



Advanced M52 Micro processor

User's Guide for Color Display

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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, controller counts down and beeps ten 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 relay outputs
Heating	0-10 vdc and 1, 2 and/or 3 relay outputs
Humidifying	0-10 vdc and 1 relay outputs
Dehumidifying	0-10 vdc and 1 or 2 relay outputs

DX Demand (Cooling)

Cycles on compressors in stages 1 to 32 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 enables fans on 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 (Low Pressure)*
After three consecutive low-pressure alarms in 60 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 32 depending on Series and number of units connected together with *Co-Work* as demand for dehumidification increases from 0 to 100%.

Variable speed fans (if available) will nominally slow down to accelerate this process. See settings tab.

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 enables fans on 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 (DSV) closes.

The Dehum. Solenoid (DSV) 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 affect 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 (set point 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 (Low Pressure)*
After three consecutive low-pressure alarms in 60 minutes, compressor contactor opens. Alarm must be acknowledged and cleared before Compressor will start or cycle power.
- *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). There is also a compressor minimum runtime of 3 minutes (adjustable) which will prevent the compressor from being turned off by the control. The compressor can stop during this time through high or low pressure or by cycling the power.

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 *Compressor Disable* Terminal 31 and 32 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 or outside air temperature is above 7.2°C, (45°F adjustable). The modulating glycol valve or output signal for outside air dampers begins to open when the difference between the return air temperature (Temp Return Air) and the entering glycol temperature or outside air temperature (Temp EGT/ Ambient) is greater than 3°C, (6°F adjustable). 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 or outside air temperature drops below 7.2°C (45°F adjustable) the compressors will stop automatically. The unit will operate in Free Cooling mode only at this time. The glycol or outside air temperature is monitored by the unit using Temp EGT/ Ambient input. Temp Return Air and Temp EGT/ Ambient can be viewed in the Settings Tab on page one. If the Glycol or Outside Air Temperature drops below 0°C, (32°F) the unit will switch to DX cooling only as this too low of a Glycol fluid or outside air temperature would cause any condensation on the evaporator coil to freeze.

Note: The Status screen on the controller indicates full free cooling is on when it displays 2/2 and will display 1/1 in combination with DX cooling. Free cooling is off when it displays 0/2 or 0/1 under the percentage demand next to the Free Cooling icon. The percentage of free cooling in 2/2 will show double what the main cooling bar is showing. This percentage is reflective of the % that each valve is open.

Reheat:

On demand for reheat the demand signal ramps up and heater contactor closes at 33% demand. SCR or Hot Water/ Steam Reheat Valve modulates from 33% to 100% output to match the demand signal. Once demand has been satisfied the SCR or Hot Water/ Steam Reheat Valve modulates down to 0% and the heater contactor opens. On Multi-stage heaters each stage will be energized at equal intervals as the demand increases from 0 to 100%. Stage 1 activates at 33%, Stage 2 activates at 66%, Stage 3 activates at 99%. When demand is met stages deactivate at Stage 3 deactivates at 66%, Stage 2 deactivates at 33% and Stage 1 deactivates at 0% heating demand.

Hot gas reheat only operates on demand for reheat during a dehumidification cycle as the demand signal ramps up the Hot Gas reheat solenoid valve is activated at 33% reheat demand and remains open until reheat demand decreases to 0%.

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 16, (depending on the 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 set point. 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" or “Drain”

Loss of demand

Loss of air flow

Humidifier Service 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

High temp cut out for heater

High water level sensor/ current transducer

Compressor elapse timer

Crank case heaters

External Optional Safety Controls

Fire stat or Smoke detector terminals 19 and 20

EPO terminals 19 and 20

On/Off Control

Local Mode:

When the controller is set to Local Mode, On/Off control of the unit is controlled by the keypad

When the controller is set to Remote Mode, On/Off control can also be controlled by a remote signal through terminals 15 and 16. When this is active, On/Off control of the unit cannot be controlled by the keypad

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.

Local / Remote	Remote ON/OFF	Remote Dem. Off	Standby Start	Unit Operation
Local	OFF	OFF	OFF	STOP
Local	ON	OFF	OFF	RUN
Local	OFF	ON	OFF	Stop
Local	OFF	OFF	ON	RUN
Local	ON	ON	OFF	STOP
Local	ON	ON	ON	RUN
Local	OFF	ON	ON	RUN
Local	OFF	OFF	OFF	RUN
Local	ON	OFF	OFF	RUN
Local	OFF	ON	OFF	STOP
Local	OFF	OFF	ON	RUN
Local	ON	ON	OFF	STOP
Local	ON	ON	ON	RUN
Local	OFF	ON	ON	RUN
Remote	OFF	OFF	OFF	STOP
Remote	ON	OFF	OFF	RUN
Remote	OFF	ON	OFF	STOP
Remote	OFF	OFF	ON	RUN
Remote	ON	ON	OFF	STOP
Remote	ON	ON	ON	RUN
Remote	OFF	ON	ON	RUN
Remote	OFF	OFF	OFF	RUN
Remote	ON	OFF	OFF	RUN
Remote	OFF	ON	OFF	STOP
Remote	OFF	OFF	ON	RUN
Remote	On	ON	OFF	STOP
Remote	On	ON	ON	RUN
Remote	OFF	ON	ON	RUN

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, 9 and P only. For Series 7 and 11 it is located inside electrical panel

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.

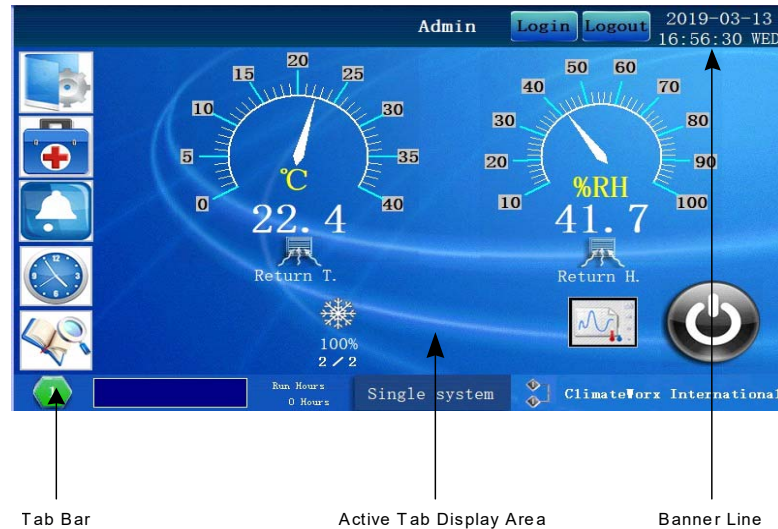
To power down unit:

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 three, change On/Off mode to “Local” (Settings tab, page 4). 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.



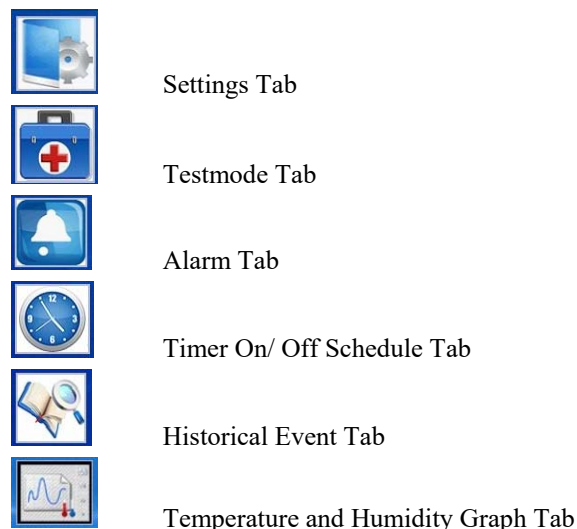
The Banner line shows the current date and time. Date is in DD/MM/YYYY format and time in 24-hour HH:mm format.

Active tab display area

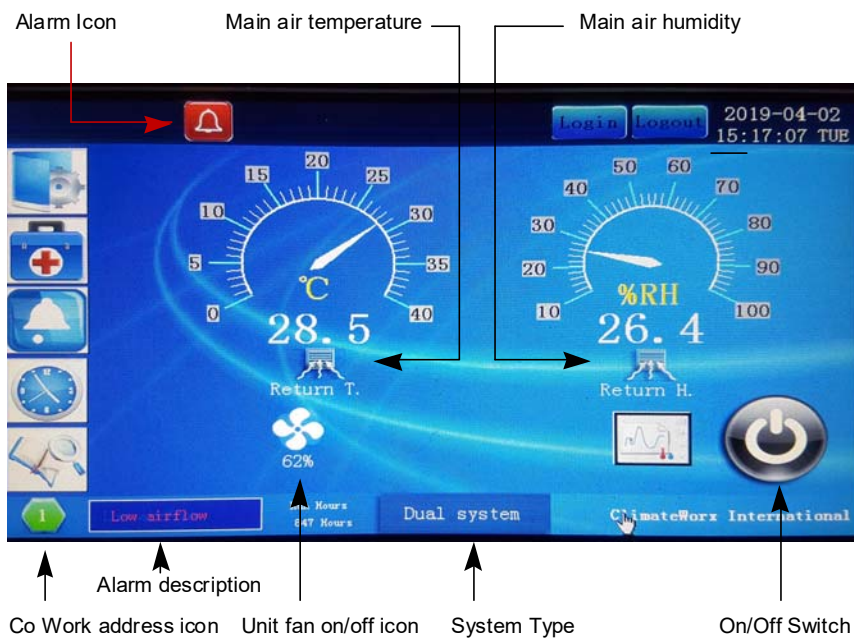
Data and information are grouped into tabs for ease of retrieval. The Active tab display area shows information corresponding to the current selected tab.

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:



Operating Status








Main Air Temperature & Humidity Readout

The main temperature & humidity readout shows the values of the sensor set to control the system “Control Sensor”. Temperature readout can be displayed in either °C or °F depending on the setting “Temp units”.

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 (shows 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. The terminal connection is P501 on main board with a native output protocol MODbus RTU. Follow the field wiring diagram as shown on page 70.

Unit fan On/Off Icon





The unit fan on/off icon appears when the unit fan is running except during fan purge delay the icon does not appear while the fan continues to operate for this period of time.

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.

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 for local, remote and timer modes. Remote on/off and Standby Start Icons will appear only when the function is active.

	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 Co-work network address.



Duty Unit (e.g. Address 1)

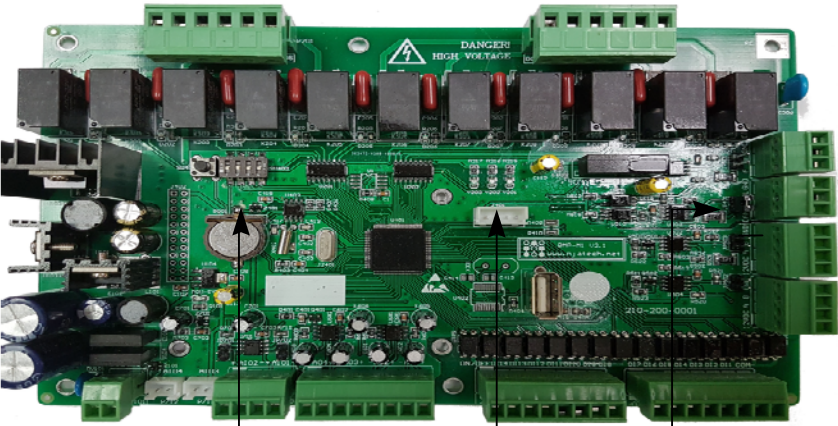


Standby Unit (e.g. Address 1)

Co-work icon is always visible but will only be blue when unit is connected in a co work network and the unit is in the standby mode.

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. Jumpers must also be installed on 2 units in each Co-work network at position JP401 shown below.

LED Flash Fast- Single Unit, Flash Slow- Master Unit, Solid ON- Slave Unit



Co work DIP Switches SW402 Co work LED Y202 Co work Jumper JP401

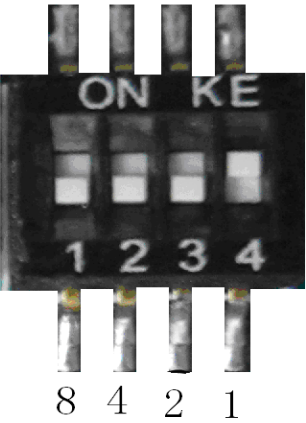


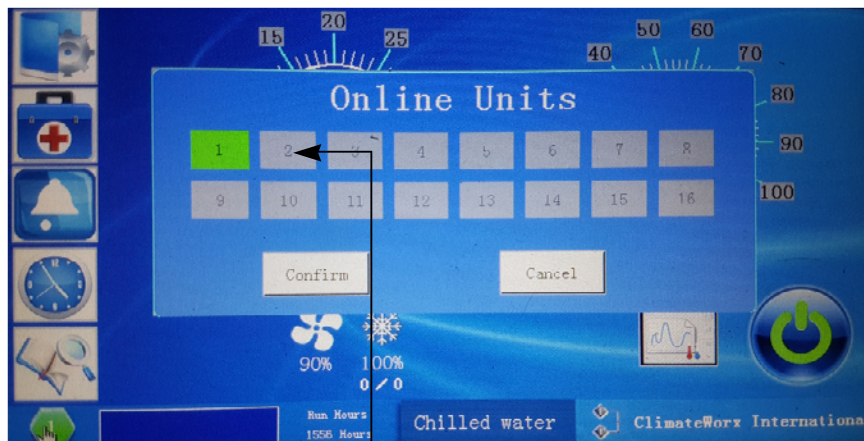
Fig 1.MainBoard DIP Switch

This is CAN ID and is only used for co-work.

CANBUS ID	1	2	3	4
1	0	0	0	0
2	0	0	0	1
3	0	0	1	0
4	0	0	1	1
5	0	1	0	0
6	0	1	0	1
7	0	1	1	0
8	0	1	1	1
9	1	0	0	0
10	1	0	0	1
11	1	0	1	0
12	1	0	1	1
13	1	1	0	0
14	1	1	0	1
15	1	1	1	0
16	1	1	1	1

Each display must have the corresponding Co-work address selected to display in the upper right hand corner. This is done by logging in with level 1 pass word and then touching the co work icon in the upper right hand corner. Selected the appropriate number of icon to correspond with the addressing of the main board done in the previous step.

Note: In the Co-work configuration the member with the lowest Co-work number will always be the master unit.



Co Work network active Icon Select unit Icon

Security

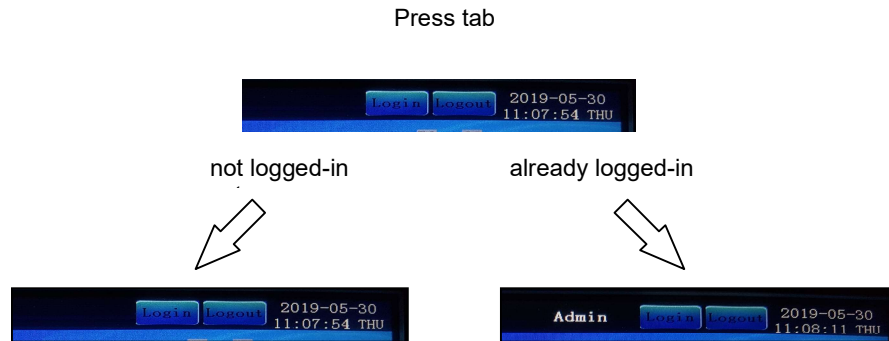
To prevent unauthorized interference with the system operation and settings, the M52 Microprocessors have three levels of security that can be assigned to different personnel having different responsibilities.

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	Admin	Factory	User
Default password	1024	4321	1234
Local on/off control	✓	✓	✓
Alarm clear	✓	✓	✓
Alarm configuration	✓		
Time schedule / clock	✓	✓	✓
Setting - configuration 1	✓	✓	
Setting - configuration 2	✓		
Setting - control parameter	✓		
Test mode – Data Re-initialization	✓		
Test mode – Local net setting	✓		
Test mode – Server setting	✓		

To invoke security log-in or log-out, simply press the tab at log-in or log-out:

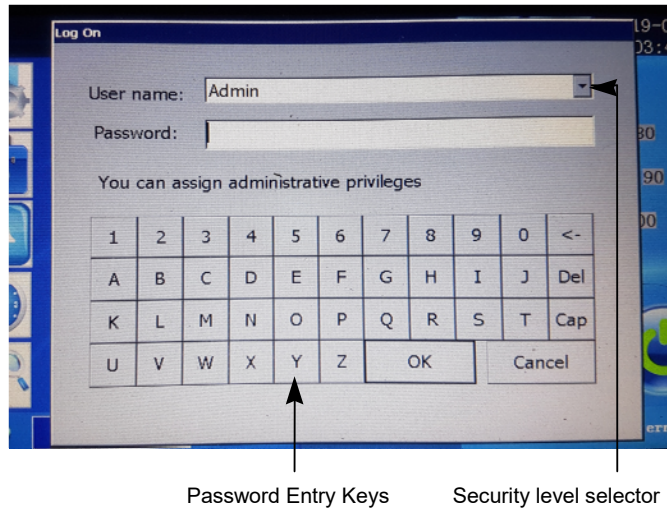


Log-in Security

On the first power-up, you can log-in to security by using the factory preset password “1024”, “4321” and “1234” for security level Admin, Factory and User 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 minute after the last key is released.

Alarms

Active Alarm Queue

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: Active alarms and their date & time of occurrence can be reviewed under the event log providing they are configured for logging.

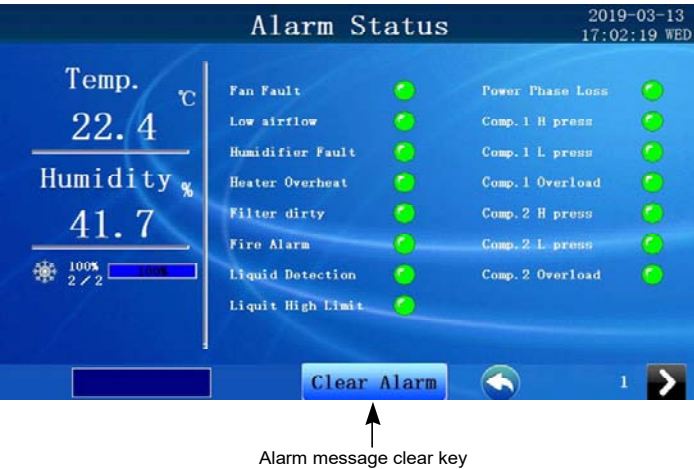


Clear Alarm Message

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 alarm tab beginning on page 3. You can switch to alarm configuration screen by pressing the [Change page] key in the alarm tab and will appear after the 2 pages of alarm status screens.



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

The “x” indicates the alarm feature is in active.

	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 Critical - if this options is selected, common alarm output will be activated under alarm condition.
	Common alarm option key Non Critical -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.








































































Alarm configuration will NOT synchronize across the Co-Work™ network.

High Temperature Alarm note:

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. See *Co-Work* functioning chart on pages 53-55.

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 Fault	    	Immediate all devices shutdown
Low Air Flow	    	Immediate all devices shutdown
Humidifier Service	  	Humidifier shutdown
Heater Overheat	  	Heater shutdown
Filter dirty	  	Only show alarm
Fire Alarm/ Emergency Power Off	  	Immediate all devices shutdown ¹
Liquid Detection	 	
Liquid High Limit	  	
Power Phase Loss	  	Immediate all devices shutdown
High pressure Comp. 1	  	Immediate compressor shutdown
Low pressure Comp. 1	  	Immediate compressor shutdown
Overload Comp. 1	  	Immediate compressor shutdown²
High pressure Comp. 2	  	Immediate compressor shutdown
Low pressure Comp. 2	  	Immediate compressor shutdown
Overload Comp. 2	  	Immediate compressor shutdown ²
High R. Temp	   	Only show alarm
Low R. Temp	   	Only show alarm
High R. Humidity	   	Only show alarm
Low R. Humidity	   	Only show alarm
Loss of R. Sensor	    	Immediate all devices shutdown
High S. Temp	 	

Low S. Temp			
High S. Humidity			
Low S. Humidity			
Loss of S. Sensor			
High Voltage			Only show alarm
Low Voltage			Only show alarm
Custom Fault 1			
Custom Fault 2			
Loss of EX1			Only show alarm
Loss of EX2			Only show alarm
F Drier dirty			Only show alarm

Note: ¹ All units in the same *Co-Work* network will shut down. ² On DX units fitted with external motor protector module only.

The following table summarizes the default configuration for all of the Common Alarm outputs for each alarm. They are categorized in two different priorities Critical and Non Critical. This can be changed by logging in with the level 1 password and touching the common alarm icon to change it's state.

<u>Alarm Message</u>	<u>Originates</u>	<u>Default Configuration</u>	<u>System Designation</u>
Fan Fault	Main Board		Critical
Low Air Flow	Main Board		Critical
Humidifier Service	Main Board		Non Critical
Heater Overheat	Main Board		Non Critical
Filter dirty	Main Board		Non Critical
Fire Alarm/ Emergency Power Off	Main Board		Critical
Liquid Detection	Main Board		Critical
Liquid High Limit	Main Board		Critical
Power Phase Loss	Main Board		Critical
High pressure Comp. 1	EXP 1		Non Critical
Low pressure Comp. 1	EXP 1		Non Critical
Overload Comp. 1	EXP 1		Non Critical
High pressure Comp. 2	EXP 2		Non Critical

Low pressure Comp. 2	EXP 2		Non Critical
Overload Comp. 2	EXP 2		Non Critical
High R. Temp	R. Sensor		Non Critical
Low R. Temp	R. Sensor		Non Critical
High R. Humidity	R. Sensor		Non Critical
Low R. Humidity	R. Sensor		Non Critical
Loss of R. Sensor	R. Sensor		Critical
High S. Temp	S. Sensor		Non Critical
Low S. Temp	S. Sensor		Non Critical
High S. Humidity	S. Sensor		Non Critical
Low S. Humidity	S. Sensor		Non Critical
Loss of S. Sensor	S. Sensor		Non Critical
High Voltage	Main Board		Non Critical
Low Voltage	Main Board		Non Critical
Custom Fault 1	Main Board		Non Critical
Custom Fault 2	Main Board		Non Critical
Loss of EX1	EXP 1		Non Critical
Loss of EX2	EXP 1		Non Critical
F Drier dirty	Filter Sensor		Non Critical ³

Note: ³ The Filter Drier Alarm set point is a fixed amount between the entering temperature and the leaving temperature. When the difference exceeds 3°C or 5.4°F the alarm will be activated.

Historical Event Log

For fault analysis, the system maintains at least the last 500 historical events logged in the memory. The logs are ranked chronologically with the latest event at the top.

The view of the data can be configured by user by selecting config tab on event log page.



The following type of events will be logged:

Power failure / Power restore / Unit start / Unit stop

Alarm raised

Alarm acknowledged




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: This is done through the +/- icon when the cursor is over this function icon.

-  uses “Dead band 1” setting for close control
-  when close control is not required,
uses “Relax deadband” setting to conserve energy while
room condition within acceptable limit
-  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: Touching the time will provoke a pop up to appear for changing the schedule time. The on/ off and rlx functions can be changed simply touching the text on the screen. Make sure to press confirm once all change have been completed.



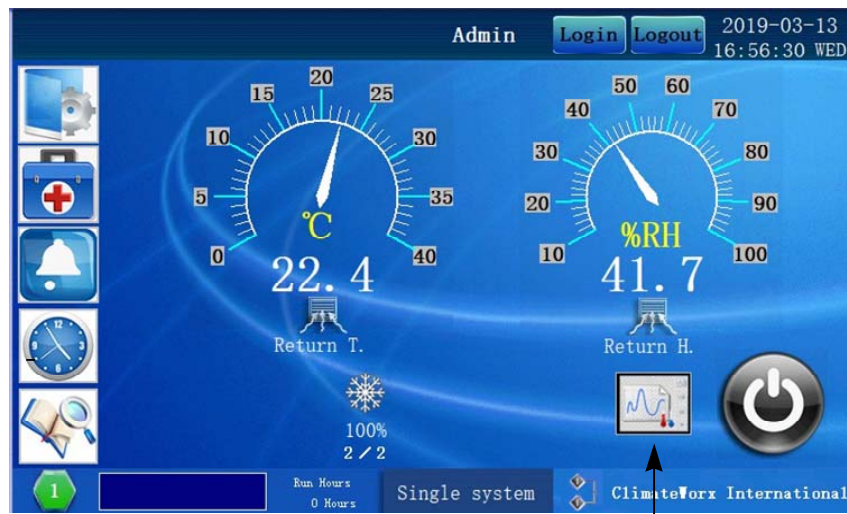
Set Clock

The clock can only be set by simply touching the date and time in the upper right hand corner of the status screen. A pop up will appear as shown below. Change the date and time and then press confirm or cancel to have the time update or revert to current setting.

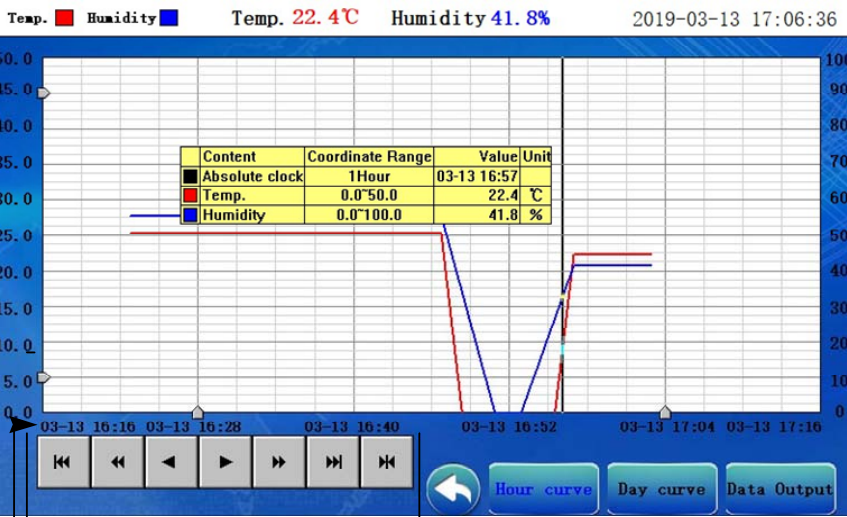


Temperature and Humidity Log Graph

The historical temperature and humidity variation can be reviewed under the Graph tab. The log graph stores the latest 1 year of main temperature and humidity data. Data are logged in 15 minutes interval. Data can be downloaded via USB out of the display. Data output key will allow you to select the range you wish to download. This data can then be uploaded into excel for further review.



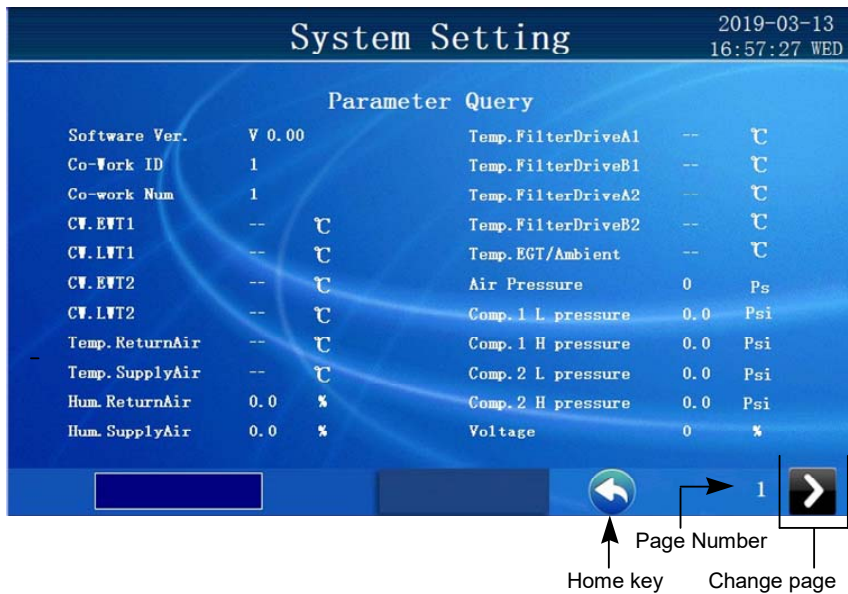
View Graph



Date / Time Guide movement keys Curve Selection keys Download key

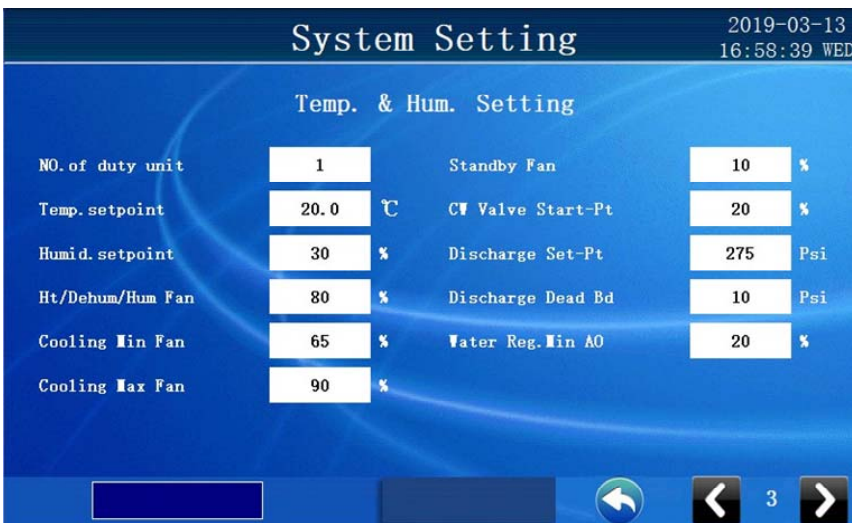
Settings

System settings can be reviewed and altered in the {Setting} tab. Settings are divided into seven groups. You can switch the display by pressing the [Change page] keys. The first 2 pages are for viewing of current parameter readings.



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 selecting the value you wish to change in the white box. The value being changed will change with each touch or will prompt a pup up that allows a value to be entered.



Settings Summary

The following tables summarize the settings in each page:

Page 1 :

Readings 1

Description	Range	Default	Units
Software version	-	-	-
Co-Work ID	1-16	1	-
Co-Work Total	1-16	1	-
*CW EWT 1	0-45	-	°C
*CW LWT 1	0-45	-	°C
*CW EWT 2	0-45	-	°C
*CW LWT 2	0-45	-	°C
*Temp. Return Air	0-50	-	°C
*Temp. Supply Air	0-50	-	°C
Hum. Return Air	0-99.9	-	% RH
Hum. Supply Air	0-99.9	-	% RH
*TempFilterDrierA1	0-45	-	°C
*Temp.FilterDrierB1	0-45	-	°C
*Temp.FilterDrierA2	0-45	-	°C
*Temp.FilterDrierB1	0-45	-	°C
*Temp. EGT/Ambient	0-45	-	°C
Air Pressure	0-9.9	-	Ps
Suction Pressure1	0-300	-	Ps
Discharge Pressure1	15-515	-	Ps
Suction Pressure2	0-300	-	Ps
Discharge Pressure2	15-515	-	Ps
Voltage	50-130	-	%

*Display changes to °F when Temp Units on Page 3 settings is set to °F

Page 2 :

Readings 2

Description	Range	Default	Units
EXT1 Software ver	-	-	-
EXT2 Software ver	-	-	-
*Suction Temp 1	0-30	-	°C
*Suction Temp 2	0-30	-	°C
Fan runtime	0-65535	-	hours
Comp 1 runtime	0-65535	-	hours
Comp 2 runtime	0-65535	-	hours
Heater 1 runtime	0-65535	-	hours
Heater 2 runtime	0-65535	-	hours
Humid runtime	0-65535	-	hours
Cooling runtime	0-65535	-	hours

*Display changes to °F when Temp Units on Page 3 settings is set to °F

Page 3 : Configuration 1

Description	Range	Default	Units	
No. of duty unit	1-16	1	-	✓
*Temp. set point	12-30	22	°C	✓
*Temp. set point	53-86	72	°F	✓
Humid. Set point	30-80	50	% RH	✓
Ht/Dehum/Hum	10-100	80	%	✓
Fan				
Standby Fan	0-100	0	%	✓
Cooling Min Fan	10-100	65	%	✓
Cooling Max Fan	10-100	90	%	✓
CW Valve Start - Pt	10-100	20	%	✓
Discharge Set - Pt	10-500	275	Ps	✓
Discharge Dead Bd	1-50	10	Ps	✓
Water Reg Min AO	10-100	20	%	✓

*Display changes to °F when Temp Units on Page 3 settings is set to °F

Page 4 : Configuration 2

Description	Range	Default	Units	Synchronization
Baud rate	1200-19.2k	9600	bps	✓
On/Off mode	Local/Remote/Timer	Local	-	✓
Auto changeover	0-9999	24	hours	✓
Warm-up period	0-180	120	seconds	✓
Fan purge delay	0-9999	120	seconds	✓
Comp. elapse	30-300	30	seconds	✓
Comp. Min time	30-300	30	seconds	✓
Pos. start delay	0-600	180	seconds	✓
Humid. Fault delay	0-9999	900	seconds	✓
Liquid H/L Fault delay	0-60	60	seconds	✓
*Temp. units	°C/°F	°C	-	✓
Sensor display	Unit/ Site	Unit	-	✓
Language	English/ Chinese	English	-	✓
Control Sensor	Return/Supply/Mix	Return	-	✓

*Display changes to °F when Temp Units on Page 3 is set to °F

Page 5 : Configuration 3

Description	Range	Default	Units	Synchronization
*Temp. dead band	0-10	2	°C	✓
*Relaxed band Temp	0-20	5	°C	✓
*Temp. dead band	0-18	4	°F	✓
*Relaxed band Temp	0-36	9	°F	✓
Hum. Dead band	0-30	6	%RH	✓
Relaxed band Humid	0-50	20	%RH	✓
*Prop. band Cool	1-10	2	°C	✓
*Prop. band Heat	1-10	2	°C	✓
*Prop. band Cool	2-18	4	°F	✓
*Prop. band Heat	2-18	4	°F	✓
Prop. band Humid	2-10	3	%RH	✓
Prop. band Dehum	2-10	3	%RH	✓
Temp. I-time	100-6000	1800	seconds	✓
Humid. I-time	100-6000	1800	seconds	✓
Temp. D-time	0-61	15	-	✓

Humid. D-time	0-94	15	-	✓
Humid. Control	Enable/ Disable	Enable	-	✓
Reheat Control	Enable/ Disable	Enable	-	✓
Dehum. Control	Enable/ Disable	Enable	-	✓
Free Cooling Control	Enable/ Disable	Disable	-	✓
*Free Cooling T/D	3-7	3	°C	✓
*Free Cooling H/L	4-12	7.2	°C	✓
*Free Cooling T/D	6-14	6	°F	✓
*Free Cooling H/L	39-54	45	°F	✓
Damper switch delay	30-180	30	seconds	✓
Temp Control	Avg/ Max	Avg	-	✓

*Display changes to °F when Temp Units on Page 3 is set to °F

Page 6 :

Configuration 4

Description	Range	Default	Units
System Type	CHW/Single/Dual	Dual	-
Control Mode	Auto/Manual	Auto	-
Restart delay	0-9999	10	seconds
Network address	1-99	1	-
Sensor Mode	Local/Remote/Disable	Local	-
Heater Min. On	0-100	0	%
Cool Min. On	0-100	0	%
*R. Temp Hi limit	12-37	30	°C
*R. Temp Low limit	5-30	15	°C
*R. Temp Hi limit	53-99	86	°F
*R. Temp Low limit	41-86	59	°F
R. Humid. Hi limit	50-90	70	% RH
R. Humid. Lo limit	20-50	30	% RH
*S. Temp Hi limit	12-37	30	°C
*S. Temp Low limit	5-30	15	°C
*S. Temp Hi limit	53-99	86	°F
*S. Temp Low limit	41-86	59	°F
S. Humid. Hi limit	50-90	70	% RH
S. Humid. Lo limit	20-50	30	% RH
Volt Hi limit	102-120	115	%
Volt Low limit	80-98	85	%
Volt adjust	80-120	100	%
*R. temp offset	+5 /- 5	0	°C
*R. temp offset	+10/ -10	0	°F
R. hum offset	+10/ -10	0	% RH
*S. temp offset	+5 /- 5	0	°C
*S. temp offset	+10/ -10	0	°F
S. hum offset	+10/ -10	0	% RH

*Display changes to °F when Temp Units on Page 3 is set to °F

Page 7 :

Configuration 5

Description	Range	Default	Units
Fan Run Time Reset	-	-	-
Comp 1 Run Time Reset	-	-	-
Comp 2 Run Time Reset	-	-	-
Heater 1 Run Time Reset	-	-	-
Heater 2 Run Time Reset	-	-	-
Heater 3 Run Time Reset	-	-	-
Humid Run Time Reset	-	-	-

Settings Summary Glossary

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

Page 1: Display

Parameter	Definition
Software version	Version of software operating on the microprocessor main board
Co-Work ID	Specific unit address in the <i>Co-Work</i> network
Co-Work Total	Total number of members in the <i>Co-Work</i> network
CW EWT 1	Chilled Water entering temperature circuit 1 (optional)
CW LWT 1	Chilled Water leaving temperature circuit 1 (optional)
CW EWT 2	Chilled Water entering temperature circuit 2 (optional)
CW LWT 2	Chilled Water leaving temperature circuit 2 (optional)
Temp. Return Air	Temperature of sensor designated as return air
Temp. Supply Air	Temperature of sensor designated as supply air
Hum. Return Air	Humidity of sensor designated at return air
Hum. Supply Air	Humidity of sensor designated at supply air
TempFilterDrierA1	Refrigerant temperature entering Filter Drier Circuit 1 (optional)
Temp.FilterDrierB1	Refrigerant temperature leaving Filter Drier Circuit 1 (optional)
Temp.FilterDrierA2	Refrigerant temperature entering Filter Drier Circuit 2 (optional)
Temp.FilterDrierB1	Refrigerant temperature leaving Filter Drier Circuit 2 (optional)
Temp. EGT/ Ambient	Temperature of Entering Glycol or Ambient Air used in the Free Cooling Configuration
Air Pressure	Pressure reading from a transducer either under floor or in a duct (optional)
Suction Pressure1	Pressure reading from a pressure transducer Circuit 1(optional)
Discharge Pressure1	Pressure reading from a pressure transducer Circuit 1(optional)
Suction Pressure2	Pressure reading from a pressure transducer Circuit 2(optional)
Discharge Pressure2	Pressure reading from a pressure transducer Circuit 2(optional)
Voltage	Control voltage output

Page 2: Display

Parameter	Definition
EXT1 Software ver	Version of software operating on the microprocessor expansion board circuit 1
EXT2 Software ver	Version of software operating on the microprocessor expansion board circuit 2
Suction Temp 1	Suction Temperature reading from circuit 1 (optional)
Suction Temp 2	Suction Temperature reading from circuit 2 (optional)
Fan runtime	Total fan run time
Comp 1 runtime	Total compressor run time Circuit 1
Comp 2 runtime	Total compressor run time Circuit 2
SCR Heat runtime	SCR Heater run time or heater 1 runtime if no SCR
Heater 1 runtime	Heater 1 run time
Heater 2 runtime	Heater 2 run time
Humid runtime	Total humidifier run time
Cooling runtime	Total cooling run time

Page 3: Configuration 1

Parameter	Definition
No Duty Units	Units required to run together in a <i>Co-Work</i> network to satisfy the load.
Temp. setpoint	Controls space temperature based on return or supply air temperature.
Humid. setpoint	Controls space humidity based on return or supply air humidity
Ht/Dehum/Hum Fan	Sets the fan speed when humidification/heating or dehum demand is present.
Standby fan	Sets the fan speed when the unit is in standby operation
Cooling Min fan	Sets the minimum fan speed when cooling demand is not present
Cooling Max fan	Sets the maximum fan speed when cooling demand is present
CW Valve Start - Pt	Sets the minimum demand required for the CW valve to begin opening
Discharge Set - Pt	Sets the fan speed based on static pressure
Discharge Dead Bd	Tolerance for discharge fan speed pressure
Water Reg Min AO	Minimum open setting for modulating water regulating valve

Page 4: Configuration 2

Parameter	Definition
Baud rate	Network communication speed
On/Off mode	Sets unit to turn "ON" and "OFF" by local keypad, remote signal or timer schedule.
Auto changeover	Time interval after which duty and standby unit switch in a <i>Co-Work</i> network
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 shuts down.
Comp. Min time	Prevents compressors from running for less than this time
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.
Humid. Fault delay	Connected to the humidifier high water level sensor and delays boiler dirty alarm to prevent nuisance alarms on humidifier start-up.
Liquid H/L Fault delay	Time interval to activate alarm after fault has been detected.
Temp. unit	Sets ALL temperature display units to °F or °C
Sensor Display	In a <i>Co-Work</i> network choose to display the individual unit sensor readings or the average readings (SITE readings are the average of all sensor readings in a <i>Co-Work</i> network)
Language	Choose between English and Chinese
Control Sensor	Enables the unit to be controlled by Supply or Return Air Sensor. Mix is Supply Temperature and Return Humidity.

Page 5 Configuration 3

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
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
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 Humidification.
Reheat Control	Choose to enable or disable reheat control or control reheat.
Dehum. Control	Choose to enable or disable humidity control or control Dehumidification.
Free-cooling Control	Choose to enable or disable Glycol Free Cooling
Free Cooling T/D	Change over from DX to Economizer based on Return Air Temperature and Entering Glycol Temperature. This represents the minimum difference between the two measurements to allow for this feature to operate.
Free Cooling H/L	Disables compressors in economization mode when the Entering Glycol Temperatures reaches this set point or lower.
Damper switch delay	Adjusts the time for the fan to turn on in damper applications.
Temp Control	Allows for control by MAX or Average when multiple sensors are used.

Page 6: Configuration 4

Parameter	Definition
System Type	Identifies cooling type and number of stages
Control Mode	This function is used in the test mode to be able to select manual operation and activate devices manually from the test mode pages.
Restart Delay	Delays the unit from starting until the time limit expires.
Network address	Controller address to identify the unit in a BMS network.
Sensor mode	Enables or disables the unit air temperature sensor from the averaging features in a Co-Work network during standby periods. Also used for disabling sensor for demonstrations.
Heater Min. On	Sets the minimum demand required for the Reheat to begin operating.
Cool Min. On	Sets the minimum demand required for the Cooling to begin operating
R. Temp. Hi limit	Maximum of controlling return temperature sensor before activating alarm
R. Temp. Lo limit	Minimum of controlling return temperature sensor before activating alarm
R. Humid. Hi limit	Maximum of controlling return humidity sensor before activating alarm
R. Humid. Lo limit	Minimum of controlling return humidity sensor before activating alarm
S Temp. Hi limit	Maximum of controlling supply temperature sensor before activating alarm
S Temp. Lo limit	Minimum of controlling supply temperature sensor before activating alarm
S. Humid. Hi limit	Maximum of controlling return humidity sensor before activating alarm
S. Humid. Lo limit	Minimum of controlling return humidity sensor before activating alarm
Volt. Hi limit	Maximum allowable voltage before activating alarm
Volt. Lo limit	Minimum allowable voltage before activating alarm
Voltage adjust	Calibration function used to fine tune the voltage reading from the control transformer.
R temp. offset	Calibration function used to fine tune the return temperature sensor reading.
R.hum. offset	Calibration function used to fine-tune the return humidity sensor reading.
S temp. offset	Calibration function used to fine tune the supply temperature sensor reading.
S.hum. offset	Calibration function used to fine-tune the supply humidity sensor reading.

Page 7: Configuration 5

Parameter	Definition
Fan runtime reset	Resets fan run time to zero
Comp 1 runtime reset	Resets compressor 1 run time to zero
Comp 2 runtime reset	Resets compressor 2 run time to zero

Heater 1 runtime reset	Resets SCR reheat or Heater 1 run time to zero
Heater 2 runtime reset	Resets heater 2 runtime to zero
Heater 3 runtime reset	Resets heater 3 runtime to zero
Humid runtime reset	Resets humidifier run time to zero

Test Mode

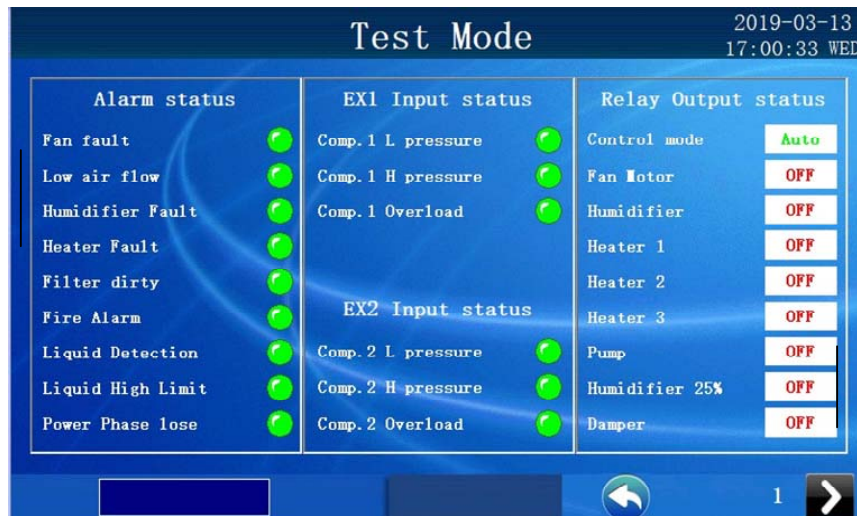
The {Testmode} tab contains an assortment of utilities designed to simplify field testing and troubleshooting. The utilities are divided into ten pages:

- Microprocessor board Alarm diagnostic
- Digital EXP board Alarm diagnostic
- Microprocessor board diagnostic
- Digital EXP board diagnostic
- Switched Analogue output diagnostic
- Analogue EXP board diagnostic
- Data re-initialization
- Local Network Setting
- Server Setting

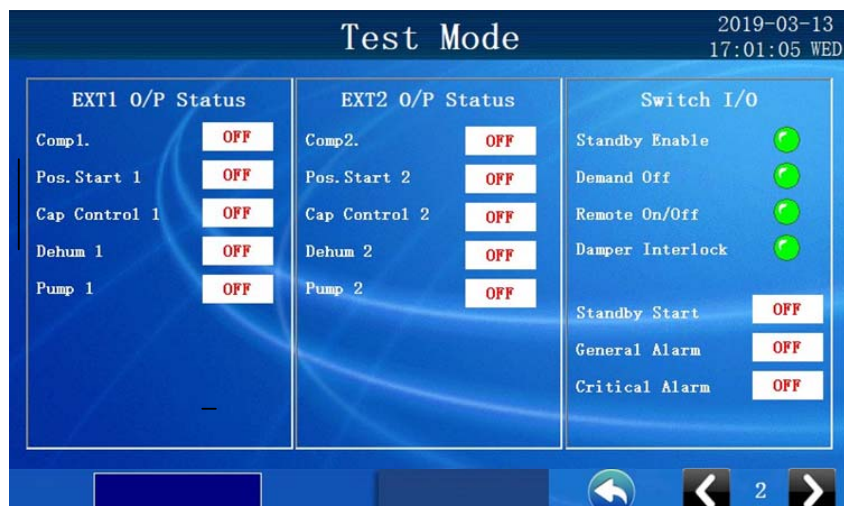
Microprocessor Board Diagnostic

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

Status of Alarms, all Inputs and all Outputs. Relay output can be changed from this page once the appropriate level of security has been logged into.



Selected board and function

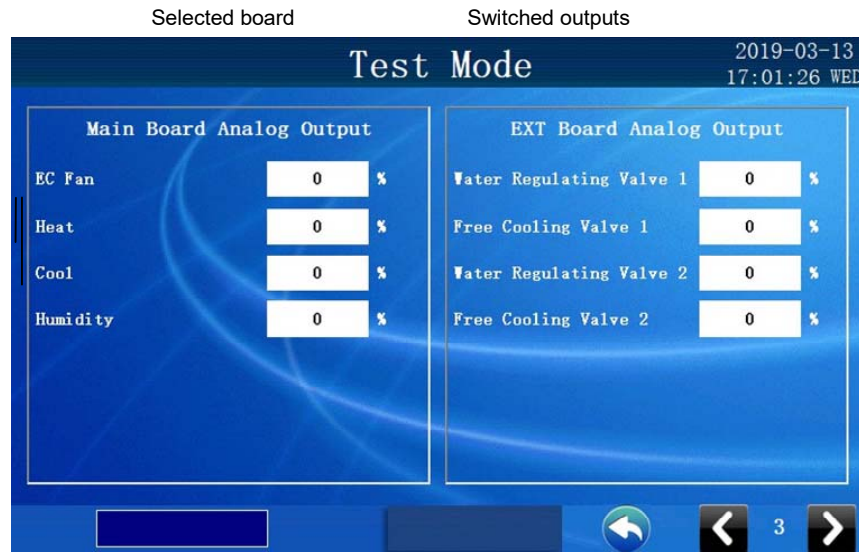


Under the Microprocessor board diagnostic page, you can:

- 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 touching the white block of the item you wish to change selector.
- Review the status of the analogue inputs and outputs on the Microprocessor boards, and override control of the outputs by placing control in "Manual" by touching the item in the white box and the status will switch.

Digital Board Diagnostic

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



Under the digital main board diagnostic page, you can:

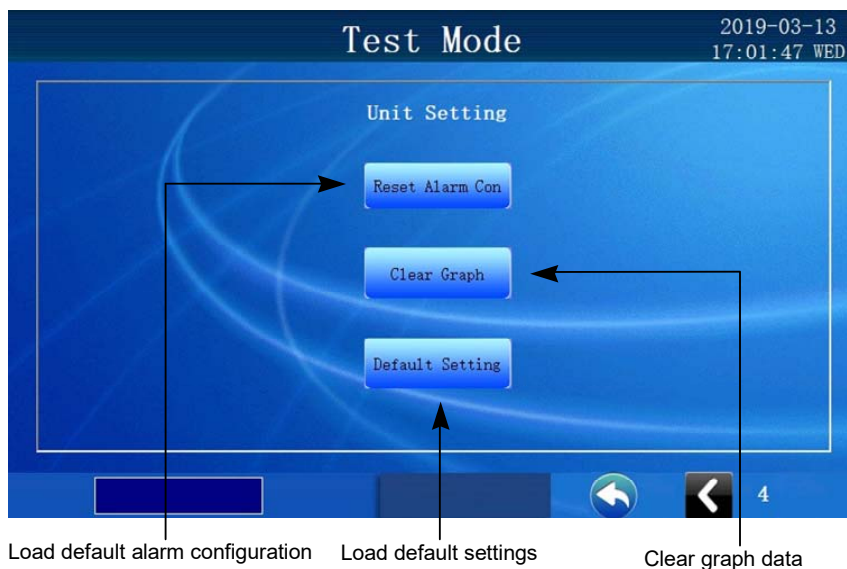
- Select the digital main board to review.
- Review the status of the switched outputs on the selected digital main board.
- Review the status of the switched outputs on the selected digital main board, and override control of the outputs by using the state selector. **This function is only active when Control Mode is in “Manual”.** See settings page 6.

Test Mode Unit on/off

A state selector appears only in the manual mode. You can turn items on/off by selecting the state selector. You can also increase and decrease the Analogue O/P by selecting the device then the state selector. **Some devices will not turn on unless the fan has already been activated in manual mode. If you find a device or an output turns off or reverts back to 0% shortly after activation this is an indicator that the fan has not been turned on and needs to be.** The +/- characters will appear. When the over-ride is selected the board 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.

Data Re-initialization

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



Under this page, you can:

- Set alarm configurations to default configurations (See Alarm Response Summary)¹.
- Set system configuration and control settings to default configurations (See Setting Summary)
- Clear log data in temperature and humidity log graph.

¹ Not recommended for chilled water units, Series 7 and 11 and units with options.

Component Configuration

Main Board

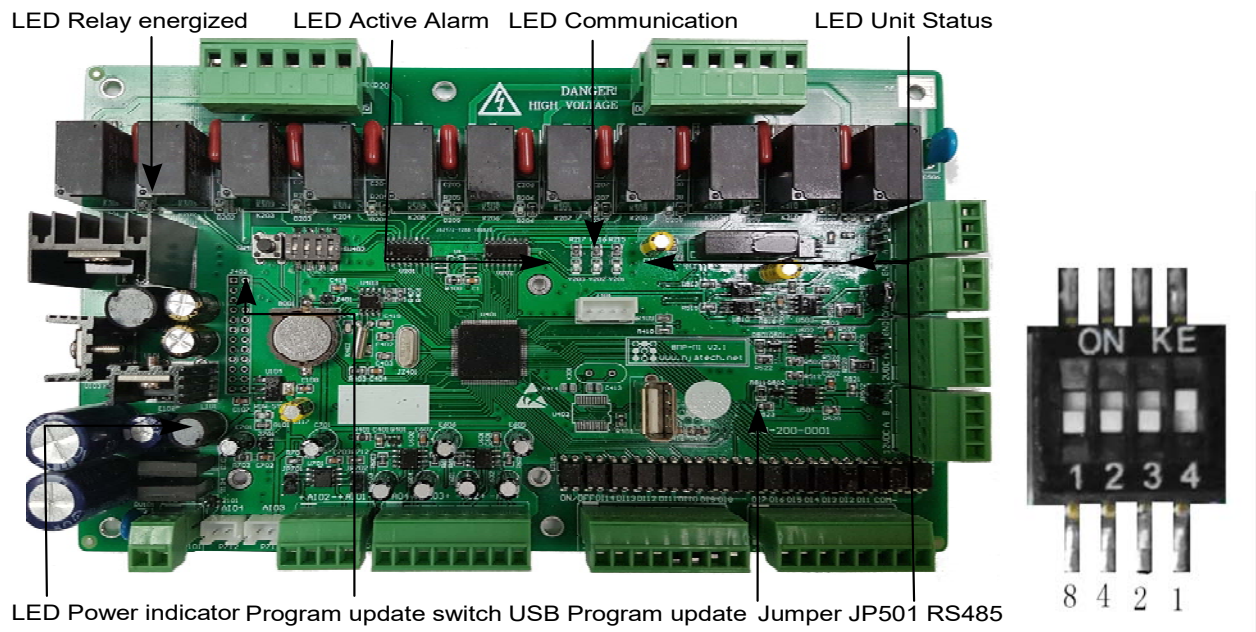


Fig.1 Main Board

This is for CAN ID only used for co-work.

CANBUS ID	1	2	3	4
1	0	0	0	0
2	0	0	0	1
3	0	0	1	0
4	0	0	1	1
5	0	1	0	0
6	0	1	0	1
7	0	1	1	0
8	0	1	1	1
9	1	0	0	0
10	1	0	0	1
11	1	0	1	0
12	1	0	1	1
13	1	1	0	0
14	1	1	0	1
15	1	1	1	0
16	1	1	1	1

Four bit code can be set to address ID is 1~16, a total of 16 different ID units.

EXP Board

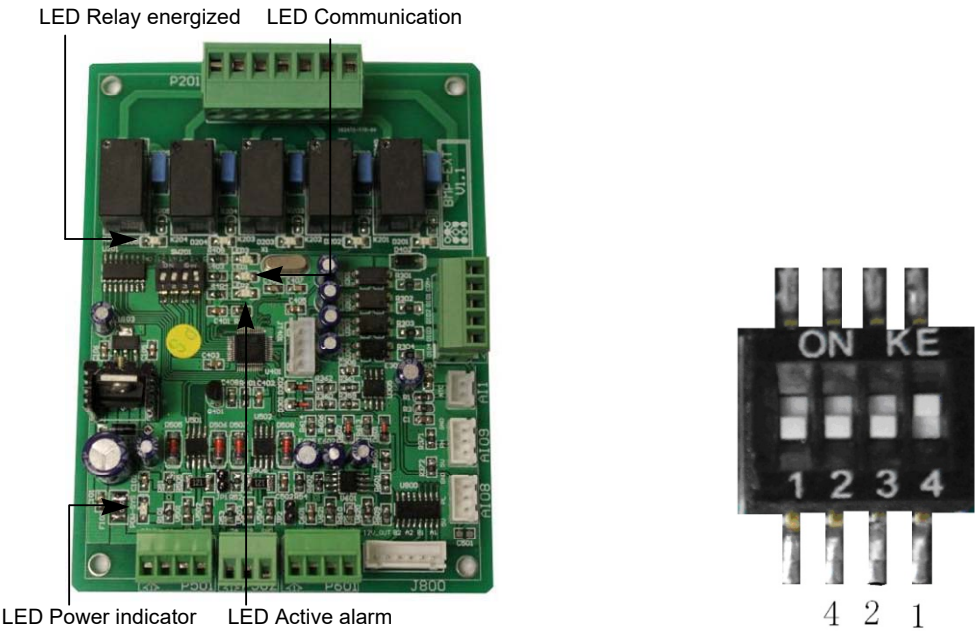


Fig.2 EXP Board

As shown in Figure 2, first bit code representation of E-TX Valve Enable to the P501 code in the ON position, not in the ON position means E-TX Valve Disable.

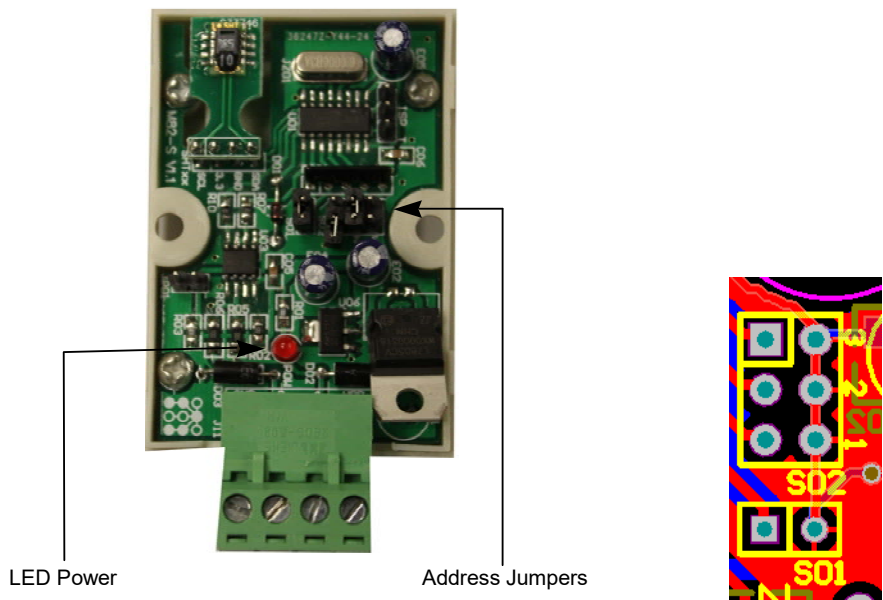
2 bit code represents the DC VFD Comp. Enable to the P501 Code in the ON position, not in the ON position means DC VFD Comp. Disable, P502 will not communication with DC VFD Controller.

3, 4 bit code represents the RS485 address, when the shifting to the ON position are respectively corresponding to 2, 1 values; All not in the numerical ON position corresponding to 0. The physical meaning is dial dial to the corresponding numerical 2 is the expansion board 485 communication.

This is for RS485 Address, we can only support EXT RS485 address 2 and 3. 4,5,6,7 is for Extension.

3	4	EXT RS485 ID
0	0	2
0	1	3
1	0	4
1	1	5

Temperature and Humidity Sensor



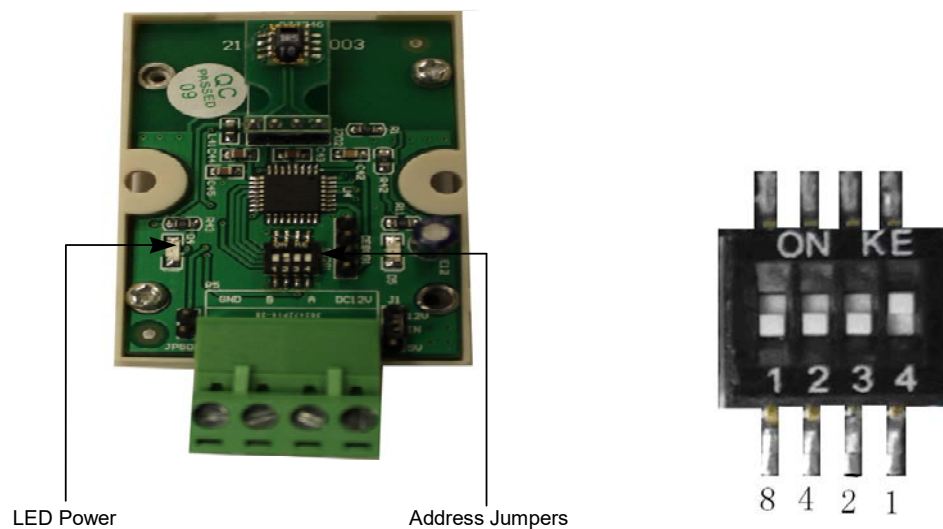
As shown above, S01 have jumpers and represents the address plus 8. S02 you can see the table.

No	S02-1	S02-2	S02-3	485
1	0	0	0	1
2	1	0	0	2
3	0	1	0	3
4	1	1	0	4
5	0	0	1	5
6	1	0	1	6
7	0	1	1	7
8	1	1	1	8

The return sensor RS485 address is 11(8+3 : S01 on S02-2 on),the supply sensor is 12(8+4:S01 on S02 -1 on, S02-2 on)

Now we only use RS485 Address 11&12
RS485 Address 11 is the return Air Sensor.
RS485 Address 12 is the supply Air Sensor.

Alternate Temperature & Humidity Sensor



1,2, 3, 4 bit code represents the RS485 address, when the shifting to the ON position are respectively corresponding to 8,4, 2, 1 values; All in the numerical Off position corresponding to 0.

RS485	4	3	2	1
1	0	0	0	0
2	0	0	0	1
3	0	0	1	0
4	0	0	1	1
5	0	1	0	0
6	0	1	0	1
7	0	1	1	0
8	0	1	1	1
9	1	0	0	0
10	1	0	0	1
11	1	0	1	0
12	1	0	1	1
13	1	1	0	0
14	1	1	0	1
15	1	1	1	0
16	1	1	1	1

Now we only use RS485 Address 11&12
 RS485 Address 11 is the return Air Sensor.
 RS485 Address 12 is the supply Air Sensor.
 Other Address can use in Sensor Hub

5. Sensor Hub

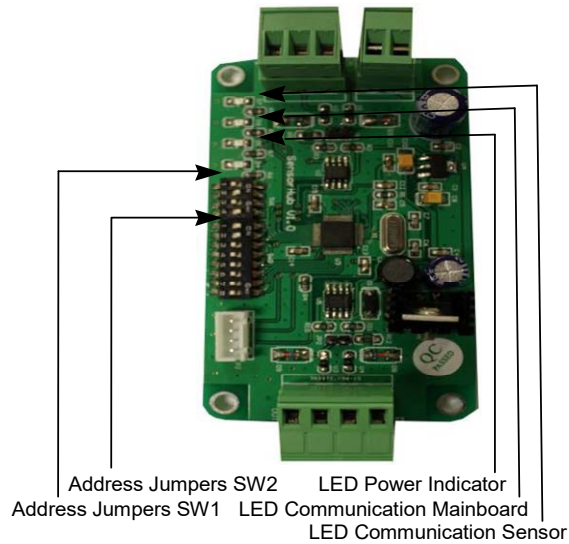


Fig 6 Sensor Hub

SW1 is the Switch for Main Board Communication.

SW2 is the Switch for Temperature and Humidity sensor.

P1 is the Power of the board,

P3 Connect multiple Temperature and Humidity Sensor.

P4 can connect to Main Board P502.

SW1 Table:

RS485	4	3	2	1
1	0	0	0	0
2	0	0	0	1
3	0	0	1	0
4	0	0	1	1
5	0	1	0	0
6	0	1	0	1
7	0	1	1	0
8	0	1	1	1
9	1	0	0	0
10	1	0	0	1
11	1	0	1	0
12	1	0	1	1
13	1	1	0	0
14	1	1	0	1
15	1	1	1	0
16	1	1	1	1

Now we only use RS485 Address 11&12

RS485 Address 11 is the return Air Sensor.

RS485 Address 12 is the supply Air Sensor.

SW2 we use 1,2,3,4 Bit. We can connect 16 Temperature and Humidity Sensors and give the average Temperature and Humidity to the Main Board.

SW2 Table:

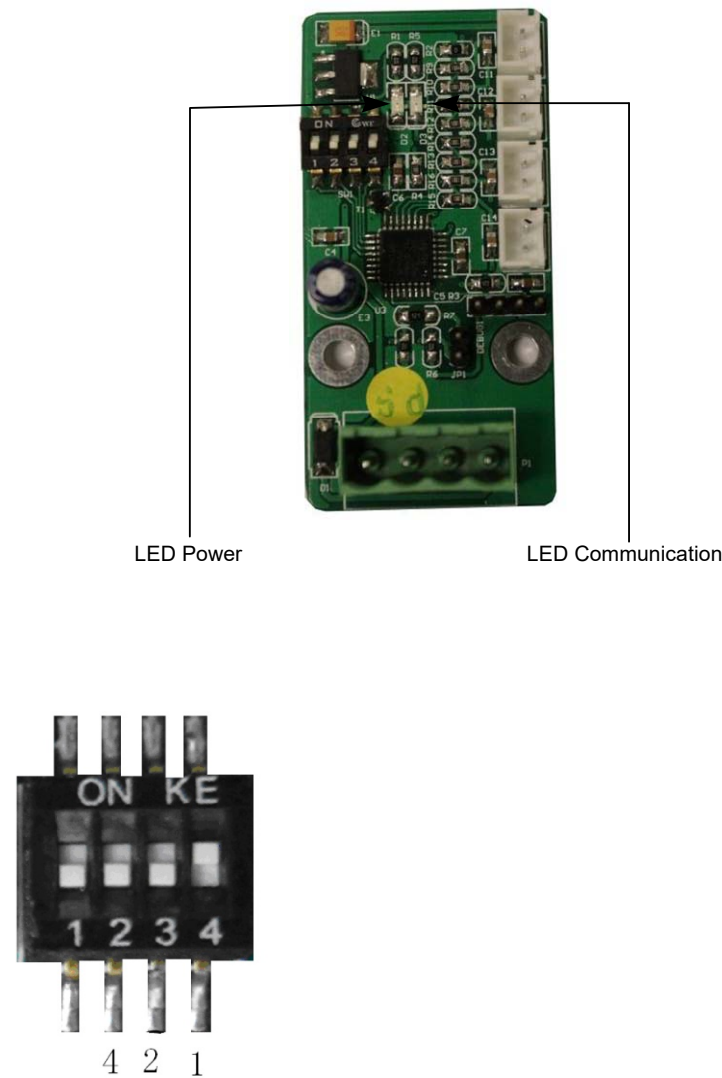
Total num	4	3	2	1
1	0	0	0	0
2	0	0	0	1
3	0	0	1	0
4	0	0	1	1
5	0	1	0	0
6	0	1	0	1
7	0	1	1	0
8	0	1	1	1
9	1	0	0	0
10	1	0	0	1
11	1	0	1	0
12	1	0	1	1
13	1	1	0	0
14	1	1	0	1
15	1	1	1	0
16	1	1	1	1

If the Total Num is 1 ,it that means only one Temperature and Humidity sensor on P3. The address is 1.

If the Total Num is 2 ,it that means two Temperature and Humidity sensors on P3. The address is 1,2.

If the Total Num is 8 , it that means 8 Temperature and Humidity sensors on P3. The address is 1,2,3,4,5,6,7,8.

Chilled Water and Filter Drier Sensor Board



As shown in Figure 3, first bit code representation of RS485 communication baud rate in the ON position, set the baud rate 2400, in the Off position the baud rate is 9600, the real-time adjustment.

2, 3, 4 bit code represents the RS485 address, when the shifting to the ON position are respectively corresponding to 4, 2, 1 values; All in the numerical Off position corresponding to 0. The physical meaning is dial to the corresponding numerical 9 is the expansion board 485 communication.

2	3	4	Sensor RS485 Address
0	0	0	9
0	0	1	10

Now we only use RS485 Address 9&10
RS485 Address 9 is the CW temperature Sensor.
RS485 Address 10 is the filter temperature Sensor.

Co-Work™

Co-Work™ is a six function networking feature that is built into every Advanced M52 controller. Through the use of a three wire cable you can link up to 16 units with up to 32 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 69 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 16 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 Advanced 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 6 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:

Follow the field wiring diagram as shown on page 75

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 as shown on page 16. Jumpers must also be installed on 2 units in each *Co-Work™* network at position JP401

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 17) Note the Network address located in the top left corner of the screen refers to the RS485 communication network and is ClimateWorx's control and monitoring software system. Consult your local representative or the factory for details.

The number of duty units will be established by the controller based on the cooling demand. The number of duty units can be adjusted manually if required from settings tab page 3.

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 16 for the PC board address code.

Notes:

Operator can use the key pad at any display to log on. Once you logon to the network that display can be selected to control any of the units. This is done by selecting the Co-work Icon in the upper right hand corner of the display. A window will appear that shows all of the units in the Co- work network. You can select from here the unit you would like to control as shown on page 17.



When an alarm condition is detected the alarm is broadcast to all units in the network. The alarm needs to be acknowledged at all units 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 duty unit readings) or the individual temperature and humidity of the unit under the Settings tab. Refer to the Setting section

Alarm Settings, Responses chart:

Advanced M-52 Co-work functioning chart

			Duty unit EC Output	3rd duty unit 'ON' @ Hi-temp	Unit Swap	No Resp	Both Down	Comments
Fan Overload	Y	Y	0	N/A	Y			Default: Both Fan & Comp. drop off, then unit swap.
	O	Y	0	Y	O			Back up unit "ON" by Hi-Temp.
	Y	O	0	N/A	Y			Both Fan & Comp. drop off, then unit swap.
	O	O	0	Y	O			Back up unit "ON" by Hi-Temp.
Low Airflow	Y	Y	0	N/A	Y			Default: Both Fan & Comp. drop off, then unit swap.
	O	Y	0	Y	O			Back up unit "ON" by Hi-Temp.
	Y	O	0	N/A	Y			Both Fan & Comp. drop off, then unit swap.
	O	O	0	Y	O			Back up unit "ON" by Hi-Temp.
Humid. service	O	O	10V	Y	O			Default: Comp. & Fan keep running on duty unit and back up unit "ON" by Hi-temp.
	Y	O	1.0V	N/A	Y			Both Fan & Comp. drop off, then unit swap.
	O	Y	10V	Y	O			Comp. & Fan keep running on duty unit and back up unit "ON" by Hi-temp.
	Y	Y	1.0V	N/A	Y			Both Fan & Comp. drop off, then unit swap.
Heater Overheat	O	O	10V	Y	O	Y		Default: Comp. & Fan keep running on duty unit and back up unit "ON" by Hi-temp.
	Y	O	0	N/A	Y			Both Fan & Comp. drop off, then unit swap.
	O	Y	10V	Y	O			Comp. & Fan keep running on duty unit and back up unit "ON" by Hi-temp.
	Y	Y	0	N/A	Y			Both Fan & Comp. drop off, then unit swap.
Filter Dirty	O	O	10.V	Y	O	Y		Default: Comp. & Fan keep running on duty unit and back up unit "ON" by Hi-temp.
	Y	O	1.0V	N/A	Y			Both Fan & Comp. drop off, then unit swap and continues "ON" even alarm cleared.
	O	Y	10V	Y	O			Comp. & Fan keep running on duty unit and back up unit "ON" by Hi-temp.
	Y	Y	1.0V	N/A	Y			Both Fan & Comp. drop off, then unit swap and continues "ON" even alarm cleared.
Fire	Y	O	0	N/A	Y			Default: (unchecked). Comp. & Fan drop off and unit swap when alarm checked-in.
	O	Y	0	Y	O	Y		Comp. & fan drop off and back up unit would be "ON" by Hi-Temp. when alarm checked-in.
	Y	Y	0	N/A	Y			Default: (unchecked). Comp. & Fan drop off and unit swap when alarm checked-in.
	O	O	0	Y	O	Y		Comp. & fan drop off and back up unit would be "ON" by Hi-Temp. when alarm checked-in.
Liquid Detection	O	O	10V	Y	O	Y		Default (unchecked). Comp. & fan on duty unit remains "ON" when alarm checked-in.
	O	Y	10V	Y	O	Y		Comp. & fan on duty unit remains "ON" when alarm checked-in.
	Y	O	1.0V	N/A	Y			Comp. & fan drop off on duty unit and unit swap when alarm checked-in
	Y	Y	1.0V	N/A	Y			Comp. & fan drop off on duty unit and unit swap when alarm checked-in
Liquid High Limit	O	O	10V	Y	O	Y		Default (Unchecked). Comp. and fan remain "ON" when alarm checked in.
	Y	O	1.0V	N/A	Y			Comp. & fan drop off on duty unit and unit swap when checked-in
	Y	Y	1.0V	N/A	Y			Comp. & fan drop off on duty unit and unit swap when alarm checked-in
	O	Y	10V	Y	O	Y		Comp. & fan on duty unit remains "ON" when alarm checked-in.
Power Phase Loss	Y	O	0	N/A	Y			Default (Unchecked). Comp. & fan drop off on duty unit and unit swap when checked in.
	Y	Y	0	N/A	Y			Comp. & fan drop off on duty unit and unit swap when checked in.
	O	Y	0	N/A	O	Y		Comp. & fan drop off on duty unit and back up unit would be "ON" by Hi-temp. when checked in.
	O	O	0	N/A	O	Y		Comp. & fan drop off on duty unit and back up unit would be "ON" by Hi-temp. when checked in.
Comp. 1 & 2 Hi-Press.	O	O	10V	Y	O			Default: Comp. drop off on H.P. and 2nd comp. remains one on 'Dual' unit. Unit swap on Single unit.
	Y	Y	1.0V	N/A	Y			Comp.(s) & fan drop off on duty unit and unit swap.
	Y	O	1.0V	N/A	Y			Comp.(s) & fan drop off on duty unit and unit swap.
	O	Y	10V	N/A	O			Unit swap on Single unit, H.P. comp. drop off on duty unit and keep 2nd one ON on 'Dual' unit.
Comp. 1 & 2 Low-Press.	O	O	10V	Y	O	Y		Default: comp. drop off on Low pressure while fan and 2nd comp. keep running on dual unit.
	O	Y	10V	Y	O			Duty comp. drop off & "Auto" reset on pressure. No unit swap.
	Y	Y	1.0V	N/A	Y			Duty unit drop off and unit swap.
	Y	O	1.0V	N/A	Y			Duty unit drop off and unit swap.
Overload Comp. 1/2	O	O	10V	Y	O			Default: Comp. drop off. Fan & 2nd comp. keep running on dual. Back up unit turned on by Hi-Temp.
	O	Y	10V	Y	O			Comp. drop off. Fan & 2nd comp. keep running. Back up unit turned on by Hi-Temp.
	Y	O	1.0V	N/A	Y			Duty unit drop off and unit swap.
	Y	Y	1.0V	N/A	Y			Duty unit drop off and unit swap.
Hi-Temp. Ret. Air	O	Y	10V	Y	N/A			Default: Back up unit starts up on Hi-Temp. and then drop off when temp. reach set point.
	Y	O	1.0V	O	O		Y	Duty unit will shutdown and no units will be running.
	Y	Y	1.0V	N/A	Y			Duty unit drop off and unit swap.
	O	O	10V	Y	N/A			Back up unit comes on by Hi-Temp. then drop off when temp. reach set point.

Advanced M-52 Co-work functioning chart

Lo-Temp. Ret. Air	O	Y	8.0V	N/A	O	Y	Default. Nothing happen
	Y	O	1.0V	N/A	Y		Duty unit drop off and unit swap.
	O	O	8.0V	N/A	O	Y	Nothing happen
	Y	Y	1.0V	N/A	Y		Duty unit drop off and unit swap.
Hi-Humid. Ret. Air	O	Y	10V	N/A	N/A		Default. Back up unit comes on by Hi-Humid alarm, then drop off when temp. reach set point.
	Y	O	1.0V	O	O	Y	No units will be running.
	O	O	10V	N/A	N/A		Back up unit comes on by Hi-Humid alarm, then drop off when temp. reach set point.
	Y	Y	1.0V	N/A	Y		Duty unit drop off and unit swap.
Lo-Humid. Ret. Air	O	Y	6.5V@CL & 8.0V@HT	Y	O		Default. Back up unit comes on by Hi-temp. only
	Y	Y	10V@CL & 8.0V@HT	Y	O		Back up unit comes on by Hi-temp. only
	Y	O	6.5V@CL & 8.0V@HT	Y	O		Back up unit comes on by Hi-temp. only
	O	O	10V@CL & 8.0V@HT	Y	O		Back up unit comes on by Hi-temp. only
Loss of Ret. Sensor	Y	Y	1.0V	N/A	Y		Default. Unit continues to run without sensor for 3 more minutes then shutdown and unit swap.
	Y	O	1.0V	N/A	Y		Unit continues to run without sensor for 3 more minutes then shutdown and unit swap.
	O	Y	8.0V	Y	O		Unit continues to run on last command for 3 more minutes. Back up unit will be on by Hi-temp.
	O	O	8.0V	Y	O		Unit continues to run on last command for 3 more minutes. Back up unit will be on by Hi-temp.
Hi-Sup. Air Temp.	O	O	10V	Y	N/A		Default (Unchecked). Back up unit comes on by Hi-temp when alarm checked-in.
	Y	O	1.0V	N/A	Y		Unit shutdown and unit swap.
	Y	Y	1.0V	N/A	Y		Unit shutdown and unit swap.
	O	Y	10V	Y	N/A		Back up unit comes on by hi-temp.
Lo-Sup. Air Temp.	O	O	8.0V	O	O	Y	Default (Unchecked). Unit keep running. No Back up or unit swap at all.
	Y	O	1.0V	N/A	Y		Duty unit shutdown and unit swap.
	Y	Y	1.0V	N/A	Y		Duty unit shutdown and unit swap.
	Y	O	8.0V	O	O	Y	Unit keep running. No back up or unit swap at all.
Hi-Hum. Sup./Air	O	O	10V@CL & 8.0V@HT	N/A	N/A		Default (Unchecked). Unit keep running & back up comes on by Hi-Humid. Alarm
	Y	Y	1.0V	N/A	Y		Duty unit shutdown and unit swap.
	Y	O	10V@CL & 8.0V@HT	N/A	N/A		Unit keep running & back up comes on by Hi-Humid. Alarm.
	O	Y	10V@CL & 8.0V@HT	N/A	N/A		Unit keep running & back up comes on by Hi-Humid. Alarm.
Lo-Hum. Sup./Air	O	O	10V@CL & 8.0V@HT	N/A	N/A		Default (unchecked). Unit keep running. no back up unit or unit swap.
	Y	Y	1.0V	N/A	Y		Unit shut down and unit swap.
	Y	O	1.0V	N/A	Y		Unit shut down and unit swap.
	O	Y	10V@CL & 8.0V@HT	N/A	N/A		Unit keep running. no back up unit or unit swap.
Loss of Sup. Sensor	O	O	8.0V	O	O		Default (Unchecked). Unit continue to be on last command for 3 more minutes then only fan runs & no back up.
	Y	O	1.0V	N/A	Y		Unit continues to run on last command and shutdown then unit swap.
	Y	Y	1.0V	N/A	Y		Unit continues to run on last command and shutdown then unit swap.
	O	Y	8.0V	O	O		Unit continue to run on last command for 3 more minutes then only fan runs, no back up or unit swap.
High Voltage	O	O	10V@CL & 8.0V@HT	Y	O	Y	Default. Unit just keep running.
	Y	O	1.0V	N/A	Y		Unit shutdown and unit swap.
	O	Y	10V@CL & 8.0V@HT	Y	O		Only fan just keep running.
	Y	Y	1.0V	N/A	Y		Unit shutdown and unit swap.
Low Voltage	O	O	10V@CL & 8.0V@HT	Y	O	Y	Default. Unit keep running..
	Y	O	1.0V	N/A	Y		Unit shutdown and unit swap.
	O	Y	10V@CL & 8.0V@HT	Y	O		Fan keep running on duty unit.
	Y	Y	1.0V	N/A	Y		Unit shutdown and unit swap.
Custom Fault 1	O	O	10V	Y	N/A		Default (Unchecked). Back up unit comes on by Hi-temp alarm.
	Y	O	1.0V	N/A	Y		Unit shut down and unit swap.
	O	Y	10V	O	O	Y	Unit keep running. no back up unit on Hi-temp.
	Y	Y	1.0V	N/A	Y		Unit shut down and unit swap.

Advanced M-52 Co-work functioning chart

Custom Fault 2	O	O	10V	Y	N/A			Default (Unchecked). Back up unit comes on by Hi-temp alarm.
	Y	O	1.0V	N/A	Y			Unit shut down and unit swap.
	O	Y	10V	O	O	Y		Unit keep running, no back up unit on Hi-temp.
	Y	Y	1.0V	N/A	Y			Unit shut down and unit swap.
Loss of EX 1	O	Y	10V	O	O	Y		Default. Fan keep running and no back up unit on Hi-temp.
	Y	Y	1.0V	N/A	Y			Unit shut down and unit swap.
	Y	O	1.0V	N/A	Y			Unit shut down and unit swap.
	O	O	10V	O	O	Y		Fan keep running and no back up unit on Hi-temp.
Loss of EX 2	O	Y	10V	O	O	Y		Default. Fan keep running and no back up unit on Hi-temp.
	Y	Y	1.0V	N/A	Y			Unit shut down and unit swap.
	Y	O	1.0V	N/A	Y			Unit shut down and unit swap.
	O	O	10V	O	O	Y		Fan keep running and no back up unit on Hi-temp.
Filter Drier Dirty	O	Y	10V	O	O	Y		Default. Compressors keep running and no back up unit on Hi-temp.
	Y	Y	1.0V	N/A	Y			Unit shutdown and unit swap.
	O	O	10V	O	O	Y		Compressors keep running and no back up unit on Hi-temp.
	Y	O	1.0V	N/A	Y			Unit shutdown and unit swap.

LEGEND:



Enable option Key



Unit Shutdown option key



Standby Enable option key

Y

Selected

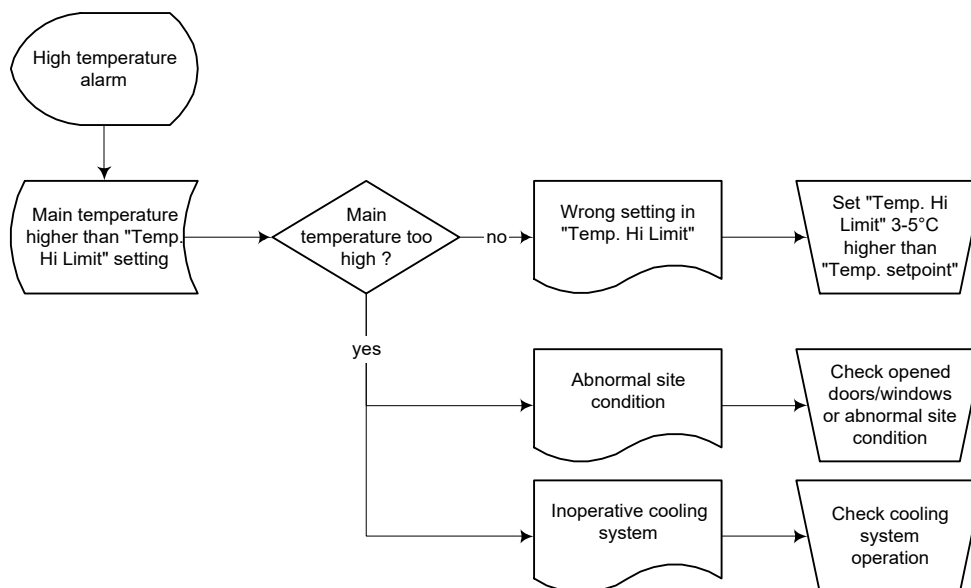
O

Not Selected

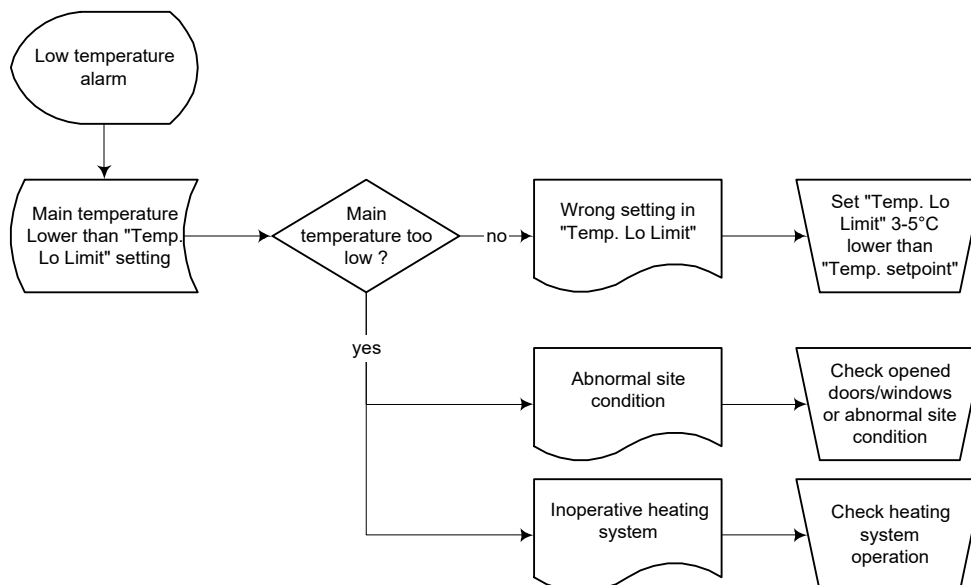
Fault Finding

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.

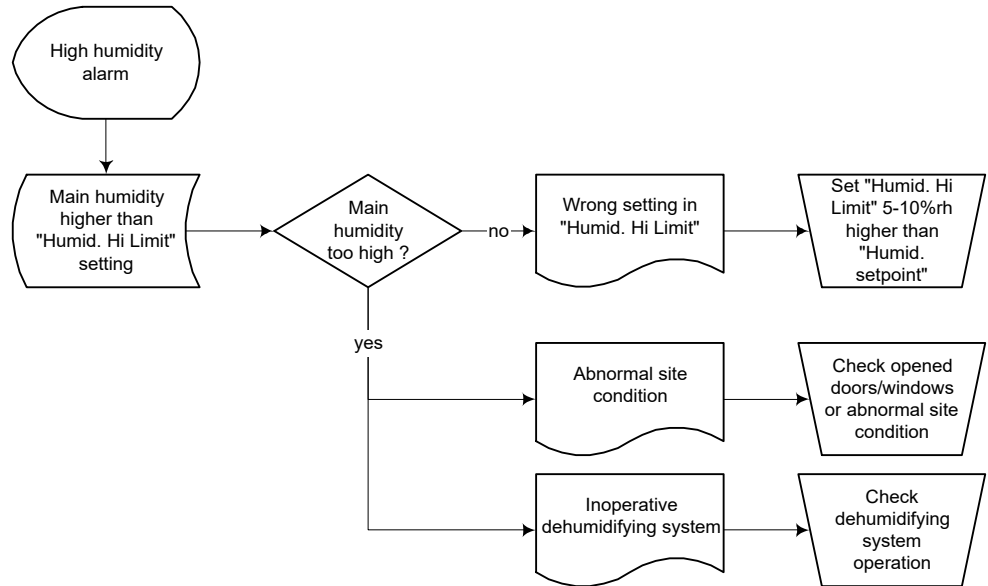
High Temperature Alarm



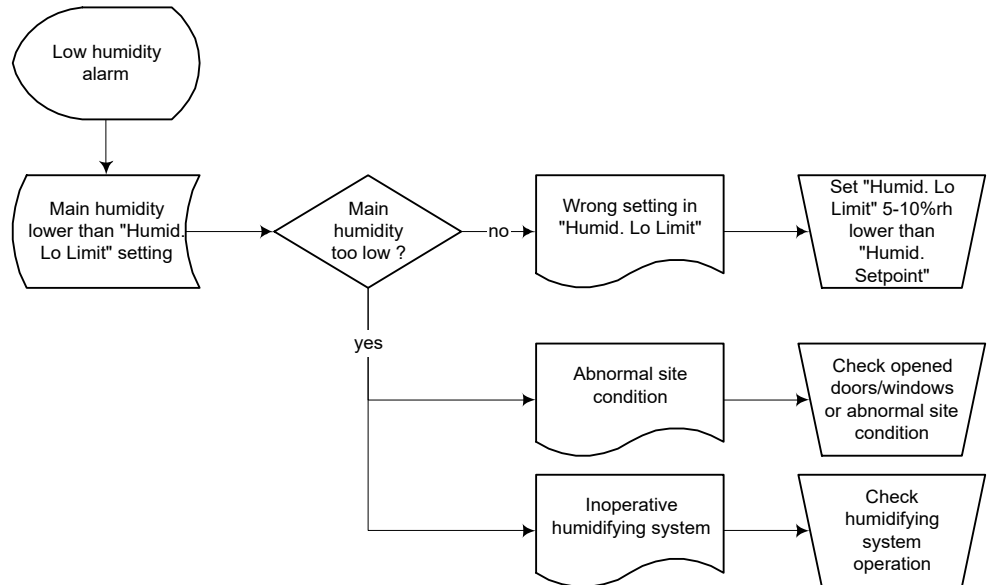
Low Temperature Alarm



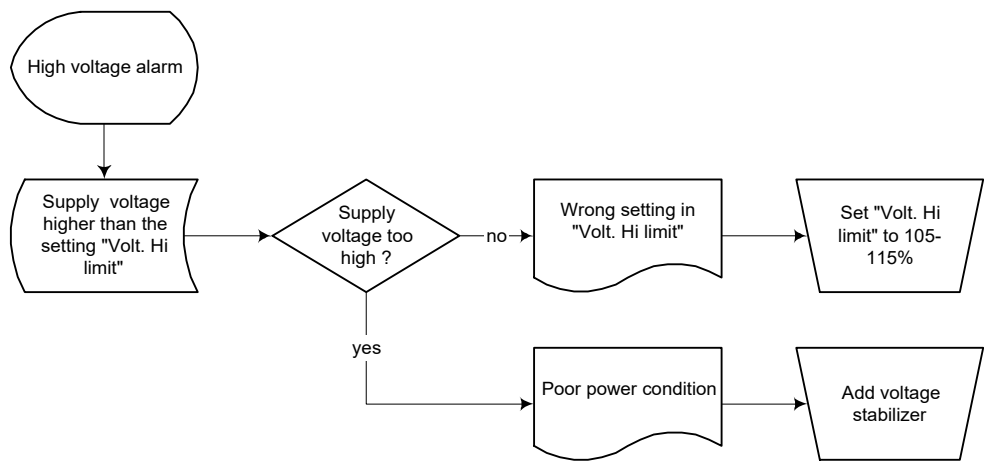
High Humidity Alarm



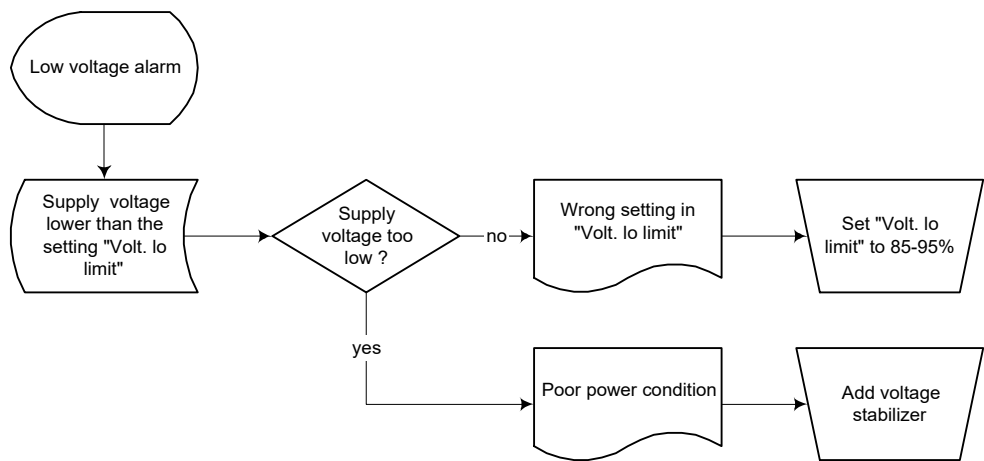
Low Humidity Alarm



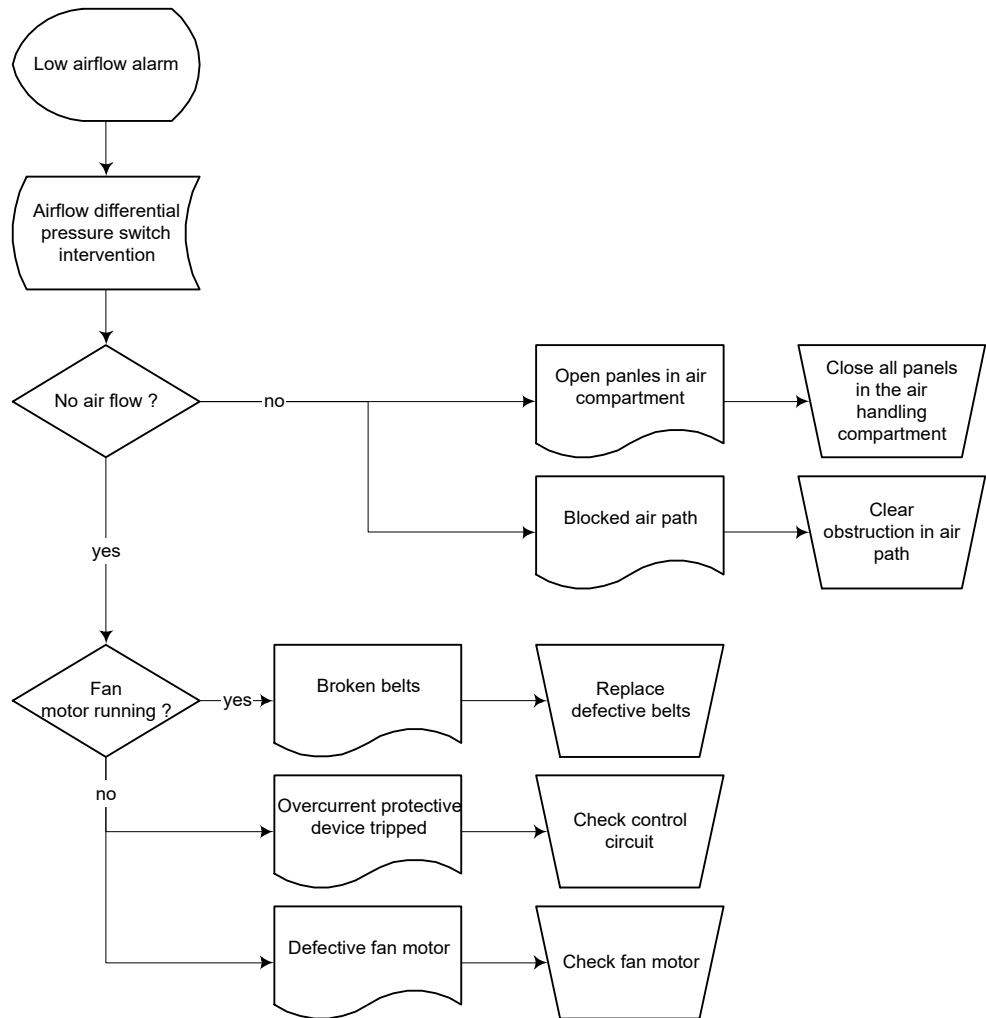
High Voltage Alarm



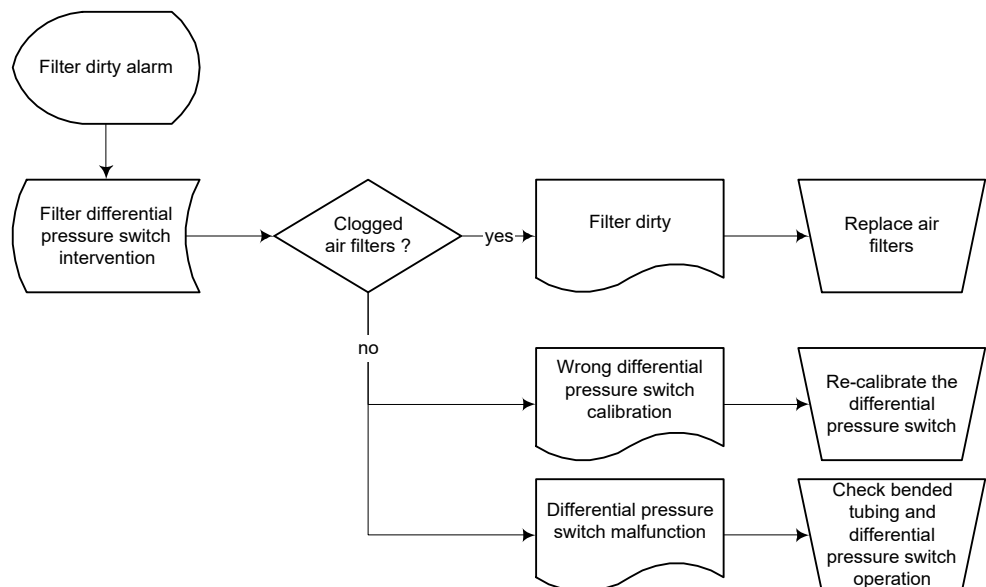
Low Voltage Alarm



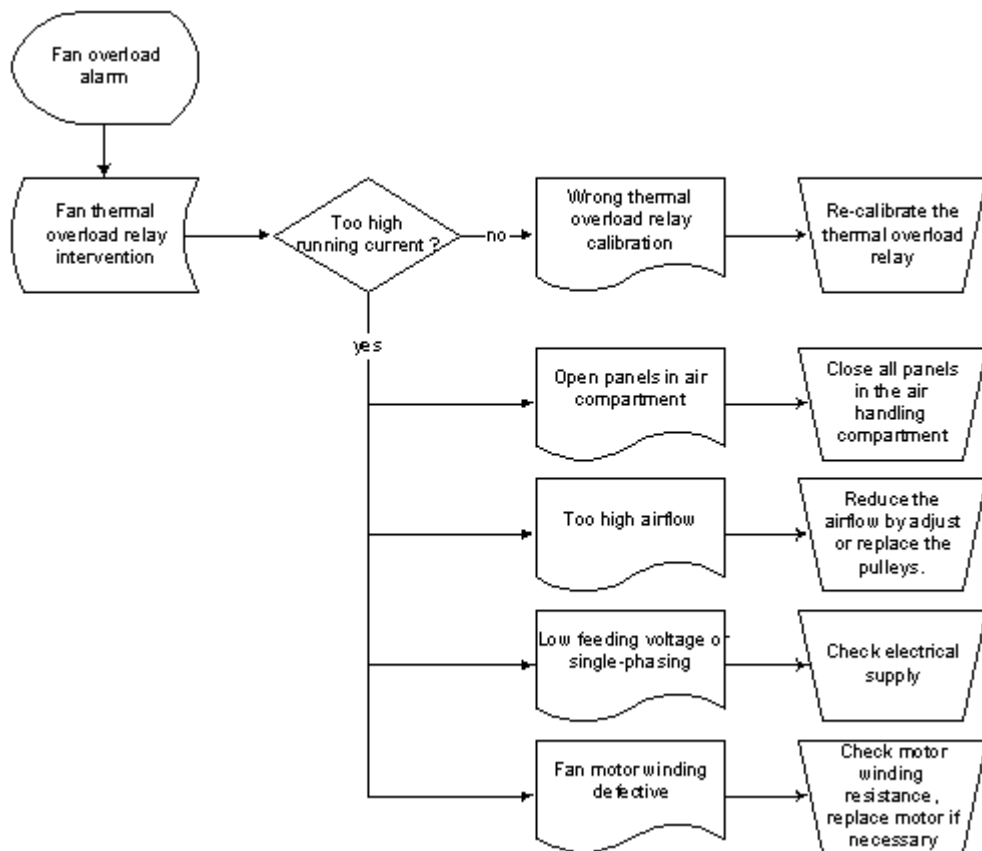
Low Airflow Alarm



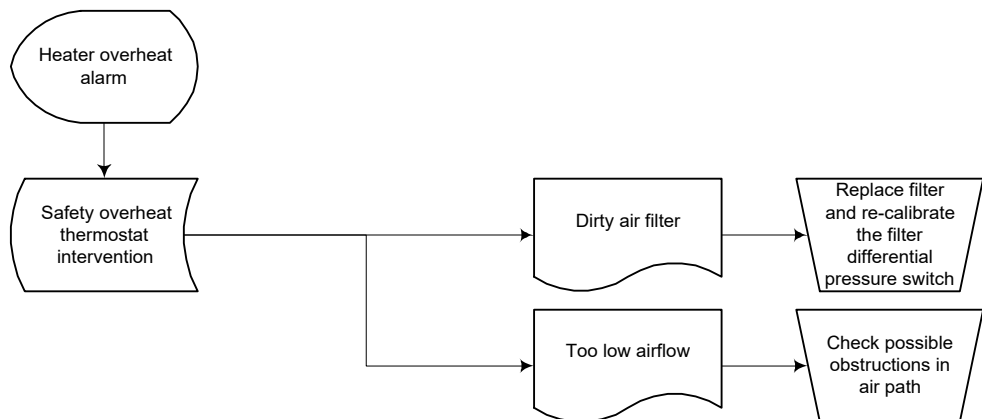
Filter Dirty Alarm

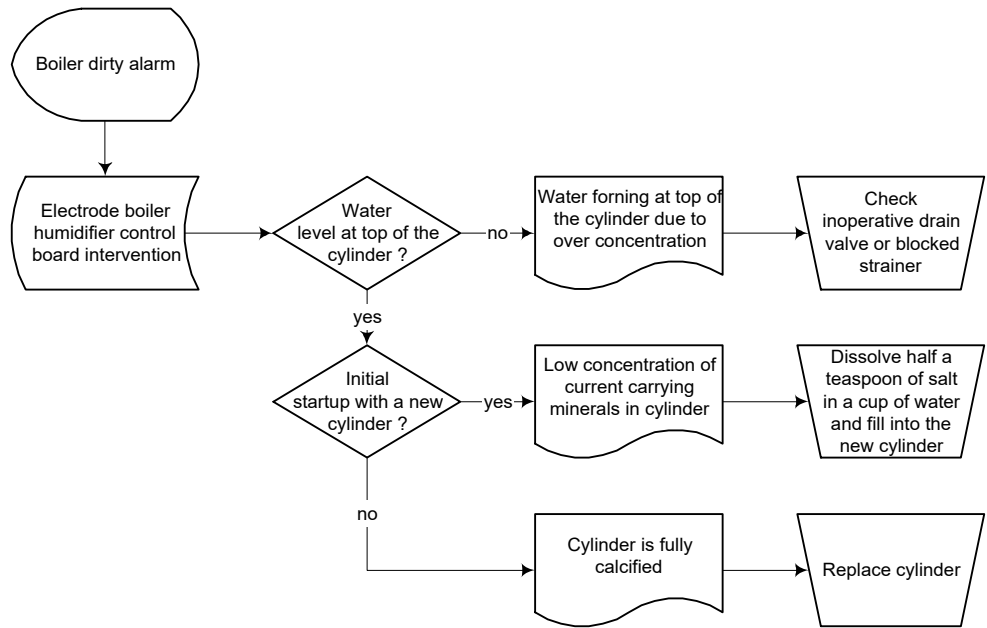


Fan Overload Alarm

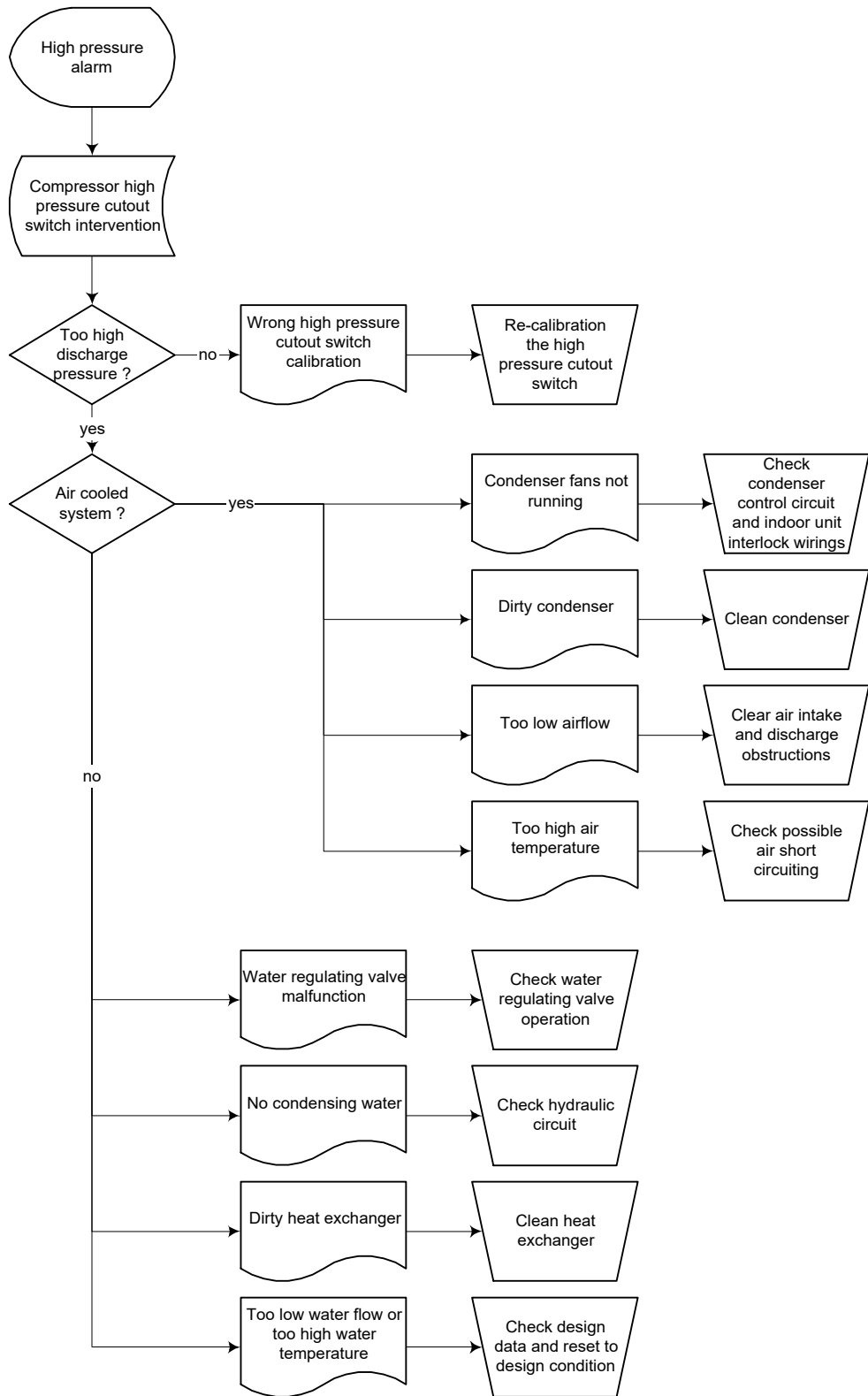


Heater Overheat Alarm

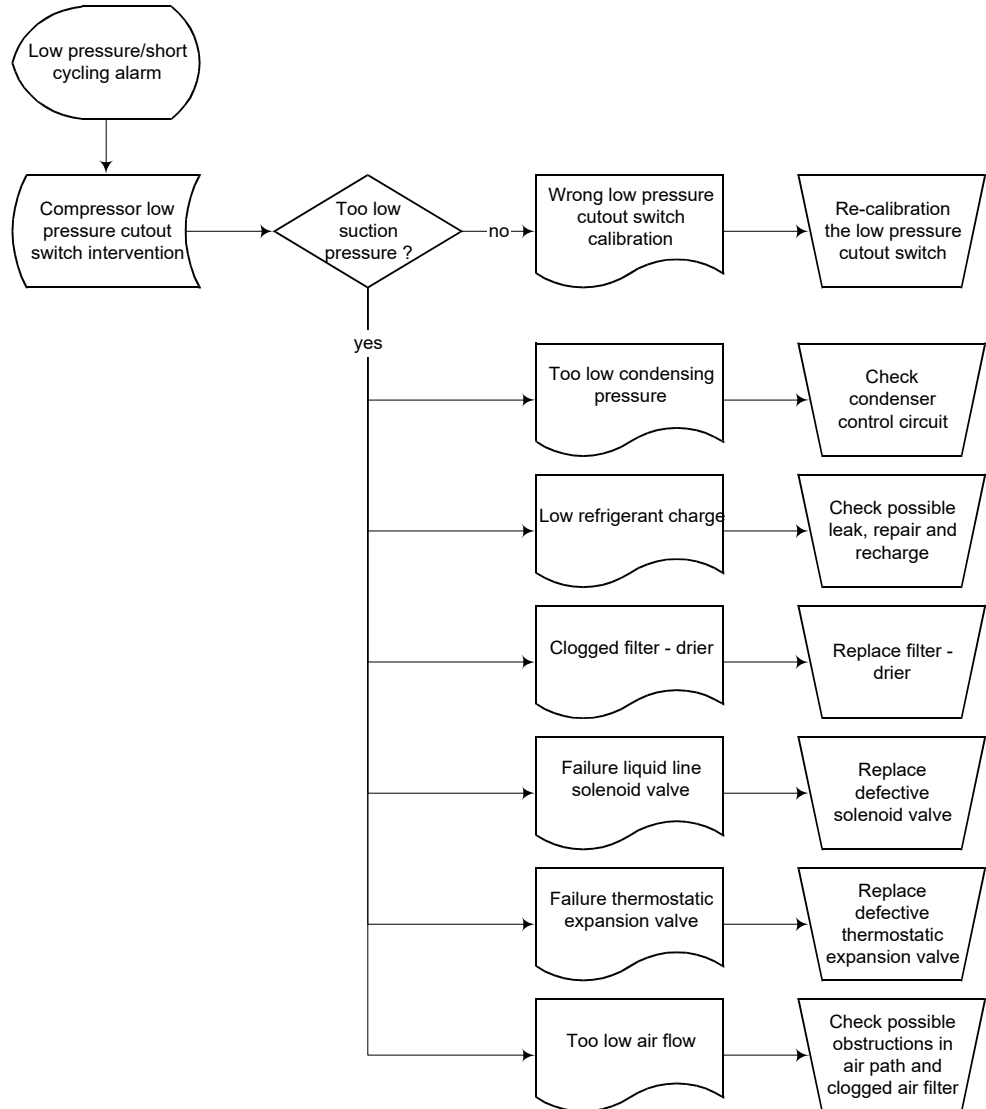


Boiler Dirty Alarm

High Pressure Alarm

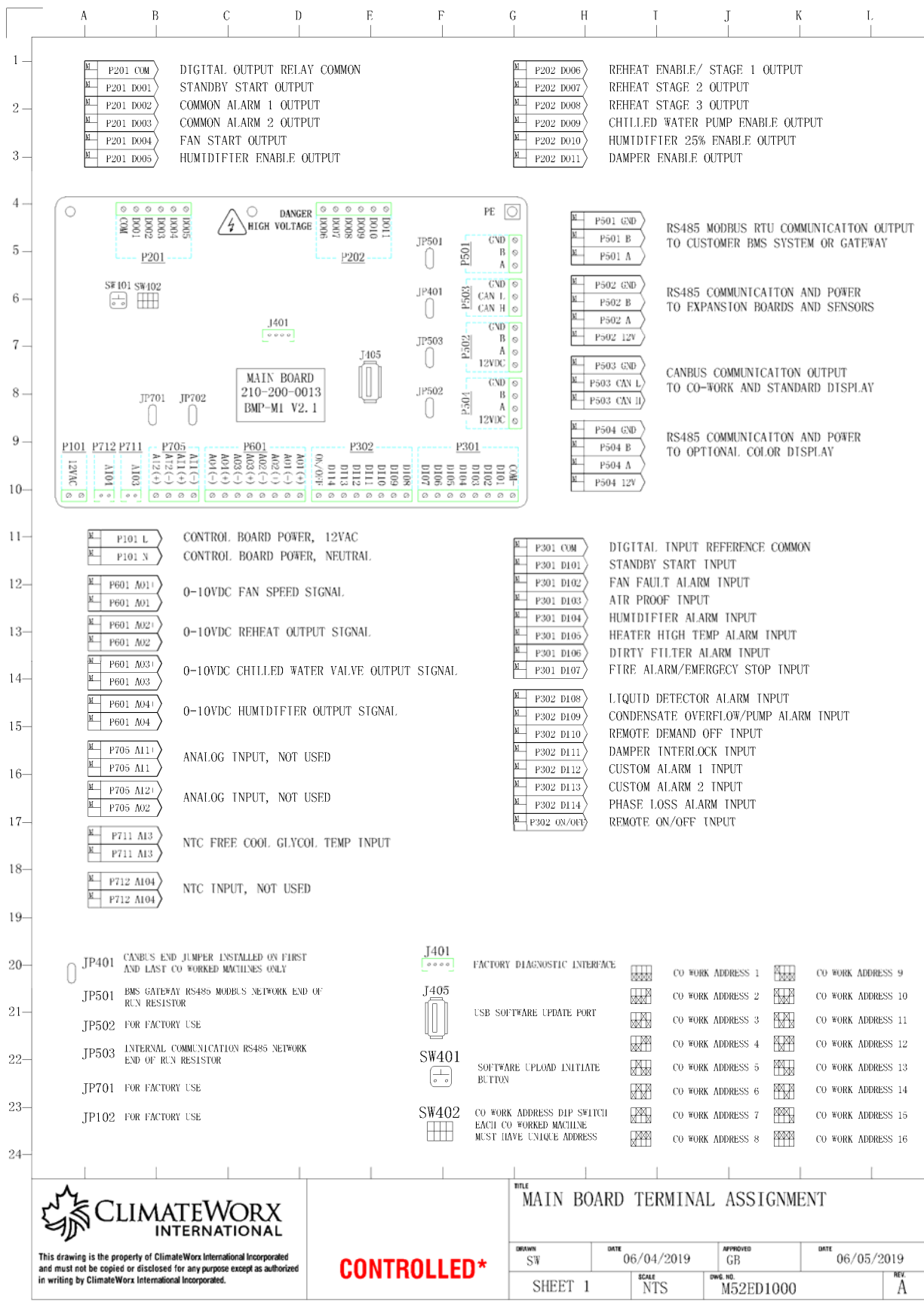


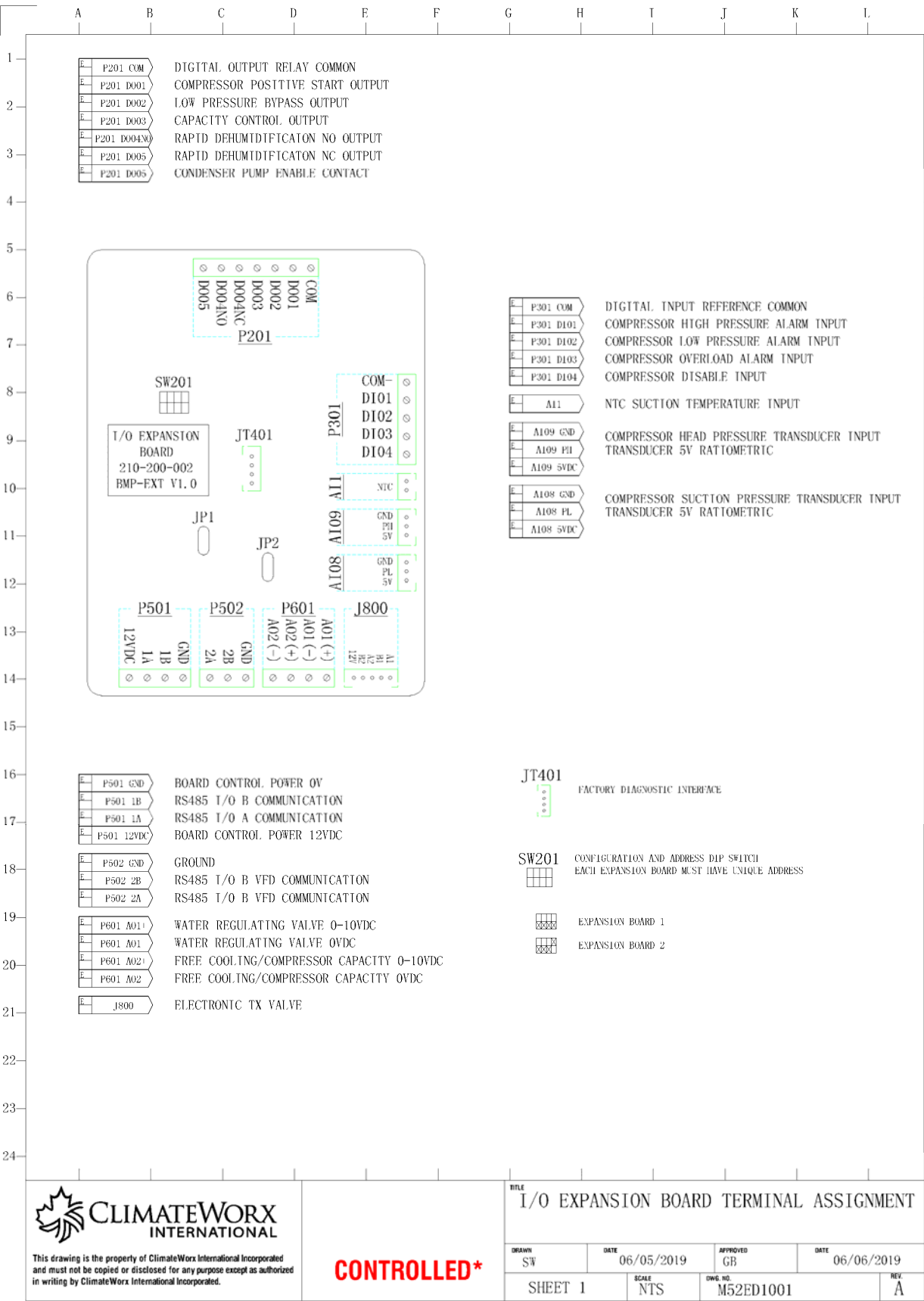
Low Pressure or Short Cycling Alarm

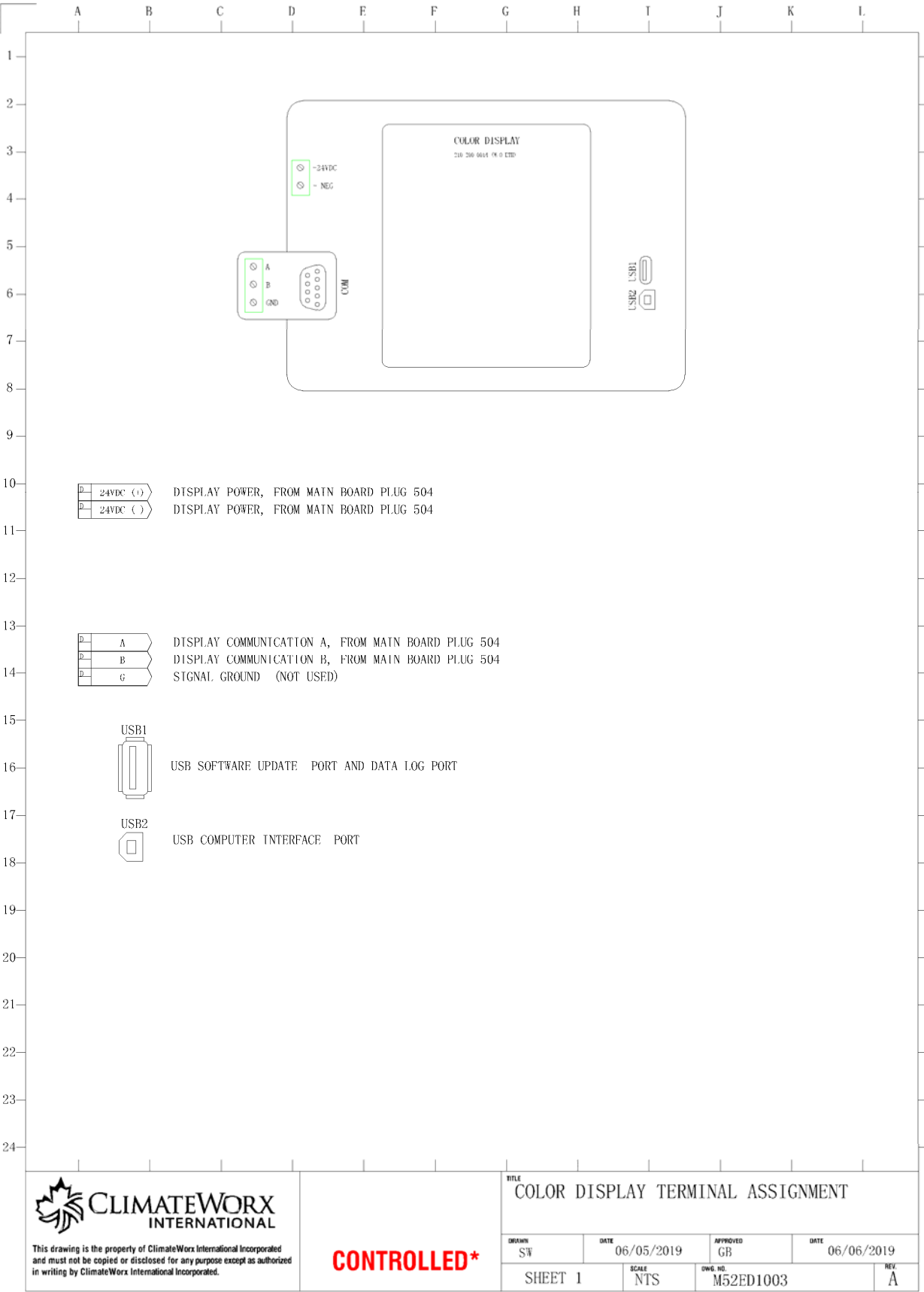


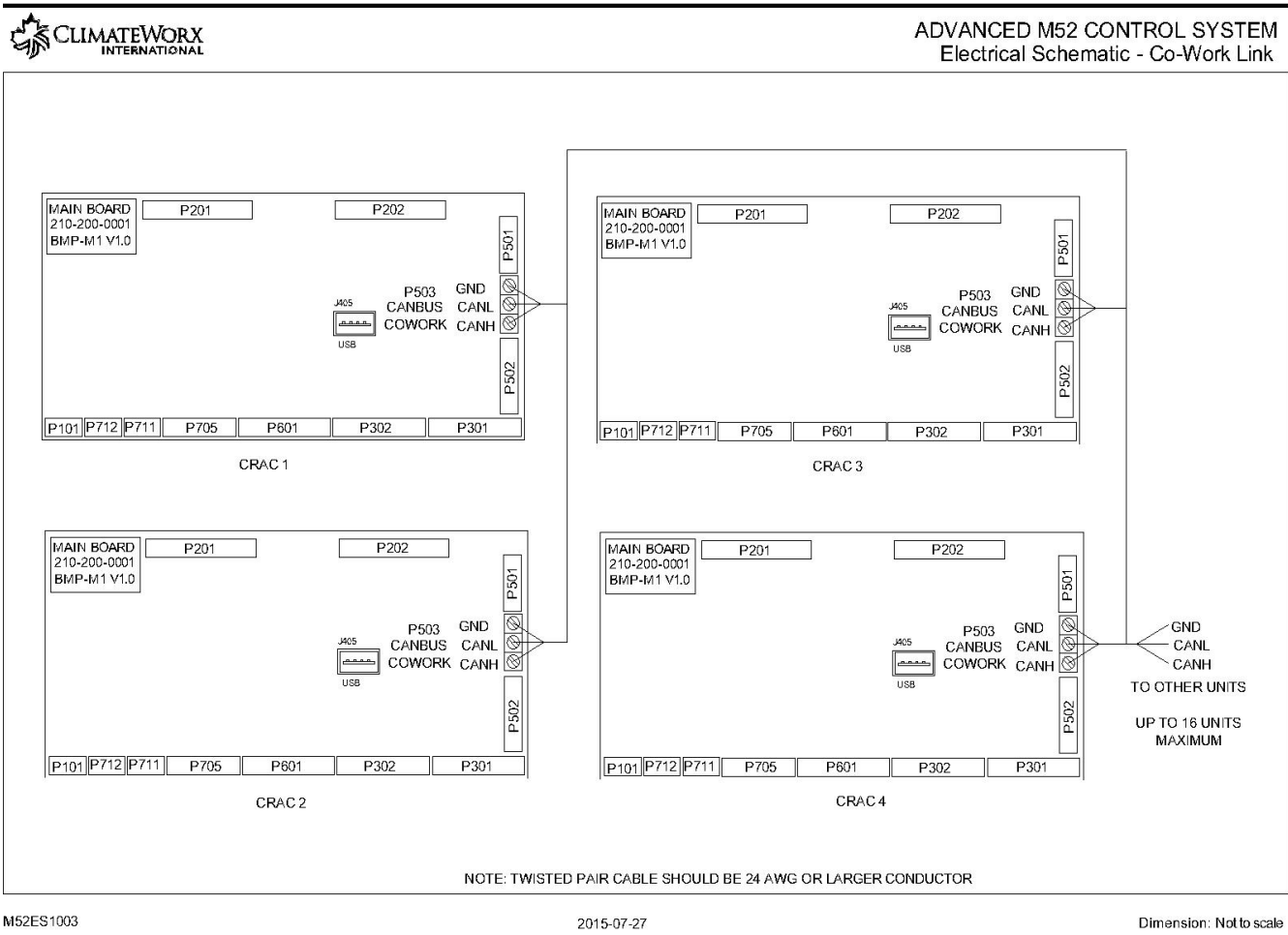
Appendix A: Electrical Schematic Diagrams

<u>Drawing Title</u>	<u>Drawing no.</u>	<u>Page No.</u>
Main Board Terminal Assignment	M52ED1000	63
Expansion Board Terminal Assignment	M52ED1001	64
Display Terminal Assignment	M52ED1002	65
Electrical Schematic – Co-Work Interconnection Link	M52ES1003	66
Electrical Schematic - RS485 Serial Communication Link	M52ES1004	67



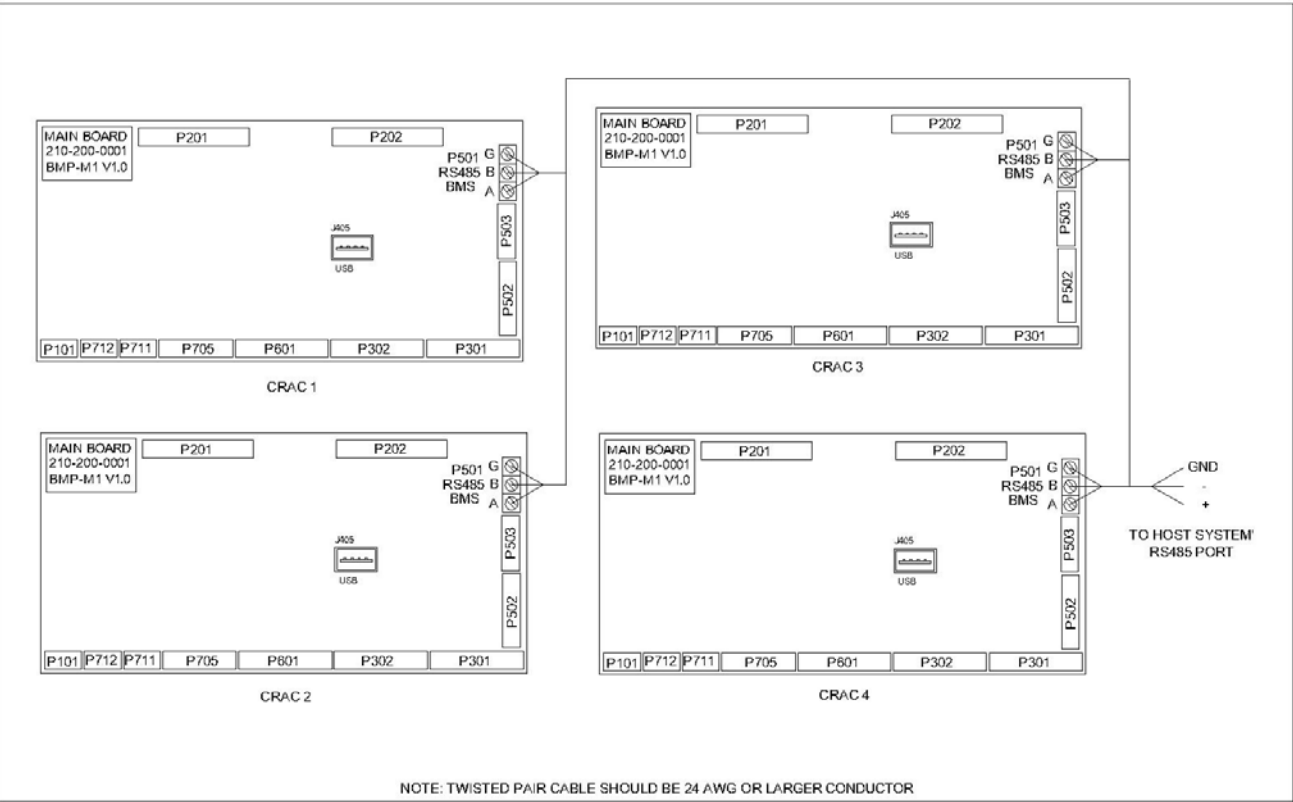








ADVANCED M52 CONTROL SYSTEM
Electrical Schematic - RS485 ModBus RTU to Serial Communication Link



M52ES1004

2015-07-27

Dimension: Not to scale

Notes:

