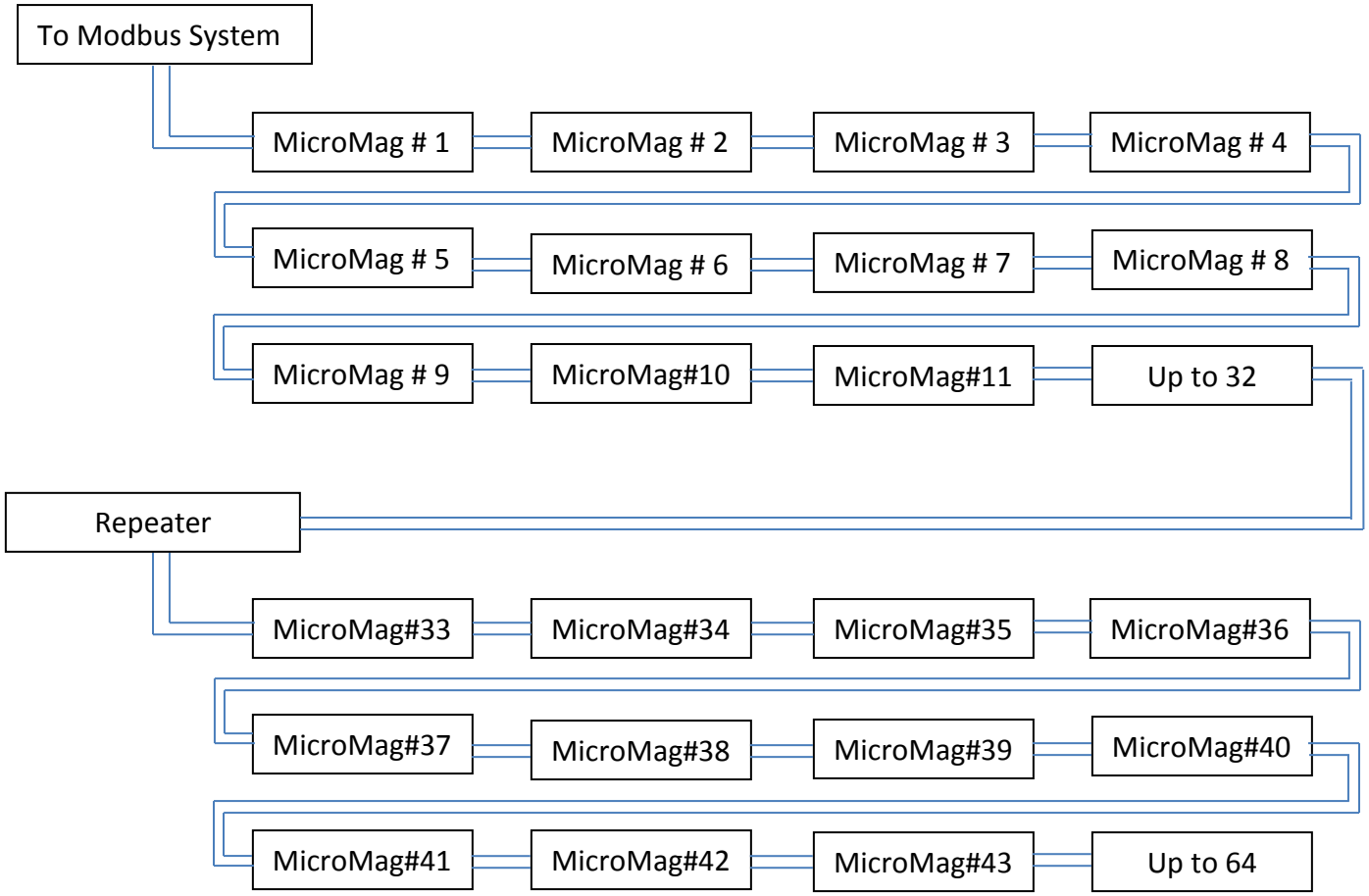
15.4 Multiple MicroMag's, BACnet MSTP to BACnet IP

- Uses MicroMag RS 485 Communications Terminal located above LCD
- Two wire shielded cable wired in straight line (NO STAR)
- Up to 16 MicroMag's connected to one MCS-BACnet-Router2
- MCS-BACnet-Router2 Converts BACnet MSTP to BACnet IP
- Each MCS-BACnet-Router2 connects to BMS via Cat 5 cable
- You may connect as many MCS-BACnet-Router2's as required



15.5 Multiple MicroMag's, RTU to Modbus

- Uses MicroMag RS 485 Communications Terminal located above LCD
- Two wire shielded cable wired in straight line (NO STAR)
- You can connect up to 32 MicroMag's directly to the BMS Modbus system
- After every 32 MicroMag's you will require a repeater
- Two wire shielded cable wired in straight line (NO STAR)
- Up to 250 MicroMag's can communicate to the BMS Modbus system



16. MicroMag States

16.1 Economizer States

#	State	Description
0	OFF AND CLOSED	Economizer at min. because unoccupied, unit off or no air flow
1	AT MIN OPEN %	Economizer at minimum position and CO2 within range
2	AT HI CO2 OPEN %	Economizer at high CO2 position
3	ECON ON – NORMAL	Economizer on
4	ECON ON – HI CO2	Economizer is on but the CO2 is also high
5	OUTDR DMPR OPEN	Outside damper is open when occupied and at full position
6	OUTDR DMPR OFF	Outside damper closed in unoccupied mode
7	ECON ON–HOOD ON	Economizer on but Hood on is overriding damper position
8	EXHAUST HOOD ON	Economizer off, damper at maximum position because Hood is on

16.2 Evaporator Fan State

#	State	Description
0	EVAP INIT	The evaporator Fan Capacity Control is in initialization mode
1	UNLDING AZ	Evaporator Fan is unloading, capacity is above zone and heating
2	LOADING AZ	Evaporator Fan is loading, capacity is above zone and cooling
3	HOLDING AZ	***Currently not used***
4	UNLDING BZ	Evaporator Fan is unloading, capacity is below zone and cooling
5	LOADING BZ	Evaporator Fan is loading, capacity is below zone and heating
6	HOLDING BZ	***Currently not used***
7	UNLDING IZ	Evaporator Fan is unloading, capacity is in zone based on ROC
8	LOADING IZ	Evaporator Fan is loading, capacity is in zone based on ROC
9	HOLDING IZ	Evaporator Fan is holding capacity is in the zone and ROC stable
10	UNLD ROC	Evaporator Fan is unloading because of a high ROC
11	LOAD ROC	Evaporator Fan is loading because of a low ROC
12	HOLD ROC	Evaporator Fan is holding, capacity is approaching target at acceptable ROC
13	EVAP ON	Evaporator Fan is on
14	DISABLED	Evaporator Fan is disabled
15	LOCKED OUT	Evaporator Fan is Locked Out
16	POST DELAY	Evaporator Fan is shutting down and is in post delay time
17	PRE DELAY	Evaporator Fan is running in pre delay time
18	EVAP OFF	Evaporator Fan is off
19	EVAP SUPER	Evaporator Fan is running in supervisor mode

16.3 Pump States

#	State	Description
0	PUMP INIT	Pump I in unitization mode
1	PUMP ON	Pump is on
2	PUMP OFF	Pump is off
3	PUMP SUPER	Pump is in supervisor mode

16.4 Cooling States

#	State	Description
0	COOL INIT	Cooling is initialization mode
1	UNLOADING AZ	We are above the zone and unloading (ROC)
2	LOADING AZ	We are above the zone and loading (normal)
3	HOLDING AZ	We are above the zone and holding (ROC)
4	UNLOADING BZ	We are below the zone and unloading (normal)
5	LOADING BZ	We are below the zone and loading (ROC)
6	HOLDING BZ	We are below the zone and holding (ROC)
7	UNLOADING IZ	We are in the zone and unloading (ROC)
8	LOADING IZ	We are in the zone and loading (ROC)
9	HOLDING IZ	We are in the zone and holding (normal)
10	UNLD ROC	We are unloading based on ROC
11	LOAD ROC	We are loading based on ROC
12	HOLD ROC	We are holding based on ROC
13	OFF & READY	The cooling is off but ready to run
14	DISABLED	The cooling is disabled
15	NO FLOW	The cooling is off because there is no flow
16	N/A	The cooling is not available
17	LOCKED OUT	The cooling is locked out
18	SUPERISOR	We are in supervised mode
19	HOLD PCOOL	We are in pre cooling and holding

16.5 Condenser States

#	State	Description
0	COND INIT	The condenser is in initialization state
1	UNLOADING AZ	We are above the zone and unloading (ROC)
2	LOADING AZ	We are above the zone and loading (normal)
3	HOLDING AZ	We are above the zone and holding (ROC)
4	UNLOADING BZ	We are below the zone and unloading (normal)
5	LOADING BZ	We are below the zone and loading (ROC)
6	HOLDING BZ	We are below the zone and holding (ROC)
7	UNLOADING IZ	We are in the zone and unloading (ROC)
8	LOADING IZ	We are in the zone and loading (ROC)
9	HOLDING IZ	We are in the zone and holding (normal)
10	UNLD ROC	We are unloading based on ROC
11	LOAD ROC	We are loading based on ROC
12	HOLD ROC	We are holding based on ROC
13	DISABLED	The condenser is disabled
14	NO FLOW	The unit is off because there is no flow
15	LOCKED OUT	The condenser is locked out
16	COND OFF	The condenser is off
17	N/A	The condenser is not available

16.6 Heating States

#	State	Description
0	HEATING INIT	The stage of heating is in initialization state
1	UNLOADING AZ	We are above the zone and unloading (normal)
2	LOADING AZ	We are above the zone and loading (ROC)
3	HOLDING AZ	We are above the zone and holding (ROC)
4	UNLOADING BZ	We are below the zone and unloading (ROC)
5	LOADING BZ	We are below the zone and loading (normal)
6	HOLDING BZ	We are below the zone and holding (ROC)
7	UNLOADING IZ	We are in the zone and unloading (ROC)
8	LOADING IZ	We are in the zone and loading (ROC)
9	HOLDING IZ	We are in the zone and holding (normal)
10	UNLD ROC	We are unloading based on ROC
11	LOAD ROC	We are loading based on ROC
12	HOLD ROC	We are holding based on ROC
13	IGNITION	We are in ignition, looking for temperature rise [sp 100 within time(sec)]
14	WARMING UP	Ignition occurred go to warmup stage (sp 101)
15	OPERATING	We are in normal operations
16	HOLD IGNTN	We are holding for ignition
17	OFF&READY	We are off & ready to run
18	DISABLED	This stage of heating has been disabled
19	NO FLOW	We are off because there is no air flow

20	LOCKED OUT	We have had 2 failures within 2 hours and are in lockout
21	N/A	Not Available
22	SUPERVISOR	We are in supervisor mode
23	SAFETY TRIP	We have had a safety trip. We will put back into service after safety time
24	HI AMBIENT	We are off on high ambient

16.7 Reheat States

#	State	Description
0	REHEAT INI	The reheating is in initialization state
1	UNLOADING AZ	We are above the zone and unloading (normal)
2	LOADING AZ	We are above the zone and loading (ROC)
3	HOLDING AZ	We are above the zone and holding (ROC)
4	UNLOADING BZ	We are below the zone and unloading (ROC)
5	LOADING BZ	We are below the zone and loading (normal)
6	HOLDING BZ	We are below the zone and holding (ROC)
7	UNLOADING IZ	We are in the zone and unloading (ROC)
8	LOADING IZ	We are in the zone and loading (ROC)
9	HOLDING IZ	We are in the zone and holding (normal)
10	UNLD ROC	We are unloading based on ROC
11	LOAD ROC	We are loading based on ROC
12	HOLD ROC	We are holding based on ROC
13	OFF & READY	We are off & ready to run
14	DISABLED	Reheat has been disabled
15	NO FLOW	We are off because there is no air flow
16	LOCKED OUT	We have had 2 failures within 2 hours and are in lockout
17	N/A	Not Available

16.8 Exhaust States

#	State	Description
0	EXHST INI	The Exhaust is in initialization state
1	UNLOADING AZ	***Currently not used***
2	LOADING AZ	We are above the zone and loading (normal)
3	HOLDING AZ	***Currently not used***
4	UNLOADING BZ	We are below the zone and unloading (normal)
5	LOADING BZ	***Currently not used***
6	HOLDING BZ	***Currently not used***
7	UNLOADING IZ	***Currently not used***
8	LOADING IZ	***Currently not used***
9	HOLDING IZ	We are in the zone and holding (normal)
10	UNLD ROC	***Currently not used***
11	LOAD ROC	***Currently not used***
12	HOLD ROC	***Currently not used***
13	OFF & READY	We are off & ready to run

14	DISABLED	Exhaust has been disabled
15	NO FLOW	***Currently not used***
16	LOCKED OUT	We are in lockout mode
17	N/A	Not Available
18	HOOD ON	Exhaust is open because hood is on

16.9 RTU Algo States

#	State	Description
0	PowerUpDelay	This is a power up delay before starting to run the algorithm
1	MCS IO FAILED	We have failed to communicate to an RO6 or SI8AO4 board
2	MACH LOCKOUT	The Unit is in lockout mode
3	OFF SMOKE AL	The Unit is off on smoke alarm
4	OFF SCHEDULE	The Unit is off based on current schedule
5	OFF DEMAND	The Unit is off based on no current load
6	OFF RUN/STOP	The Unit is off based on RUN/STOP switch in STOP
7	DIRECT SUPERV	The Unit is under supervised mode
8	EVAP FAN ONLY	The unit is off and we are in evaporator fan only
9	COOLING	The Unit is in COOLING mode
10	HEATING	The Unit is in HEATING mode
11	DEHUMID	The Unit is in Dehumidification mode
12	HEAT: HP ONLY	The unit is in HEAT mode with heat pump only running
13	HEAT:HP + AUX	The Unit is in HEATING mode with the heat pump running + the AUX on
14	HEAT:AUX ONLY	The Unit is in HEATING mode with AUX only on
15	HEAT:AUX+EMRG	The Unit is in HEATING mode with AUX and EMRG n
16	HEAT:ALL	The Unit is in HEATING mode and all available stages are on
17	HEAT:EMERG	The Unit is in HEATING mode and the EMERG heat is on
18	HEAT:PRIMARY	The Unit is in HEATING mode, no heat pump, running primary heating
19	MORN WARM UP	The Unit is in HEATING mode for morning warm up
20	COOL:HI HUMID	The Unit is in COOLING mode based on high humidity

16.10 Chiller States

#	State	Description
0	PUMP ONLY	Replaces ‘EVAP FAN ONLY’ in RTU Algo States (#8)

16.11 Compressor States

#	State	Description
0	LOST IO	Lost communications to an IO board
1	SAFETY TRIP	This compressor has tripped on a safety. It will be put back in the ready state after the safety time
2	LOCKOUT	This compressor has been locked out. (From lost IO, multiple safety trips of same type within 2 hours, etc)
3	DISABLED	The compressor has been disabled. (Disable switch has been turned on)
4	OFF:LowAmb	The compressor is off based on low ambient
5	OFF: DEHUM	This stage is not available for dehumidification
6	PUMPDOWN	The compressor is in PUMP DOWN state, either at startup or shutdown
7	ANTI CYCLE	The compressor is off and in anti cycle mode. (Setpoint #40 & #41 provide off to on and on to on. On to on provides control for number of cycles per hour.)
8	OFF&READY	The compressor is off and ready to run. It must be in the off and ready to run for a minimum of 1 minute
9	REVERSING	This compressor is used as a heat pump and the reversing valve is on
10	START-UP	This compressor is in startup mode. Startup is a function of the compressor type.
11	RUNNING	This compressor is running
12	DEFROSTING	This compressor is in a defrost cycle
13	SucPsiHOLD	The compressor is in a suction psi hold
14	SucPsiUNLD	The compressor is in a suction unload condition
15	DisPsiUNLD	The compressor is in a discharge pressure unload
16	DisPsiHOLD	The compressor is in a discharge pressure hold
17	UNLD LOTMP	***Not implanted***
18	HOLD LOTMP	***Not implanted***
19	HOLD HIAMP	The compressor is holding based on high ampere draw
20	DIS TMPHLD	The compressor is holding based on high discharge temperature
21	HOLD HIWTR	***Not implanted***
22	UNLD HIAMP	The compressor is unloading due to current high amps
23	UNLD HITMP	***Not implanted***
24	HOLD HITMP	***Not implanted***
25	DIS TmUNLD	The compressor is unloading based on current high discharge temperature
26	DisSh UNLD	The compressor is unloading based on high discharge superheat
27	DisSH HOLD	***Not implanted***

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