MISSION CRITICAL Air Conditioning Systems

M52 Microprocessor

User's Guide

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Sequence of Operation

The following is an outline of the operation of the unit. Not all units have all options.

1. Unit powered
2. ClimateWorx Banner appears and controller beeps three times.
3. Microprocessor initializes *Co-Work* and runs self check.
4. Random start timer activates
5. *Restart delay* counts down

Phase Loss (OPTION):

On loss or cross of a phase of supply power the unit will shut down or display Phase Loss alarm. You must acknowledge the alarm and correct the phase before the unit will restart.

6. Blower starts (Blower runs continuously) when unit is in the *ON* position and when *Restart mode* is set to Auto.
7. *Warm-up period* begins to allow time for steady signal from sensors. Temp/Hum readings flash on screen during warm-up.
8. DX systems, crankcase heaters are energized when compressor is OFF through auxiliary N/C contact on compressor contactor.
9. Air cooled DX units with flooded condenser Low Ambient Control (LAC) N/C auxiliary contact on compressor contactor energizes receiver heaters.

Analogue and digital outputs for functions

Cooling	0-10 vdc and 1 or 2 triac outputs
Heating	0-10 vdc and 1, 2 and/or 3 triac outputs
Humidifying	0-10 vdc and 1 triac output
Dehumidifying	0-10 vdc and 1 or 2 triac outputs

DX Demand (Cooling)

Cycles on compressors in stages 1 to 8 depending on number of units connected together with *Co-Work* as demand for cooling increases from 0 to 100%.

Demand for compressor:

- Compressor contactor receives signal from microprocessor. *Positive Start* timer (Pos. start delay) starts and bypasses LP switch for cold start-up. When HP switch is closed the start circuit is complete and the compressor starts.
- N/C auxiliary contact on compressor contactor opens and de-energizes receiver heaters. (Flooded Condenser LAC)

- N/C auxiliary contact on compressor contactor opens and de-energizes crankcase heater.
- N/O auxiliary contact on compressor contactor starts remote condenser. (Air-cooled units only)
- Low-pressure switch remains closed after Pos. start time expires and compressor remains on.

Compressor stops when:

- *Loss of demand*
  Compressor contactor opens
- *Low pressure condition*
  Compressor stops when LP SW. opens. (Automatic reset) compressor contactor opens.
- *Short cycling alarm*
  After three consecutive low-pressure alarms in 30 mins, compressor contactor opens. Alarm must be acknowledged and cleared before Compressor will start.
- *High pressure condition*
  Compressor stops when HP Switch opens. (Manual reset)
  Compressor contactor opens. Compressor will not start until HP Switch is manually reset and Alarm is acknowledged and cleared.
- *Thermal protection opens (automatic reset)*
  Line voltage cut-outs on all compressors except Specter compressor where the compressor module causes a Compressor Overload alarm and stops the compressor through the microprocessor. Compressor module resets after 30 minutes.

Note: Anytime the contactor opens the *comp. elapse* timer keeps compressor off for 3 minutes (adjustable)

Chilled Water

On demand for cooling or dehumidification chilled water valve opens as demand signal ramps up from 0 to 100%. Valve operates on 0-10 Vdc.

Valve closes when:

Loss of demand, signal diminishes to 0 Vdc

DX Demand (Dehumidification):

Cycles on compressors in stages 1 to 4 or 8 depending on Series and number of units connected together with *Co-Work* as demand for dehumidification increases from 0 to 100%.

Demand for compressor:

- Compressor contactor receives signal from microprocessor. *Positive Start* timer (Pos. start delay) starts and bypasses LP switch for cold winter start-up. When HP switch is closed the start circuit is complete and the compressor starts.
- N/C auxiliary contact on compressor contactor opens and de-energizes receiver heaters. (Flooded Condenser LAC)
- N/C auxiliary contact on compressor contactor opens and de-energizes crankcase heater.
- N/O auxiliary contact on compressor contactor starts remote condenser. (Air-cooled units only)
- Low-pressure switch remains closed after Pos. start time expires and compressor remains on.

Rapid Dehumidification Feature (Series 6 units only)

If there is less than 20 percent demand for cooling and a demand for dehumidification the Dehum. Solenoid valve closes.

The Dehum. Solenoid closes off refrigerant flow to part of the evaporator coil. This causes a drop in suction pressure and a lower coil surface temperature over a portion of the coil. The coil begins to remove more moisture as a result. The air is partially reheated, as the air through the inactive part of the evaporator is unconditioned. This creates an overall drop in the sensible heat ratio (Rapid Dehumidification)

During dehumidification demand, some sensible cooling takes place. Under very low load conditions, the sensible cooling effect maybe greater than the combined offsetting effect of the heat load plus the available reheat capacity, which may cause a drop in room temperature. If temp continues to drop and is less than (setpoint MINUS (temp dead band DIVIDED by 2) MINUS heating proportional band) the compressors will stop overriding the demand for Dehum. The temperature must return to set point before another cycle of dehumidification starts.

ie: **Low limit cutout =[Set point – (temp deadband ÷2) – heating propband]**

Compressor stops when:

- *Loss of demand*
  Compressor contactor opens
- *Low pressure condition*
  Compressor stops when LP SW. opens. (Automatic reset) compressor contactor opens.
- *Short cycling alarm*
  After three consecutive low-pressure alarms in 30 mins, compressor contactor opens. Alarm must be acknowledged and cleared before Compressor will start.
- *High pressure condition*
  Compressor stops when HP Switch opens. (Manual reset)
  Compressor contactor opens. Compressor will not start until HP Switch is manually reset and Alarm is acknowledged and cleared.
- *Thermal protection opens* (automatic reset)
  Line voltage cut-outs on all compressors except Specter compressor where the compressor module causes a *Compressor Overload* alarm and stops the compressor through the microprocessor. Compressor module resets after 30 minutes.
- *Low limit temperature*
  If return air temperature continues to drop and is less than (setpoint MINUS (temp dead band DIVIDED by 2) MINUS heating proportional band) the compressors will stop overriding the demand for Dehum.

Note: Anytime the compressor contactor opens the *comp. elapse* timer keeps compressor off for 3 minutes (adjustable)

Dual Cooling Units:

Dual cooled units operate on DX as described above in DX Cooling Demand and DX Dehumidification Demand. In DX mode the chilled water valve is closed. When a remote signal contact input closes on *both Chiller Ready* Terminal 31 and 32 and *Compressor Disable* Terminal 33 and 34 the compressors will stop and the unit will operate as described in Chilled Water above.

Free Cooling Units:

Free cooling units operate on DX as described above in DX Cooling Demand and DX Dehumidification Demand when the glycol loop temperature is above 7.2°C, (45°F). The modulating

glycol valve begins to open when the difference between the return air temperature (Temp 1) and the (EGT) entering glycol temperature (temp 2) is greater than 3°C, (6°F). The unit will operate in Free Cooling as long as the cooling demand remains in the 0-50% range. Once the cooling demand reaches 51-99% range the unit will operate with one circuit in Free Cooling and the opposite circuit in DX Cooling. If the cooling demand reaches 100% then the unit will switch to DX cooling only.

When the glycol temperature drops below 7.2°C (45°F) the compressors will stop automatically. The unit will operate in Free Cooling mode only at this time. The glycol temperature is monitored by the unit using Temp 2 input. Temp 1 and Temp 2 can be viewed in the Test Mode section on page three. If the Glycol Temperature drops below 0°C, (32°F) the unit will switch to DX cooling only as this low of a Glycol fluid temperature would cause any condensation on the evaporator coil to freeze..

Note: The Status screen on the controller indicates free cooling is on when it displays 2/2 and off when it displays 0/2 under the percentage demand next to the Free Cooling icon.

Reheat:

On demand for heat the demand signal ramps up and heater contactor closes at 100% demand, for one stage or at 20% with SCR. SCR modulates from 20 to 100% output to match the demand signal. On multi-stage heaters each stage will be energized at equal intervals as the demand increases from 0 to 100%.

Heater stops when:

Loss of demand
Loss of air flow
Heater high temp cut out

Humidifier:

When the "On/Off/Drain " switch is in the "On" position, a demand for humidification causes the humidifier contactor(s) to close in stages 1 to 4 or 8, (depending on Series and number of units connected together with *Co-Work),* as demand for humidification increases from 0 to 100%.

After a short time delay, approximately 1 to 3 minutes, the fill valve will energize allowing water to fill the boiler bottle. The fill valve closes when the humidifier reaches its FLA current or when the water level reaches the high water level sensor. Water begins to boil after a few minutes. The humidifier will continue to boil and fill to maintain the humidity setpoint. Periodically the humidifier will initiate a flush cycle to maintain constant steam output and to flush some of the mineral content from the boiler bottle.

When the boiler bottle reaches the end of its useful life it will activate a Boiler Dirty Alarm and will shut off the humidifier. It is common for the Boiler Dirty Alarm to sound on an initial start-up as the humidifier begins the process of concentrating the mineral content of the contained water.

To drain the humidifier you must cause a humidification demand and then switch the "On/Off/ Drain" switch to Drain. You must set the switch back to "Off "when the bottle has completely drained.

Humidifier stops when:

"On/Off/Drain" switch is switched "Off"

Loss of demand
Loss of air flow
Boiler Dirty Alarm intervention.

PID

The M52 microprocessor uses PID control logic to maintain the set point conditions. The following parameters are adjustable so the controller can be fine-tuned to specific site conditions.

Dead band, temp. humid. dead band
Cool prop. band
Heating prop. band
Humidifying prop. band
Dehum. prop. band
Integral time temp
Integral time hum.

Internal Safety Controls

Fuses (60 Hz), circuit breakers (50 Hz) on all components
Fan overload relay (Vertical floor mount, VFM systems only)
Air proving switch (Vertical floor mount, VFM systems only)
Dirty filter switch (Vertical floor mount, VFM systems only)
High pressure refrigerant (manual reset)
Low pressure refrigerant
Internal thermal protection compressor and motor
High temp cut out for heater
Boiler dirty for humidifier
Compressor elapse timer
Crank case heaters

External Optional Safety Controls

Fire stat terminals 19 and 20
Smoke detector terminals 19 and 20
Liquid detector J51-01 02 and 03

On/Off Control

Local Mode:
When the controller is set to Local Mode, On/Off control of the unit is controlled by the keypad
Remote Mode:
When the controller is set to Remote, On/Off control is controlled by a remote signal through terminals 15 and 16.
Timer Mode:
When the controller is set to Timer, On/Off control follows the time schedule programmed on the controller. Unit can be set to be On, Off or Relax. Relax mode cause the microprocessor to control using the RELAX deadbands which are programmable. In this mode the fan continues to operate.

Back up Capability

Standby Enable:
Each unit sends an output to start a back up unit in the event of an alarm condition as configured in the Alarm Response menu. Terminals 11 and 12
Standby Start:
Each unit accepts an input signal to start regardless of its On/Off mode state at terminals 17 and 18

Note: On/Off mode:

When operating in a *Co-Work* network all On/Off mode options are synchronized. Therefore, turning off a unit, either by the touch screen when in Local, by the remote on/off at terminals 15 and 16 when in Remote, or through the schedule when in Timer mode will turn off all units in that network.

To turn off an individual unit either as a stand-alone or in a *Co-Work* network see the Test Mode section or simply open the disconnect switch.

Powering Up / Powering Down

The first powering up must be performed by CLIMATEWORX authorized personnel only. Failure to do so may damage the unit and void the warranty.

The main power switch (rotary disconnect) is located on the front of the unit. Series 6, 8 and 9 only.

Immediately after turning on the main power switch, the control system will perform the following power up sequence:

1. The control system will generate three short “beep” sound to alert power has been applied and the unit is about to start.

2. The control system will then perform a self-test and verify all stored setting and data are within valid range.

3. After the self-test, the control system will count down the programmed “Restart delay” time and then put the system into normal operation.

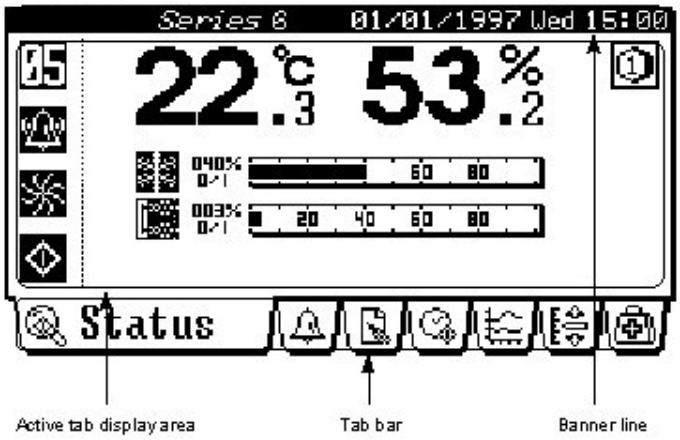
To power down unit:

For units in Local Mode log into appropriate security level (refer to Log-in Security). An On/Off toggle switch will appear on the bottom left corner of the display. Press “O” to power down unit. Once fan stops, open disconnect.

For units in Timer or Remote Modes, log into security level number three, change On/Off mode to “Local” (Settings tab, page 2). Follow above procedure to power down unit.

The Control Panel

The control panel is formed by a graphic LCD display and an overlay touch screen keypad. The layout of the screen consists of three distinctive regions - the Banner line, the Active tab display area and the Tab bar. The tabs are set-up like the tabs in a 3-ring binder. Each section contains different information.



Banner line

The Banner line shows the system type and the current date and time. Date is in DD/MM/YYYY format and time in 24-hour HH:mm format.

Active tab display area

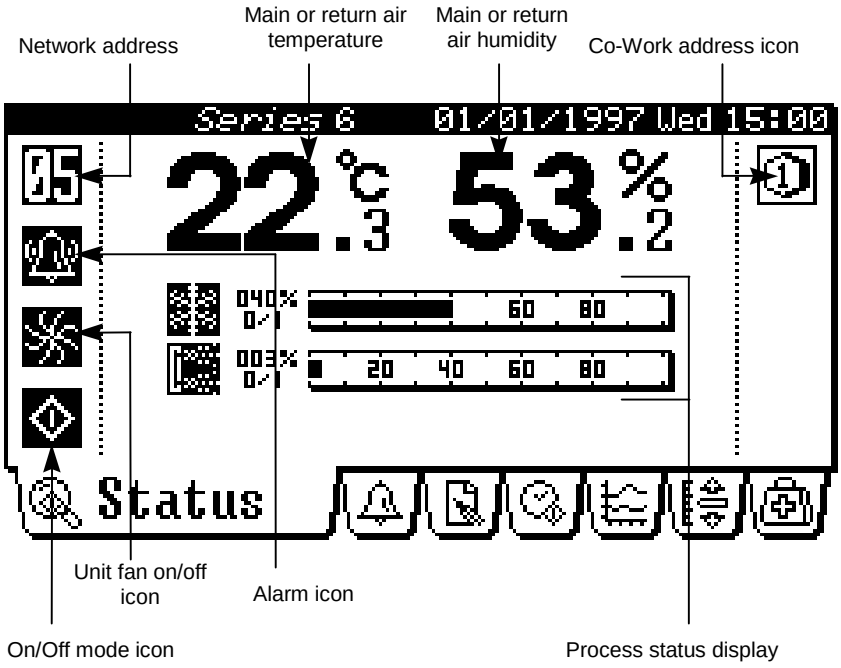
Data and information are grouped into tabs for ease of retrieval. The Active tab display area shows information corresponding to the current selected tab.

Tab bar

Tab bar shows the available tabs and allows user to switch tab display by pressing the corresponding tab icon. There are 7 tabs in the Tab bar:

Status	**Operating Status Tab**
Alarm	**Alarm Tab**
Event	**Historical Event Tab**
Schedule	**Timer On/Off Schedule Tab**
Graph	**Temperature and Humidity Graph Tab**
Setting	**Settings Tab**
Testmode	**Testmode Tab**

Operating Status



Main Return Air Temperature & Humidity Readout

The main temperature & humidity readout shows the values of the return air being sensed by the system. Temperature readout can be displayed in either °C or °F depending on the setting "Temperature display".

