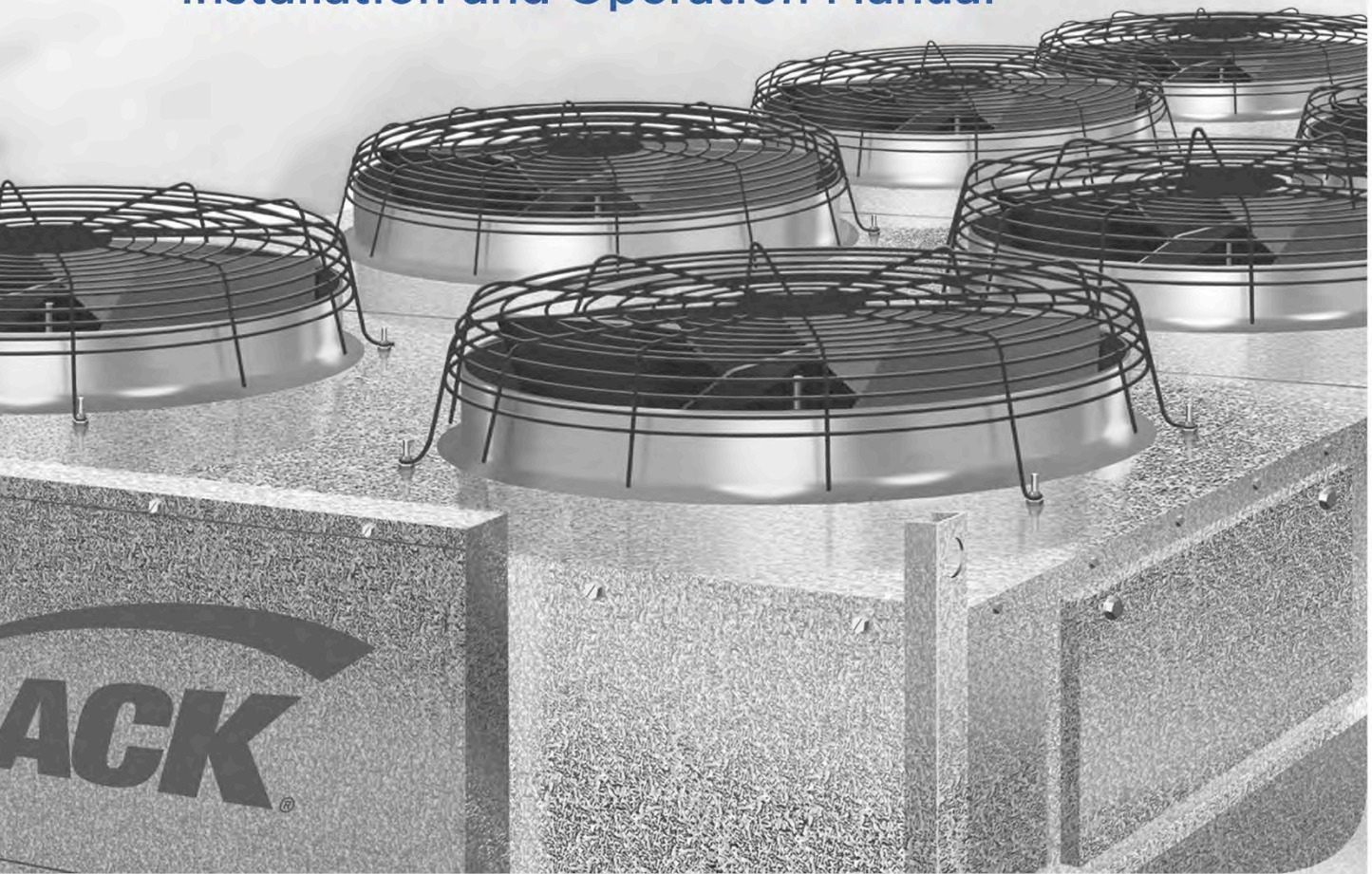




Levitor II

AIR-COOLED CONDENSER
(Available for Fluid Cooler Applications)

Installation and Operation Manual



Part Number: E208035_M

Products that provide lasting solutions.



BEFORE YOU BEGIN

Read the safety information completely and carefully.



The precautions and use of the procedures described herein are intended to use the product correctly and safely. Comply with the precautions described below to protect you and others from possible injuries. Relative to their potential danger, the relevant matters are divided into four parts as defined by ANSI Z535.5

ANSI Z535.5 DEFINITIONS



• **DANGER** – Indicate[s] a hazardous situation which, if not avoided, will result in death or serious injury.



• **WARNING** – Indicate[s] a hazardous situation which, if not avoided, could result in death or serious injury.



• **CAUTION** – Indicate[s] a hazardous situation which, if not avoided, could result in minor or moderate injury.

• **NOTICE** – *Not related to personal injury* – Indicates[s] situations, which if not avoided, could result in damage to equipment.

Environmental Concerns

Hussmann recommends responsible handling of refrigerants that contain Chlorine, Fluorine and Carbon (CFCs) and those that contain Hydrogen, Chlorine, Fluorine, and Carbon (HCFCs). Only certified technicians may handle these refrigerants. All technicians must be aware and follow the requirements set forth by the Federal Clean Air Act (Section 608) for any service procedure being performed on this equipment that involves refrigerant. Additionally, some states have other requirements that must be adhered to for responsible management of refrigerants.



WARNING

PERSONAL PROTECTION EQUIPMENT (PPE)

Only qualified personnel should install and service this equipment. Personal Protection Equipment (PPE) is required whenever servicing this equipment. Wear safety glasses, gloves, protective boots or shoes, long pants, and a long-sleeve shirt as required when working with this equipment. Observe all precautions on tags, stickers, labels and literature attached to this equipment.



CAUTION

Contractors shall strictly adhere to specifications provided by the Engineer of Record (EOR), as well as US Environmental Protection Agency regulations, OSHA regulations, and all other federal, state and local codes. This work should only be done by qualified, licensed contractors. There are numerous hazards, not limited to, but including: burns due to high temperatures, high pressures, toxic substances, electrical arcs and shocks, very heavy equipment with specific lift points and structural constraints, food and product damage or contamination, public safety, noise, and possible environmental damage. Never leave operating compressors unattended during the manual soft-start process. Always power rocker switches off when unattended.

Table 26 ADVANCED TAB DESCRIPTION

Field	Description
KW Load	A reference for power monitoring system regarding total amount of KW used by the condenser system (including fans, pumps, etc).
Setpoint Pos	Refers to where the setpoint lies within the Throttling Range.
P-Gain	Determines how large the P mode of the PID will be.
I-Gain	Determines how large the I mode of the PID will be.
D-Gain	Determines how large the D mode of the PID will be.
Emergency Out	Indicates the % of fan capacity at which the condenser will operate when the emergency override input is low.
Inverter Prior	Defines the priority level of the alarm generated when the variable-speed fan inverter fails.
Demand Bump	The amount that will be added to the control setpoint when the demand shed input is ON.
Multi Alm Type	Displays the multiple alarm advisory types of the Enhanced Suction Group application.

8.2.3.1.4 ANALOG COMBINER

Analog combiner application reads data values from multiple inputs (up to sixteen), combines them using a user-defined combination strategy and sends the combined value to the desired application input.

We are utilizing the analog combiner application to monitor and limit the maximum ambient temperature input to the condenser control application.

Figure 13 GENERAL TAB SCREENSHOT

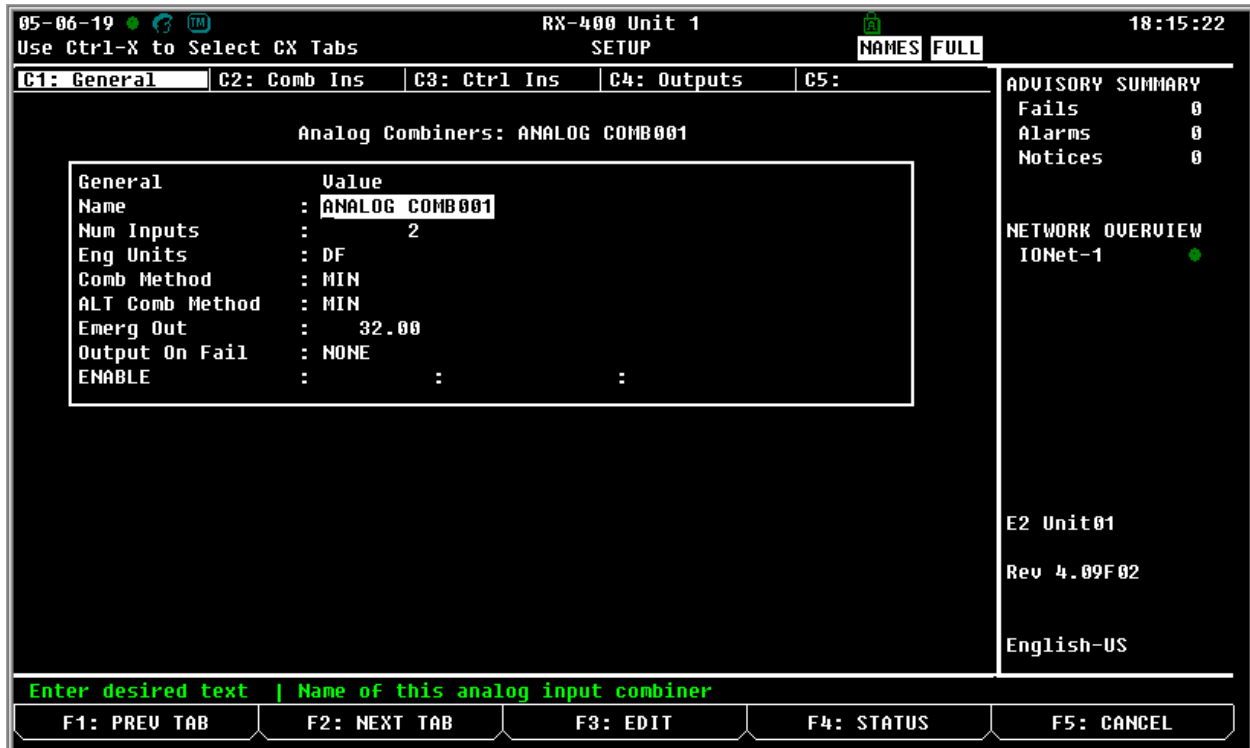


Table 27 GENERAL TAB DESCRIPTION

Field	Description
Name	Specify the name of the analog combiner application.
Num Inputs	Number of inputs that would be combined by the analog combiner.
Eng Units	Units for both the analog input and output values.
Comb Method	Selects MIN as the input combination strategy, which uses the lowest input value as the output.
ALT Comb Method	Strategy used when the use alt input is ON.
Emerg Out	Output will be overridden to this value whenever the EMERGENCY BYP input is low.
Output on Fail	Not used
ENABLE	Not used.

Figure 14 COMB INS TAB SCREENSHOT



Table 28 COMB INS TAB DESCRIPTION

Field	Description
ANALOG INPUT1	Associated with the Outside Air Temperature (OAT) input.
ANALOG INPUT2	Specified to be a constant 100.00 as we needed to limit the analog input to a maximum allowed value.

Figure 15 CTRL INS TAB SCREENSHOT



Table 29 CTRL INS TAB DESCRIPTION

Field	Description
USE ALT	Input tells the analog combiner application whether to use the primary combination method (OFF) or the alternate combination method (ON).
EMERGENCY BYP	Input allows the user to override the analog combiner application's output to the value specified in the Emerg Out field.

Figure 16 OUTPUTS TAB SCREENSHOT

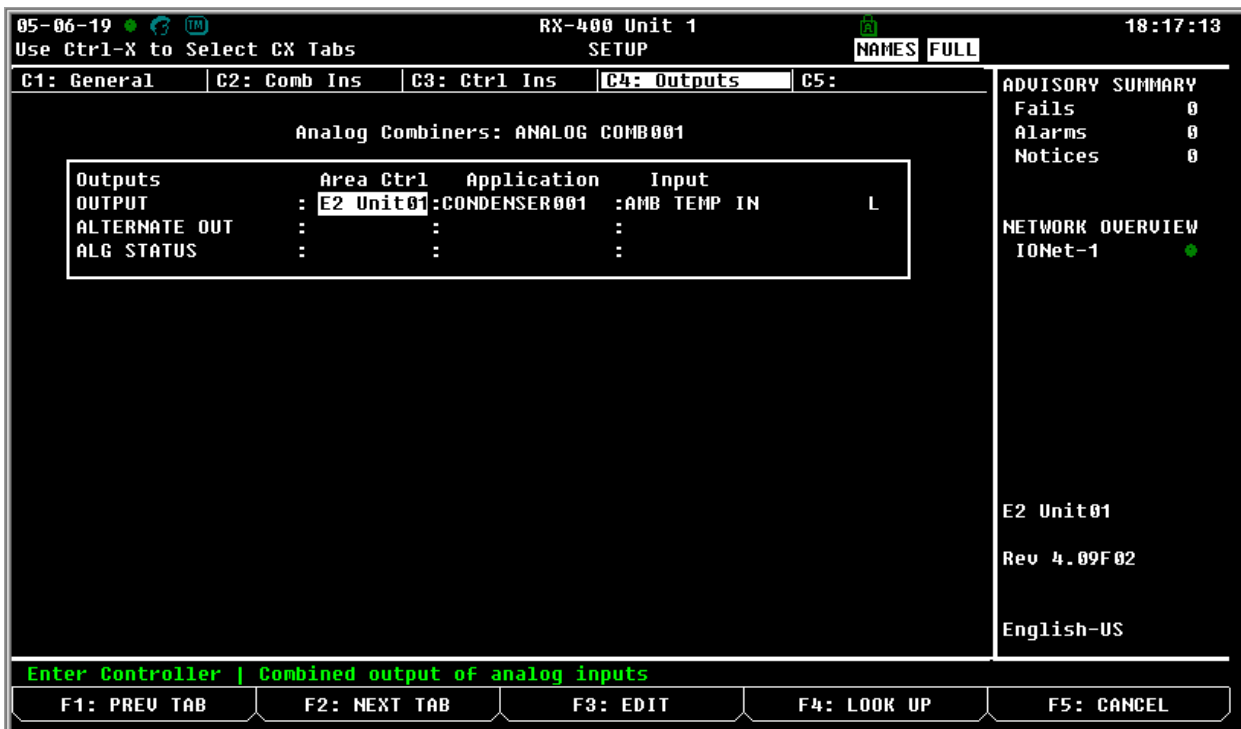


Table 30 OUTPUTS TAB DESCRIPTION

Field	Description
OUTPUT	Result of the combination of Analog Input 1 through Analog Input 16 using the primary method of combination (Comb Method) is sent to the output.
ALTERNATE OUT	Not used
ALG STATUS	Not used

8.2.3.1.5 FLEXIBLE COMBINER

Flexible combiner application combines up to eight analog and up to eight digital input values using programmed equations to provide up to provide up to eight analog outputs and four digital outputs.

We are utilizing the flexible combiner application to disable the second AO in split condenser mode.

Figure 17 GENERAL TAB SCREEN SHOT

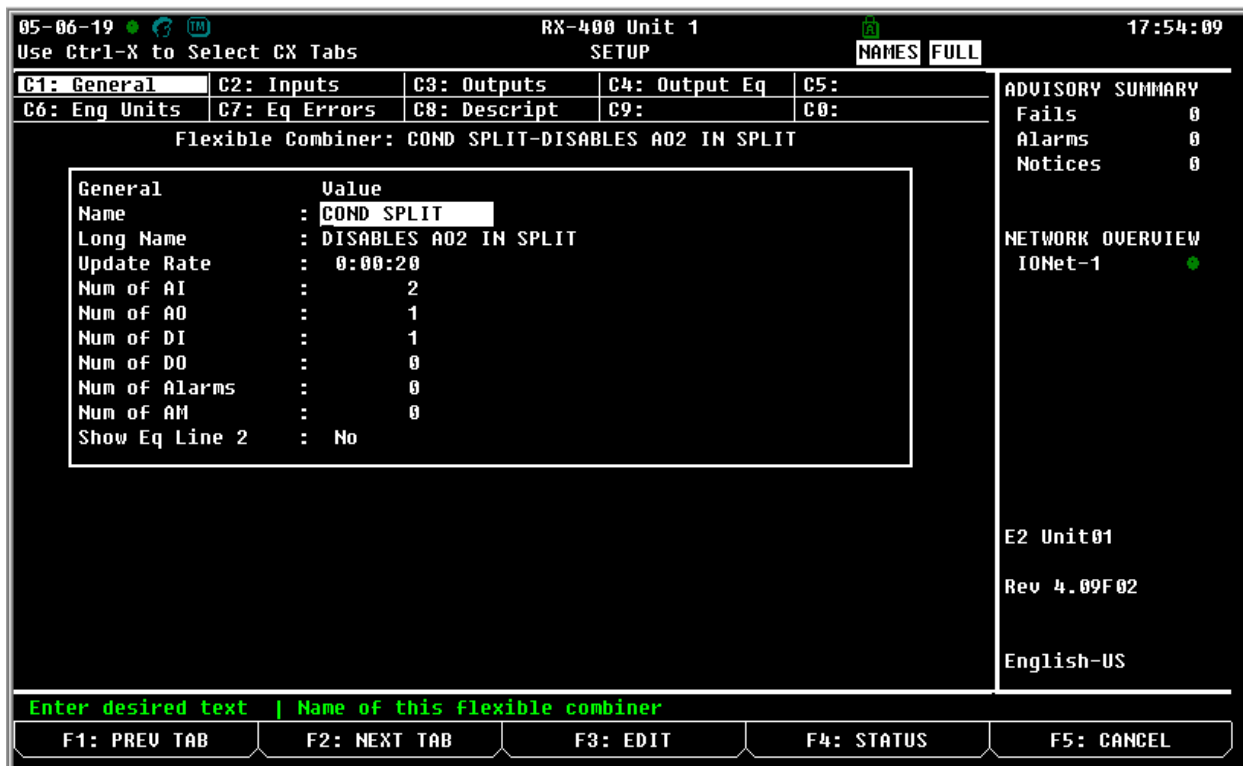


Table 31 GENERAL TAB DESCRIPTION

Field	Description
Name	Specify the name for flexible combiner application
Long Name	Specify further details if needed like functionality, etc.
Update Rate	Determines how fast this flexible combiner application within the E2 controller operates.
Num of AI	Define to use two analog inputs.
Num of AO	Define to provide one analog output.
Num of DI	Define to use one digital input.
Num of DO	Not used.
Num of Alarms	Not used.
Num of AM	Not used.
Show Eq Line 2	Not used.

Figure 18 INPUTS TAB SCREENSHOT

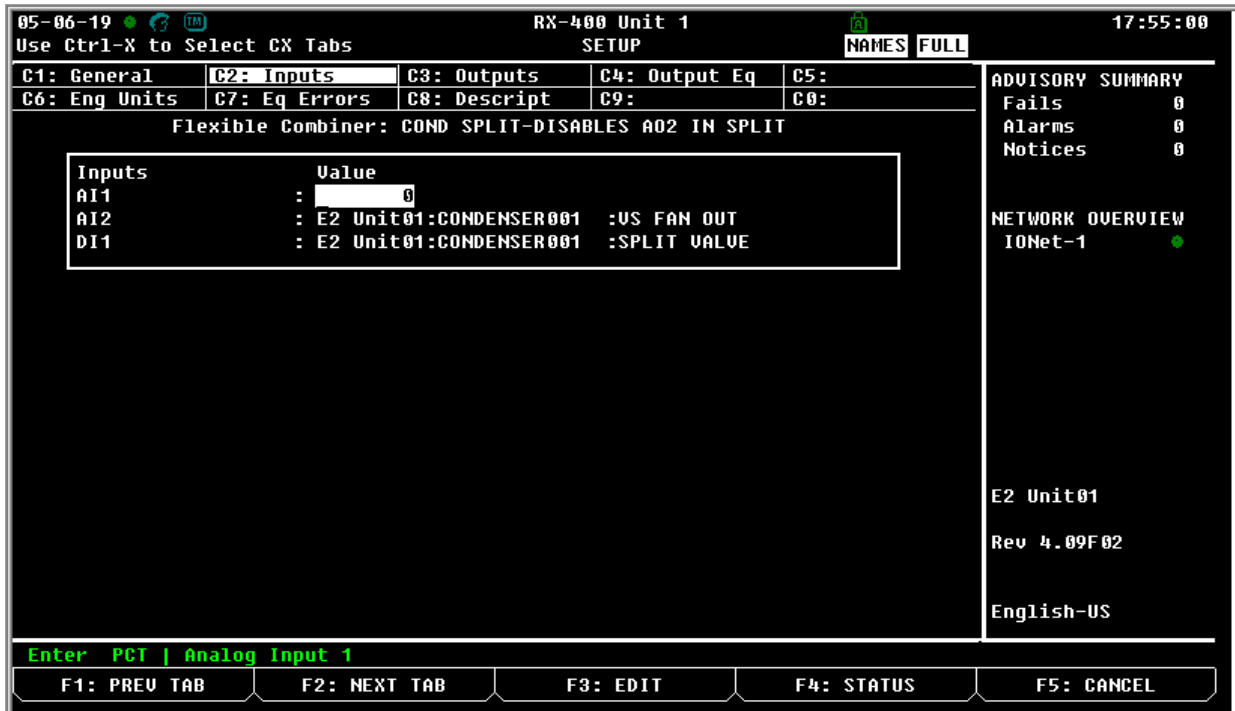


Table 32 INPUTS TAB DESCRIPTION

Field	Description
AI1	Specified to be a constant 0 as we need to turn of the analog output.
AI2	Associated with an analog output generated to control section 1 in the condenser application.
DI1	Associated with a digital output generated to control split valve in the condenser application.

Figure 19 OUTPUTS TAB SCREENSHOT

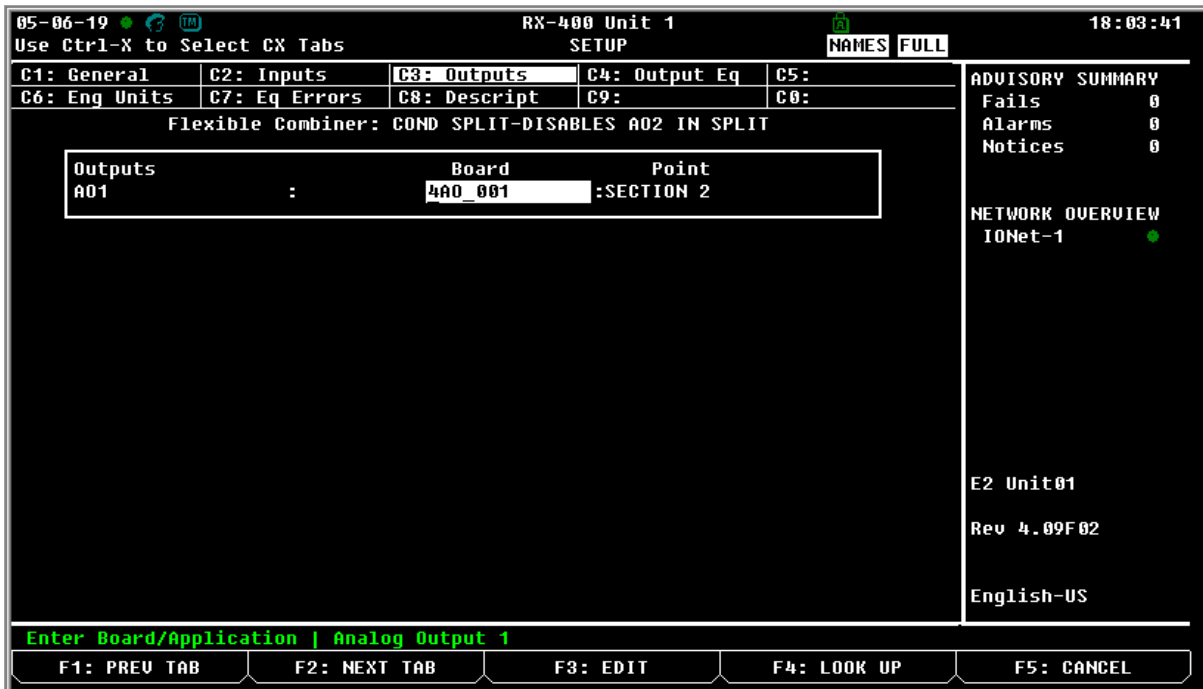


Table 33 OUTPUTS TAB DESCRIPTION

Field	Description
AO1	For our application this is associated to control the section 2 fans.

Figure 20 OUTPUT EQ TAB SCREENSHOT

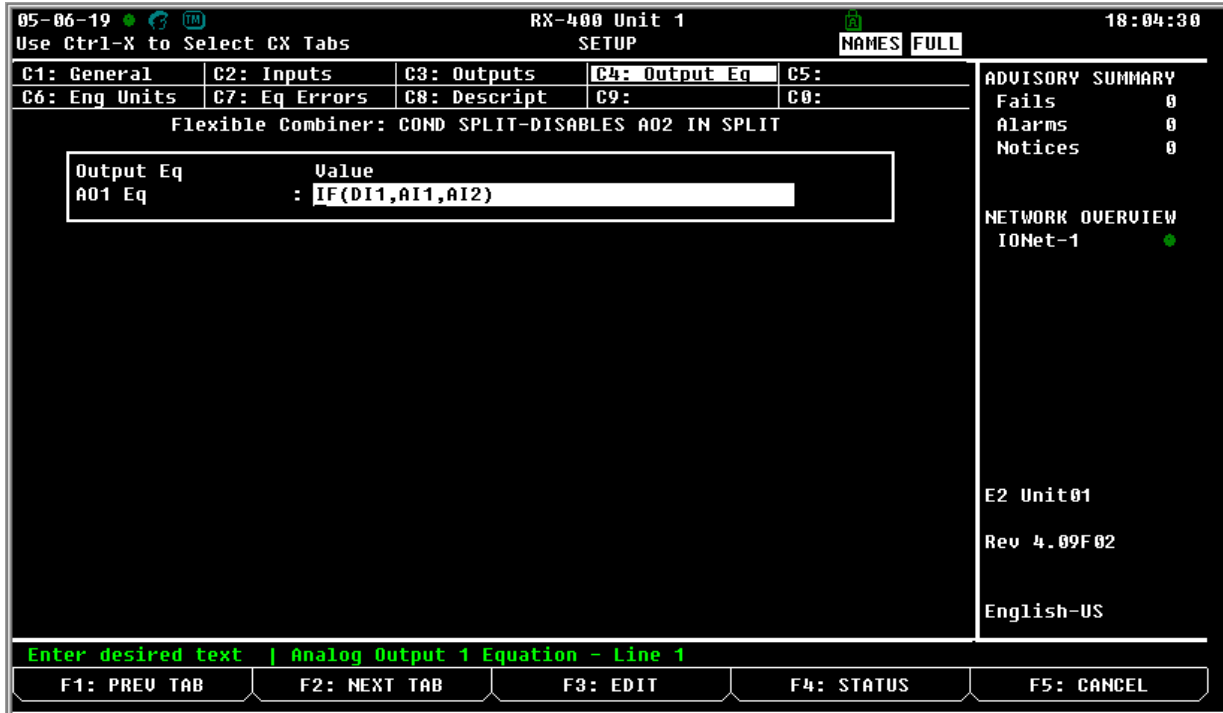


Table 34 OUTPUT EQ TAB DESCRIPTION

Field	Description
AO1 Eq	When the digital input 1 is ON, AO1 is set to AI1. When the digital input 1 is OFF, AO1 is set to AI2.

Figure 21 ENG UNIT TAB SCREENSHOT

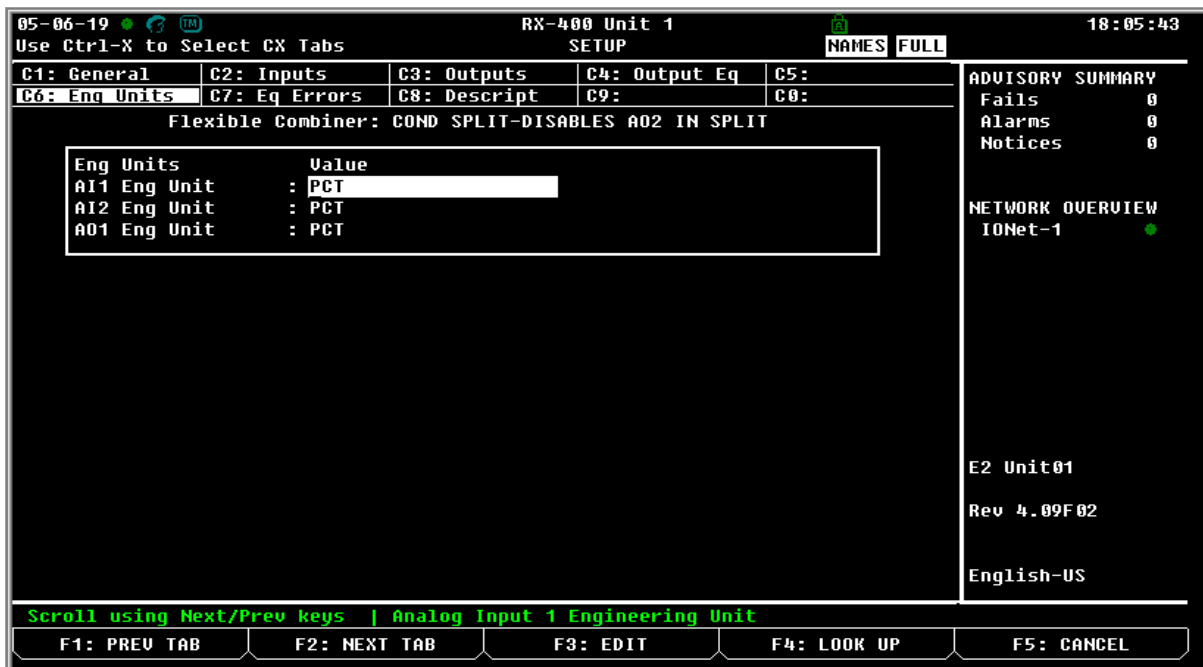


Table 35 ENG UNITS TAB DESCRIPTION

Field	Description
AI1 Eng Unit	Specifies the analog input 1 engineering units for flexible combiner. <i>Notes: For our application this is specified to be percentage.</i>
AI2 Eng Unit	Specifies the analog input 2 engineering units for flexible combiner. <i>Notes: For our application this is specified to be percentage.</i>
DI1 Eng Unit	Specifies the digital input 1 engineering units for flexible combiner. <i>Notes: For our application this is specified to be percentage.</i>

Figure 22 DESCRIPT TAB SCREENSHOT

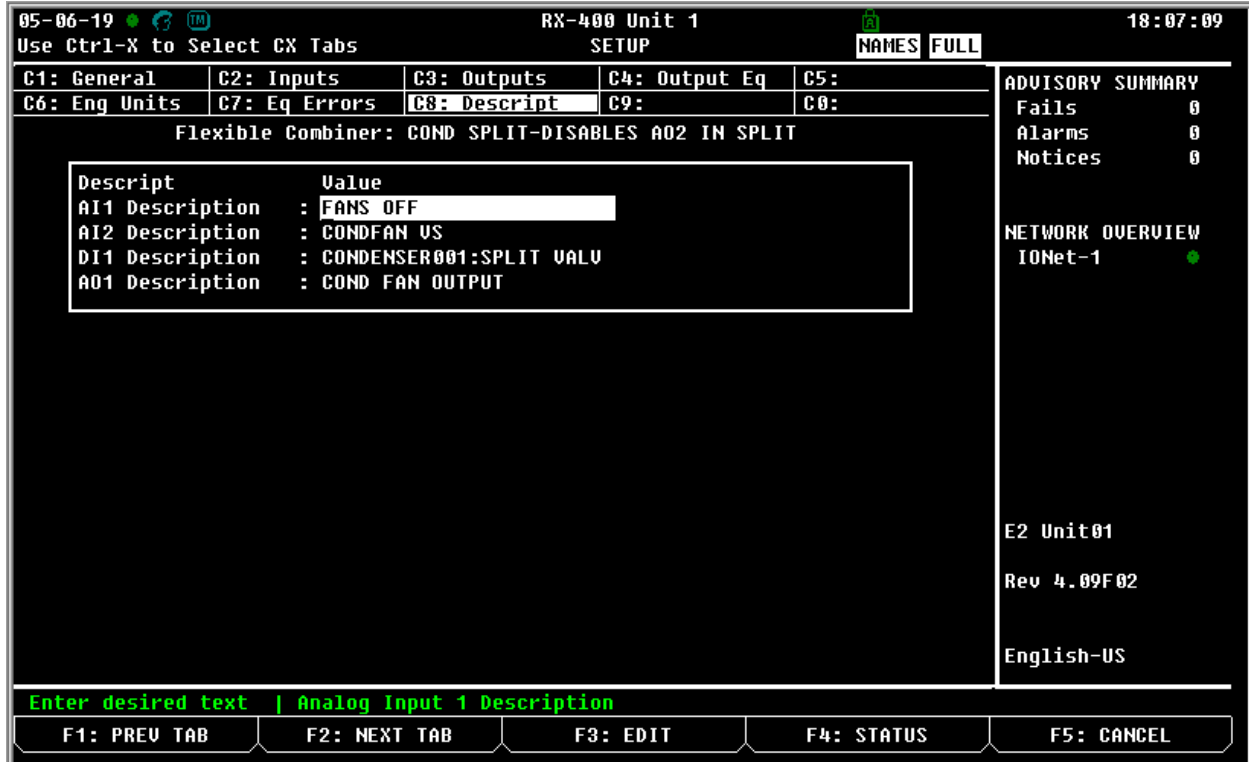


Table 36 DESCRIPT TAB DESCRIPTION

Field	Description
AI1 Description	Used to provide additional analog input 1 description for flexible combiner.
AI2 Description	Used to provide additional analog input 2 description for flexible combiner.
DI1 Description	Used to provide additional digital input 1 description for flexible combiner.
AO1 Description	Used to provide additional analog output 1 description for flexible combiner.

8.2.3.2 TROUBLESHOOTING

Table 37 E2 MULTIFLEX TROUBLESHOOTING

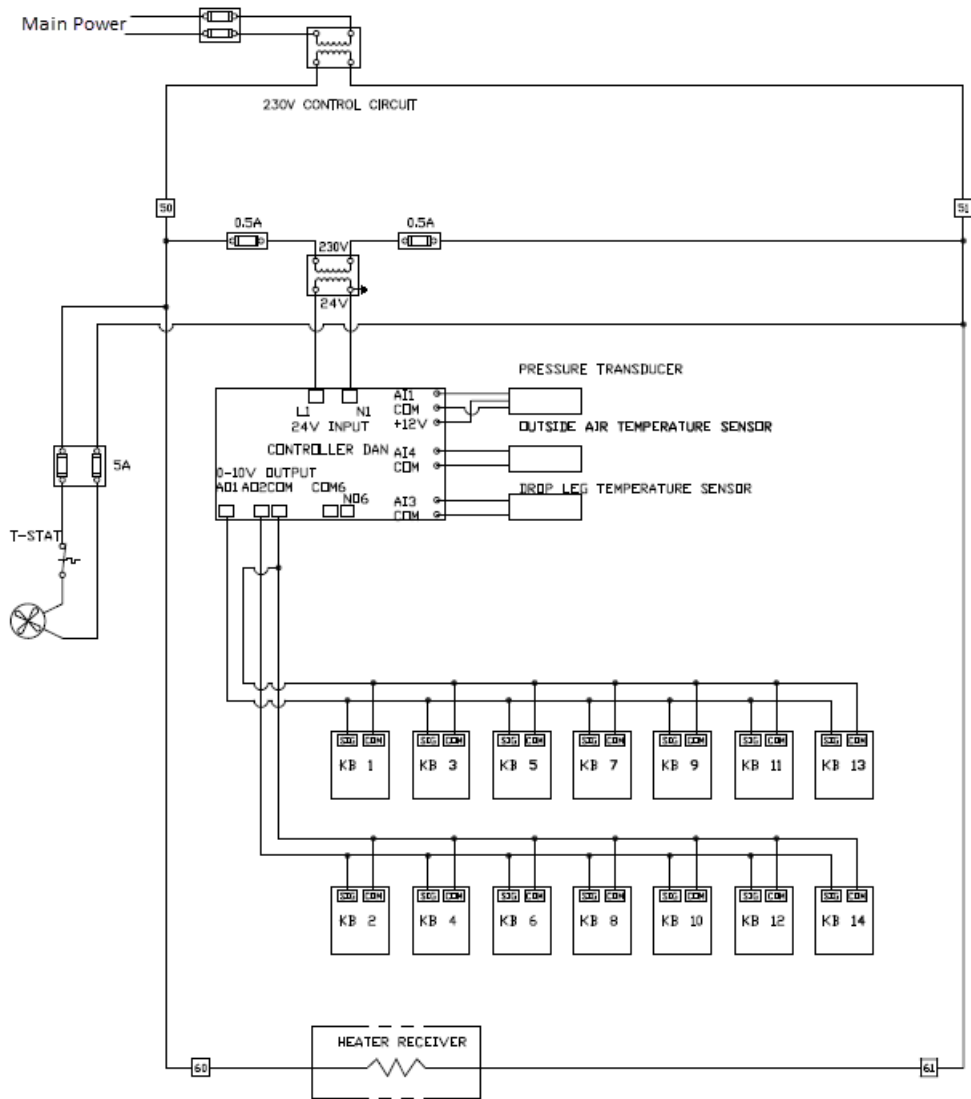
SYMPTOM	POSSIBLE PROBLEM	SOLUTION
I/O Network Problems	I/O board not getting power.	Check I/O board power--is the green STATUS light on? If not, check power wiring connections, and use a multimeter to verify the board is getting 24VAC. Reset power to board.
	I/O board not communicating or won't come online.	Check I/O network connections: 1. Check wire polarity (positive to positive/negative to negative) 2. Check for broken or loose wires.
	Dip switches are set incorrectly.	Check I/O board network dip switches. Verify network ID number is not a duplicate and that baud rate switches are set to 9600. (If switches are wrong, make changes and then reset the controller.)
	Terminating resistance jumpers are set incorrectly.	Check for proper setting of terminating resistance jumpers. Network segment should be terminated on the two endpoints of the daisy chain and unterminated everywhere else.
	Boards are not powered.	Check Network/Power voltages.
Problems with Condenser	Condenser will not operate.	Verify that E2 is programmed with proper number of fans. 1. Highlight the General tab (C1) in the Condenser Setup screen. 2. Is the correct number of fans in the Number of Fans field?
	Incorrect board and point settings.	Confirm proper board and point settings: Go to the Inputs tab (C3) in the Condenser Setup screen to check PRES CRTL IN and DISCH TRIP IN.
	Fail-Safe wiring on 8RO is incorrect.	Verify proper fail-safe switch positions on the 8RO board. The fail-safe dip switches are labeled S2 on the 8RO and S3 on the 8ROe and 8IO. Set the rocker UP (ON) to close the relay and turn the output ON during network failure. Set the switch DOWN (OFF) to open the relay and turn the output OFF during network failure.
	Condenser will not split.	Enable the condenser to split.

		Go to General tab (C1) in the Condensers Setup screen and set the Split Enable field to Yes .
	Unsplit setpoint is set too low.	Unsplit setpoint value is compared with discharge pressure value instead of temperature. Enter the value in terms of discharge pressure. Go to Setpoints tab (C2) in the Condensers Setup screen and check that the UNSPLIT STPT field value has been entered as a pressure value.
	Half of the fans are not running.	Check the split fan relay output: 1. Go to the Other Outs tab (C7) in the Condensers Setup screen and check that SPLIT FAN has a board and point assignment. 2. Verify Split is enabled: Go to General tab (C1) in the Condensers Setup screen and set the Split Enable field to Yes . 3. Verify output is ON.
Problems with Temp Sensor or Pressure Transducer Displaying Proper Value	16AI input dip switches are set improperly	The 16-dip switched on the 16AI board correspond to each of the inputs: Dip Switches Up = Temperature sensor Dip Switches Down = Pressure Transducer
	Incorrect board and point address	Set Proper board and point setting for both input and output: Go to the Inputs tab in the application's Setup screen and check Board and Point
	Incorrect sensor type	<ol style="list-style-type: none"> Verify that the sensor type in E2 is the same as the sensor installed. From the Main Menu, select System Configuration (7) and Input Definitions (1). Highlight the desired input and press F1 (SETUP) to check Sensor Type.

8.2.4 DANFOSS CONTROLLER

Condensers are built with MCX06D programmable controller fitted with LCD display.

Figure 23 DANFOSS MCX06D CONTROLLER WIRING DIAGRAM



8.2.4.1 CONNECTIVITY

Following are the two methods in which the Danfoss MCX06D controller can be accessed:

- c. Local display on the controller.
- d. Programmable controller MMIMYK.

8.2.4.1.1 MCX06D LOCAL DISPLAY INTERFACE

Utilize the controller display (provided with backlight) to view the system status on the home screen as illustrated in the following figure.

Figure 24 MCX06D CONTROLLER LOCAL DISPLAY



Home screen displays following information:

1. Condensing temperature
2. Condensing target temperature
3. Fan speed (%)
4. Split condenser status (ON/OFF)
5. Application status
6. Control input (Discharge pressure/Drop leg temperature)

Following table provides information regarding 4 keys functionality from home screen:

Table 38 KEYS FUNCTIONALITY IN HOME SCREEN

KEY Label	Description
CANCEL	<ol style="list-style-type: none"> 1. In home screen, when selected navigates to alarm status screen. 2. In any other screen, when selected navigates back to previous screen.
UP	<ol style="list-style-type: none"> 1. In home screen, not programmed. 2. In appropriate screens, utilized to increase the value.
DOWN	<ol style="list-style-type: none"> 1. In home screen, when selected navigates to inputs status screen. 2. In appropriate screens, utilized to decrease the value.
ENTER	<ol style="list-style-type: none"> 1. In home screen, when selected navigates to main menu screen. 2. In appropriate screens, utilized to update the modified parameter.

8.2.4.1.2 PROGRAMMABLE CONTROLLER MMIMYK

MMIMYK controller performs the following functions:

- Programming module
- Gateway
- Data logger

MMIMYK also supports the following interfaces:

- CANbus interface to connect to MCX controllers.
- SD/MMC card slot to support software upload and datalogging.
- Modbus RS485 serial interface

Figure 25 MMIMYK CONNECTION DIAGRAM

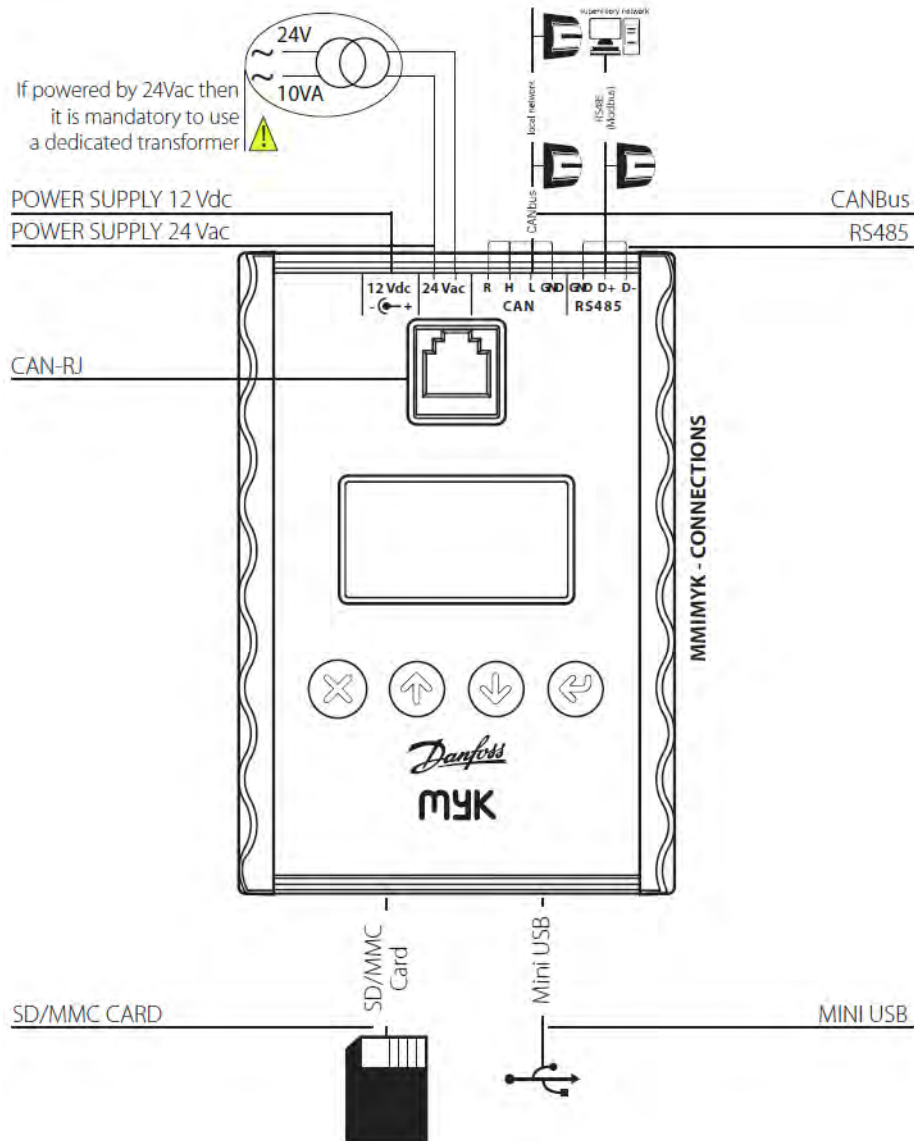
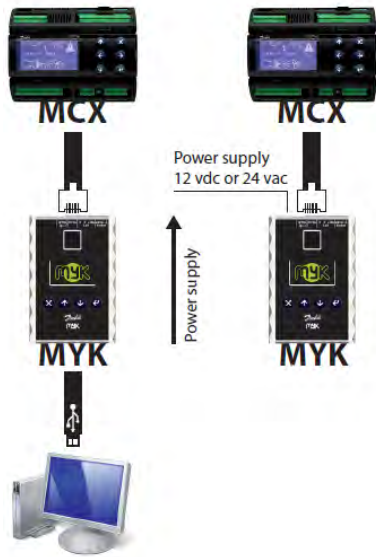
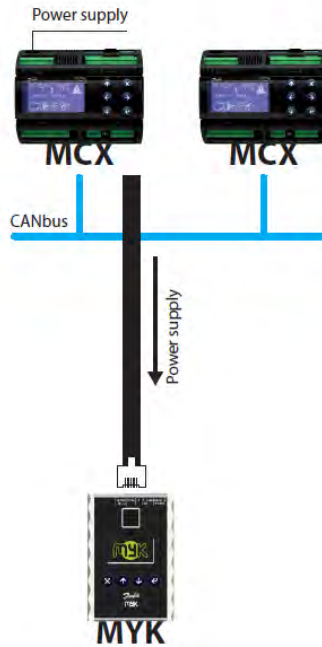


Figure 26 MMIMYK NETWORK DIAGRAM

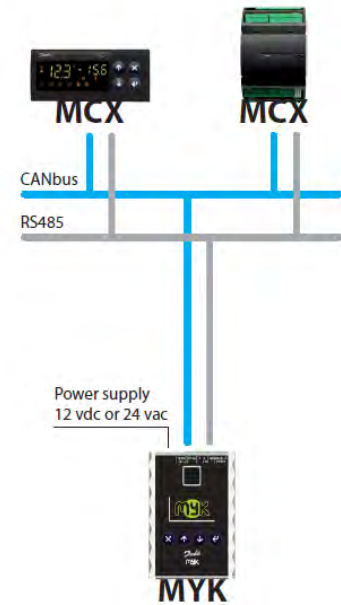
DIRECT CONNECTION TO MCX
MMIMYK supplies power to MCX (programming function)



NETWORK CONNECTION
MMIMYK powered by MCX



NETWORK CONNECTION
MMIMYK externally powered



8.2.4.1.2.1 APPLICATION SOFTWARE UPDATE

Following figure illustrates MMIMYK connection to MCX06D controller through CANbus network. The MMIMYK can be powered either through USB to PC connection or external power supply.

Figure 27 MMIMYK CONNECTIONS - CANBUS TO MCX06D



Levitor Series II Air Cooled Condenser (PN E208035_M)

To upload the latest application to MCX06D controller, both the latest app.pk and mmimykcfg files must be loaded into an SD-Card and insert upside down into MMIMYK. Navigate the menu as follows:

- Select PROGRAM and press ENTER button.
- Select DOWNLOAD and press ENTER button.
- Using DOWN button select 1:/ folder and press ENTER button.
- Using DOWN button select /cond and press ENTER button.
- Select ALL and press ENTER button.
- MMIMYK would start downloading.
- MMIMYK displays FINISHED when transfer is complete.
- Press EXIT button until we get back to the main screen.

8.2.4.1.2.2 WEBSERVER ACCESS

Following steps illustrate how to access MCX06D webserver:

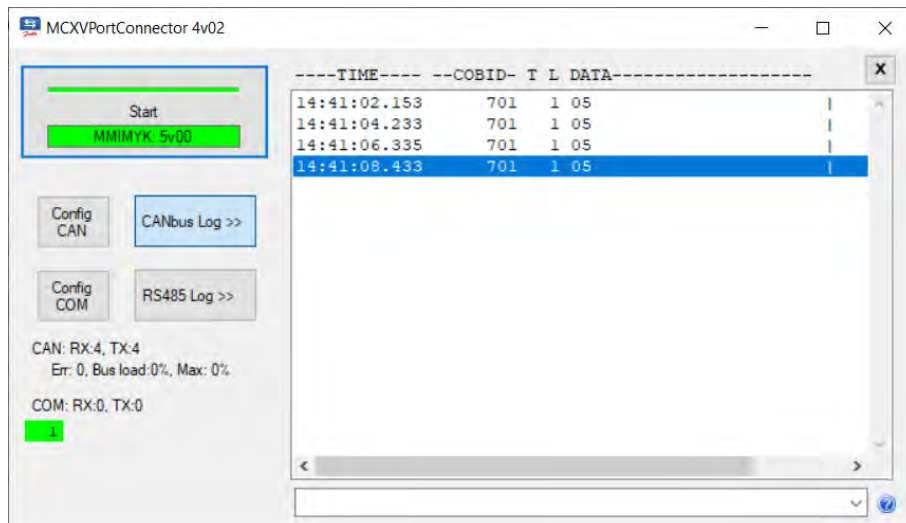
- If not installed, please install MyKManager on our PC.
- Have the Simulator folder downloaded onto your PC.

Figure 28 SIMULATOR FOLDER

Name	Date modified	Type	Size
MCXWEB	5/7/2019 9:23 AM	File folder	
app.pk	5/16/2019 8:26 AM	PK File	89 KB
DEITUtils.dll	5/7/2019 3:16 AM	Application extens...	193 KB
devices	3/13/2015 9:41 PM	Configuration setti...	10 KB
eprom_1.dat	9/23/2019 2:29 PM	DAT File	17 KB
FTD2XX_NET.dll	8/2/2017 9:13 AM	Application extens...	69 KB
ioEmulator_1.dat	7/23/2019 4:45 PM	DAT File	2 KB
MCXVPortConnector	5/7/2019 3:16 AM	Application	177 KB
MyKLibrary.dll	5/7/2019 3:16 AM	Application extens...	62 KB
NSimulator	8/2/2017 9:13 AM	Application	69 KB
NVMDebugDLL.dll	2/12/2019 8:59 AM	Application extens...	168 KB
NVMDebugger	5/7/2019 3:16 AM	Application	980 KB
nvmfontcDLL.dll	2/12/2019 9:06 AM	Application extens...	219 KB
Simulation_1.dat	9/23/2019 2:29 PM	DAT File	3 KB
Simulator	1/10/2014 8:55 AM	Windows Batch File	1 KB

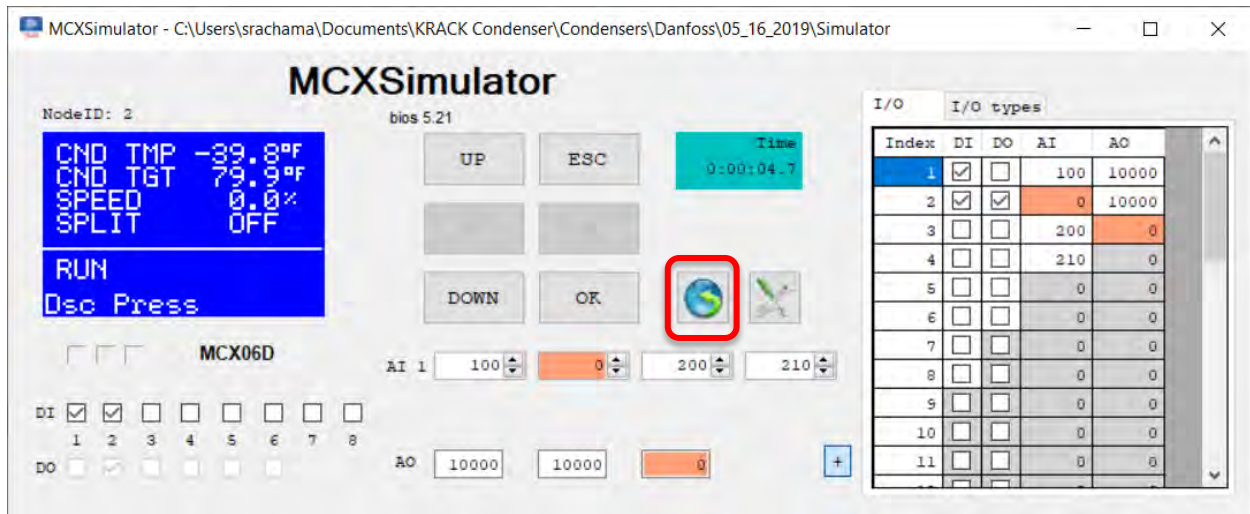
- Run MCXVPortConnector application as highlighted in Figure 47. Select Start and the datalogger should be running.

Figure 29 MCXVPortConnector DATALOGGER



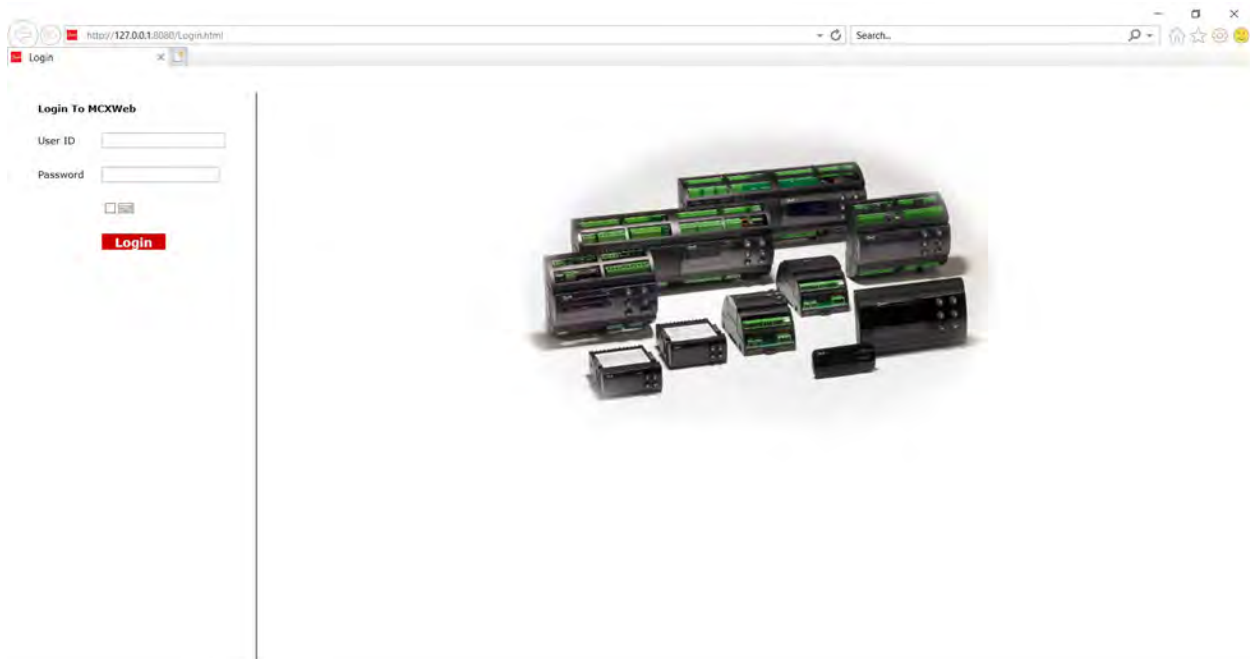
- Select the Simulator batch file as illustrated in Figure 47 and let it run.

Figure 30 MCXSimulator



- Select the Globe icon as illustrated in Figure 49 a web browser will pop as illustrated below:

Figure 31 MCXWeb INTERFACE



- Use following credentials to login to the controller.
User ID: admin
Password: PASS
- Wait until the page refreshes and displays the devices available.
Select VSCond device to view the application status, update parameters, view any existing alarms in the system, graph the parameters over time, etc.

Following figures show a few of the screens available in the web interface.

Figure 40 I/O CONFIG SCREEN



Select “Analog Input” option on I/O Config screen and press ENTER button for the application to navigate to Analog Input Setup screen.

Following are the analog inputs necessary for the Condenser Control application:

- Discharge pressure transducer
- Drop leg temperature sensor
- Outdoor ambient temperature sensor

Figure 41 ANALOG INPUT SETUP SCREEN



Select an analog input and press ENTER button for the application to navigate to the corresponding analog input screen.

The following are the settings available for each analog input:

Table 40 ANALOG INPUT MENU

S.No.	Option	Description
1.	FUN	Allows to select one of the inputs defined in the application.
2.	TYPE	Allows to select the input type from the defined options.
3.	CAL	Allows to define the calibration offset.
4.	MIN	Defines the minimum valid value.
5.	MAX	Defines the maximum valid value.
6.	DEL	Defines the delay time for error detection.
7.	ERR	Enables or disables error detection.

Figure 42 ANALOG INPUT SCREEN



Select “Analog Output” option on I/O Config screen and press ENTER button for the application to navigate to the Analog Output Setup screen.

Following are the analog outputs being controlled by the Condenser Control application:

- Fan bank 1
- Fan bank 2

Figure 43 ANALOG OUTPUT SETUP SCREEN



Select an analog output and press ENTER button for the application to navigate to the corresponding analog output screen.

The following are the settings available for each analog input:

Table 41 ANALOG OUTPUT MENU

S.No.	Option	Description
1.	FUN	Allows to select one of the outputs defined in the application.
2.	TYPE	Allows to select the output type from the defined options.

Figure 44 ANALOG OUTPUT SCREEN



8.2.4.2.3 PARAMETERS

Scroll to select “Parameters” option on the Main Menu at Level 3 and press ENTER button for the application to navigate to Parameters screen.

Figure 45 PARAMETERS SELECTION



The application provides following options under Parameters Menu:

Table 42 PARAMETERS MENU

S. No.	Option	Description
1.	General	Allows to update controller settings.
2.	Unit Config	Allows to update application settings.
3.	Advanced	Allows to update advanced application settings.
4.	Overrides	Allows to override inputs and outputs.

Figure 46 PARAMETERS SCREEN



8.2.4.2.3.1 GENERAL

Scroll to select “General” option on the Parameters screen and press ENTER button for the application to navigate to General screen.

Figure 47 GENERAL SCREEN



General screen provides following options for further selection:

Table 43 GENERAL MENU

S. No.	Option	Description
1.	Configuration	Configure buzzer and alarm related parameters.
2.	Serial settings	Configure serial communication settings.
3.	Password	Configure passwords for 3 levels of access.
4.	Setup	Configure system related parameters.
5.	Reset VFD	Reset VFD (Sets AO to 10VDC for 2 seconds and auto clears).

The following table lists the parameters available under Configuration:

Table 44 GENERAL – CONFIGURATION PARAMETERS

Label	Parameters	Description	Min	Max	Default	Unit
BUZ	Buzzer activation time	Defines the on time for which the buzzer will be active	0	15	1	Min
AdL	Alarm relay activation delay	Defines the delay from the point of alarm generation after which the alarm relay would be active	0	999	0	Sec
AOF	Alarm relay active if unit in OFF	Defines whether alarm relay would be active or not when the application is turned OFF	0	1	1 – YES	Enum 1

The following table lists the parameters available under Serial Settings:

Table 45 GENERAL – SERIAL SETTINGS PARAMETERS

Label	Parameters	Description	Min	Max	Default	Unit
SEr	Serial address	Defines the device address for both MODBUS and CANbus networks	1	100	1	
bAU	Serial baudrate	Defines the serial communication baud rate for MODBUS network	0	8	8 – 384	Enum 2
COM	Serial settings	Defines the serial communication settings for MODBUS Network	0	2	1 – 8E1	Enum 1

The following table lists the parameters available under Password:

Table 46 GENERAL – PASSWORD PARAMETERS

Label	Parameters	Description	Min	Max	Default	Unit
L01	Password level 1	Defines the password for level 1 access	0	999	100	
L02	Password level 2	Defines the password for level 2 access	0	999	200	
L03	Password level 3	Defines the password for level 2 access	0	999	300	

The following table lists the parameters available under Setup:

Table 47 GENERAL – SETUP PARAMETERS

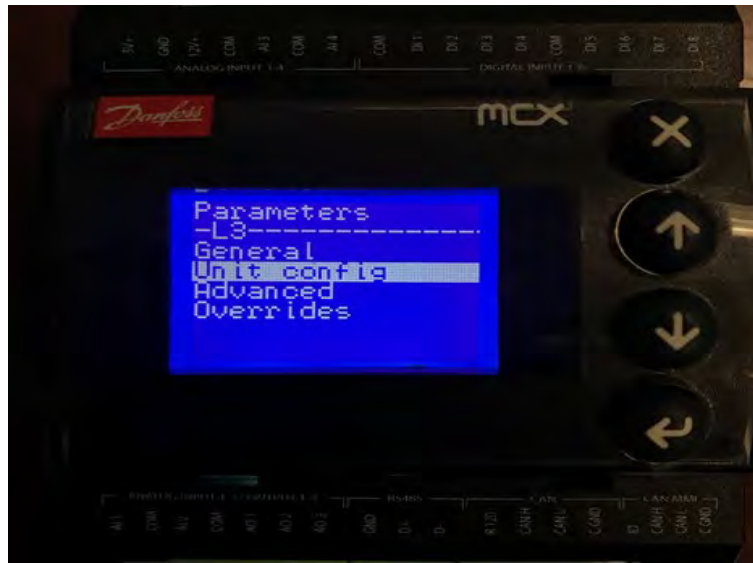
Label	Parameters	Description	Min	Max	Default	Unit
y01	ON/OFF	Enable or disable the condenser control application	0	1	1 - ON	Enum 5

y05	Temp Units	Defines the temperature units	0	1	1 – F	Enum 4
y07	Restore default parameters	When selected restores the parameters to default values	0	1	0 – NO	Enum 1
y08	Gas Type	Select the appropriate refrigerant	0	41	39 – R448A	Enum 6
y09	Advanced Menu	Enable or disable the advanced menu	0	1	0 – NO	Enum 1

8.2.4.2.3.2 UNIT CONFIG

Scroll to select “Unit Config” option on the Parameters screen and press ENTER button for the application to navigate to Unit Config screen.

Figure 48 UNIT CONFIG SELECTION



Unit config menu provides following options for further selection:

Table 48 UNIT CONFIG PARAMETERS

Label	Parameters	Description	Min	Max	Default	Unit
c01	Cond TD	Defines the temperature differential setpoint	0	50	10.1	°F
c02	Max Cond Temp	Defines the maximum condensing temperature for operation	0	100	104.9	°F
c03	Min Cond Temp	Defines the minimum condensing temperature for operation	0	0	72.9	°F
c04	Split Cut Out	Defines the OAT setpoint above which the application exits the split condenser mode.	0	100	95	°F
c05	Split Cut In	Defines the OAT setpoint below which the application enters the split condenser mode	0	0	70	°F
c06	Head Safety Alarm	Defines the discharge pressure setpoint above which the alarm would be generated	0	100	345.1	PSI

c07	Select Input	Selects the input for control logic to be either Discharge pressure or Drop leg temperature				
c08	Enable Split	Enable or disable the split condenser feature in the system	0	1	0 – NO	Enum 1

8.2.4.2.3.3 OVERRIDES

Scroll to select “Overrides” option on the Parameters screen and press ENTER button for the application to navigate to Overrides screen.

Figure 49 OVERRIDES SELECTION



Overrides menu provides the following options for further selection:

Table 49 OVERRIDES PARAMETERS

Label	Parameters	Description	Min	Max	Default	Unit
Oe1	Disc Press	Enables or disables discharge pressure input override feature	0	1	0 = NO	Enum 1
Ov1	Disc Press	Defines the override value for discharge pressure input	-50.0	200.0	0.0	Bar
Oe2	Drop Leg	Enables or disables drop leg temperature input override feature	0	1	0 = NO	Enum 1
Ov2	Drop Leg	Defines the override value for drop leg temperature input	-50.0	500.0	0.0	°C
Oe3	Outdoor temp	Enables or disables outdoor temperature input override feature	0	1	0 = NO	Enum 1
Ov3	Outdoor temp	Defines the override value for outdoor temperature input	-50.0	500.0	0.0	°C
Oe4	Fan 1	Enables or disables fan 1 output override feature	0	1	0 = NO	Enum 1

Ov4	Fan 1	Defines the override value for fan 1 output	0.0	100.0	0.0	%
Oe5	Fan 2	Enables or disables fan 2 output override feature	0	1	0 = NO	Enum 1
Ov5	Fan 2	Defines the override value for fan 2 output	0.0	100.0	0.0	%
Ov6	Split	Forces split ON/OFF	0	1	0 = AUTO	

8.2.4.2.4 ALARMS

Scroll to select “Alarms” option on the Main Menu at Level 3 and press ENTER button for the application to navigate to Alarms screen.

Figure 50 ALARMS SELECTION



The application provides the following options under Parameters Menu:

Table 50 ALARMS MENU

S. No.	Option	Description
1.	Active Alarms	Displays active alarms.
2.	Reset Alarms	Displays alarms that were reset.
3.	Log History	Displays the log of alarms.
4.	Clear Log History	Commands to clear the log history.

Figure 51 ALARMS SCREEN



Leviton Series II Air Cooled Condenser (PN E208035_M)

8.2.4.3 TROUBLESHOOTING

Table 51 DANFOSS CONTROLLER APPLICATION TROUBLESHOOTING

Alarm	Description	Corrective Action
Discharge Pressure Fault	Discharge pressure transducer failure is shorted, open or detecting the pressure out of range.	<ul style="list-style-type: none"> ▪ Check for any cable issues or connector issues. ▪ Check that the pressure transducer is landing on the appropriate connector on the board. ▪ Check that the pressure transducer cable is fully inserted into the pressure transducer. ▪ Confirm that the proper transducer is being used in the system.
Outdoor Temp Fault	OAT sensor is shorted, open or detecting the temperature out of range.	<ul style="list-style-type: none"> ▪ Check for any cable issues or connector issues. ▪ Check that the temperature sensor is landing on the appropriate connector on the board. ▪ Check that the temperature sensor probe.
Drop Leg Temp Fault	Drop leg temperature sensor is shorted, open or detecting the temperature out of the range.	
VFD Alarm	VFD reporting fault condition	Please refer to section 8.3
High Pressure Alarm	Discharge pressure raised above the head safety alarm setpoint defined in the application	Auto recovers when the discharge pressure falls below head safety alarm setpoint.

8.2.5 MICROTHERMO

Condensers are built with MT-700 series modular hardware platform which needs to be integrated with the Data Logger for access. The following modules are used in this application:

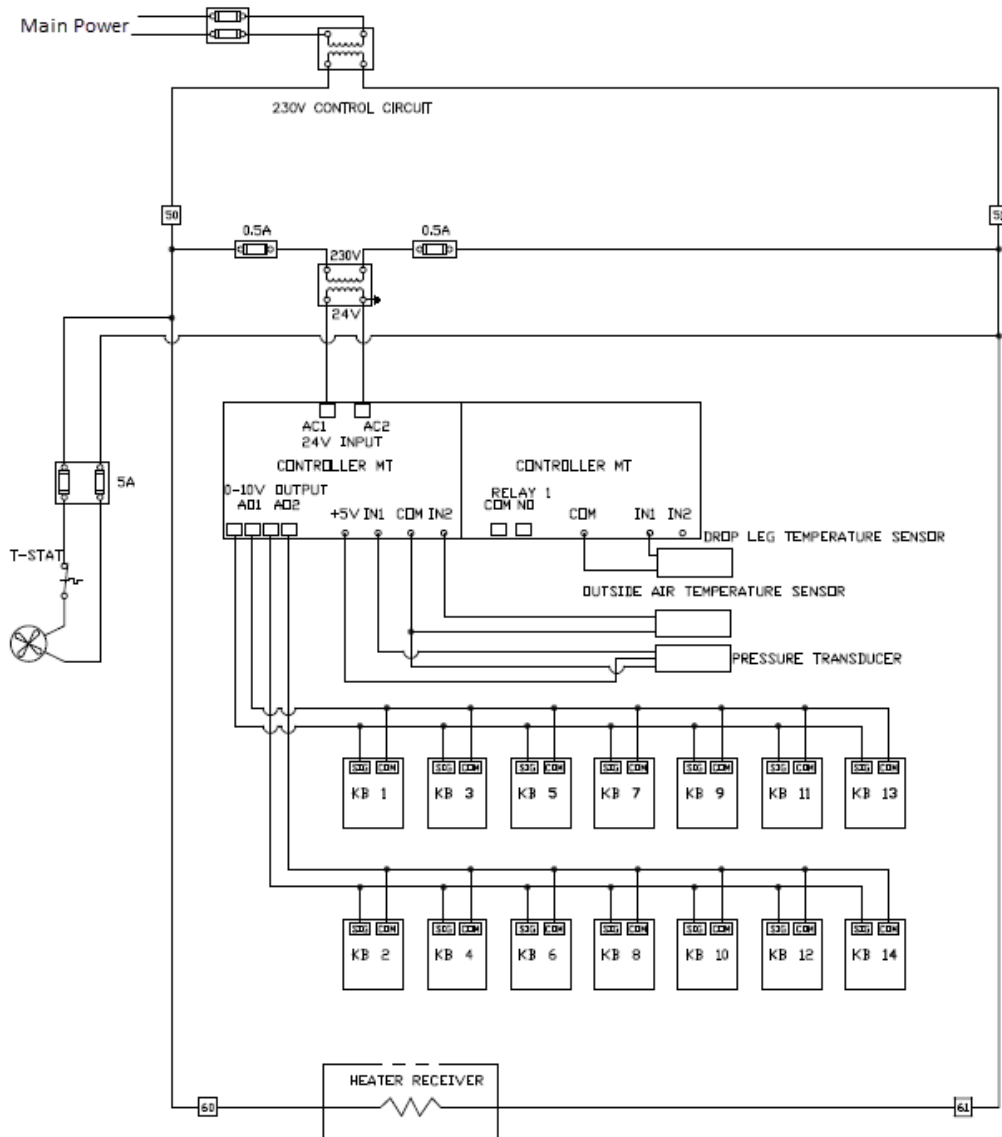
- MT-722F is the main brain module.
- MT-784A is the expansion module that provides 8 universal inputs and 4 relay outputs.

The function of the main controller is determined by the Condenser / Gas Cooler application that is loaded by the MT Alliance software.

Notes:

- Main module supports a maximum of 10 expansion modules.
- Physical order of modules in a train does not matter.

Figure 52 MICROTHERMO MT-722F MT-784A CONTROLLER WIRING DIAGRAM



8.2.5.1 COMMISSIONING

Condenser Gas Cooler (CGC) application is a complete high-side control application. Following sections illustrate how to setup this application through MT Alliance Software on the Data Logger.

8.2.5.1.1 INPUT SETTINGS

Following inputs are necessary for this application:

- Ambient temperature
- Drop leg temperature
- Discharge pressure
- VFD fault

The following figure shows the inputs selection please note that the values shown may not represent your application settings.

Figure 53 INPUT SETTINGS SCREENSHOT

Parameter	Source	Config	Value	Unit
Outside Air Temperature (OAT)	Universal Input (UI)	Config	62.8	°F
Outlet Temperature (COT)	Universal Input (UI)	Config	95.1	°F
Outlet Pressure (COP)	Universal Input (UI)	Config	167.0	psig
Drop Leg Pressure (DLP)	<Calculated Output>	Config	167.0	psig
Discharge Pressure	<None>	Config		

The “Config” button allows each input to be configured either to select a sensor model and assigned to the hardware or to the network variable. It also allows to configure a low-pass filter:

- When the “Time Constant” is set to 0 secs, the filter would be disabled yielding the fastest response.
- A high value provides a more precise measurement, by averaging fluctuations caused by electrical noise, at the expense of a more sluggish response.

Following figures illustrate the controller configuration please note that the values shown may not represent your application settings.

Figure 54 OAT SENSOR CONFIGURATION SCREENSHOT

UI Configuration - Outside Air Temperature

Configuration

Manufacturer: Micro Thermo

Model: 023-0072 Therm 10k T2 Orange Lead

Max Range: 302.0 °F

Min Range: -58.0 °F

Time Constant: 9 s

Refresh Rate: 1.00 s

Calibration: Calibration will be effective immediately when performed and cannot be undone with the cancel button.

Assignment

Module Position: 1

Input #: 2

OK Cancel

Figure 55 DROPLEG SENSOR CONFIGURATION SCREENSHOT

UI Configuration - CGC Out Temp

Configuration

Manufacturer: Micro Thermo

Model: 023-0072 Therm 10k T2 Orange Lead

Max Range: 302.0 °F

Min Range: -58.0 °F

Time Constant: 9 s

Refresh Rate: 1.00 s

Calibration: Calibration will be effective immediately when performed and cannot be undone with the cancel button.

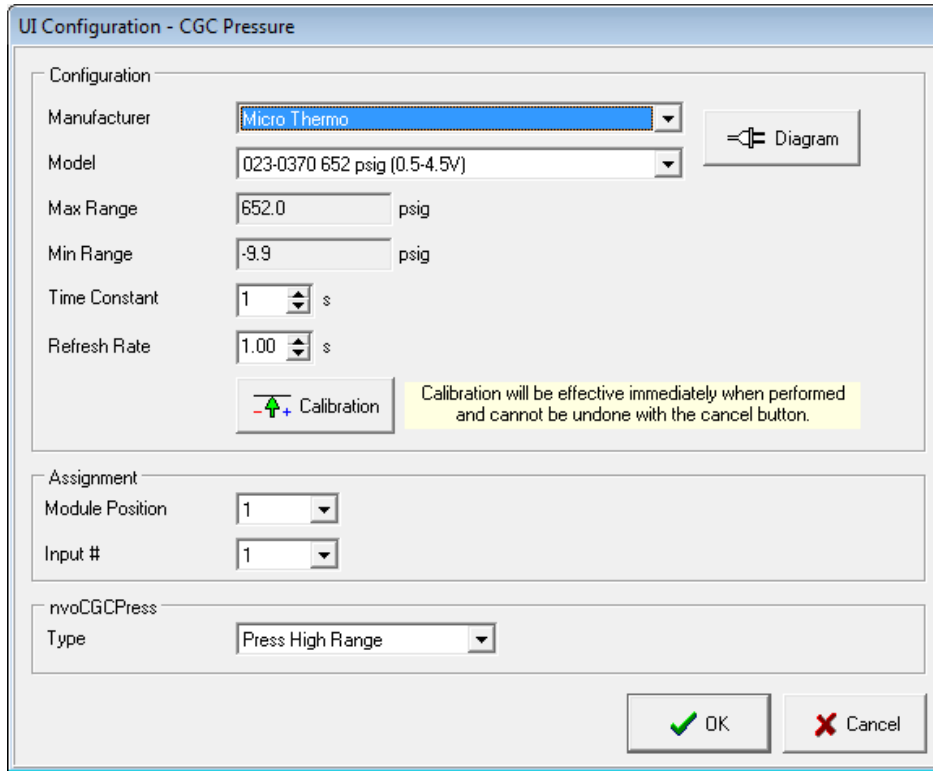
Assignment

Module Position: 2

Input #: 1

OK Cancel

Figure 56 DISCHARGE PRESSURE TRANSDUCER CONFIGURATION SCREENSHOT



Notes: In the MT-700 platform, the physical pressure sensor and the type of output network variable are chosen independently. Plan is to standardize type to be "Press High Range" for all pressures, large or small.

Figure 57 DROP LEG PRESSURE CONFIGURATION SCREENSHOT

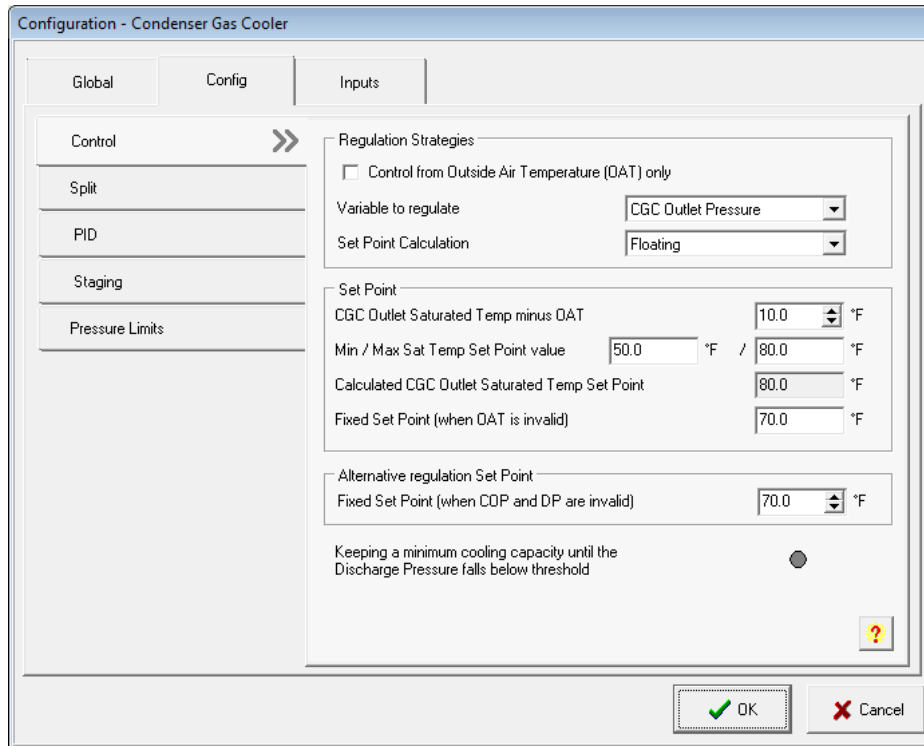


8.2.5.1.2 CONFIGURATION

The CGC application supports regulation strategies either to control outlet temperature or outlet pressure (discharge pressure converted to saturated temperature). For the application shown condenser outlet pressure controlled by maintaining a fixed difference, between outside ambient temperature and the condenser saturated temperature. Also, a floating setpoint rather than the fixed setpoint, which is limited by "Min / Max Sat Temp Set Point value". When the OAT is not available, a "Fixed set point" is the fall back.

When the outlet pressure (discharge pressure) is not available, the CGC application uses the outlet temperature (drop leg) with reference to "Fixed Set Point (when COP and DP are invalid)".

Figure 58 CGC CONTROL SETTINGS SCREENSHOT



For split condenser system, the section B is shut down when OAT drops below the threshold minus half of the dead band and resumes operation when OAT rises above the threshold plus half of the dead band. The split condenser is disabled when discharge pressure rises above the “Threshold to start maximum refrigeration”.

Figure 59 CGC SPLIT SETTINGS SCREENSHOT

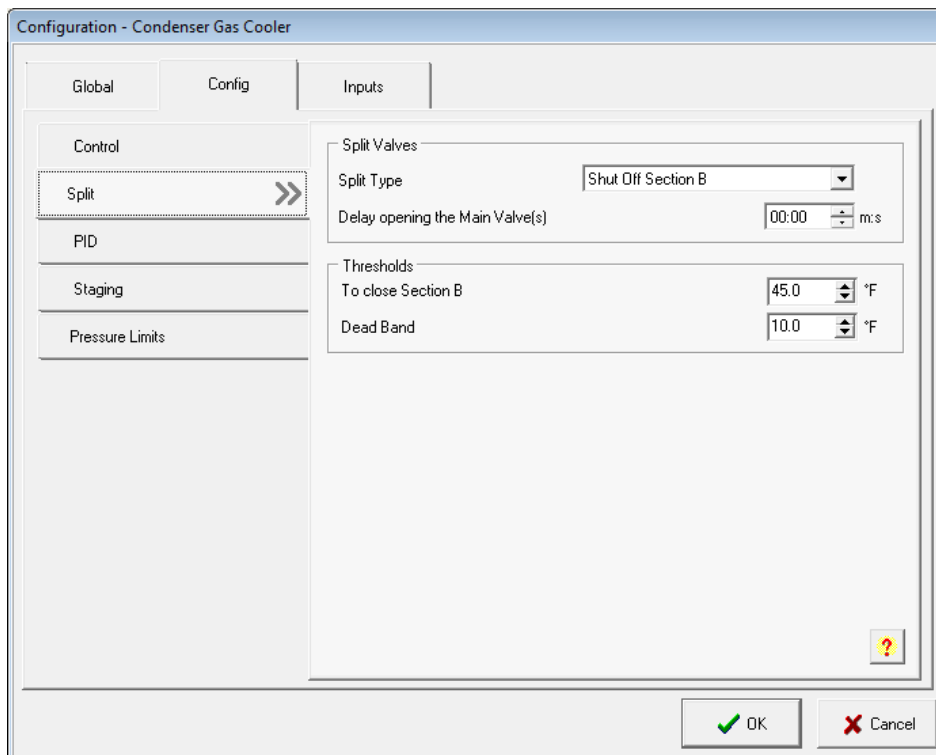
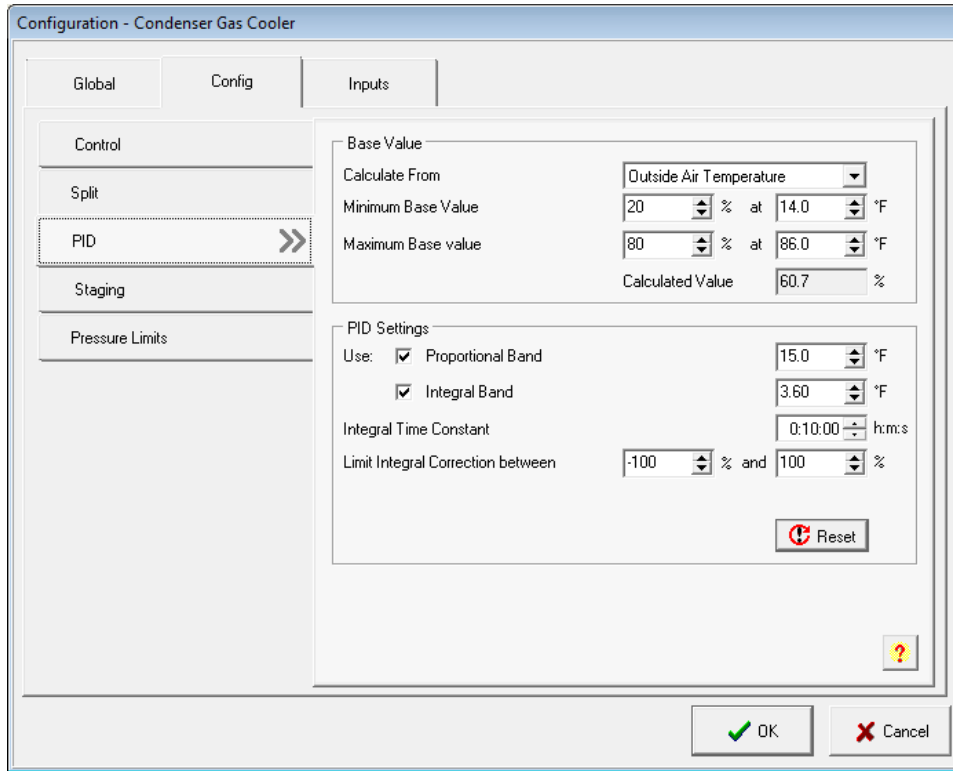


Figure 60 CGC PID SETTINGS SCREENSHOT



Variable speed fans are operated through VFDs therefore one AO is used per section and no fan relay. The minimum and maximum relative capacity are set to 0% and 100%.

Figure 61 CGC STAGING SETTINGS SCREENSHOT

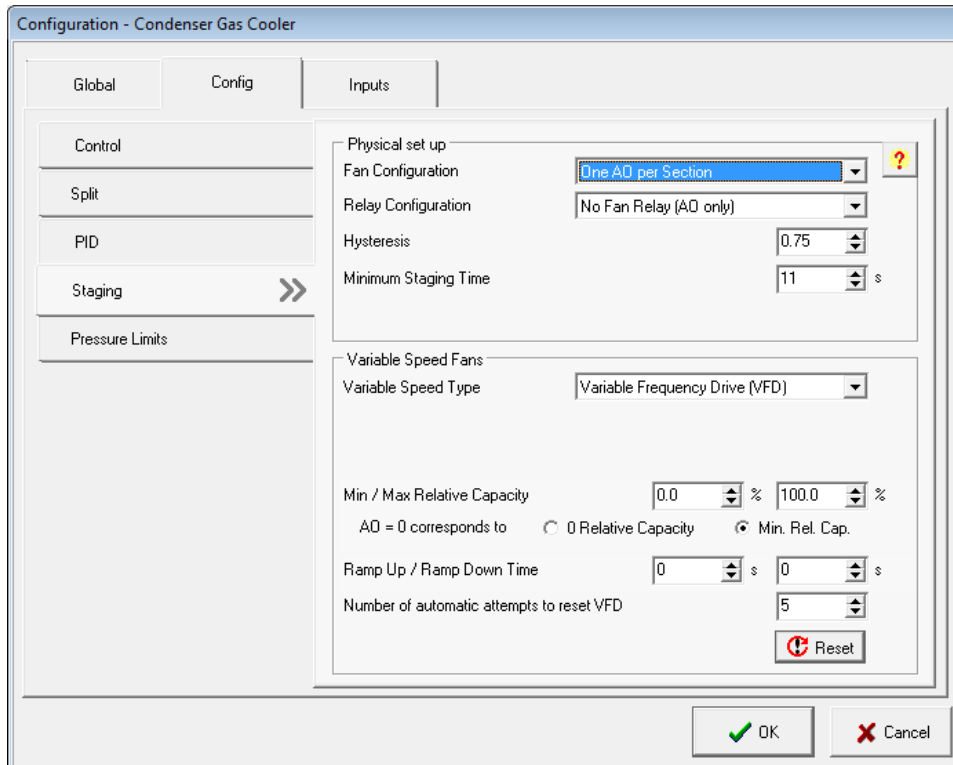
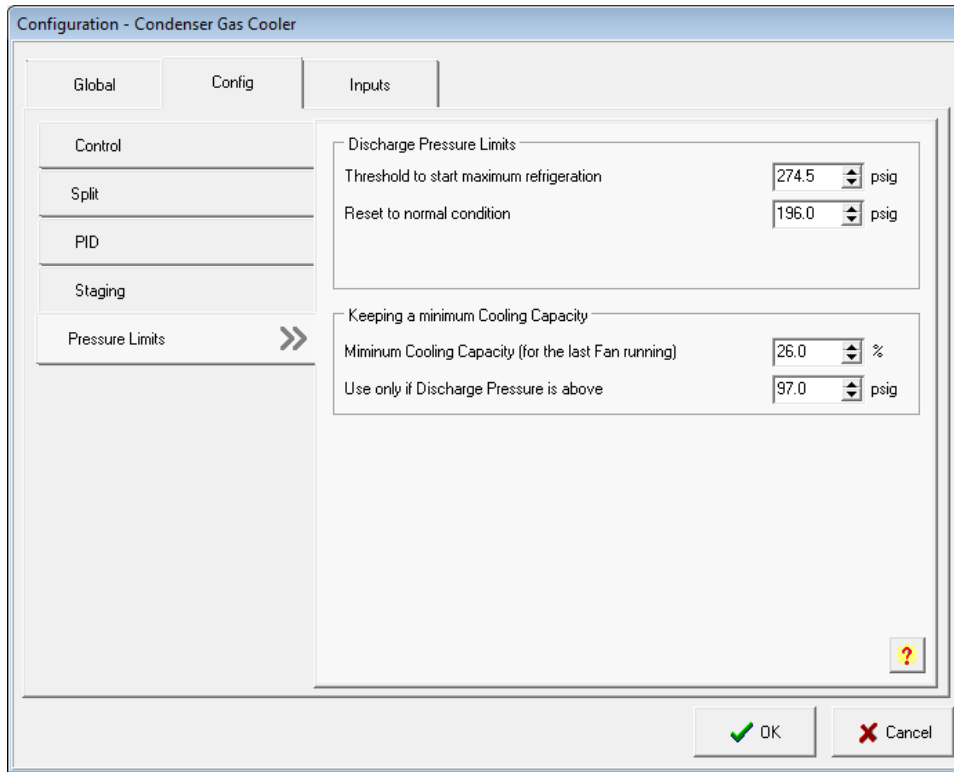


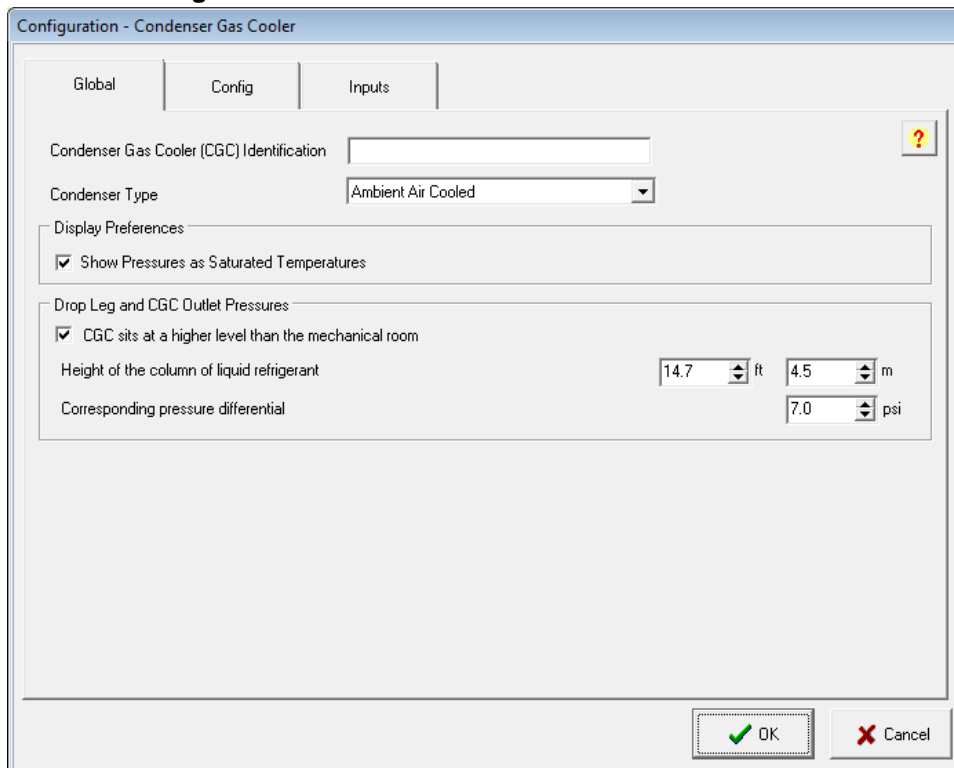
Figure 62 CGC PRESSURE LIMITS SETTINGS SCREENSHOT



8.2.5.1.3 GLOBAL SETTINGS

Select the condenser type and measure either Drop Leg Pressure or CGC Outlet Pressure using the differential pressure created by the weight of the column of liquid refrigerant. The static differential pressure is considered +ve, if the CGC is at a higher level than the receiver.

Figure 63 CGC GLOBAL SETTINGS SCREENSHOT



Levitor Series II Air Cooled Condenser (PN E208035_M)

8.2.5.1.4 SECTION A

The following screen shots illustrate Section A settings regarding the AO and VFD.

Figure 64 CGC SECTION A – OUTPUTS CONFIGURATION SCREENSHOT

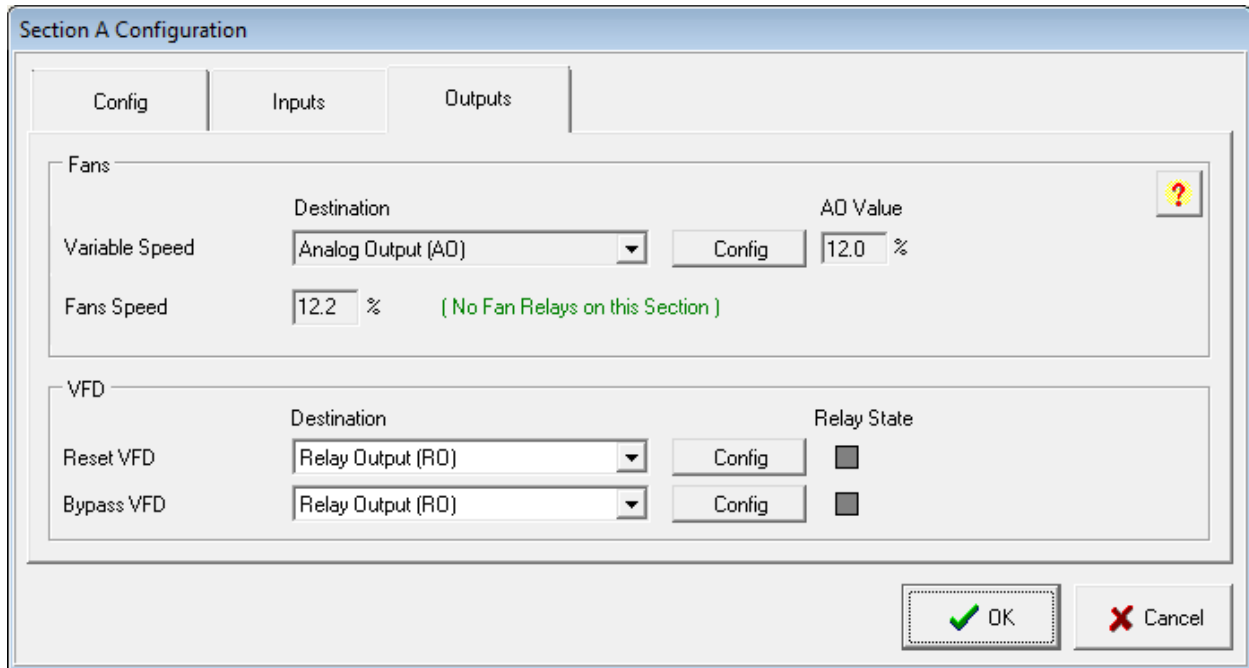
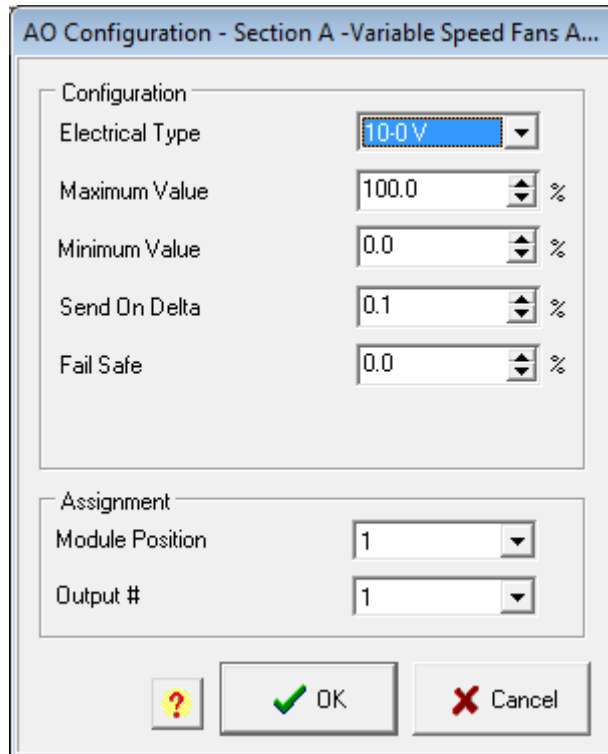


Figure 65 CGC SECTION A – AO CONFIGURATION SCREENSHOT



Notes: AO is specified to be 10 – 0V, so that the fans run at maximum speed when the node is powered off.

Reset and bypass VFD settings, shall be configured as remote/network variables as we do not need them for the VFDs utilized in our system. Following screenshots illustrate the appropriate settings.

Figure 66 CGC SECTION A – RESET VFD CONFIGURATION SCREENSHOT

Reset VFD

Configuration

Local/Remote
Remote

Assignment

Network Variable Bit #
InvoSpareRelays Bit 15

Override

Value No Override

OK Cancel

Figure 67 CGC SECTION A – BYPASS VFD CONFIGURATION SCREENSHOT

Bypass VFD

Configuration

Local/Remote
Remote

Assignment

Network Variable Bit #
InvoSpareRelays Bit 14

OK Cancel

Following screenshots illustrates the VFD Fault input selection and settings.

Figure 68 CGC SECTION A – VFD FAULT SELECTION SCREENSHOT

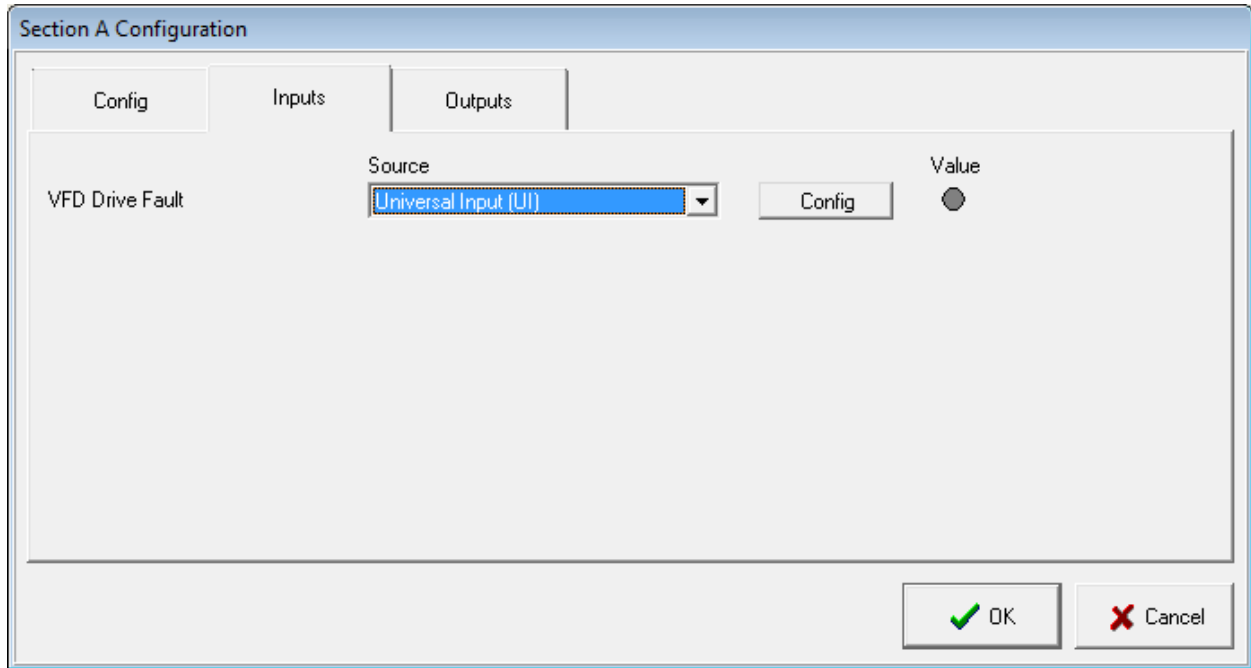
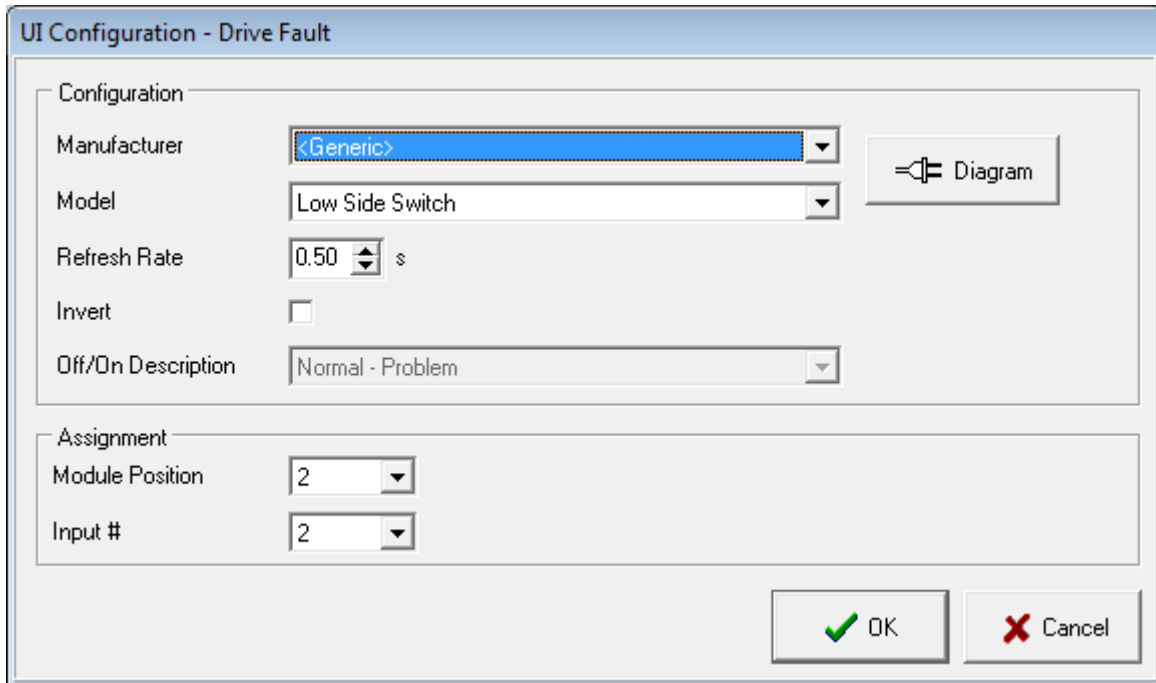


Figure 69 CGC SECTION A – VFD FAULT CONFIGURATION SCREENSHOT



8.2.5.1.5 SECTION B

Following screen shots illustrate Section B settings regarding the Split, AO and VFD.

Figure 70 CGC SECTION B – OUTPUTS CONFIGURATION SCREENSHOT

The screenshot shows the 'Section B Configuration' dialog box with the 'Outputs' tab selected. It is divided into three sections: 'Sections Split', 'Fans', and 'VFD'. Each section contains configuration options for different outputs.

Section	Output Name	Destination	Relay State
Sections Split	Main Valve	Relay Output (RO)	Relay State (Checked)
	Fan Power	<None>	
	Venting Valve	<None>	
Fans	Variable Speed	Analog Output (AO)	AO Value: 12.0 %
	Fans Speed	12.1 %	(No Fan Relays on this Section)
VFD	Reset VFD	Relay Output (RO)	Relay State (Unchecked)
	Bypass VFD	Relay Output (RO)	Relay State (Unchecked)

Buttons: OK, Cancel

Figure 71 CGC SECTION B – SPLIT VALVE RELAY CONFIGURATION SCREENSHOT

The screenshot shows the 'RO Configuration - Split Valve Relay' dialog box. It has two main sections: 'Configuration' and 'Assignment'.

Configuration:

- Local/Remote: Local
- Normally Closed (Selected) / Normally Open

Assignment:

- Module Position: 2
- Output #: 1

Buttons: OK, Cancel

Figure 72 CGC SECTION B – AO CONFIGURATION SCREENSHOT

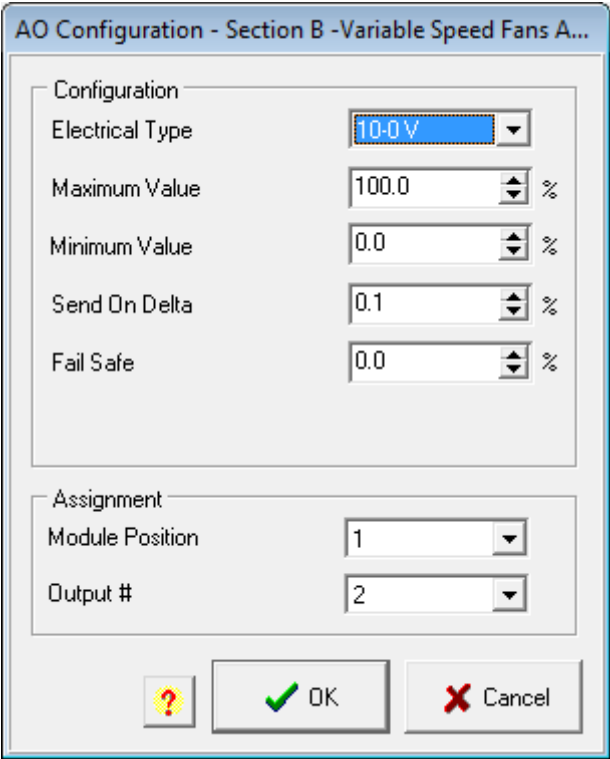


Figure 73 CGC SECTION B – RESET VFD CONFIGURATION SCREENSHOT

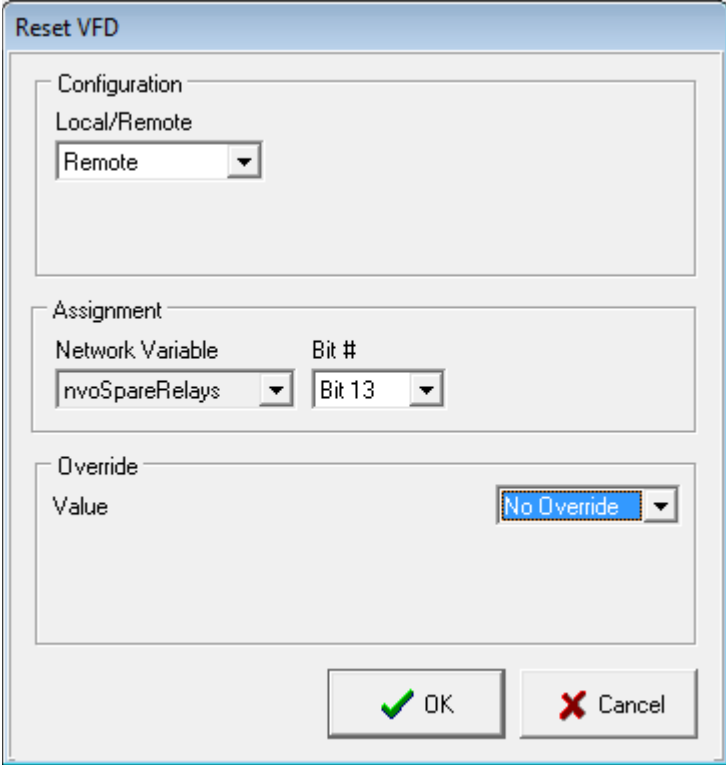


Figure 74 CGD SECTION B – BYPASS VFD CONFIGURATION SCREENSHOT

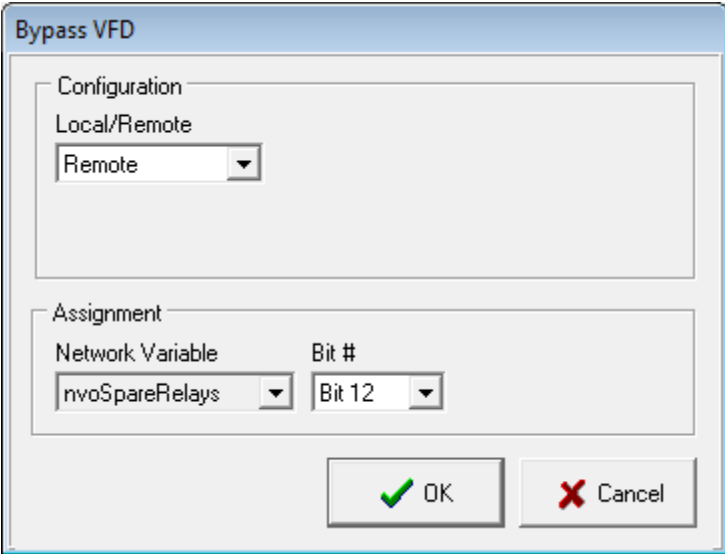


Figure 75 CGC SECTION B – VFD FAULT SELECTION SCREENSHOT

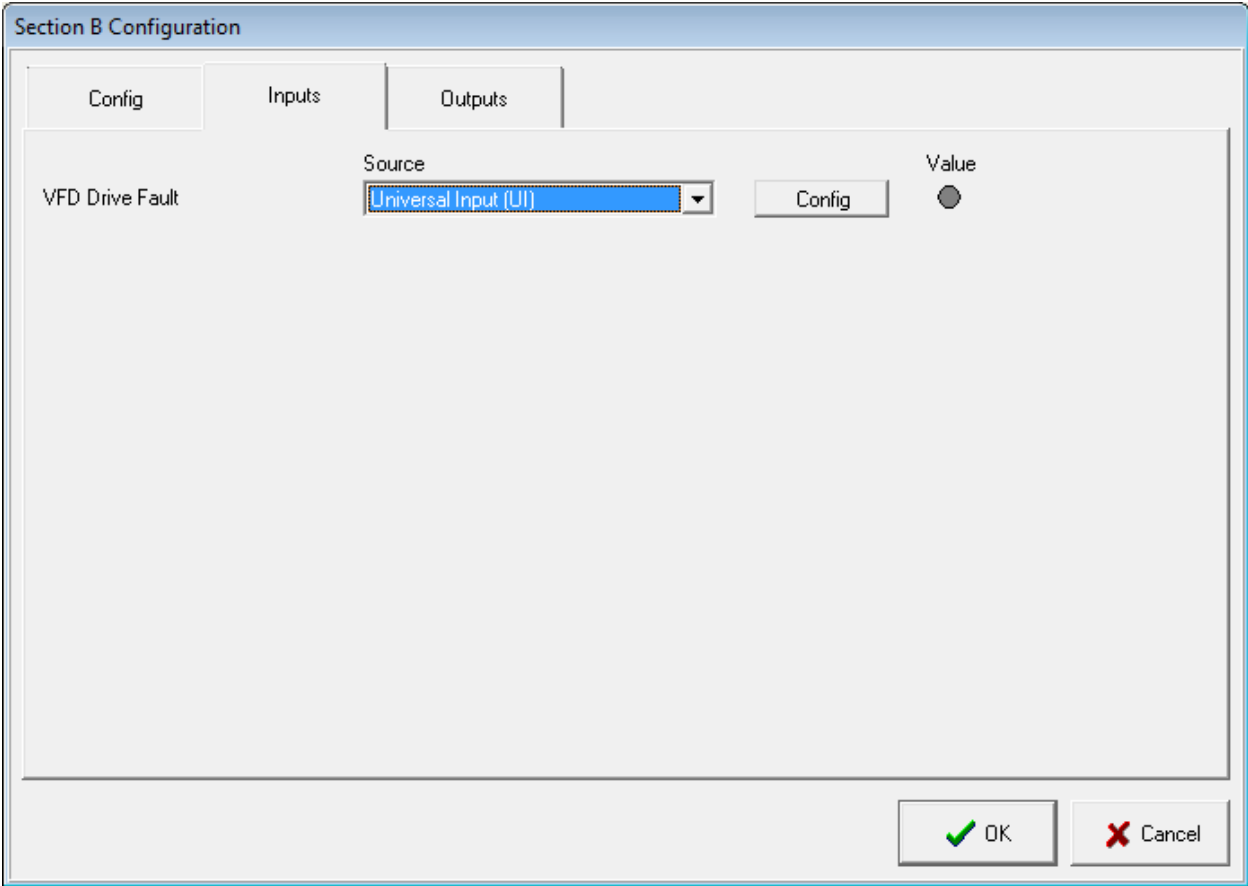
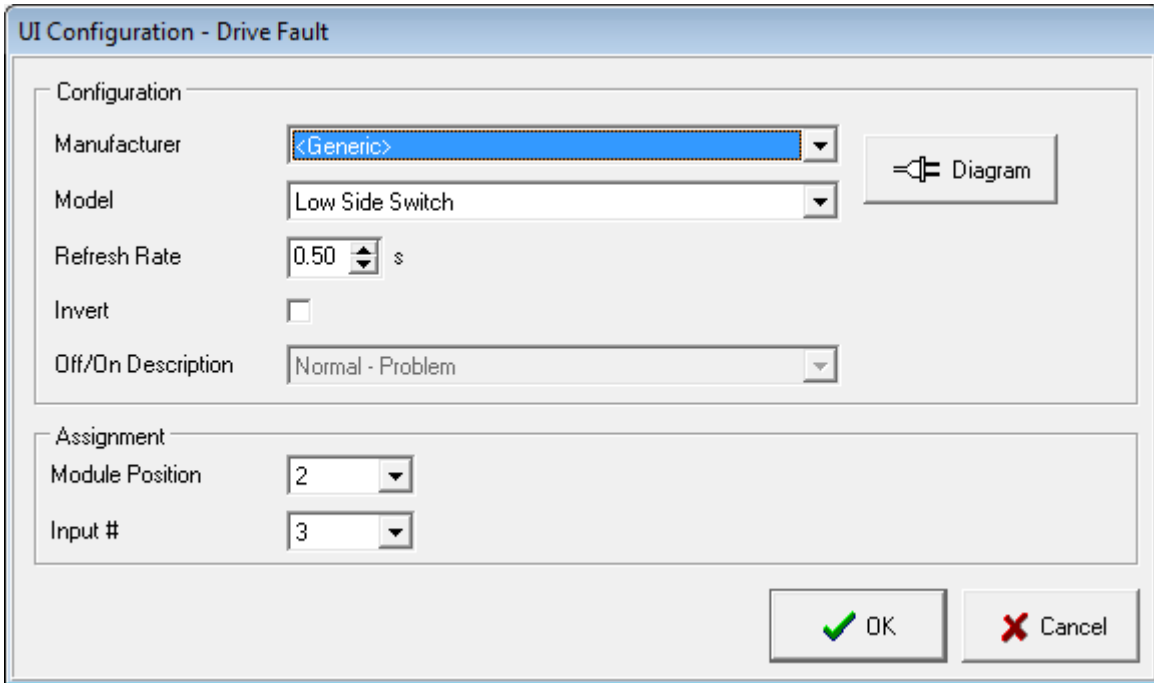


Figure 76 CGC SECTION B – VFD FAULT CONFIGURATION SCREENSHOT



8.2.5.2 TROUBLESHOOTING

Table 3 MICROTHERMO CONTROLLER APPLICATION TROUBLESHOOTING

Alarm	Description	Corrective Action
CGC Outlet Pressure Failure	Discharge pressure transducer failure is shorted, open or detecting the pressure out of range.	<ul style="list-style-type: none"> ▪ Check for any cable issues or connector issues. ▪ Check that the pressure transducer is landing on the appropriate connector on the board. ▪ Check that the pressure transducer cable is fully inserted into the pressure transducer. ▪ Confirm that the proper transducer is being used in the system.
Outside Air Temperature Sensor Failure	OAT sensor is shorted, open or detecting the temperature out of range.	<ul style="list-style-type: none"> ▪ Check for any cable issues or connector issues. ▪ Check that the temperature sensor is landing on the appropriate connector on the board. ▪ Check that the temperature sensor probe.
CGC Outlet Temperature Sensor Failure	Drop leg temperature sensor is shorted, open or detecting the temperature out of the range.	
Section A Drive Fault Section B Drive Fault	VFD reporting fault condition	Please refer to section 8.3

8.3 KB DRIVE TROUBLESHOOTING - LED STATUS, FAULTS AND RECOVERY

LED	Drive Status	Color and Flash sequence	Flash Rate	Color and sequence after recovered fault	Description	Fault State		Recovery	
						J3 (A/M) on	J3 (A/M) off	J3 (A/M) on	J3 (A/M) off
Status (ST)	Normal Operation	Green	1 Sec. On/off	-	Run Mode	-	-	-	-
	Overload 120% Full load	Red	On Continuously	Green	Motor Current greater than 120%	Motor speed reduced to maintain the CL	-	-	-
	Overload trip	Red	0.25 Sec On/Off	-	Drive/motor in Overload for greater than 6 seconds	Drive shutdown (PWMs off)	Set speed to zero or toggle F-S or R-S connection		
	Short Circuit	Red	1 Sec. On/Off	-	Output Phase to Phase Short		Toggle F-S or R-S connection	Toggle J3 (A/M)	
	Undervoltage	Red Yellow	0.25 Sec. On/Off	Red/Yellow/Green	Line voltage less than 151Vac		Automatic recovery when the line voltage is greater than 174Vac	Toggle J3 (A/M) State when the line voltage is greater than 174Vac	
	Overvoltage	Red/Yellow	1 Sec. On/Off	Red/Yellow/Green	Line voltage greater than 283Vac		Automatic recovery when the line voltage is less than 265Vac	Toggle J3 (A/M) State when the line voltage is less than 265Vac	
	Stop	Yellow	On Continuously	-	Stop Mode		-	-	-
	Phase Loss Detection	Yellow	0.04 Sec. On/0.06 Sec. Off	-	Input Phase missing. (3 Phase input drives only)	Drive shutdown (PWMs off) after 60 seconds	Check Input connections, Cycle AC line power	Check Input connections, Toggle J3 (A/M) State	

	Communications Error	Green/Red	1 Sec. On/Off	-	Modbus communications error	Drive shutdown (PWMs off)	Automatic recovery when the error is fixed. Check connections	Automatic recovery when the error is fixed. Check connections
	Overtemperature	Red	1 Sec On, 1 Sec. Off, 0.25 Sec. On, 0.25 Sec. Off	Red/Green	IPM Temperature greater than 108C		Automatic recovery when the IPM temperature is less than 90C	Toggle J3 (A/M) State when the IPM temperature is less than 90C
	EEPROM error	Red	0.25 Sec. On, 0.25 Sec. Off, 0.25 Sec On. 2 Sec. Off	-	EEPROM data corrupt		Cycle AC line power	Toggle J3 (A/M) State
PWR (Power)	Bus and Logic Power supply on	Green	On Continuously	-	Power supply is ok	-	-	-

9 INSPECTION AND CLEANING

If the Levitor Series II unit is equipped with an electrical power disconnect switch make sure the switch is in the "OFF" position, preferably locked in this position, before any electrical work is performed on the unit. Without a disconnect switch on the unit, make sure all power to the unit is off from the source.

Electrical connections should be inspected periodically and tightened if required. Loose electric connections can cause severe electrical damage as well as nuisance trip out and burnouts.

During the unit start up, phase check the fans for the correct rotation. While the fans are rotating, the airflow should pass through the coil surface first, flow through the fan and away from the unit. If the fans are pushing the air into the coil surface, the fans are rotating in the wrong direction and the motor wiring needs to be corrected.

For maximum efficiency, air-cooled condensers should be cleaned of lint and dust every 4 to 6 months so that airflow is not restricted. More frequent cleaning may be necessary under severe conditions. Use a water spray with an approved cleaning solution for finned tube coils, such as those used on air conditioning units. The water and cleaning solution should be sprayed on the coil surface opposite the direction of the fan airflow direction. The Levitor Series II units are equipped with convenient access panels to allow the cleaning spray wand to be inserted into the fan cabinet above the coil section and below each motor & fan.

10 REPLACEMENT PARTS LISTS

Figure 77 REPLACEMENT PARTS

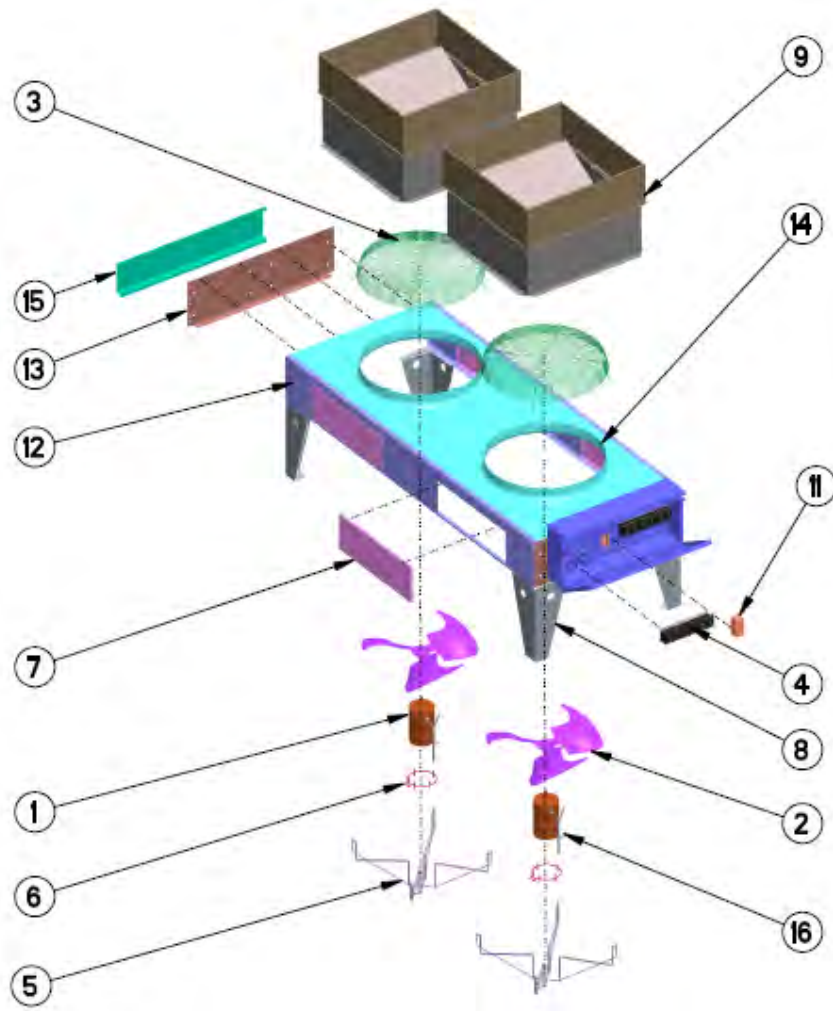


Table 53 REPLACEMENT PARTS

Item	General Description	Options Description	Krack BOM Part Number
1	MOTOR	Refer Table 53 in next page for Motor combination	
2	BLADE	Refer Table 53 in next page for Motor combination	
3	FAN GUARD	Refer Table 53 in next page for Motor combination	
4	MOTOR CONTACTOR (30AMPS)	24V 110V 230V	E209971004 E209971002 E209971003
5	BRACKET	Refer Table 53 in next page for Motor combination	
6	MOTOR MTG RING	Refer Table 53 in next page for Motor combination	
7	MOTOR SERVICE DOOR PANEL	MOTOR SERVICE DOOR PANEL	E86121
8	SUPPORT LEG	LEV-B SUPPORT LEG (18") L&R STATIONARY LEG SUPPORT (HORZ.) 15" LEG WITH MOUNTING FASTNERS 22" LEG WITH MOUNTING FASTNERS 30" LEG WITH MOUNTING FASTNERS 36" LEG WITH MOUNTING FASTNERS 42" LEG WITH MOUNTING FASTNERS 48" LEG WITH MOUNTING FASTNERS INCLUDING GUSSETS 60" LEG WITH MOUNTING FASTNERS INCLUDING GUSSETS	E281661 E82971 E203297 E280914 E281663 E281653 E280915 E203522A E203580A
9	GRAVITY DAMPER/LOUVER	LAVB LAVA, C, E, F	CE82700 CE280870
10	PHASE MONITOR (NOT SHOWN)	230V 460V 575V	10989A E201708A BN04257A
11	BACKUP CONTROLS	P352AB-3C PRESSURE CONTROLLER S352AA-2C ADDER MODULE (PRESSURE) P399BAC-1C PRESSURE TRANSDUCER P352PN-3C PRESS CONTROL MODULE P499RCP-105K PRES TRANSDUCER A350AB-1 TEMPERATURE CONTROLLER Y350 R-1 POWER MODULE A99BC-300 TEMPERATURE SENSOR (9.75 FEET) S350AA-1 ADDER MODULE (TEMPERATURE) A99BC-1500C TEMP SENSOR 50 FT	E207051 E207052 E207053 E208200001 E208201001 E205533 E205534 E205564 E205535 E206053
12	PLENUM PANELS	SERVICE DOOR SIDE SERVICE PNL SIDE NO DOOR END/CENTER 1W* END/CENTER 2W* CENTER 2W W/FRAME* CENTER 1W W/FRAME* PARITION 2W PARITION 2W W/FRAME	E86121 E203436 E203581 E203433 E203434 E203451 E203450 E203435 E203452
13	SHELF MOUNT	LEV2 PLENUM END/CTR SHELF MNT 1W LEV2 PLENUM END/CTR SHELF MNT 2W LEV2 PLENUM CTR SHELF W/FRM 1W LEV2 PLENUM CTR SHELF W/FRM 2W MTR SUPT SHELF UPPER 182-215T	E208039 E208077 E208101 E208102 D256472

		MTR SUPT SHELF LOWER 182-215T MOTOR SHELF 36" LENGTH	D256473 820390
14	FAN PANELS	LEV2 FAN PNL 30" 1W & 2W NARROW LEV2 FAN PNL 30/24" 1W & 2W NARROW LEV2 FAN PNL 30" 2W LEV2 FAN PNL 30"W/24" FAN 2W 24" STD FAN PANEL	E87128P E208168P D256804P E208167P E86115P
15	COVERS	LEV2 COVER RETURN BEND LEV2 HEADER COVER LEV2 HEADER COVER DBL CIRC LEV2 HEADER COVER DBL CIRC W/FRAME LEV RETURN BEND COVER 24" FAN HEADER COVER LEV-B	E203432 E203431 E204989A E204989F E86127 E208165
16	WIRE HARNESS LEV2	WHA-P399-200C ACVV-W-F-G 1FAN WIRE HARNESS LEV2 WIRE HARNESS 2F-(2W)4F LH LEV2 WIRE HARNESS (2W)4F RH LEV2 WIRE HARNESS 3F-(2W)6F LH LEV2 WIRE HARNESS (2W)6F RH LEV2 WIRE HARNESS 4F-(2W)8F LH LEV2 WIRE HARNESS (2W)8F RH LEV2 WIRE HARNESS 5F-(2W)10F LH LEV2 WIRE HARNESS (2W)10F RH LEV2 WIRE HARNESS 6F-(2W)12F LH LEV2 WIRE HARNESS (2W)12F RH ACVB-I 1 LH WIRE HARNESS LEV2-B WIRE HARNESS 2F-(2W)4F LH LEV2-B WIRE HARNESS (2W)4F RH LEV2-B WIRE HARNESS 3F-(2W)6F LH LEV2-B WIRE HARNESS (2W)6F RH LEV2-B WIRE HARNESS 4F-(2W)8F LH LEV2-B WIRE HARNESS (2W)8F RH LEV2-B WIRE HARNESS 5F-(2W)10F LH LEV2-B WIRE HARNESS (2W)10F RH LEV2-B WIRE HARNESS 6F-(2W)12F LH LEV2-B WIRE HARNESS (2W)12F RH LEV2-B WIRE HARNESS 2F-(2W)14F LH LEV2-B WIRE HARNESS (2W)14F RH	E207054 805870 80588RB 80589RB 80590RB 80591RB 80592RB 80593RB 80594RB 80595RB 80596RB 80597RB E83149 E83150RB E83151RB E83152RB E83153RB E83154RB E83155RB E83156RB E83157RB E83158RB E83159RB E83160RB E83161RB
17	CONTROL PANEL VENTILATION ACCESSORIES FOR "K" MOTOR OPTION (NOT SHOWN)	VENT FAN-SQUARE AXIAL 6-15/16" 335 CFM CONTROL-THERMOSTAT GRAINGER 1ZHC5 INTAKE FILTER 2H05583/A-FLTR ASSM SC162-P15/60 FAN-GUARD 6-15/16	3089686 3082140 2H05583001 3074993
18	VFD "K" MOTOR OPTION (NOT SHOWN)	DRIVE-KB-280V-LEV-MX DRIVE-KB-460/380V-LEV-MX	3148881 3148880
19	CONTROL WIRE "K" MOTOR (NOT SHOWN)	CABLE BELDEN 22GA 2C 8761	0427376
20	VARIABLE SPEED CONTROLLERS FOR "K" MOTOR OPTION (NOT SHOWN) JCI/HUSSMANN	PEAK 1820 HS-OEM1820-0 TRANSDUCER JOHNSON P499ACP-105 (4-20 mA) P499RCP-105C PRESSURE TRANSDUCER (.5-4.5vdc) WHA-P399-200C WIRE HARNESS A99BC-300 TEMP SENSOR (set189a) 9.75FT LEAD	3075128 E211081001 E207053 E207054 E205564

EMERSON CPC	CPC MULTIFLEX 810-3063 88AO CPC TRANSDUCER 0-500PSI #800-2500 (0.5-4.5 vdc) SNSR TEMP LOW PIPE HLC5011125	E210857001 E152353 0706186
DANFOSS	DANFOSS MCX06D 24V AKS 32 PRESSURE TRANSDUCER 0-500 PSIG METER WIRE 060G3991 084N002900 AKS-11 TEMP PROBE	3087943 E208130 E208131
MICRO-THERMO	MT-784A 8UI-4RO CONTROLLER MT-722F 23-0073 AMBIENT TEMP SENSOSR 952-0002 500PSI TRANSDUCER	3095039 3094789 E207161 E208140

TABLE 54 – MOTOR, FAN BLADE, MOTOR RING, FAN GUARD AND BRACKET COMBINATION FOR DIFFERENT MOTORS

MOTOR TYPE	VOLTAGE	FAN MOTOR	FAN BLADE	MOTOR RING	FAN GUARD	MOTOR BRACKET (Two Per Motor)
MOTOR TYPE A - 850RPM, 1HP,	208/3/60	11503IN	E208057	800340	E280792	E208055
	460/3/60					
	380/3/60					
	380/3/50					
	575/3/60	E205307IN	E208057	800340	E280792	E208055
MOTOR TYPE B - 1140RPM, 0.5HP	208/1/60	E205529	E206876	N/A	E82691	N/A
	208/3/60	11525IN	E206876	N/A	E82691	N/A
	460/3/60	11525IN	E206876	N/A	E82691	N/A
	380/360	11525IN	E206876	N/A	E82691	N/A
	575/3/60	E208100	E206876	N/A	E82691	N/A
MOTOR TYPE C - 850RPM, 1.5HP	208/3/60	E151976IN	E208058	800340	E280792	E208055
	460/3/60					
	380/360	E151976A	E208058	800340	E280792	E208055
	575/3/60					
MOTOR TYPE E - 575RPM, 0.5HP	208/3/60	E2068808IN	E208056	800340	E280792	E208055
	460/3/60					
	380/360	E318680	E208056	800340	E280792	E208055
	575/3/60					
MOTOR TYPE F - 1140, 1.5HP	208/3/60	E205492IN	E209267001	E209540001	E280792	E209538001
	460/3/60					
	380/360	E206689IN	E209267001	E209540001	E280792	E209538001
	575/3/60					
MOTOR TYPE K - 1140, 1.5HP	208/3/60	3055269	E209267001	800340	E209813001	E280793
	460/3/60	3080452	E209267001	800340	E209813001	E280793



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