Process Status Display

This region shows the current operating status of the system by means of graphic icons and analogue bar.

	Heating		Cooling
	Dehumidifying		Humidifying
	Free Cooling (3rd bar when active)		

Network Address

This shows the Network address set in setting "Network address". Every unit in the network must be set to a unique address. This address relates to the RS485 serial communication buss.

Alarm Icon

The alarm icon shows up if there is any active alarm in the system. You can review the details of the alarm in the {Alarm} tab.

Unit fan On/Off Icon

The unit fan on/off icons show up when the unit fan is running. This icon changes from continuously on to blinking when the unit is under fan purge shutdown.

On/Off Mode Icon

The On/Off mode icons keep you aware of the current On/Off mode selection. The On/Off mode selection can be set in the “On/Off mode” setting under the {Setting} tab.

	Local on/off control via control panel
	Remote on/off control via switch input
	Programmed timer schedule auto on/off
	Standby start back-up start mode

Co-Work™ Address Icon

This shows the *Co-Work*™ operation mode and network address.

	Duty Master (e.g. Address 1)		Standby Master (e.g. Address 1)

Every master unit in the *Co-Work*™ network must have a unique address which can be set through the DIP switches on the main board and I/O expansion board.

Co-Work Address	Main Board	I/O Expansion Board
1	M1	D1
2	M2	D2
3	M3	D3
4	M4	D4
5	M5	D5
6	M6	D6
7	M7	D7
8	M8	D8

Note: Above table is valid for Series 6, 7, 8 and 11 (Single Compressor Units) **up** to 8 units

Co-Work Address	Main Board	I/O Expansion Board
1	M1	D1
		D2
2	M2	D3
		D4
3	M3	D5
		D6
4	M4	D7
		D8

Note: Above table is valid for Series 9 (Dual Compressor Units) **up** to 4 units

Security

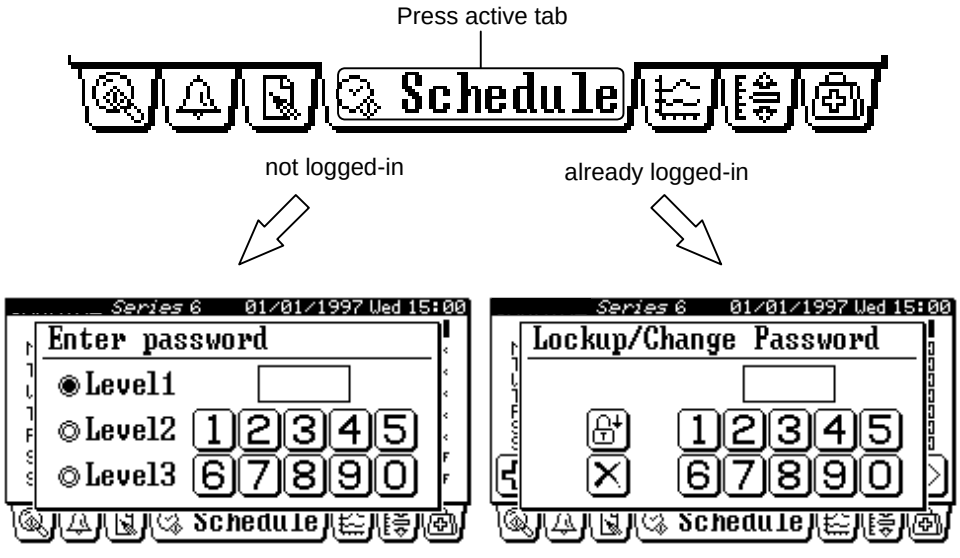
To prevent unauthorized interference with the system operation and settings, the M52 Microprocessors have three levels of security that can be assigned to different personnel having different responsibilities.

Settings can only be altered after entering the four-digit password for the corresponding security level.

The factory default password and access right for each security level is summarized in the following table:

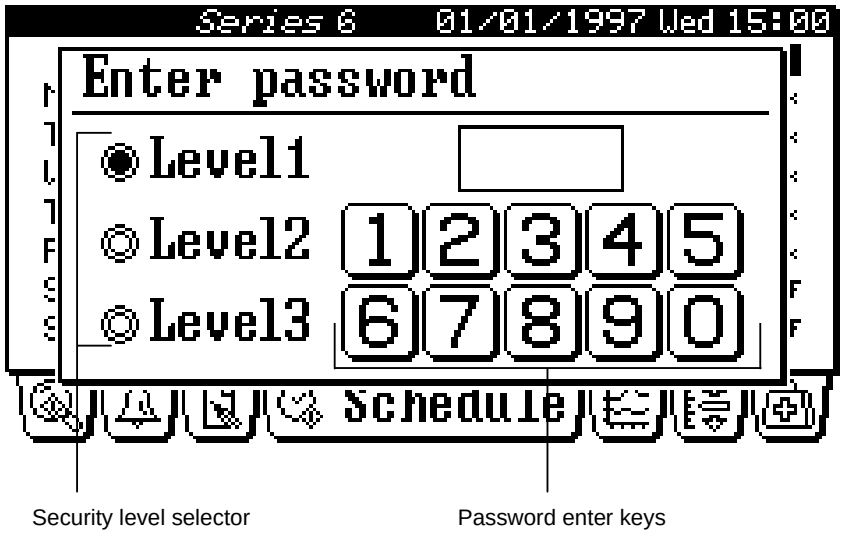
Function / Description	**Level 1**	**Level 2**	**Level 3**
Default password	1024	4321	1234
Local on/off control	✓	✓	✓
Alarm clear	✓	✓	✓
Alarm configuration	✓		
Time schedule / clock	✓	✓	✓
Setting - configuration 1	✓	✓	
Setting - configuration 2	✓		
Setting - reading	✓		
Setting - control parameter	✓		
Testmode - Microprocessor board	✓		
Testmode - digital I/O board	✓		
Testmode - sensor	✓		
Testmode - default value	✓		

To invoke security log-in or log-out, simply press the active tab on the Tab bar:



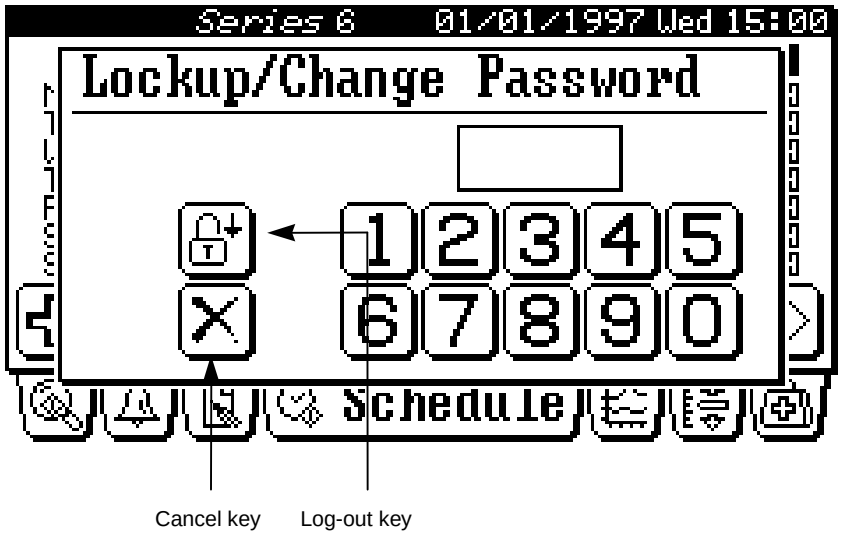
Log-in Security

On the first power-up, you can log-in to security by using the factory preset password “1024”, “4321” and “1234” for security level 1, 2 and 3 respectively.



Log-out Security

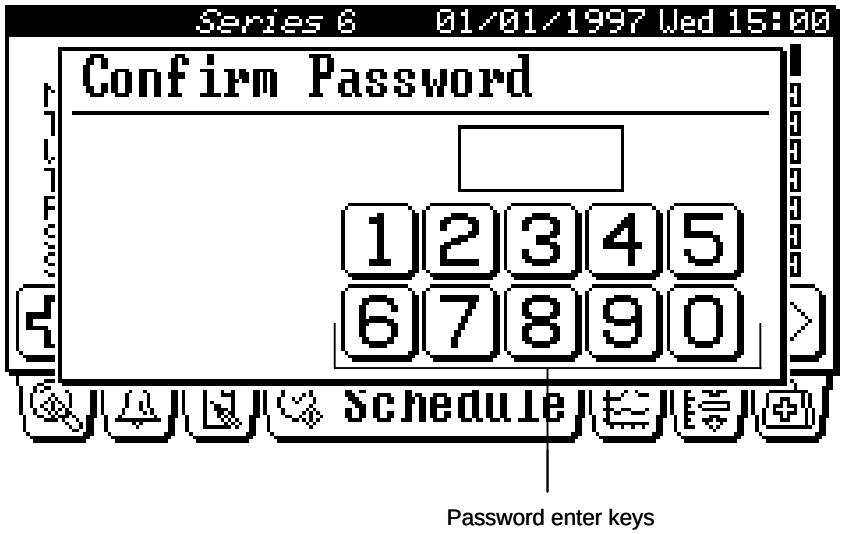
Exiting the security can be achieved by pressing the Log-out key in the log-out / change password screen.



The system will also automatically re-lock security approximately 1 minutes after the last key is released.

Change Password

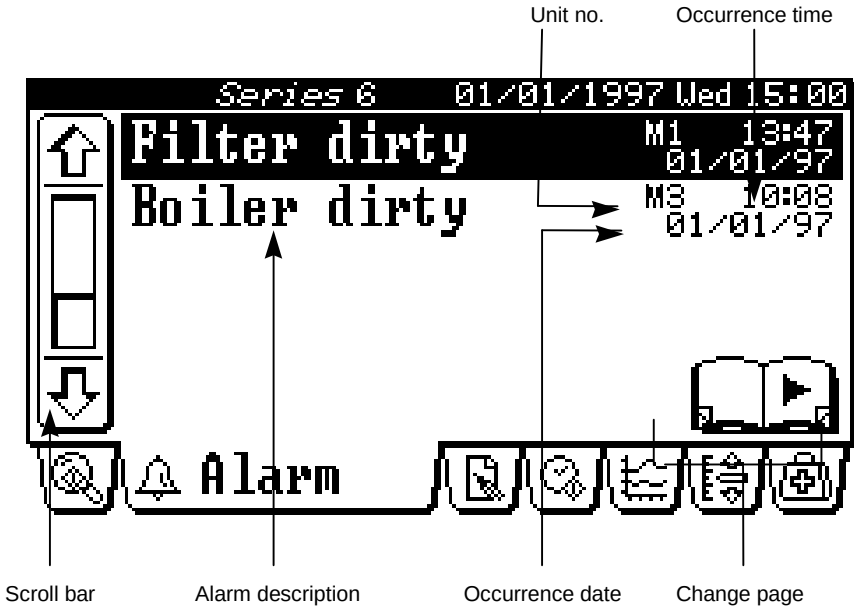
After logging-in to security, you can press the active tab again to invoke the log-out / change password screen. You have to key in the new password twice to confirm the change.


Series 6
01/01/1997 Wed 15:00
Confirm Password
1 2 3 4 5
6 7 8 9 0
Schedule
Password enter keys

Alarms

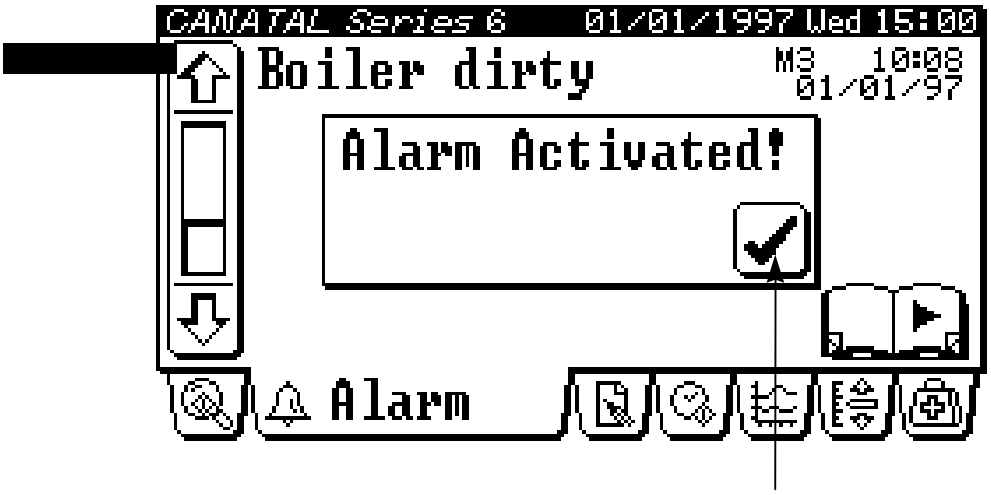
Review Active Alarm Queue

Active alarms and their date & time of occurrence can be reviewed under the alarm tab. The active alarms are displayed chronologically with the latest alarm at the top.



Acknowledging Alarm

In case of an alarm condition occurrence and provided the alarm is enabled and configured for audible warning, (See Alarm Configuration), a pop-up message will display on the screen like



the following:

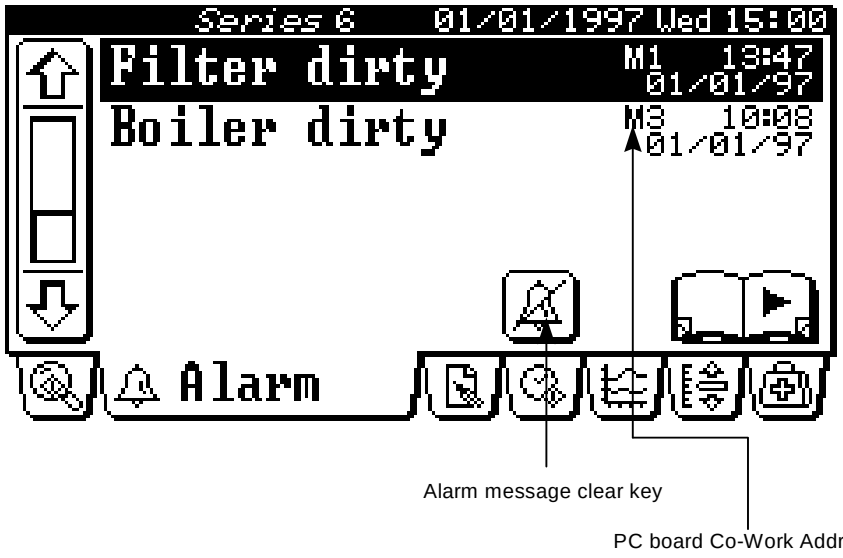
You are requested to press the alarm activated "tick" or "check" mark, [Alarm acknowledge] alarm key in order to mute the audible warning and de-activate the common alarm output. The alarm will not return again. Therefore it is imperative that you respond with the appropriate action to the alarm. See the Fault Finding section.

Clear Alarm Message

Alarm message in the active alarm queue can only be cleared if both the following two conditions are satisfied:

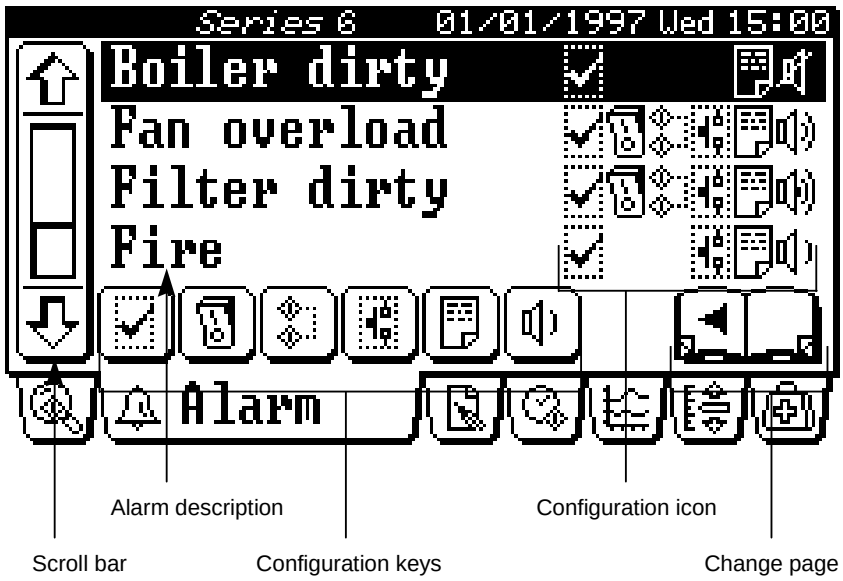
- The alarm condition has been rectified, which restores the safety switch to its normal position and
- The message is confirmed to be cleared by pressing the [Alarm message clear] key.

Note: The [PC board *Co-Work* Address] identifies which PC board the alarm was registered by.

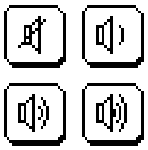


Alarm Configuration

The alarm configuration screen is under the active alarm queue screen inside the {Alarm} tab. You can switch to alarm configuration screen by pressing the [Change page] key in the alarm queue screen.



Every alarm has a number of configuration options. You can customize the way alarms are reported and what automatic actions will be performed.

	Enable option key - alarm will only be monitored if this option is selected.
	Unit shutdown option key - if this option is selected, unit will be automatically shutdown under alarm condition.
	Standby enable option key - if this options is selected, standby enable output will be activated under alarm condition.
	Common alarm option key - if this options is selected, common alarm output will be activated under alarm condition.
	Event log option key - if this options is selected, the alarm events will be logged in the historical event log.
	**Audible warning option keys** - provides selection of three different audible warning sound.

Alarm configuration will be automatically synchronized across the *Co-Work*™ network.

High Temperature Alarm note:

There is a new response outcome in the event of a high temperature alarm. The factory default response is set to turn on the next available standby unit when back-up units are connected in a *Co-Work* network. This means additional cooling capacity is automatically added to the space when a high temperature alarm is registered regardless of the Alarm Configurations set for this alarm. However, certain sites may not be able to handle this increase in air volume. Therefore, the factory can also enable the following features:

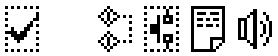
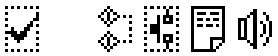
1. SWAP ON[1]: In the event a high temperature alarm is registered on a standby unit (signifying a hot spot in the room) the microprocessor will start this standby unit and stop the duty unit that is sensing the lowest return air temperature.

2. CW SWAP[1]: Disables the standby start feature on high temperature alarm in the event that the unit is connected to ductwork or a raised floor that cannot handle the increased air volume when all standby units are running in addition to the duty units.

[1]Contact ClimateWorx when choosing the above options.

Alarm Response Summary

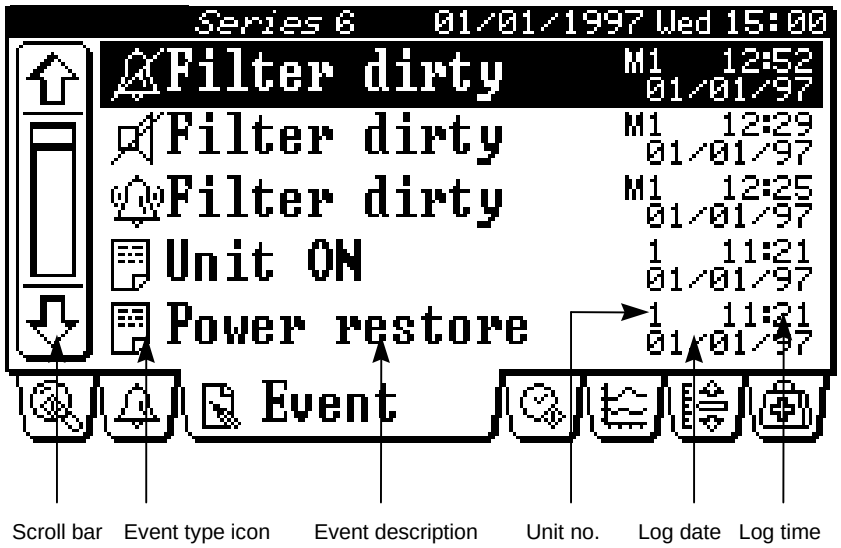
The following table summarizes the default configuration for all the alarms and their corresponding system action:

Alarm Message	Default Configuration	Mandatory System Action
Fan overload (DP float S11 only)		Immediate unit shutdown
Low airflow		
Boiler dirty		Humidifier shutdown
Heater overheat		Heater shutdown
Filter dirty		
Fire		Immediate unit shutdown [1]
Flood		
High humidity		
High humidity 2		
High temperature		
High temperature 2		
High voltage		
Low Humidity		
Low humidity 2		
Low temperature		
Low temperature 2		
Low voltage		
Fault 1 (Series 9 only)		
High refrig. pressure 1		Immediate compressor shutdown
Low refrig. pressure 1		Immediate compressor shutdown
Short cycling 1		Immediate compressor shutdown
High refrig. pressure 2 (Series 9 only)		Immediate compressor shutdown
Low refrig. pressure 2 (Series 9 only)		Immediate compressor shutdown
Short cycling 2 (Series 9 only)		Immediate compressor shutdown
Comp.overload 1 (Series 9 only) [2]		Immediate compressor shutdown
Comp.overload 2 (Series 9 only) [2]		Immediate compressor shutdown

Note: [1] All units in the same *Co-Work* network will shut down. [2] On DX units fitted with Specter compressors ZR90, ZR11, ZR12, ZR16 and ZR19

Historical Event Log

For fault analysis, the system maintains the latest 50 historical events logged in the memory. The logs are ranked chronologically with the latest event at the top.



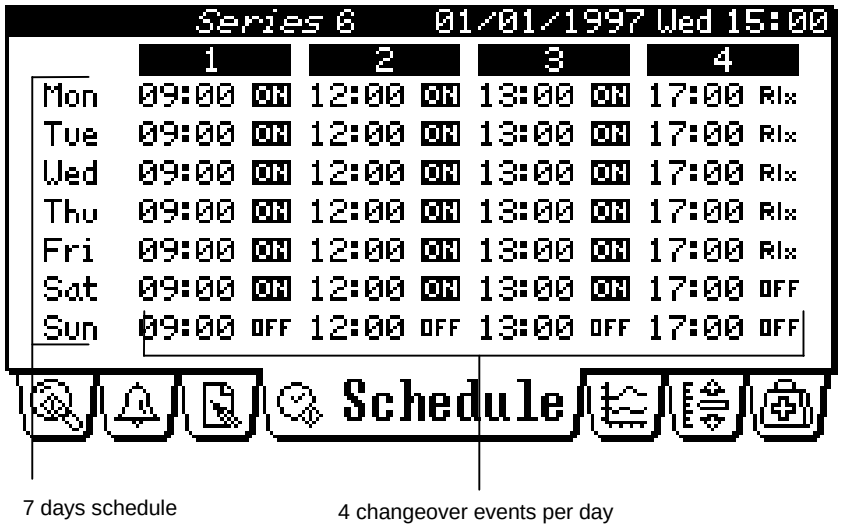
The following type of events will be logged:

	Power failure / Power restore / Unit start / Unit stop
	Alarm raised
	Alarm acknowledged
	Alarm cleared

Timer On/Off Schedule

Review Timer On/Off Schedule

The weekly on/off program provides 4 changeover events per day and 7 days per week automatic on/off/relax control for the system.

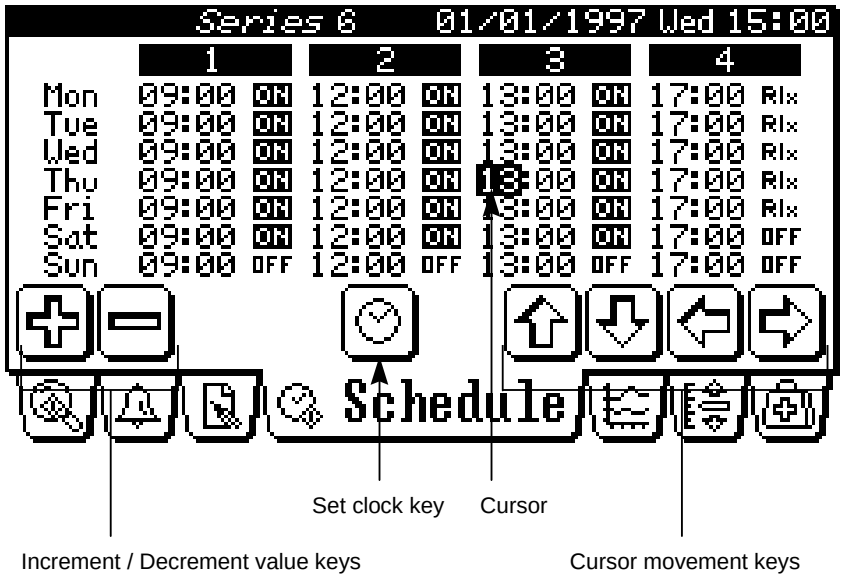


Each changeover event can be set to either “On”, “Off” or “Relax” which provides the following responses:

ON	uses “Dead band 1” setting for close control
Rlx	when close control is not required, uses “Relax deadband” setting to conserve energy while room condition within acceptable limit
OFF	turn unit off

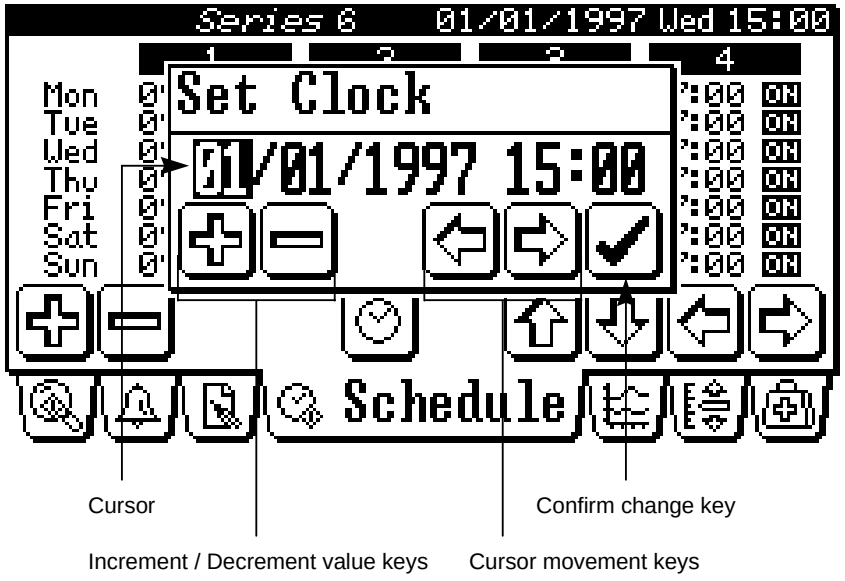
Programming the Timer On/Off Schedule

If security access is granted, you can alter the Timer On/Off Schedule settings from the following screen:



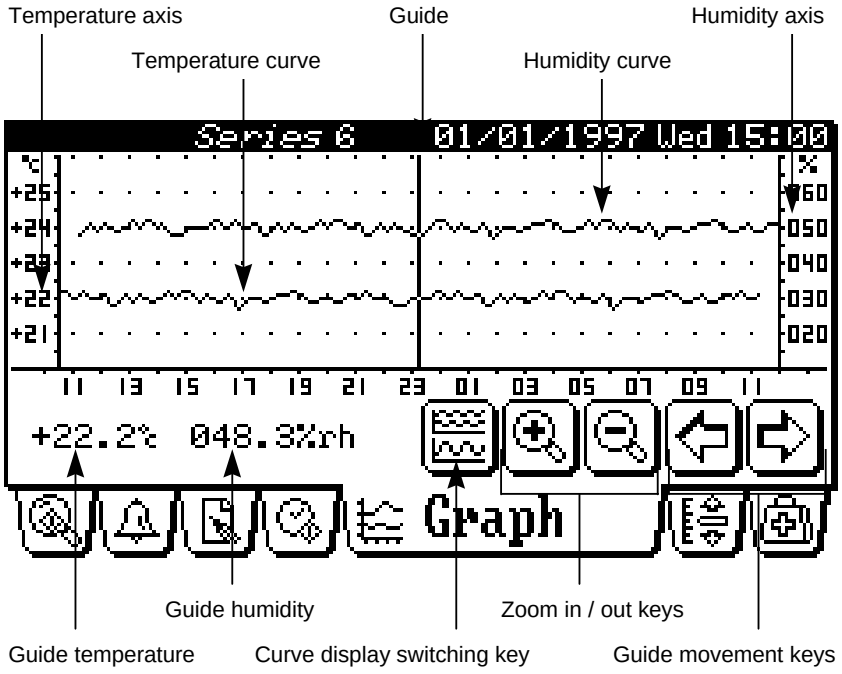
Set Clock

You can press the set clock key on the Timer On/Off Schedule screen to adjust the date and time display.



Temperature and Humidity Log Graph

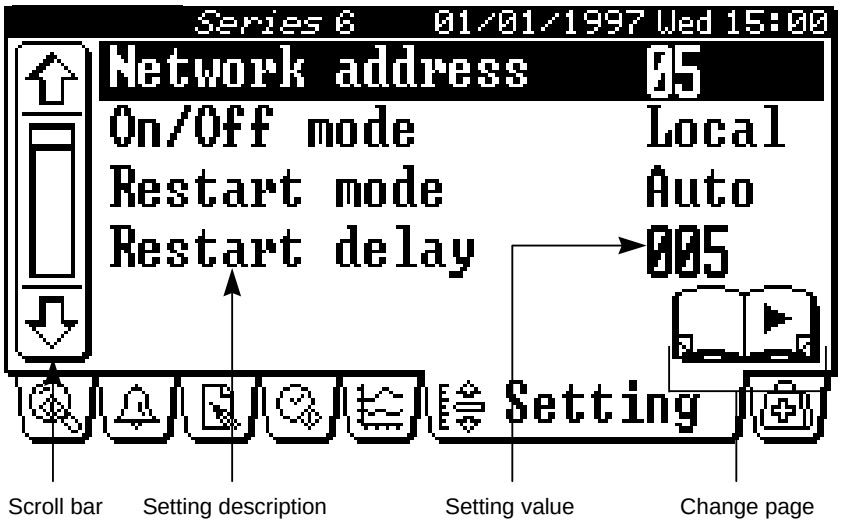
The historical temperature and humidity variation can be reviewed under the Graph tab. The log graph stores the latest 24-hour main temperature and humidity data. Data are logged in 15 minutes interval.



	Switch curve display - to cycle temperature only, humidity only or both curves display.
	Zoom in & Zoom out - to enlarge or reduce the scale of the curve display.
	Guide movement - to move the guide along the time axis.

Settings

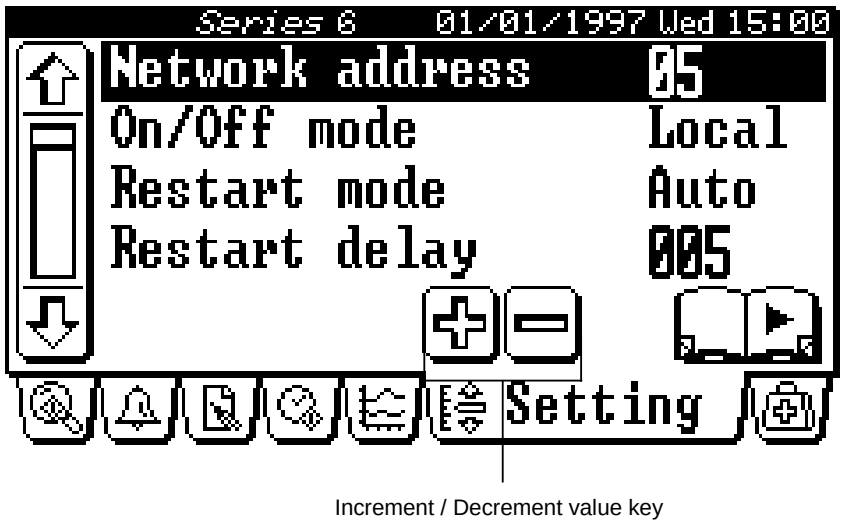
System settings can be reviewed and altered in the {Setting} tab. Settings are divided into three groups. You can switch the display by pressing the [Change page] keys.



Programming Settings

You can alter any keycode setting only if you have gained access to the appropriate security level.

After gaining the programming right, you can change the settings by using the [Increment] and [Decrement] keys.



Settings Summary Version 473 (All units except Chilled Water)

The following tables summarize the settings in each page:

Page 1 : Configuration 1

Description	Range	Default	Units	Synchronization
No. of duty unit	1-8	1	-	✓
Temp. setpoint	15-30	22	°C	✓
Temp. Hi limit	15-37	30	°C	
Temp. Low limit	10-30	15	°C	
Humid. setpoint	30-80	50	%rh	✓
Humid. Hi limit	50-90	70	%rh	
Humid. Lo limit	20-50	30	%rh	

Page 2 : Configuration 2

Description	Range	Default	Units	Synchronization
Software ver.	-	-	-	
Network address	1-99	1	-	
Baud rate	1200/9600	1200	-	✓
On/Off mode	Local/Remote/Timer	Local	-	✓
Restart mode	Auto/Manual	Auto	-	✓
Auto changeover	0-9999	24	hours	✓
Restart delay	0-9999	10	seconds	
Warm-up period	0-9999	120	seconds	✓
Fan purge delay	0-9999	120	seconds	✓
Comp. elapse	0-250	180	seconds	✓
Pos.start delay	0-9999	30	seconds	✓
Boiler dirty T.	0-9999	900	seconds	✓
Boiler limit T.	15-1440	30	minutes	✓
Sensor mode	Local/Remote/DemoL /Demo R/Disable	Local	-	
Temp. display	°C/°F	°C	-	✓
Sensor display	Unit/Site	Unit	-	✓
Language	English/Chinese	English	-	✓

Page 3 : Readings

Description	Range	Default	Units	Synchronization
Main temp.	0-50.0	-	°C	
Temperature - 2	0-50.0	-	°C	
Main humidity	0-99.9	-	%rh	
Humidity - 2	0-99.9	-	%rh	
Voltage	50-130	-	-	
Fan runtime	0-32000	0	hours	✓
Comp.1 runtime (1-8)	0-32000	0	hours	✓
Heater runtime (1-8)	0-32000	0	hours	✓
Humid. Runtime (1-8)	0-32000	0	hours	✓
Dehum. Runtime (1-8)	0-32000	0	hours	✓

Page 4 : Control Parameter

Description	Range	Default	Units	Synchronization
Temp. dead band	0-10	2	°C	✓
Relaxband Temp	0-20	5	°C	✓
Temp.2 Hi limit	15-37	30	°C	
Temp.2 Lo limit	0-30	0	°C	
Hum. dead band	0-30	6	%rh	✓
Relaxband Humid	0-50	20	%rh	✓
Hum.2 Hi limit	50-90	70	%rh	
Hum. 2 Lo limit	20-50	30	%rh	
Volt. Hi limit	102-120	115	%	
Volt. Lo limit	80-98	85	%	
Prop.band Cool	1-10	2	°C	✓
Prop.band Heat	1-10	2	°C	✓
Prop.band Humid	2-10	5	%rh	✓
Prop.band Dehum	2-10	5	%rh	✓
Temp. I-time	1-30	30	seconds	✓
Humid. I-time	1-30	30	seconds	✓
Humid. Control	Enable/Disable	Enable	-	
Setback Humid.	30-80	50	-	✓

Settings Summary Glossary Version 473 (All units except Chilled Water)

The following provides a definition of the parameters used in the Settings section:

Page 1: Configuration 1

Parameter	Definition
No Duty Units	Units required to run together in a *Co-Work* network to satisfy the load.
Temp. setpoint	Controls space temperature base on return air temperature.
Temp. Hi limit	Maximum return temperature before activating alarm [1]
Temp. Lo limit	Minimum return air temperature before activating alarm [1]
Humid. setpoint	Controls space humidity based on return air humidity
Humid. Hi limit	Maximum return humidity before activating alarm [1]
Humid. Lo limit	Minimum return air humidity before activating alarm [1]

Page 2: Configuration 2

Parameter	Definition
Software ver.	Version of software operating on the microprocessor
Network address	Controller address to identify the unit in a SatchNet network/BMS Network
Baud rate	SatchNet network communication speed
On/Off mode	Sets unit to turn "ON" and "OFF" by local keypad, remote signal or timer schedule.
Restart mode	In a power failure this allows the unit to turn back "ON" automatically or manually
Auto changeover	Time interval after which duty and standby unit switch in a *Co-Work* network
Restart delay	Delays the unit from starting until the time limit expires.
Warm-up period	Allows sensor reading to stabilize before tripping alarms
Fan purge delay	Runs fan for minimum time to dissipate heat in components before fan shutdown.
Comp. elapse	Prevents compressors from restarting for minimum time after stopping
Pos.start delay	By passes refrigerant low-pressure switch and alarm during compressor start-up to prevent nuisance alarms in cold weather. [1]
Boiler dirty T.	Connected to the humidifier high water level sensor and delays boiler dirty alarm to prevent nuisance alarms on humidifier start-up. [1]
Boiler limit T.	Not used with steam electrode humidifier. Activates a drain cycle to flush the pan on IR humidifiers.
Sensor mode	Enables or disables the units return air sensor from the averaging feature in a *Co-Work* network during standby periods. Also used for M52 Demo controllers or remote supervisory panels.
Temp. display	Sets temperature display on Status page to °F or °C
Sensor Display	In a *Co-Work* network choose to display the individual unit sensor readings or the average readings (SITE readings are the average of all sensor readings in a *Co-Work* network)
Language	Choose between English and Chinese

Page 3: Readings

Parameter	Definition
Main temp.	Calibration function used to fine tune the return air temperature sensor.[2]
Temperature - 2	Calibration function used to fine-tune the spare temperature sensor. [2] (used only in free cool units for monitoring glycol loop temperature)
Main humidity	Calibration function used to fine-tune the return air humidity sensor. [2]
Humidity - 2	Calibration function used to fine-tune the spare humidity sensor. 2 (not used)
Voltage	Calibration function used to fine tune the voltage reading from the control transformer.[2]
Fan runtime	Totals fan run time, 1 to 4 or 8
Comp. runtime	Totals compressor run time, 1 to 8
Heater runtime	Totals heater run time, 1 to 4, 8 or 12
Humid. runtime	Totals humidifier run time, 1 to 4 or 8
Dehum. runtime	Totals full cooling run time. Dehumidifier run time = compressor run time – Dehum runtime, 1 to 4 or 8

Page 4: Control Parameter

Parameter	Definition
Temp. dead band	Tolerance for return air, + or – ½ deadband. Range of temperature where temperature control operation does not change
Relaxband Temp	Used in the timer schedule allows an alternate deadband setting
Temp.2 Hi limit	Maximum allowable spare temperature before activating alarm [1]
Temp.2 Lo limit	Minimum allowable spare temperature before activating alarm [1]
Hum. dead band	Tolerance for return air, + or – ½ deadband. Range of humidity where humidity control operation does not changes
Relaxband Humid	Used in the timer schedule allows an alternate deadband setting
Hum.2 Hi limit	Maximum allowable spare humidity before activating alarm [1]
Hum. 2 Lo limit	Minimum allowable spare humidity before activating alarm [1]
Volt. Hi limit	Maximum allowable voltage before activating alarm [1]
Volt. Lo limit	Minimum allowable voltage before activating alarm 1
Prop.band Cool	Temperature range over which all cooling stages are equally activated or chilled water valve modulates to full open.
Prop.band Heat	Temperature range over which all heater are modulated (Staged AP)
Prop.band humid	Humidity range over which all humidifier stages are equally activated.
Prop.band Dehum	Humidity range over which all dehumidification stages are equally activated or chilled water valve modulates to full open.
Temp. I-time	Integral action time constant used in the PID control loop
Humid. I-time	Integral action time constant used in the PID control loop
Humid. Control	Choose to enable or disable humidity control.
Setback Humid.	Series 9 only, allows an alternate humidity setpoint to be selected and controlled by a digital input signal by others

Notes: [1] Alarms activate only if they are enabled in the Alarm Configuration section. [2] These parameters are to be used only when performing a calibration check of the unit sensors. Do not adjust, as this will cause the unit to malfunction.

Settings Summary Version 491B2 (Chilled Water units only)

The following tables summarize the settings in each page:

Page 1 : Configuration 1

Description	Range	Default	Units	Synchronization
No. of duty unit	1-8	1	-	✓
Temp. setpoint[1]	12-30	22	°C	✓
Temp. Hi limit	12-37	30	°C	
Temp. Low limit	5-30	15	°C	
Temp. setpoint*	53-86	72	°F	✓
Temp. Hi limit*	53-99	86	°F	
Temp. Low limit*	41-86	59	°F	
Humid. setpoint	30-80	50	% RH	
Humid. Hi limit	50-90	70	% RH	
Humid. Lo limit	20-50	30	% RH	
No. of standby	1-7	0	-	✓

1) Set point adjustment range of 12 – 30˚C

* Display changes to °F when Temp Units on Page 2 is set to °F

Page 2 : Configuration 2

Description	Range	Default	Units	Synchronization
Software ver.	-	-	-	
Network address	1-999	001	-	
Baud rate	1200 – 19.2K	1200	bps	✓
On/Off mode	Local/Remote/Timer	Local	-	✓
Restart mode	Auto/Manual	Auto	-	✓
Auto changeover	0-9999	24	hours	✓
Restart delay	0-9999	10	seconds	
Warm-up period	0-9999	120	seconds	✓
Fan purge delay	0-9999	120	seconds	✓
Comp. elapse	0-250	180	seconds	✓
Pos.start delay	0-9999	180	seconds	✓
Humid. Ser. delay	0-9999	900	seconds	✓
IR auto flush	0-9999	0	minutes	✓
Sensor mode	Local/Remote/DemoL /Demo R/Disable	Local	-	
Temp. units	°C/°F	°C	-	✓
Sensor display	Unit/Site	Unit	-	✓
Language	English/Chinese	English	-	✓
Common Alr. Mode	Site/Unit	Site	-	

Page 3 : Readings

Description	Range	Default	Units	Synchronization
C. water circuit 1	Enable/Disable	Disable	-	✓
C. water circuit 2	Enable/Disable	Disable	-	✓
C. water 1 temperature	0-45	-	°C	✓
C. water 2 temperature	0-45	-	°C	✓
C. water 1 temperature*	32-113	-	°F	✓
C. water 2 temperature*	32-113	-	°F	✓
Primary circuit	1-2	1	-	
Changeover delay	0-9999s	60	seconds	✓
C.W. temp. limit	5-15	10	°C	
C.W. temp. limit *	41-59	50	°F	
Normal fan	10-100	80	%	
Backup fan	10-100	100	%	

* Display changes to °F when Temp Units on Page 2 is set to °F

Page 4 : Readings

Description	Range	Default	Units	Synchronization
Temperature 1[A]	0-50.0	-	°C	
Temperature 2	0-50.0	-	°C	
Humidity 1[A]	0-99.9	-	%RH	
Humidity 2	0-99.9	-	%RH	
Voltage	50-130	-	-	
Fan runtime (1-8)	0-32000	0	hours	✓
Comp.1 runtime (1-8)	0-32000	0	hours	✓
Heater runtime (1-8)	0-32000	0	hours	✓
SCR Heat. runtime	0-32000	0	hours	✓
Humid. Runtime (1-8)	0-32000	0	hours	✓
Dehum. Runtime (1-8)	0-32000	0	hours	✓

A) These parameters are used as the inputs for all conditioning control within the unit.
Display changes to °F when Temp Units on Page 2 is set to °F

Page 5 : Control Parameter

Description	Range	Default	Units	Synchronization
Temp. dead band	0-10	1	°C	✓
Relaxband Temp	0-20	5	°C	✓
Temp.2 Hi limit	15-37	30	°C	
Temp.2 Lo limit	0-30	0	°C	
Temp. dead band*	0-18	1.8	°F	✓
Relaxband Temp*	0-36	9	°F	✓
Temp.2 Hi limit*	54-99	54	°F	
Temp.2 Lo limit*	0-30	0	°F	
Hum. dead band	0-30	6	% RH	✓
Relaxband Humid	0-50	20	% RH	✓
Hum.2 Hi limit	50-90	70	% RH	
Hum. 2 Lo limit	20-50	30	% RH	
Volt. Hi limit	102-120	115	%	
Volt. Lo limit	80-98	85	%	
Prop.band Cool	1-10	1	°C	✓
Prop.band Heat	1-10	1	°C	✓
Prop.band Cool*	2-18	3.6	°F	✓
Prop.band Heat*	2-18	3.6	°F	✓
Prop.band Humid	2-10	5	% RH	✓
Prop.band Dehum	2-10	5	% RH	✓
Temp. I-time	1-30	30	seconds	✓
Humid. I-time	1-30	30	seconds	✓
Temp. D-time	0-61	15	-	✓
Humid. D-time	0-94	15	-	✓
Humid. Control	Enable/Disable/ Humid/Dehum	Enable	-	✓
Dual-cooling	0-130	3	°C	
Free-cooling	0-130	7.2	°C	
Dual-cooling*	32-266	5.4	°F	
Free-cooling*	32-266	45	°F	

* Display changes to °F when Temp Units on Page 2 is set to °F

Settings Summary Glossary Version 491B2 (Chilled Water units only)

The following provides a definition of the parameters used in the Settings section:

Page 1: Configuration 1

Parameter	**Definition**
No Duty Units	Units required to run together in a *Co-Work* network to satisfy the load.
Temp. setpoint	Controls space temperature base on return air temperature.
Temp. Hi limit	Maximum return temperature before activating alarm [1]
Temp. Lo limit	Minimum return air temperature before activating alarm [1]
Humid. setpoint	Controls space humidity based on return air humidity
Humid. Hi limit	Maximum return humidity before activating alarm [1]
Humid. Lo limit	Minimum return air humidity before activating alarm [1]
No of Standby	Number of standby units that will start in a high temperature alarm when in a Co-Work *network*

Page 2: Configuration 2

Parameter	**Definition**
Software ver.	Version of software operating on the microprocessor
Network address	Controller address to identify the unit in a SatchNet network/BMS Network
Baud rate	SatchNet network communication speed
On/Off mode	Sets unit to turn “ON” and “OFF” by local keypad, remote signal or timer schedule.
Restart mode	In a power failure this allows the unit to turn back “ON” automatically or manually
Auto changeover	Time interval after which duty and standby unit switch in a *Co-Work* network
Restart delay	Delays the unit from starting until the time limit expires.
Warm-up period	Allows sensor reading to stabilize before tripping alarms
Fan purge delay	Must be set to “0” for machine to run.
Comp. elapse	Prevents compressors from restarting for minimum time after stopping
Pos.start delay	By passes refrigerant low-pressure switch and alarm during compressor start-up to prevent nuisance alarms in cold weather. [1]
Humid. Ser. delay	Connected to the humidifier high water level sensor and delays boiler dirty alarm to prevent nuisance alarms on humidifier start-up. [1]
IR auto flush	Not used with steam electrode humidifier. Activates a drain cycle to flush the pan on IR humidifiers.
Sensor mode	Enables or disables the units return air sensor from the averaging feature in a *Co-Work* network during standby periods. Also used for M52 Demo controllers or remote supervisory panels.
Temp. unit	Sets ALL temperature display units to °F or °C
Sensor Display	In a *Co-Work* network choose to display the individual unit sensor readings or the average readings (SITE readings are the average of all sensor readings in a *Co-Work* network)
Language	Choose between English and Chinese
Common Alr. Mode	‘Unit’ releases synchronization feature of the common alarm to work independently in a Co-Work network. ‘Site’ maintains synchronization

Page 3 Readings

Parameter	Definition
C. water circuit 1	Flow status of CW loop per BMS sensors
C. water circuit 2	Flow status of alternate CW loop per BMS sensors
C. water 1 temperature	Temperature of alternate CW loop per BMS sensors °C
C. water 2 temperature	Temperature of alternate CW loop per BMS sensors °C
C. water 1 temperature*	Temperature of alternate CW loop per BMS sensors °F
C. water 2 temperature*	Temperature of alternate CW loop per BMS sensors °F
Primary circuit	Sets the circuit number for use as primary cooling source
Changeover delay	Provides minimum time delay during which both primary and secondary CW circuits are functioning
C.W. temp. limit	Temperature when primary to secondary CW source takes place °C
C.W. temp. limit *	Temperature when primary to secondary CW source takes place °F
Normal fan	Sets the fan speed when no cooling/heating or dehum demand is present.
Backup fan	Sets fan speed under alarm condition

Page 4: Readings

Parameter	Definition
Temperature 1	Calibration function used to fine tune the unit control temperature sensor.[2]
Temperature 2	Calibration function used to fine-tune the spare temperature sensor. [2] (used only in free cool units for monitoring glycol loop temperature)
Humidity 1	Calibration function used to fine-tune the return air humidity sensor. [2]
Humidity 2	Calibration function used to fine-tune the spare humidity sensor. [2] (not used)
Voltage	Calibration function used to fine tune the voltage reading from the control transformer.[2]
Fan runtime	Totals fan run time, 1 to 4 or 8
Comp. runtime	Totals compressor run time, 1 to 8
Heater runtime	Totals heater run time, 1 to 4, 8 or 12
SCR Heat runtime	Totals SCR heater run time, 1 to 4 or 8
Humid. runtime	Totals humidifier run time, 1 to 4 or 8
Dehum. runtime	Totals full cooling run time. Dehumidifier run time = compressor run time – Dehum runtime, 1 to 4 or 8

[2] These parameters are to be used only when performing a calibration check of the unit sensors. Do not adjust, as this will cause the unit to malfunction. Sensor must be recalibrated when changing from °C to °F.

Page 5: Control Parameter

Parameter	**Definition**
Temp. dead band	Tolerance for return air, + or – ½ deadband. Range of temperature where temperature control operation does not change
Relaxband Temp	Used in the timer schedule allows an alternate deadband setting
Temp.2 Hi limit	Maximum allowable spare temperature before activating alarm [1]
Temp.2 Lo limit	Minimum allowable spare temperature before activating alarm [1]
Hum. dead band	Tolerance for return air, + or – ½ deadband. Range of humidity where humidity control operation does not changes
Relaxband Humid	Used in the timer schedule allows an alternate deadband setting
Hum.2 Hi limit	Maximum allowable spare humidity before activating alarm [1]
Hum. 2 Lo limit	Minimum allowable spare humidity before activating alarm [1]
Volt. Hi limit	Maximum allowable voltage before activating alarm [1]
Volt. Lo limit	Minimum allowable voltage before activating alarm 1
Prop.band Cool	Temperature range over which all cooling stages are equally activated or chilled water valve modulates to full open.
Prop.band Heat	Temperature range over which all heater are modulated (Staged AP)
Prop.band humid	Humidity range over which all humidifier stages are equally activated.
Prop.band Dehum	Humidity range over which all dehumidification stages are equally activated or chilled water valve modulates to full open.
Temp. I-time	Integral action time constant used in the PID control loop
Humid. I-time	Integral action time constant used in the PID control loop
Temp. D-time	Derivative function used in PID control loop
Humid. D-time	Derivative function used in PID control loop
Humid. Control	Choose to enable or disable humidity control or control Humidity or Dehumidification independently.
Dual-cooling	Adjusts the change over set point for CW to DX change-over
Free-cooling	Adjusts the change over set point for Economizer to DX change-over

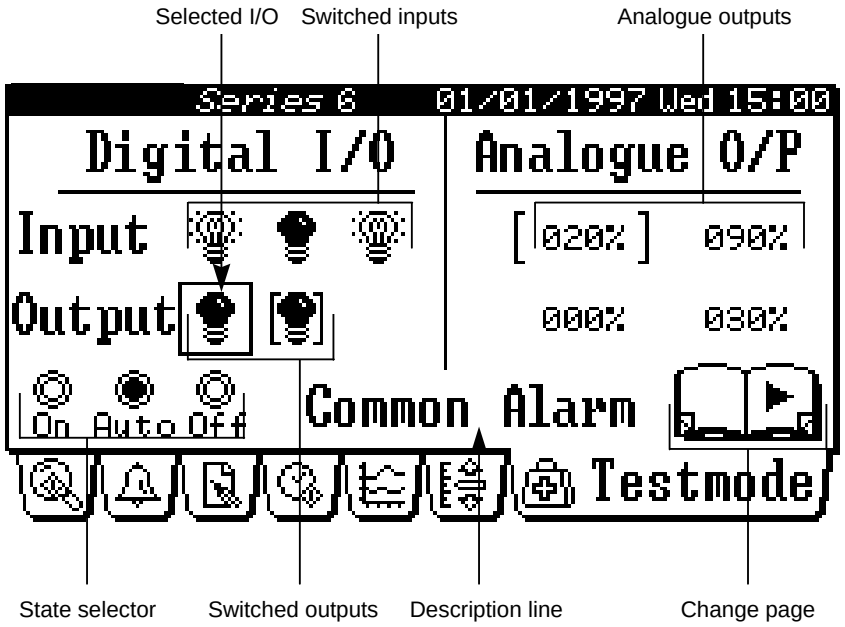
Test Mode

The {Testmode} tab contains an assortment of utilities designed to simplify field testing and troubleshooting. The utilities are divided into four pages:

- Microprocessor board diagnostic
- Digital I/O board diagnostic
- Sensor calibration
- Data re-initialization

Microprocessor Board Diagnostic

The Microprocessor board diagnostic page under the {Testmode} tab is as follows:



Under the Microprocessor board diagnostic page, you can:

- Review the status of the switched inputs on the Microprocessor board.
- Review the status of the switched outputs on the Microprocessor board, and override control of the outputs by using the state selector.
- Review the status of the analogue outputs on the Microprocessor board, and override control of the outputs by using the state selector.

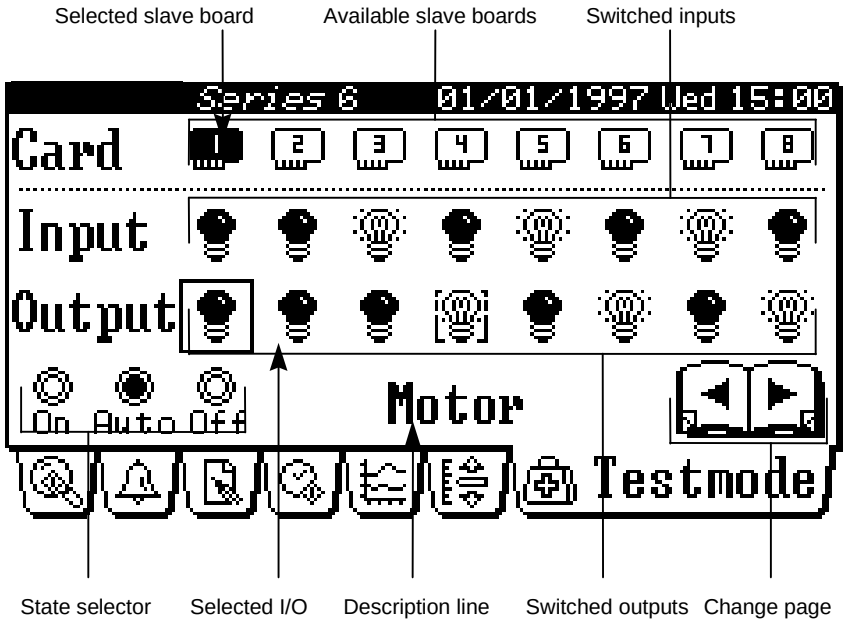
In the Microprocessor board diagnostic page, each input or output on the Microprocessor board are represented by a symbol on the display. The representation of each graphic symbol is listed in the following diagram:

	Switched input / output opened
	Switched output opened under override control
	Switched input / output closed
	Switched output closed under override control
030%	Analogue output in percentage
[020%]	Analogue output in percentage under override control

By "touching" the corresponding symbol, you can review the description of an input or output on the description line.

Digital I/O Board Diagnostic

The digital I/O board diagnostic page under the {Testmode} tab is as follows:

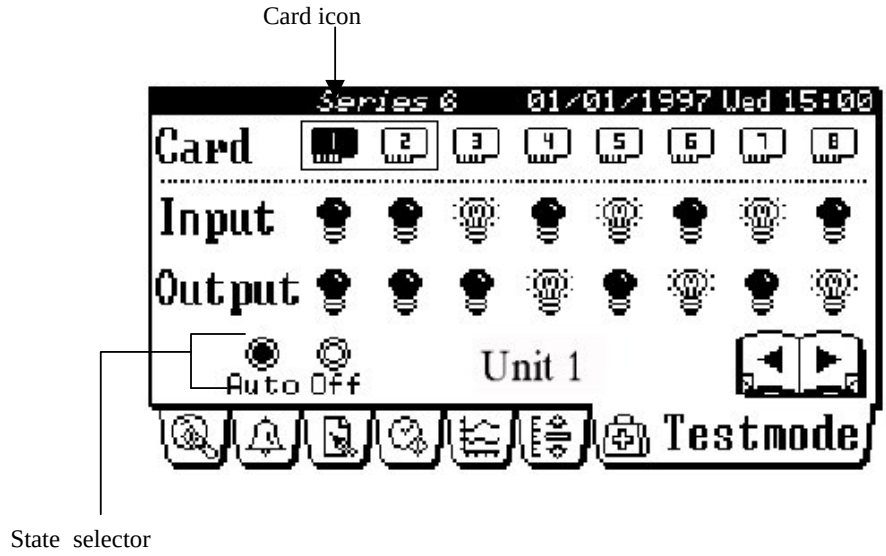


Under the digital I/O board diagnostic page, you can:

- Select any of the linked digital I/O board to review.
- Review the status of the switched inputs on the selected digital I/O board.
- Review the status of the switched outputs on the selected digital I/O board, and override control of the outputs by using the state selector.

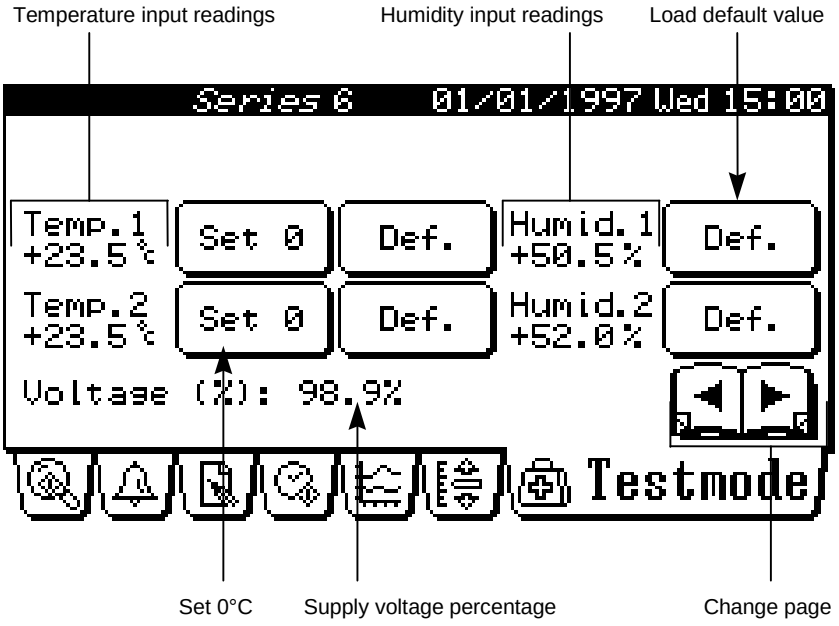
Test Mode Unit on/off

There is increased functionality on the I/O board diagnostics. It is possible to turn units off from this section regardless of the On/Off mode setting by pressing the Card icon for the unit you want to stop. When logged on to a level 1 password you will see the unit # appear at the bottom of the screen that corresponds to the I/O card(s) selected. A state selector appears and you can turn off the unit by selecting off. When the over-ride is selected the I/O card will appear with square brackets around it indicating it is in over-ride. To select a specific input or output for any card simply press the input or output light bulb after selecting the card.



Sensor Calibration

The sensor calibration page under the {Testmode} tab is as follows:



Under the sensor calibration page, you can:

- Review the current temperature inputs, adjust the 0°C reference and restore temperature input offsets to default value.
- Review the current humidity inputs and restore humidity input offsets to default value.
- Review the supply voltage percentage.

Sensor Calibration Sequence

Temperature

1. Power off unit and set the jumper on the temperature and humidity sensor board to “Zero” position. The pin 1 and 2 of the sensor board should read approximately 1000 ohms which corresponds to 0°C for the Hycal PT100 sensor.
2. Switch unit on and after one minute login security level 1. Go to the sensor page under the [Test mode] tab and press the “Def.” And then “Set 0” key next to the temp1 reading. The Temp1 reading should now read 0° C
3. Power off the machine and reset the jumper on the sensor board to normal position.

The zeroing of the temperature sensor is now complete. You can further fine tune sensor to what you actually measure by simply entering the measured temperature in ° C in the Main Temp setting under the [Setting] tab.

Relative Humidity

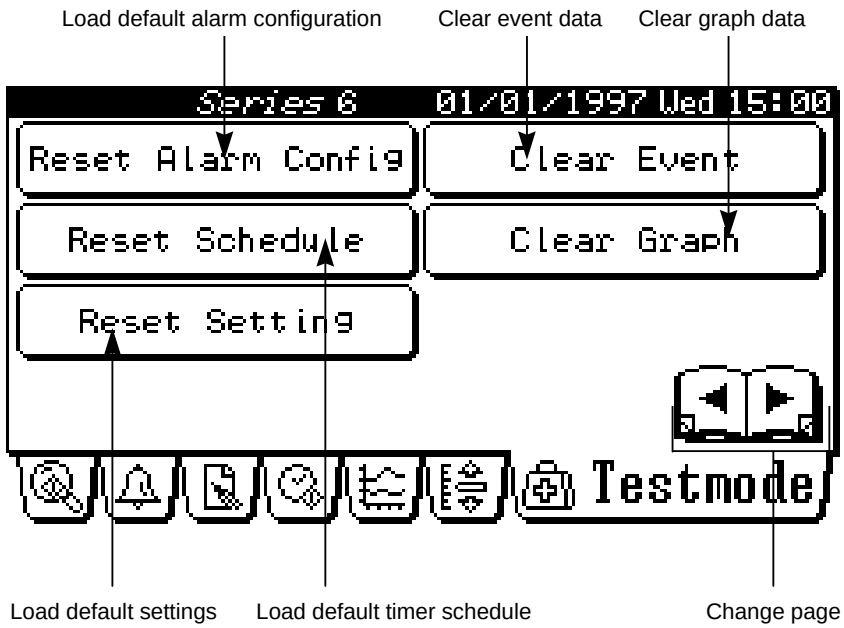
There is no zeroing function for the humidity sensor.

1. Login security level 1. Go to the sensor page under the [Test mode] tab and press the “Def.” Key next to the Humid. 1 reading.

If required, fine tune sensor to what you actually measure by simply entering the measured relative humidity in the Main Humidity setting under the [Setting] tab.

Data Re-initialization

The data re-initialization page under the {Testmode} tab is as follows:



Under this page, you can:

- Set alarm configurations to default configurations (See Alarm Response Summary)[1].
- Set timer on/off schedule to default configurations (See Timer On/Off Schedule).
- Set system configuration and control settings to default configurations (See Setting Summary)
- Clear log data in historical event log.
- Clear log data in temperature and humidity log graph.

[1] Not advisable for chilled water units, Series 7 and 11 and units with options.

Co-Work™

Co-Work™ is a six function networking feature that is built into every M52 controller. Through the use of a six wire telephone cable you can link up to 8 compressor circuits on one local area network. What this does is it makes all units in the network operate as one system which improves the system performance, reliability and manageability.

Refer to page 59 for the wiring details.

Co-Work™ performs the following six functions:

Two Levels of Duty Sharing.

The first level maintains the required number of duty units in the network and automatically sequences duty and redundant units on to even out run time. This function is time based and is factory set for 24hrs. This value is adjustable.

The second level of duty sharing automatically initiates lead/lag sequence of the components among the duty units to equalize run time.

Data Synchronization.

Unit operation data such as set points, time schedule, alarm status (see Setting Summary page for list of synchronized data) is synchronized among units under the same *Co-Work*™ network.

Sequential Load Activation.

Co-Work™ coordinates the activation and deactivation of components in a unit and within a group of units to minimize in-rush current.

Control Redundancy

Co-Work™ allows multiple master units to coexist on the same network. In case any master requires service the remaining units will automatically take over control of the whole system. In the event of a controller failure control will be transferred automatically to the other masters minimizing loss of system control and down time.

Expansion of Control Steps

Co-Work™ improves the system performance by utilizing the limited number of control steps in individual units and converts them to a maximum of 8 steps. This provides more precise control and limits on/off cycles by matching capacity to load.

Control Value Averaging

Co-Work™ exchanges sensor reading of temperature and humidity of network units and operates from the average reading. This prevents units from fighting each other when multiple units control one space.

Settings Menu, Sensor mode:

Additional flexibility in configuring a 'n+1' *Co-Work* network has been added. In certain cases it could be desirable to ignore the sensor data from standby units. Therefore, the client may now select to ignore or include sensor data from standby units. In the factory default setting, the M52 will ignore sensor data from a standby unit in the calculation to determine the average return air temperature and humidity in the controlled space. To include sensor data for standby units, open page 2 of the Settings section and review the Sensor mode entry. To include the sensor data of a standby unit in calculating the average return air temperature and humidity for a space, select REMOTE option instead of LOCAL.

Setting up the *Co-Work*™ network:

This step must be performed first when setting up a *Co-Work*™ network with software version 473 only. Go to the M52 controller on each unit to be placed in the *Co-Work*™ network and perform these steps.

Go to the settings screen, press settings tab to get the password request. Then press top right hand corner of screen (you will not see anything happen). Enter in pass word 9911 then scroll over to page 5 of settings. You will see the option under High Temperature Alarm to select for "SWAP ON", "CW SWAP" and "TURN ON". Select "TURN ON" option unless a different response is required. See definitions on page 23.

Follow the field wiring diagram as shown on page 59

Power off each unit as detailed in section Powering On/Powering Down. Turn off power at the unit mounted disconnect and open control panel door. Make your *Co-Work*™ wiring terminations. Set the dip switch setting on each microprocessor main board and each corresponding I/O expansion board as shown on page 16

Notice that dual compressor, Series 9 units have two I/O expansion boards.

Close control panel door and restore disconnect switch to on position. Logon to one unit in the network and start the unit (see page 12)

The setting of these switches will create individual addresses for each unit. The address will be displayed in the top right corner of the display (see page 14 & 16) Note the Network address located in the top left corner of the screen refers to the RS485 communication network SatchNet and is ClimateWorx's control and monitoring software system. Consult your local representative or the factory for details.

Decide how many units are required to maintain the room load. This is the number of duty units. Log on to any unit in the network using the Level 1 password. Select the Setting page. Enter the number of duty units on page one of the settings tab.

Log off of the system (page 12)

The *Co-Work* network is now set up. Each unit has a unique address that identifies each printed circuit board in the network. See page 14 & 16 for the PC board address code.

Notes:

Only one operator can use the key pad at a time. Once you logon to the network that unit becomes the master. All other units will be locked and the keypads will display Master Lock if you attempt to use them.

When an alarm condition is detected the alarm is broadcast to all units in the network. The alarm can be acknowledged at any unit in the network.

When reviewing alarm in the Alarm tab or in the Historical Event log you must pay attention to the PC board address to properly identify which unit in the network is alarming. This is the two digit address that appears to the left of the event occurrence time in the Historical Event tab and the Alarm tab. Events such as Unit on/off and Power Failure/Restore are shown for the individual unit being poled.

You can program the network to display the temperature and humidity of the site (average of all readings) or the individual temperature and humidity of the unit under the Settings tab. Refer to the Setting section

Alarm Settings, Responses chart:

M-52 Co-work functioning chart

				Units Swap	No Response	Both Units Shut Down	Comments
Fan Overload	Y	Y	Y	YES			Factory Default. Both Fan & Comp. drop off instantly then unit swap.
	Y	O	Y	YES			Comp. Drop off instantly. Unit swap after fan purge time.
	Y	Y	O	YES			Both Fan & Comp. drop off instantly then unit swap.
	Y	O	O	NO	YES		No response, Fan & Comp. remaining "ON".
Low Airflow	Y	Y	Y	YES			Factory Default. Both Fan & Comp. drop off instantly then unit swap.
	Y	O	Y	YES			Comp. Drop off instantly. Unit swap after fan purge time.
	Y	Y	O	YES			Both Fan & Comp. drop off instantly then unit swap.
	Y	O	O	NO	YES		No response, Fan & Comp. remaining "ON".
Boiler Dirty	Y	O	O	NO	YES		Factory Default. No response, No unit swap at all.
	Y	Y	O	YES			Comp. Drop off instantly. Unit swap after fan purge time.
	Y	O	Y	YES			Comp. drop off after boiler dirty delay time and then unit swap after fan purge.
	Y	Y	Y	YES			Comp. drop off instantly. Unit swap after fan purge time.
Heater Overheat	Y	O	O	NO	YES		Factory Default. No response, Fan & Comp. output signal remain "ON" on I/O board.
	Y	Y	O	YES			Comp. Drop off instantly. Unit swap after fan purge time.
	Y	O	Y	YES			Comp. Drop off instantly. Unit swap after fan purge time.
	Y	Y	Y	YES			Comp. Drop off instantly. Unit swap after fan purge time.
Filter Dirty	Y	O	O	NO	YES		Factory Default. No response
	Y	Y	O	YES			Comp. Drop off instantly. Unit swap after fan purge time.
	Y	O	Y	YES			Comp. Drop off instantly. Unit swap after fan purge time.
	Y	Y	Y	YES			Comp. Drop off instantly. Unit swap after fan purge time.
Fire	O	Y	O	NO	YES		Factory Default. No response.
	Y	O	Y	YES			Comp. Drop off instantly and unit swap after fan purge.
	Y	Y	Y	NO		YES	Unit shutdown instantly
	Y	O	O	NO	YES		Both Comp. & fan remain "ON"
	Y	Y	O	NO		YES	Unit shutdown instantly
Flood	O	O	O	NO	YES		Factory Default. No response.
	Y	O	Y	YES			Comp. drop off instantly and unit swap after fan purge.
	Y	Y	O	YES			Comp. drop off instantly and unit swap after fan purge.
	Y	Y	Y	YES			Comp. drop off instantly and unit swap after fan purge.
	Y	O	O	NO			Both Comp. & fan remain "ON"
High Humidity	Y	O	Y	NO	YES		Factory Default. No response
	Y	Y	O	YES			Comp. Drop off instantly. Unit swap after fan purge time.
	Y	Y	Y	YES			Comp. Drop off instantly. Unit swap after fan purge time.
	Y	O	O	NO	YES		No response

M-52 Co-work functioning chart

High Temperature	Y	O	Y	YES			Factory Default. Stand-by unit comes on and number of duty unit change to 2.
	Y	Y	O	YES			Standby on & master stop after purge. Duty jumps to 2. If temp. keep raising,
	Y	Y	Y	YES			duty unit jumps to 3, only one unit runs, the one lately shutdown will come back on.
	Y	O	O	YES			Both units running, duty units swithes to 2 and on when temp. keep raising.
High Voltage	Y	O	O	NO	YES		Factory Default. No response
	Y	Y	O	YES			Comp. Drop off instantly. Unit swap after fan purge time.
	Y	O	Y	NO	YES		No response
	Y	Y	Y	YES			Comp. Drop off instantly. Unit swap after fan purge time.
Low Humidity	Y	O	Y	NO	YES		Factory Default.
	Y	Y	Y	YES			Comp. Drop off instantly. Unit swap after fan purge time.
	Y	Y	O	YES			Comp. Drop off instantly. Unit swap after fan purge time.
	Y	O	O	NO	YES		No response
Low Temperature	Y	O	Y	NO	YES		Factory Default. No response
	Y	Y	Y	NO	YES		No response
	Y	Y	O	YES			Comp. Drop off instantly. Unit swap after fan purge time.
	Y	O	O	NO	YES		No response
Low Voltage	Y	O	O	NO	YES		Factory Default. No response
	Y	Y	O	YES			Comp. Drop off instantly. Unit swap after fan purge time.
	Y	O	Y	NO	YES		No response
	Y	Y	Y	YES			Comp. Drop off instantly. Unit swap after fan purge time.
High Pressure	Y	O	O	NO	YES		Factory Default. comprerssor drop off instantly with fan keep running
	Y	Y	Y	YES			Comp. Drop off instantly. Unit swap after fan purge time.
	Y	Y	O	YES			Comp. Drop off instantly. Unit swap after fan purge time.
	Y	O	Y	YES			Comp. Drop off instantly. Unit swap after fan purge time.
Low Pressure	Y	O	O	NO	YES		Factory Default. No response
	Y	O	Y	YES			Comp. Drop off instantly. Unit swap after fan purge time.
	Y	Y	Y	YES			Comp. Drop off instantly. Unit swap after fan purge time.
	Y	Y	O	YES			Comp. Drop off instantly. Unit swap after fan purge time
Short Cycling	Y	O	O	NO	YES		Factory Default. No response
	Y	Y	Y	YES			Unit swap after fan purging
	Y	O	Y	YES			Unit swap after fan purging
	Y	Y	O	YES			Unit swap after fan purging

LEGEND:

Enable option Key

Unit Shutdown option key

Standby Enable option key

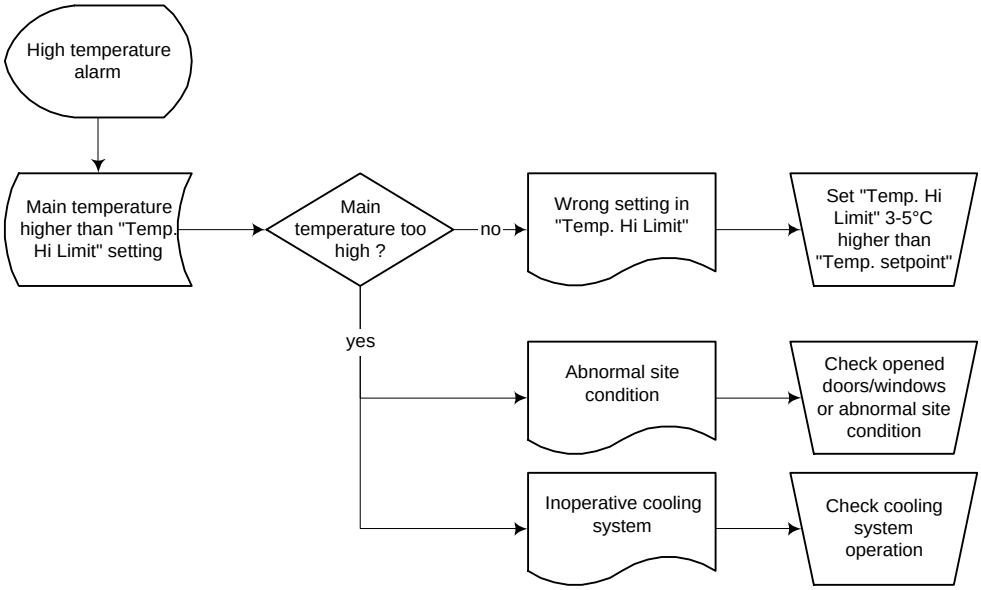
Y Selected

O Not Selected

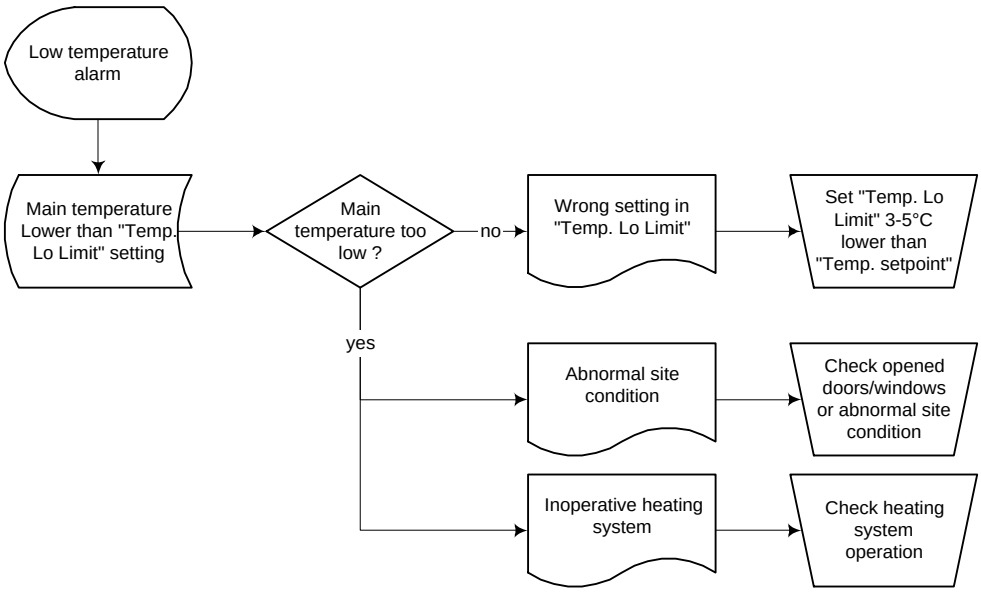
Fault Finding

In some cases, determining the cause of a fault requires a fair amount of technical knowledge and skill. The following fault finding charts are given as a guide for the service personnel to locate the common faults which may be encountered in the unit.

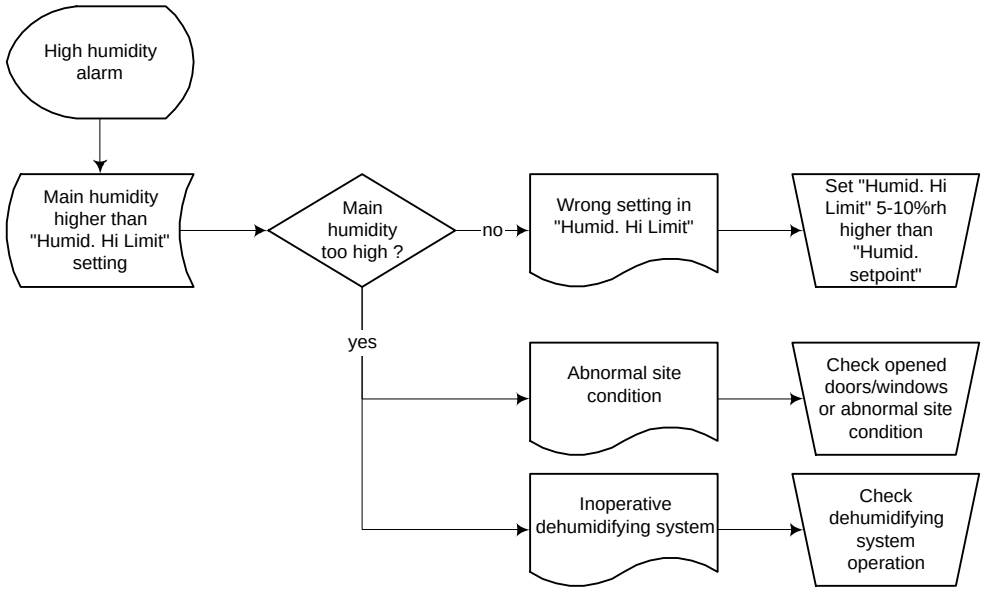
High Temperature Alarm



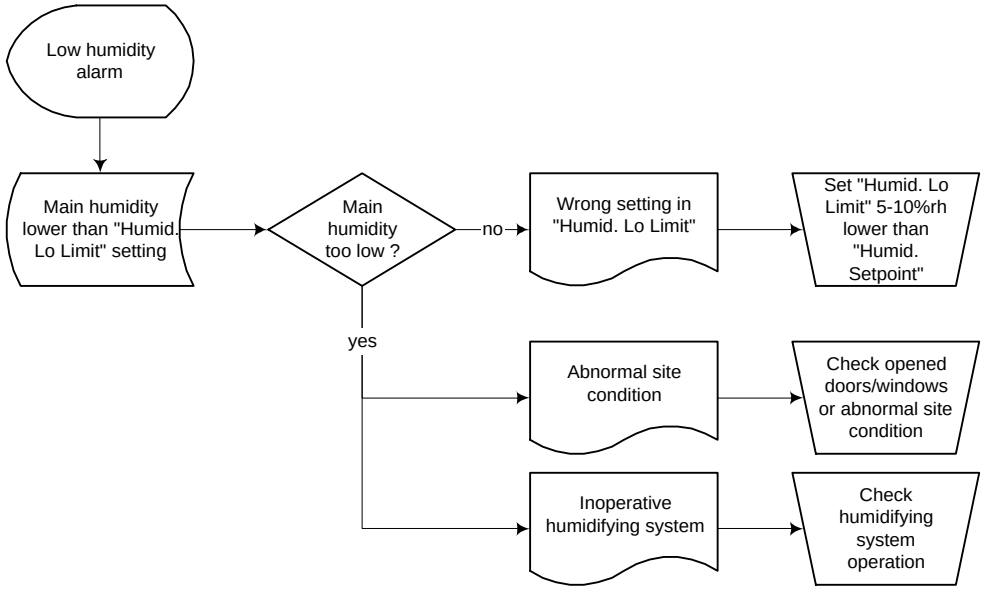
Low Temperature Alarm



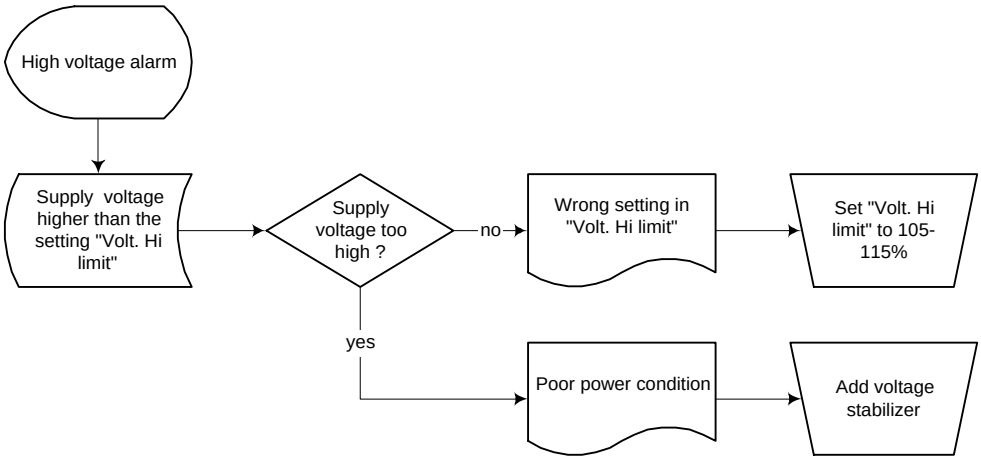
High Humidity Alarm



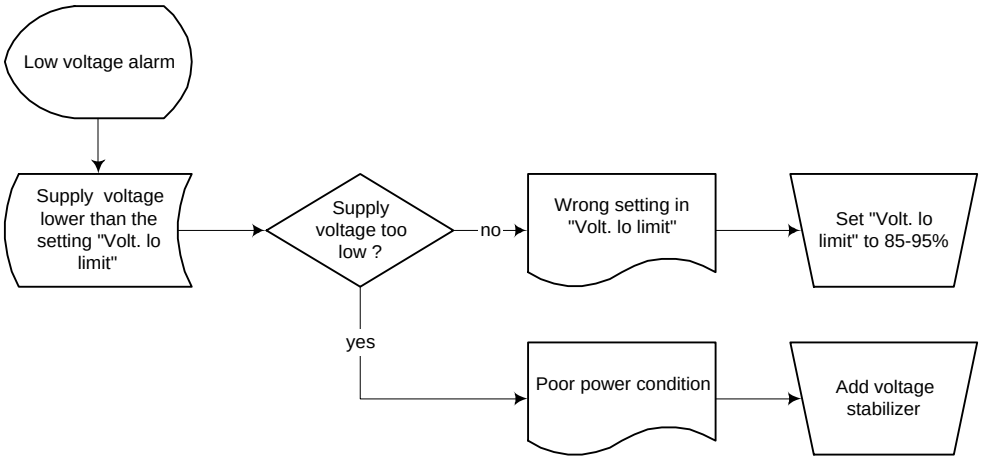
Low Humidity Alarm



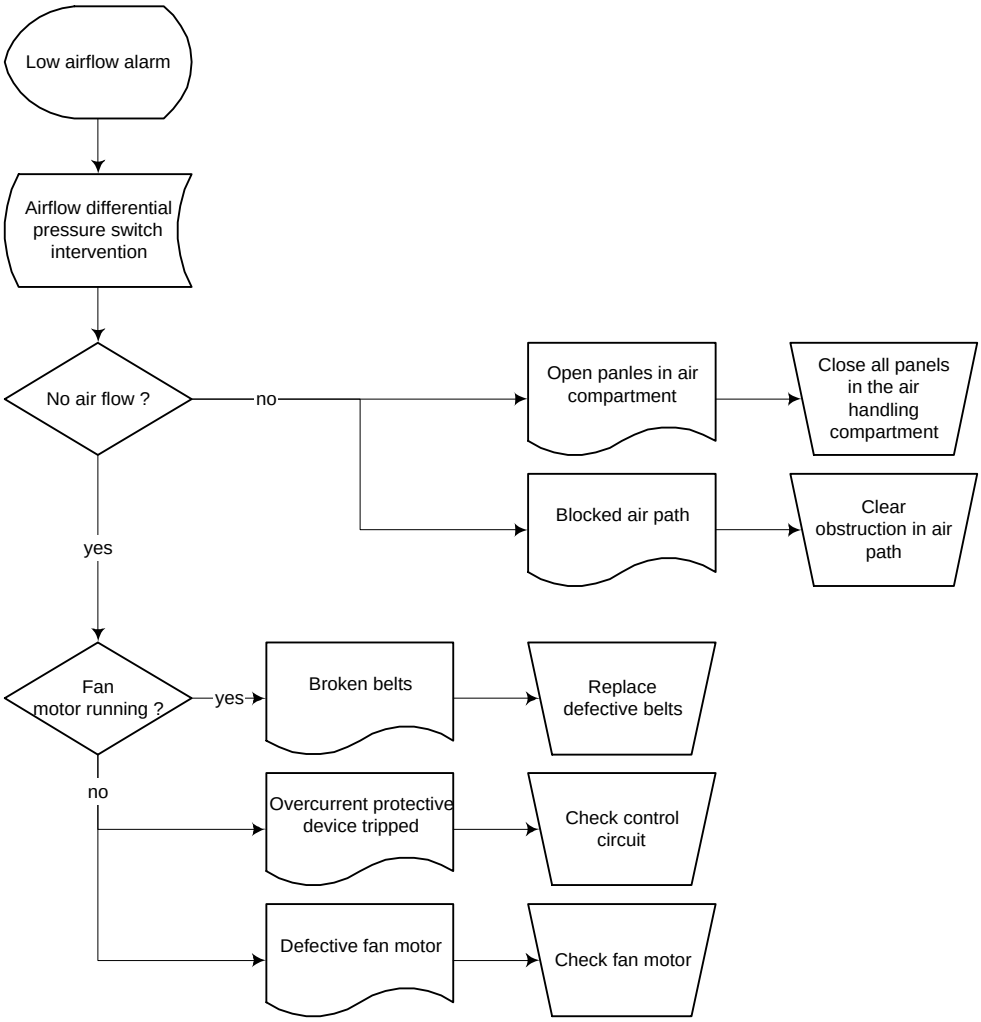
High Voltage Alarm



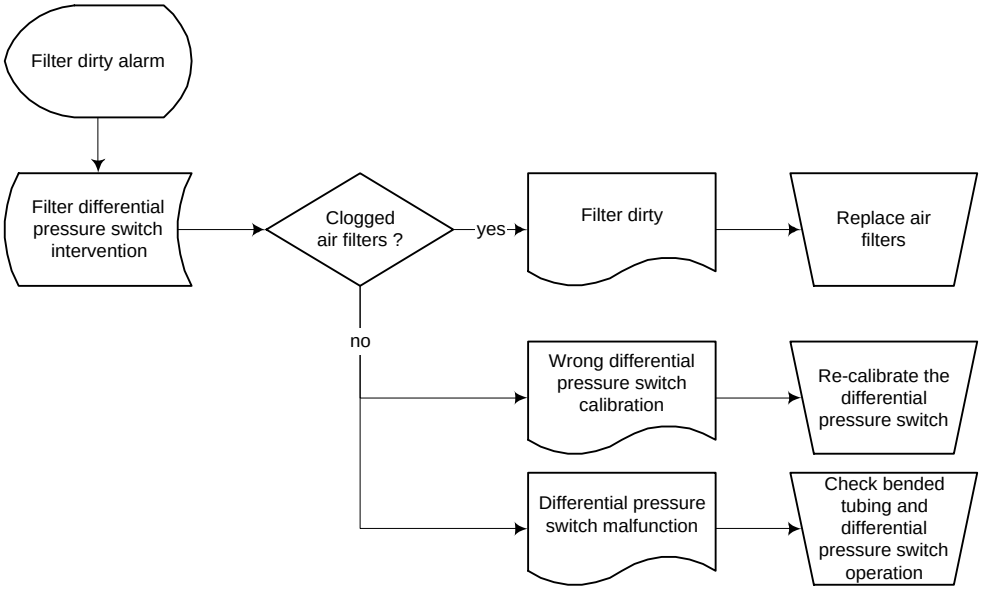
Low Voltage Alarm



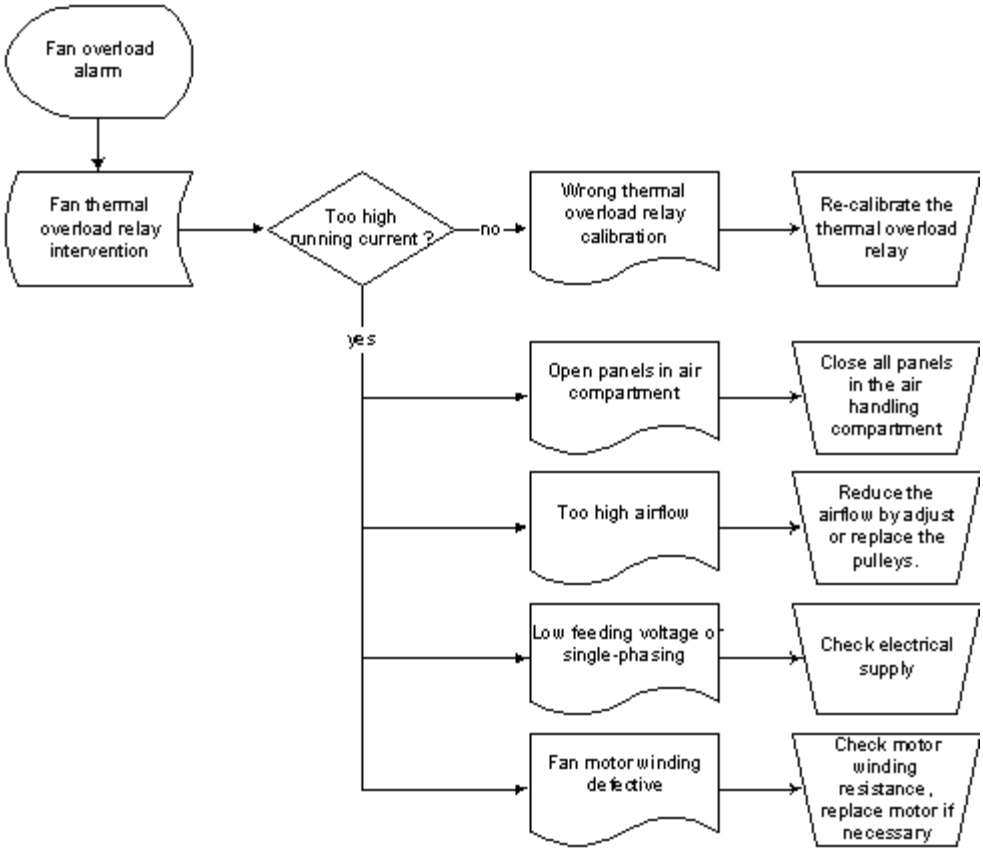
Low Airflow Alarm



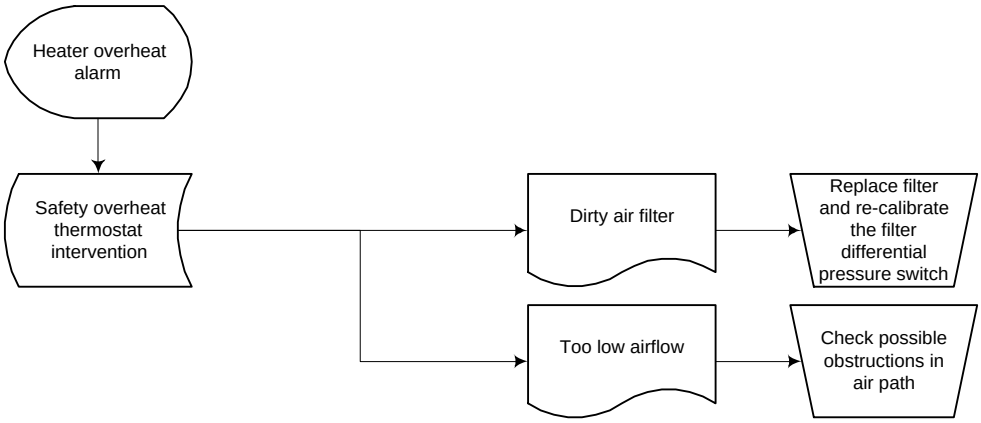
Filter Dirty Alarm



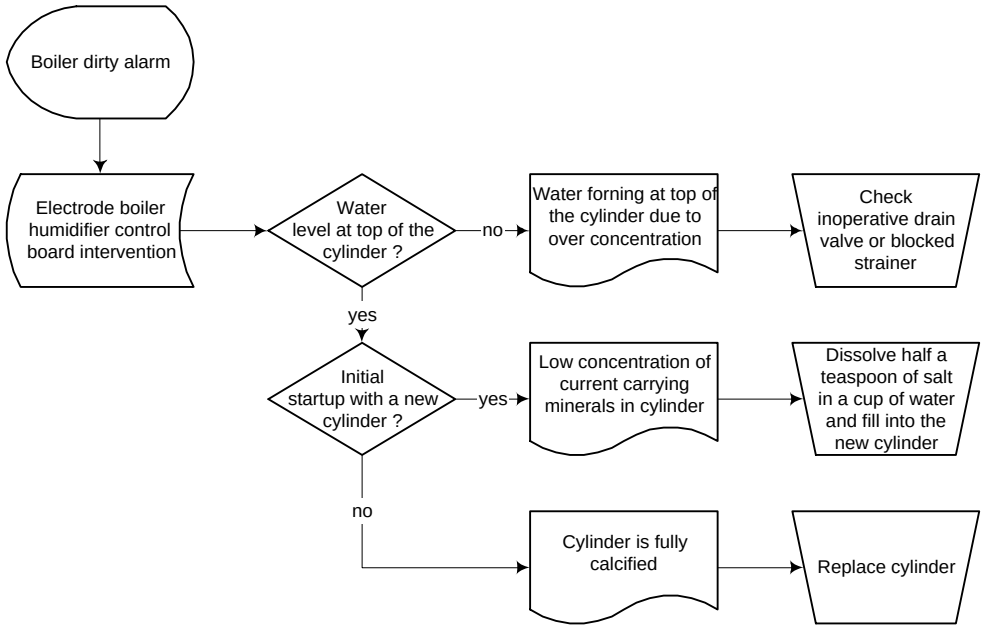
Fan Overload Alarm



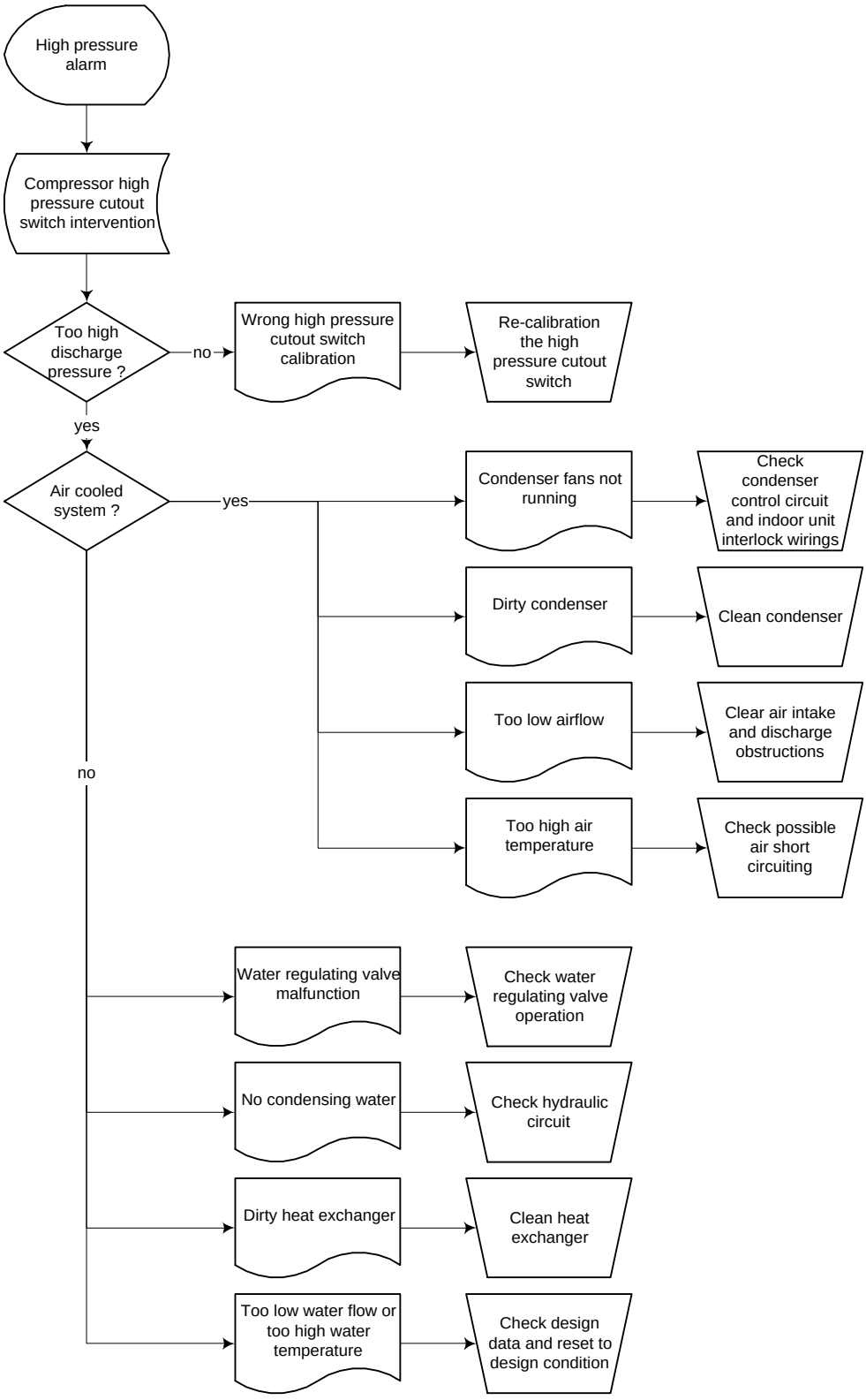
Heater Overheat Alarm



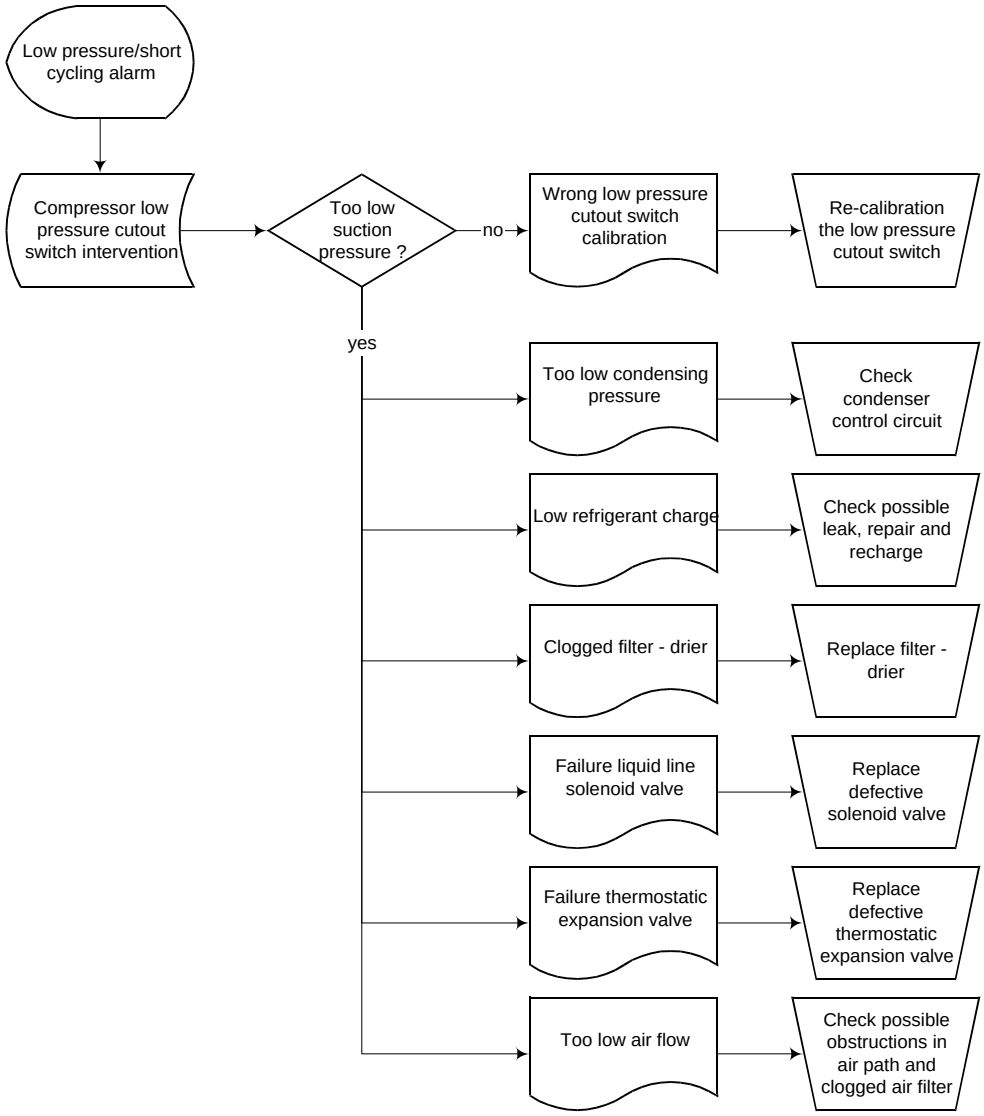
Boiler Dirty Alarm



High Pressure Alarm

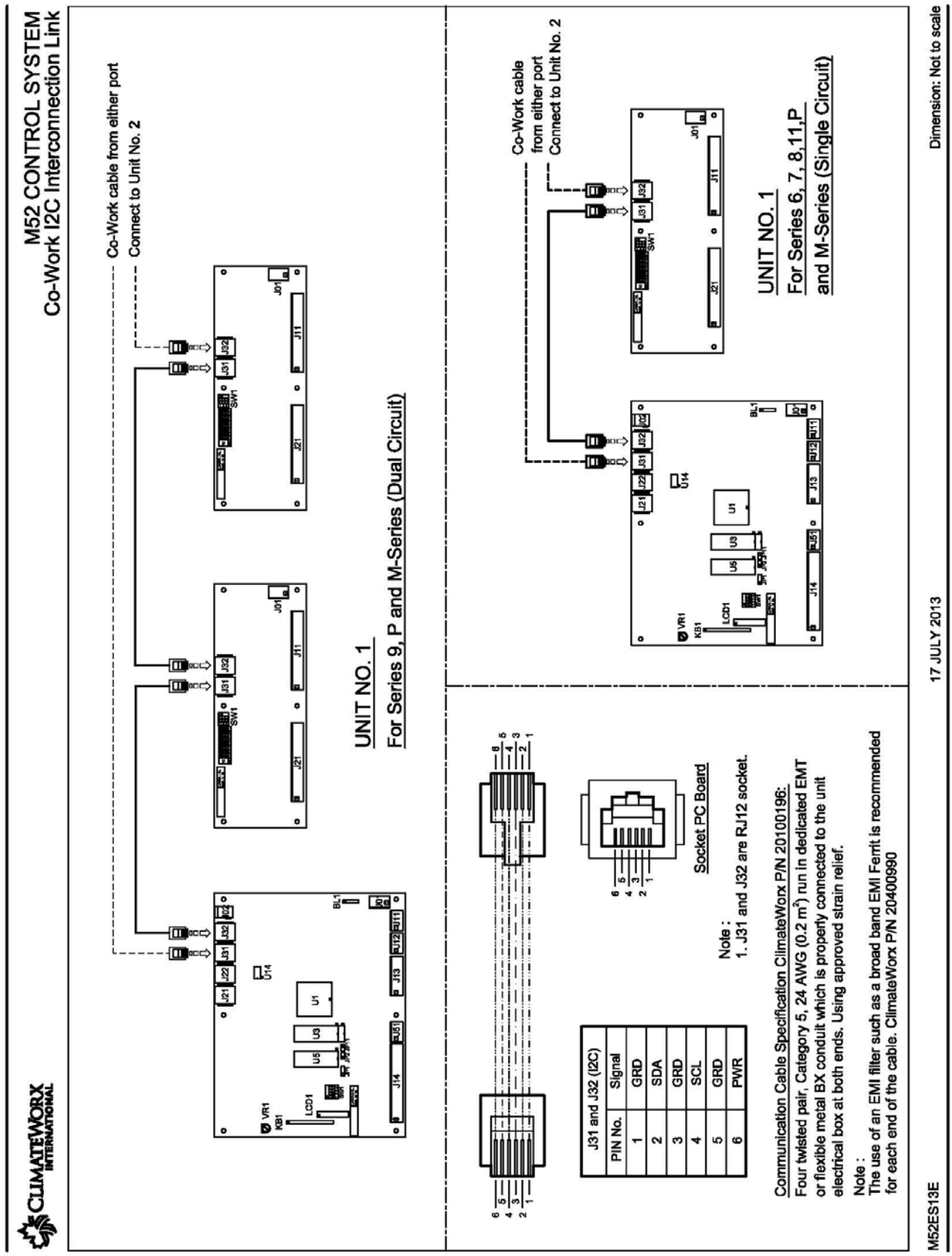


Low Pressure or Short Cycling Alarm



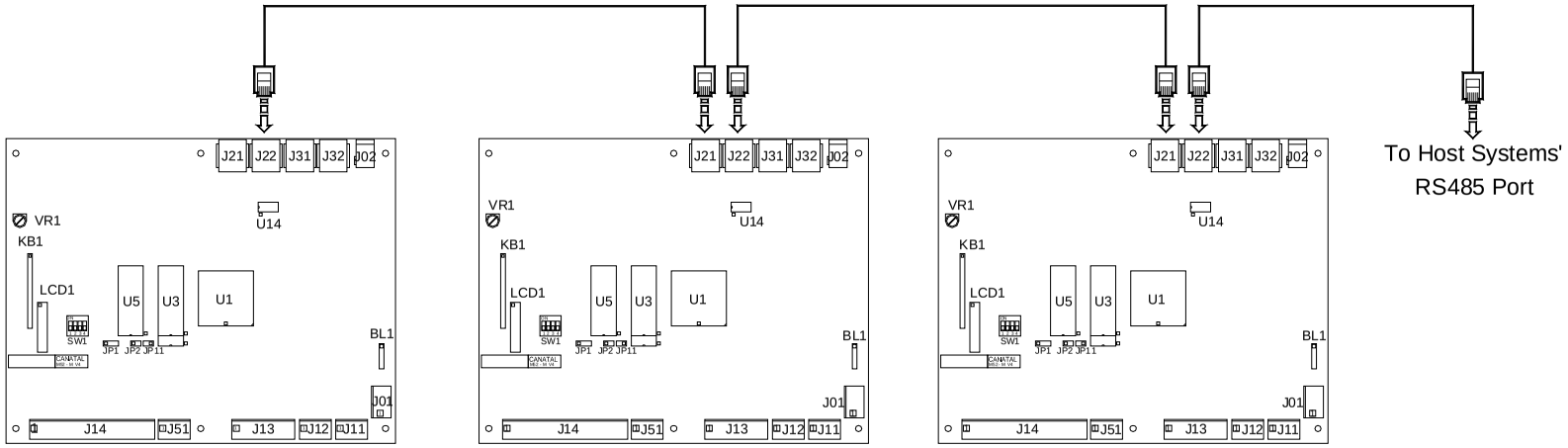
Appendix A: Electrical Schematic Diagrams

Drawing Title	Drawing no.	Page No.
Electrical Schematic - IIC Interconnection Link	M52ES01E	59
Electrical Schematic - RS485 Serial Communication Link	M52ES02E	60

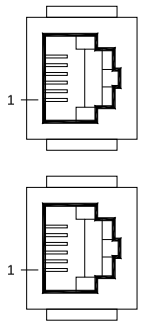

M52 CONTROL SYSTEM
Co-Work I2C Interconnection Link
CLIMATEWORX INTERNATIONAL
Co-Work cable from either port
Connect to Unit No. 2
UNIT NO. 1
For Series 9, P and M-Series (Dual Circuit)
Co-Work cable
from either port
Connect to Unit No. 2
UNIT NO. 1
For Series 6, 7, 8,11,P
and M-Series (Single Circuit)
Socket PC Board
Note :
1. J31 and J32 are RJ12 socket.
J31 and J32 (I2C)
PIN No. Signal
1 GRD
2 SDA
3 GRD
4 SCL
5 GRD
6 PWR
Communication Cable Specification ClimateWorx P/N 20100196:
Four twisted pair, Category 5, 24 AWG (0.2 m²) run in dedicated EMT
or flexible metal BX conduit which is properly connected to the unit
electrical box at both ends. Using approved strain relief.
Note :
The use of an EMI filter such as a broad band EMI Ferrit is recommended
for each end of the cable. ClimateWorx P/N 20400990
M52ES13E
17 JULY 2013
Dimension: Not to scale

CLIMATEWORX INTERNATIONAL

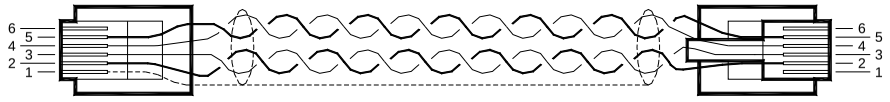
SATCHNET, M52 CONTROL SYSTEM
Electrical Schematic - RS485 Serial Communication Link



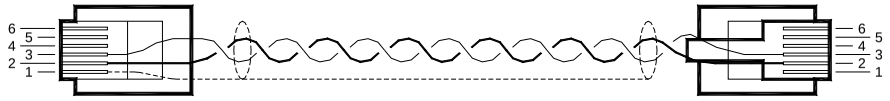
J21 and J22 (RS485)		
PIN No.	Half duplex	Full duplex
1	Grd	Grd
2	T/R(+)	R(+)
3	T/R(-)	R(-)
4	Not used	T(-)
5	Not used	T(+)
6	Not used	Not used



Socket
PC Board



Full duplex



Half duplex

Note :
1. J21 and J22 are RJ12 socket.
2. Twisted pair cable should be screened and with 24AWG or larger conductor.
3. Screen for each cable segment must be connected to ground from one end only.

Notes: