Clima-Flex®
Air Conditioning
a member of DAIKIN group

Control Manual

CM

Group: Chiller
Part Number: CM CLIC
Date: 28 May 2024

CLIC Series
Air-Cooled Scroll Compressor Chiller
Water Generator Unit

Model

25 to 250 RT

Refrigerant R-410A/R-454B

60 Hz

Table of Contents

Manufactured in an ISO 9001 certified facility

Safety Warnings

⚠ DANGER ⚠

LOCK OUT/LABEL all power sources before starting, pressurizing, depressurizing or shutting down the chiller.

Disconnect electrical power before servicing equipment. More than one disconnection may be required to de-energize the unit. Failure to follow this warning to the letter can result in serious injury or death. Be sure to read and understand the installation, operating and service instructions in this manual.

⚠ WARNING ⚠

Electric shock danger. Improper handling of this equipment can cause personal injury or equipment damage. This equipment must be properly grounded. Control panel connections and maintenance should be performed only by personnel knowledgeable in the operation of the equipment being controlled. Disconnect electrical power before servicing equipment.

⚠ CAUTION ⚠

Static sensitive components. Static discharge during handling of the electronic circuit board can cause damage to components. Use a static strap before performing any service work. Never unplug any cables, circuit board terminal blocks, or power plugs while power is applied to the panel.

⚠ CAUTION ⚠

When moving refrigerant to/from the cooler using an auxiliary tank, a grounding strap should be used. An electrical charge builds up when halo-carbon refrigerant travels in a rubber hose. A grounding strap should be used between the auxiliary refrigerant tank and the cooler end sheet (ground to ground), which will safely carry the charge to ground. Failure to follow this procedure may result in damage to sensitive electronic components.

⚠ WARNING ⚠

If refrigerant leaks from the unit, there is a potential choking danger as the refrigerant will displace air in the immediate area. Be sure to follow all applicable published industry-related standards and local, state, and federal statutes, regulations, and codes if refrigerant is produced. Avoid exposing refrigerant to an open flame or other ignition source.

⚠ WARNING ⚠

Polyolester oil, commonly referred to as POE oil, is a synthetic oil used in many refrigeration systems and may be present in this Clima Flex product. POE oil, if it ever comes in contact with PCV/CPVC, will coat the inside wall of the PVC/CPVC pipe and cause environmental stress fractures. Although there is no PCV/CPCV pipe in this product, keep this in mind when selecting piping materials for your application, as system failure and property damage could occur. Consult the pipe manufacturer's recommendations to determine appropriate pipe applications.

ANSI:Z535.5 DEFINITIONS

⚠ DANGER ⚠

Danger indicates a dangerous situation which, if not avoided, will result in death or serious injury.

⚠ WARNING ⚠

Warning indicates a potentially dangerous situation which may result in property damage, personal injury or death if not avoided.

⚠ CAUTION ⚠

Caution indicates a potentially dangerous situation which may result in minor injury or equipment damage if not avoided.

This manual provides information on the control data of the Clima Flex CLIC series.

NOTES: Indicates important details or explanatory statements for the information presented.

Our units are built with design and control in mind, so we use specialized technical control software. Some of our special features are our own piping and wiring, Scroll type compressors, new generation evaporators, air cooler condensers, optional hydraulic components and various safety protections.

Our units are ecofriendly and operate with R-454B refrigerant.

NOMENCLATURE

CLIC-300-VL-C-1-A-N-D-F-M-M-N-N-0-6-S-N-D-N-4-C-M

FAMILY

CAPACITY (BTU)
300 - 300,000

AIR DISCHARGE
VL - Vertical Large

OPERATION
C - Cooling Only

UNITS
1 - Stand alone
2 - 2 units
3 - 3 units
4 - 4 units
5 - 5 units
6 - 6 units
7 - 7 units
8 - 8 units
9 - units
10 - 10 units

CONDENSER FAN
A - Axial Fixed

ANTICORROSION
C - Coat in Condenser

N - None

VOLTAGE
C - 208-230 / 3 / 60
D - 460 / 3 / 60

COMPRESSOR
F - Fixed
V - Inverter
T - Tandem

CONDENSER
M - Microchannel

EXTRA
M - Mother Microchannel
S - Son Microchannel
T - Tandem
1 - Tandem (1 Mother Microchannel)
2 - Tandem (2 Mother Microchannel)
I - Stand alone Microchannel

CONTROL
P - Parametric
C - pCO
E - Expansion
M - MCX

REFRIGERANT
4 - R410-A
5 - R454-B

SINGLE SKID
O - With base
N - N/A

PACKAGING
D - Domestic
I - Internacional

HIDRAULIC CONNECTION
N - Not included
Y - Yes included

ELECTRICAL CONNECTION
M - Multipoint
S - Single Point

PIPE
6 - 6”

GRILLS
1 - Painted Grill
0 - N/A

FREE COOLING
N - No

HEAT RECOVERY
N - N/A
R - Heat recovery

PROTOCOL
M - Modbus
B - BACnet

FEATURES / BENEFITS

EFFICIENCY

Our units are designed to meet the needs of any project.
Our intelligent process controllers and smart temperature sensors provide maximum performance and energy savings.

The system automatically modifies the operating mode to maintain optimum system conditions, making it very easy to operate.

All temperature sensors are calibrated and adjusted at the factory prior to shipment. Start-up should be performed by a qualified technician, during initial start-up the unit will be adjusted to local conditions and all operating points will be checked.

Once the unit has been placed in place, operation is a matter of pressing the start/stop button until it is certain that the unit is operating properly, after which the unit will operate automatically, turning itself on according to the demand of the refrigeration system and local conditions.

FLEXIBILITY

The units feature intelligent processors and sensors that automatically control the temperature at optimum operating conditions.

The units were designed to be coupled with each other and combined to meet different load variations (Tandem Installation). Up to 10 modules can be combined; these combinations can be made with Water Chiller Units of different capacities ranging from 25 to 250 tons. Capacities vary depending on the number and type of units

SAFETY

All frames are manufactured from galvanized sheet steel, coated with electrostatic baked-on paint to ensure long durability and freedom from corrosion under all weather conditions, such as direct sunlight, rain and wind.

All units are designed to fit into a small installation space, thus eliminating large installation areas. We use only high quality components to ensure durability and safety even in harsh environmental conditions.

NOTE: For applications in tropical climates, our units are coated inside and out with corrosion protection (over-ordering).

Our products are certified for AHRI efficiency and ETL safety, in addition to complying with all industry safety standards. We are members of the American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE). To demonstrate our commitment to our customers and stakeholders, our equipment comes with a one-year warranty after billing.

Our units use R454B, which has a low PCA classified as slightly flammable (A2L).

DESIGN

Research conducted by the Engineering Department has resulted in units with high design efficiency and optimum performance. The selection of the main components, our quality and control system guarantee high performance and safety.

All major components are rigorously tested and qualified before installation. Each designed unit has undergone long hours of rigorous testing to ensure the safety, durability and quality of the entire system.

COMMUNICATION

The units can be controlled in tandem mode and/or connected to a central control unit. Operation and user access will be conducted through a color touchscreen.

Our units can be managed via the BACnet IP communication protocol.
Our units record all programmable variables in real-time, such as performance monitoring, specific cooling cycle alarms, and electrical system alarms.

The control and monitoring system ensures the proper functioning of the unit by monitoring in real-time the condition of the main components (high or low refrigerant pressure, compressor and fan motor conditions, etc.).

INSTALLATION

The units have been designed for easy installation. Grooved connections provide easy installation of water pipes, and these connections are located on both sides of the unit, allowing pipes to be connected on either side of the equipment.

The individual assembly of the units reduces installation costs. The units feature a rigid base that balances the weight of the unit and allows for easy installation.

MAINTENANCE

The simplicity in the design of each unit allows for maximum ease of maintenance. All major components are available to maintenance personnel by simply opening the service panel.

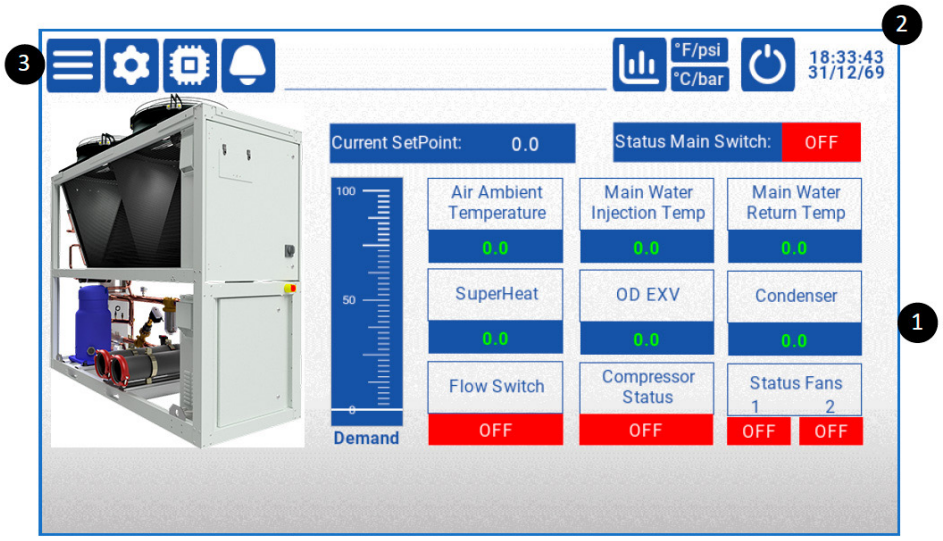
If an emergency shutdown occurs, the control section will indicate in detail the cause of the failure, helping to facilitate and accelerate troubleshooting.

SCREEN OVERVIEW

The main screen consists of two sections.

1. Chiller status area.
2. Main display.
3. Setting area.

Figure 1. Home Screen

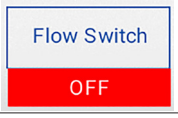
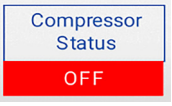
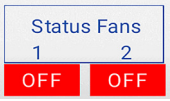


CHILLER STATUS AREA

The chiller status area, basically content the main information about chiller status and control appears on the face of the buttons and touch targets. When touched, the buttons open other screens that provide more information and control access. Table 1 provide the details.

Table 1. Chiller Status Area

Buttom/Label/Status		Description
Temperature Setpoint Cooling	Current SetPoint: 0.0	The current setpoint shows in this section, you can configuration in the settings and configurations parameters.
Indicator of the status of the main switch	Status Main Switch: OFF	The indicator shows the real time value about the main switch, change the color it´s depends the status. (Red = Off and Green = On
Value of temperature Air Ambiente	Air Ambient Temperature 0.0	The value shows measure of temperature, of Probe Air Ambient.
Value of temperature Main Water Injection Temp	Main Water Injection Temp 0.0	The value shows measure of temperature, of Probe Main Water Injection Temp
Value of temperature Main Water Return Temp	Main Water Return Temp 0.0	The value shows measure of temperature, of Probe Main Water Injection Temp

Value of temperature SuperHeat		The value shows the measure of temperature, of the calculation of SH
Value of % of Open Dregree Electronic Expansion Valve		The value shows the measured percentage of open degree, of the EXV
Value of % demand of the condenser		The value shows the measured percentahe of demand, of the condenser
Indicator of flow switch		The indicator shows the status of flow switch, red = without flow and green = with flow
Indicator of compressor status		The indicator shows the status of compressor, red=turn off and green=turn on
Indicator of fans status		The indicator shows the status of each fans, the rigth indicator show the status of Fan 1 and the left indicator show the status of Fan 2, red = turn off and green = turn on for each fan it´s same.
Linear gauge of demand cooling		The gauge shows the demand of colling in real time, this value shows in percentage.

MAIN DISPLAY

Figure 2. Main Display

After touched the button home the screen returns main screen the last points explained about this.

The devices include for default this screen. In down part explain detail about each point.

- In this screen shows the main values for obtaining a quick behavior of the unit.
- Linear gauge shows demand cooling required for the compressor.
- Main water injection temperature and main water return temperature are the value of the unit each sensor.
- States for the output digital as Compressor status, Status fan 1 and fan 2.
- States for the input digital as flow switch and main switch.
- Icon for change imperials and metrics units.
- Main switch for stopped the unit or started unit.
- Date and hour.

SETTINGS AREA

The setting area, when touched, each of the buttons in this area interacts with other parameters screens. Table 2 provides a description of each button.

Table 2. Settings Area

LABEL	ICON	DESCRIPTION
Main Screen		If you short press, go to the Main screen.
Settings		If you short press, go to the settings of the unit.
I/O values		If you short press, go to the I/O.
Alarms		If you short press, go to the Alarm
Alarms quick	E03 - Suction Temperature Fault	If you touch down or up, you can see all alarms present in actual moment
Graphs		If you short press, go to the Graphs in real time and historic values.
Main switch		If you short press, go to the started or stopped the unit.
Imperial units	°F/psi	If you short press, go to the change unit's imperials.
Metrics units	°C/bar	If you short press, go to the change unit's metrics.

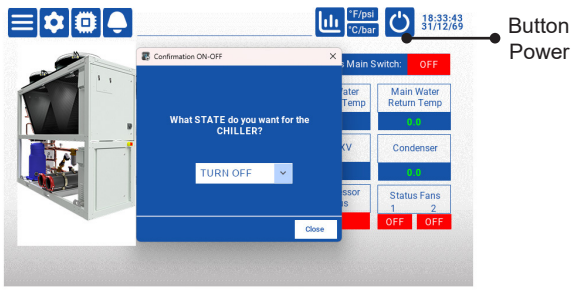
Stopping /Restarting Chiller Operation

You can start or stop the chiller from the main or home display by using the power button. The button is in upper right corner.

Stopping The Chiller

Together with the digital input the parameter defines whether the machine is in the ON od OFF state. Normally, which involves stopping the various components sequentially to protect them from the damage. To stop the chiller in these ways; Touch the Power button, A confirmation screen appears as shown (See Figure 3).

Figure 3. Stop The Chiller Confirmation Screen



Restarting The Chiller

Touch the Power button to initiate the chiller restart process and a confirmation screen appears Turn On. The chiller will wait until cooling is needed before starting the compressor.
When the chiller is running normally, it automatically starts and stops as needed to reach its setpoints.

ALARMS

On the "Wherever" page, the status of alarms can be viewed. The box displays the current alarms of any level, allowing the user to scroll to view all alarms present at that moment throughout the quick box.

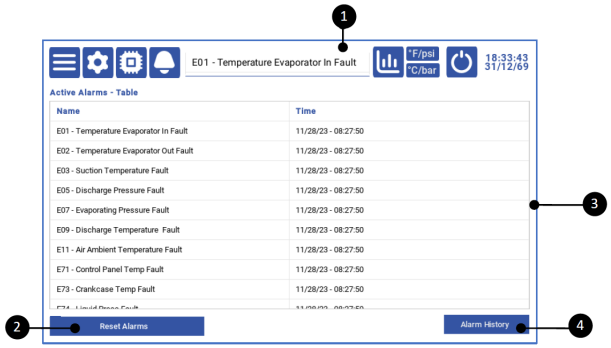
Figure 4. Alarms Quick Box

Alarms Screen

If the icon is short-pressed , the active alarms table is displayed, and if "reset alarms" is short-pressed, the device resets the inactive alarms. The callout numbers refer to the following objects on the screen:

1. Alarms quick box.
2. Button to reset previously resolved alarms.
3. Table of all active alarms with Name/Time.
4. Button to access the alarm history.

Figure 5. Alarms Screen



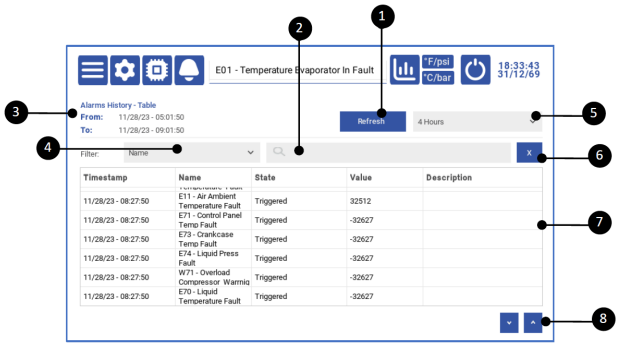
Alarms History Screen

Other button is Alarm History if you short press, you show the alarms history table. The call out numbers refer to the following objects on the screen:

1. Button refresh.
2. Search an alarm.
3. Information of date the alarms
4. Filter per timestamp, name, state, value, or description
5. Period for one minute than one day
6. Button for elimination search.
7. Alarms history - table
8. Button down or up information.

NOTE: If you want back Alarms active screen you press the icon of the bell

Figure 6. Alarms History Screen



TRENDS

Another screen is trend, where you show the performance of each sensor, divide in two sections.

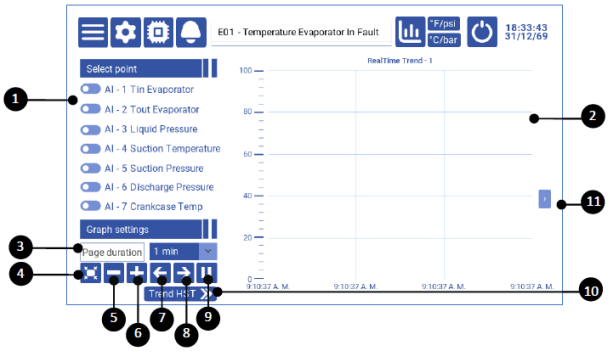
- Realtime trend
- History trend

Realtime Trends

If you short press in the icon , shows the real time trend. The call out numbers refer to the following:

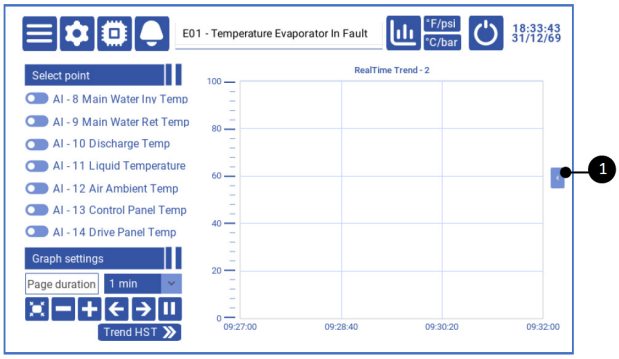
1. Slide switch for show/hide the trend of each sensor.
2. Graph Realtime trend.
3. Page duration one minute than one day
4. Set trend 0 to 100.
5. Zoom out.
6. Zoom in
7. Move left.
8. Move right.
9. Pause the trend.
10. Button go to the trend history.
11. Button go to the second screen about Realtime trend for the rest of the sensor.

Figure 7. Realtime Trend (Screen 1)



The second screen about real time trend, continues the rest of sensors, just when you press the button one you can back to the screen one. The others button it´s the same as screen one.

Figure 8. Realtime Trend (Screen 2)

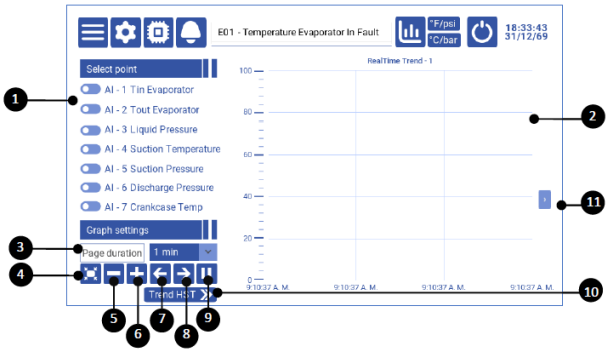


History Trend

If you short press in the icon Trend HST , shows the history trend. The call out numbers refer to the following:

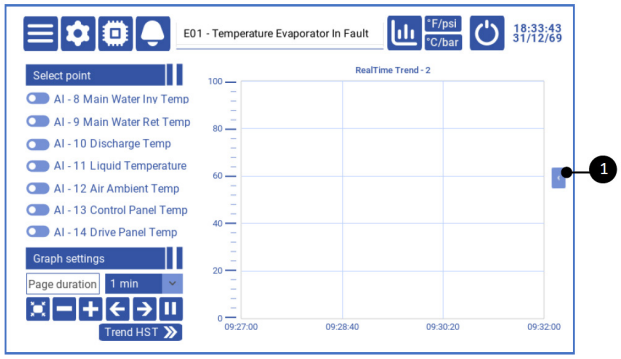
1. Slide switch for show/hide the trend of each sensor.
2. Graph history trend.
3. Page duration one minute than one day
4. Set trend 0 to 100.
5. Zoom out.
6. Zoom in
7. Move left.
8. Move right.
9. Pause the trend.
10. Button go to the second screen about history trend for the rest of the sensor.

Figure 9. Realtime Trend (Screen 1)



The second screen about history trend, continues the rest of sensors, just when you press the button one you can back to the screen one. The others button it´s the same as screen one.

Figure 10. Realtime Trend (Screen 2)



INPUTS/OUTPUTS

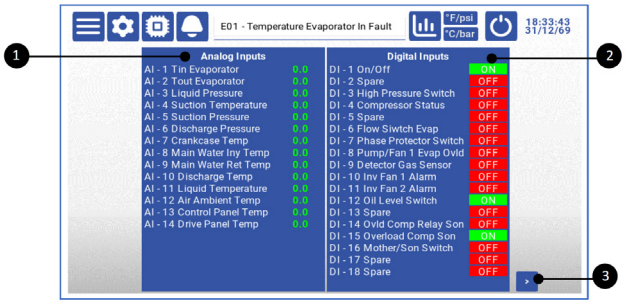
Another screen is inputs, where you show the value or status of each sensor, divide in two sections. **Inputs;** Include digital and analog. **Outputs;** include digital and analog.

Inputs

Inputs screens show the value each sensor installed in the analog inputs also and state of each sensor installed in the digital inputs. The call out numbers refer to the following:

1. Table Analog inputs.
2. Table Digital inputs.
3. Button go to the Outputs screen.

Figure 11. Inputs Screen

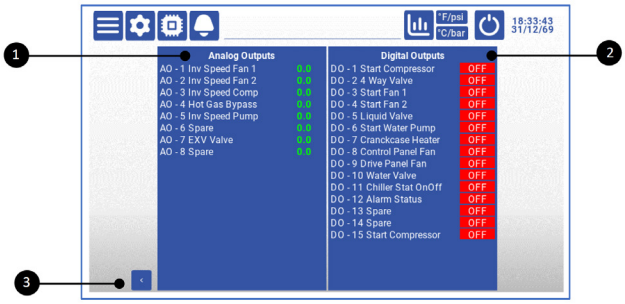


Outputs

Outputs screens show the value each output wiring in the analog outputs also and state of each digital output. The call out numbers refer to the following:

1. Table Analog outputs.
2. Table Digital outputs.
3. Button go to the Inputs screen.

Figure 12. Outputs Screen



SETTINGS

If you short press in the icon , shows the settings. The call out numbers refer to the following:

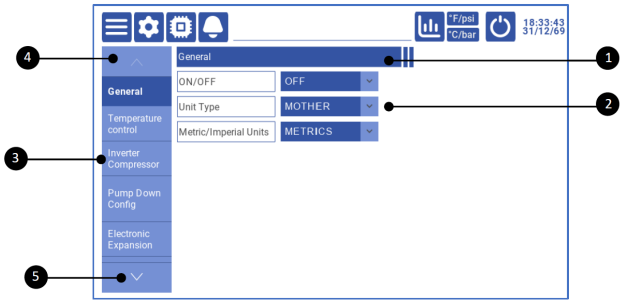
1. Title
2. Parameters editable
3. Menu table bar with all parameters refer to the following:

    a. General
    b. Temperature control
    c. Inverter compressor
    d. Pump down config.
    e. Electronic expansion
    f. Superheat
    g. Oil management.
    h. Drive config.
    i. External coil
    j. Data log
    k. Alarm config.

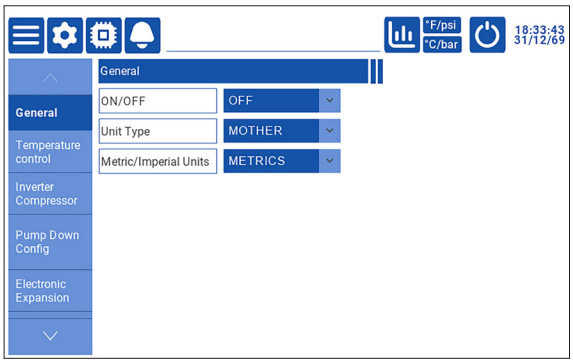
l. Panel fan
m. Crankcase control
n. Maintenance

4. Button up.
5. Button down.

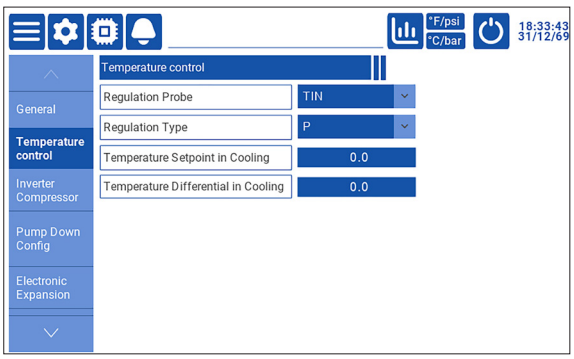
Figure 13. General Setting Screen



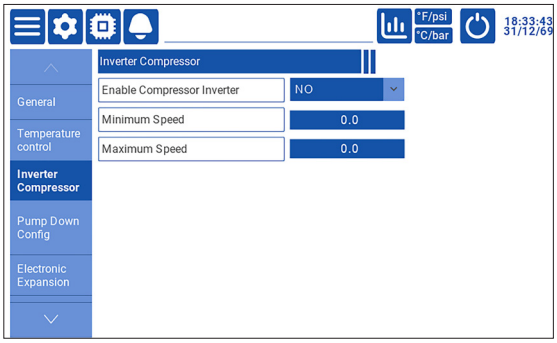
General



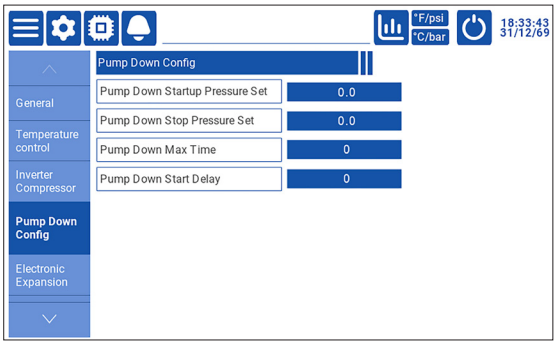
Temperature Control



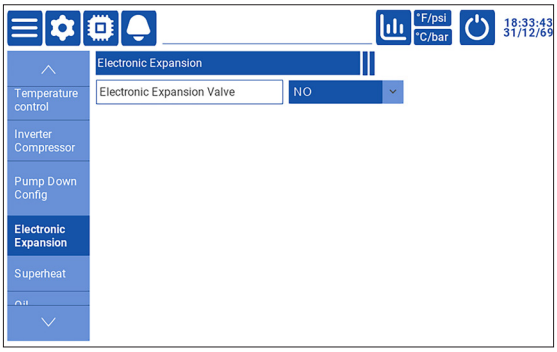
Inverter Compressor



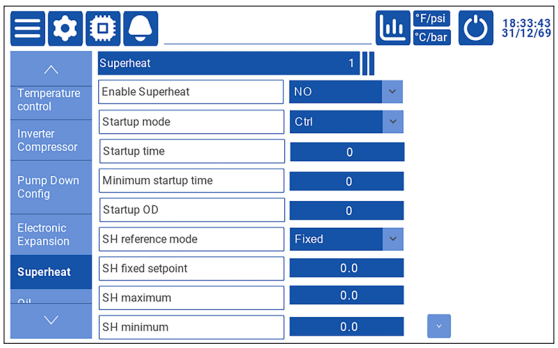
Pump Down Configuration



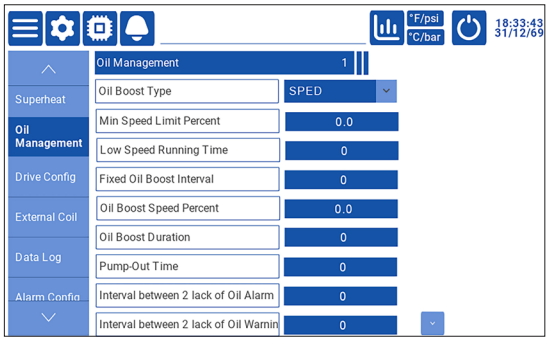
Electronic Expansion



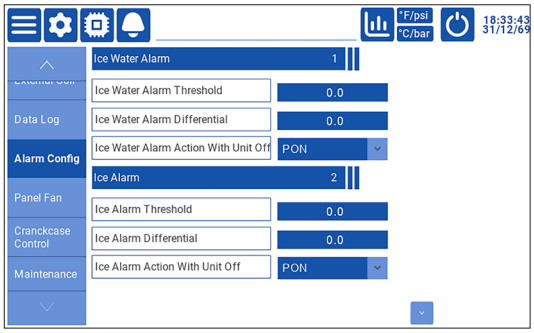
Superheat



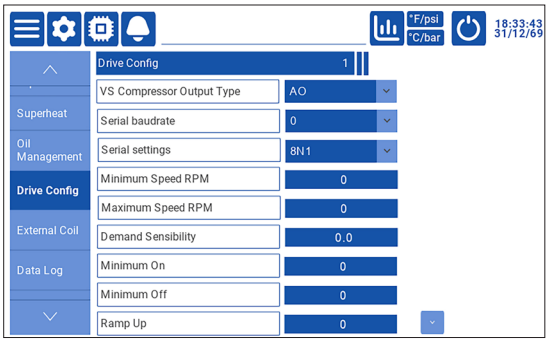
Oil Management



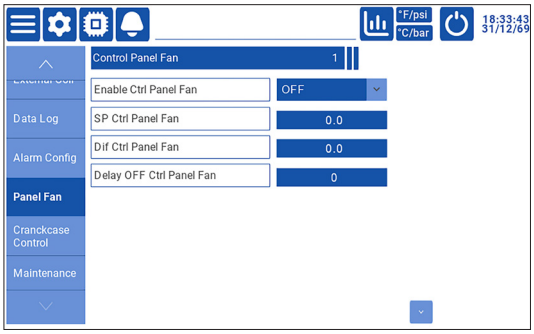
Alarm Configuration



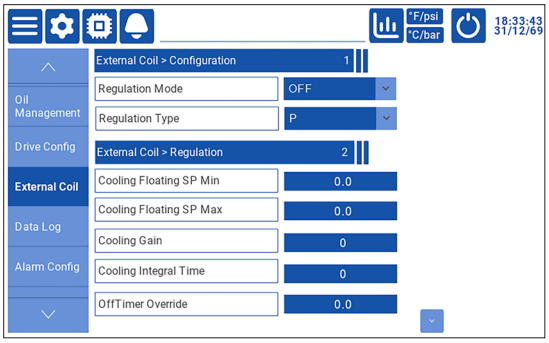
Drive Configuration



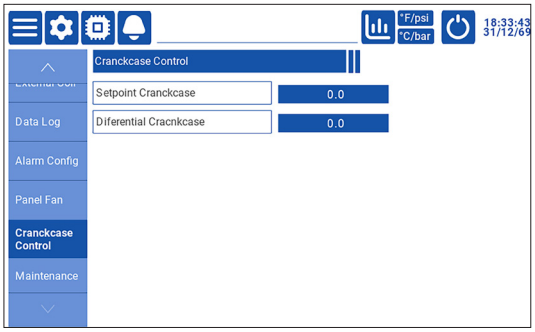
Panel Fan



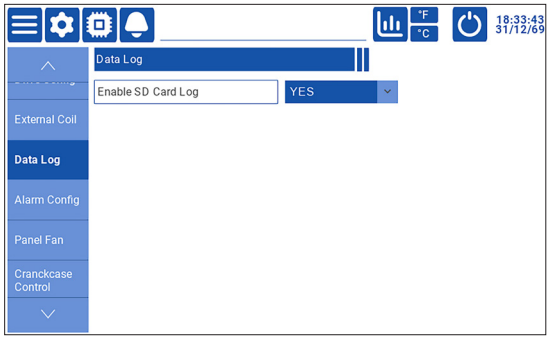
External Coil



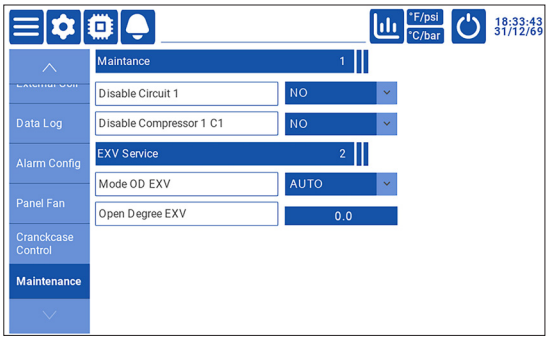
Cranckcase Control



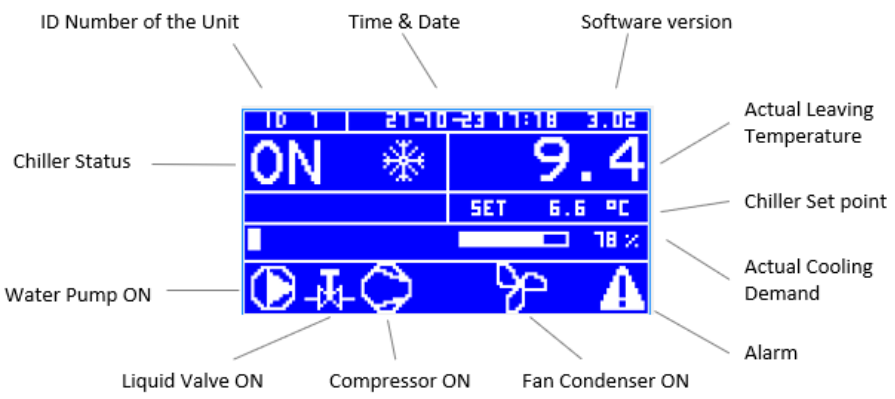
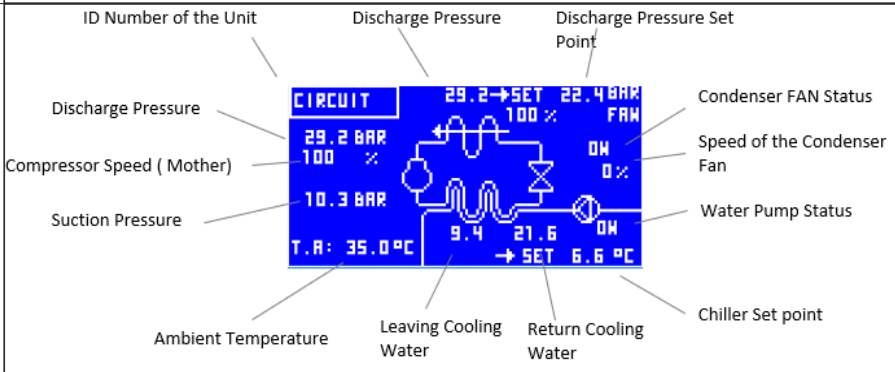
Data Log

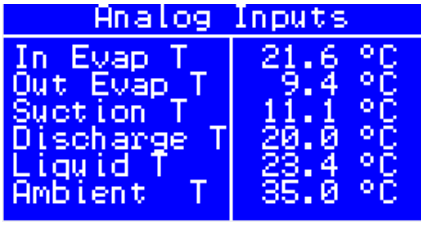
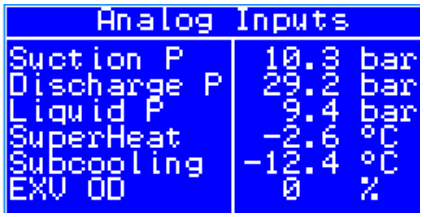
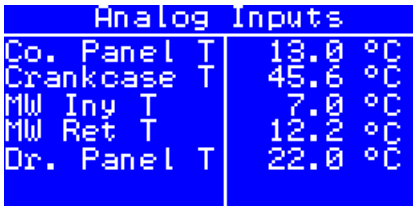
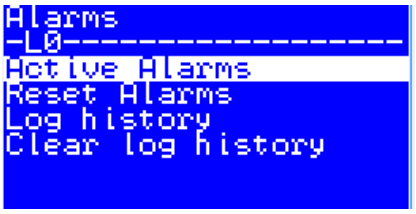
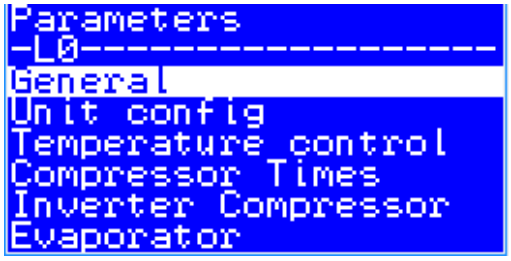


Maintenance



MXC controller has a LCD display where the chiller can be configured and operated.

Main Screen	
Keyboard	: Scroll UP, increase a value : 3s when in main screen: toggle ON/OFF : Scroll down, decrease a value : 3s when in main screen: toggle Heat/Cool mode : exit and save, : when in main screen: access the active alarm list : 3s when in Alarm screen: manual reset The LEFT and RIGHT keys, if present, allow you to move the cursor to the desired option
Refrigeration Circuit Status Screen	

Analog Inputs Screen	The access this screen, from main screen press Scroll Down button.   
Alarm Screen	Each alarm is described through an alarm description (for LCD display only), an alarm code and the time since its activation in the format hours:minutes:seconds (seconds for LCD display only). Note: You can also access alarm visualization by pressing the ESC key from the main screen.  The alarm is only reset if the alarm has ended and it will return you to the main screen. Note: Alarms can also be reset by pressing ESC for 3 seconds on the alarm screens
Start / Stop Screen	Use this menu to star / Stop chiller 
Parameters Screen	On this section the user can set up the main options of the chiller unit.  For a detail list of parameters see section 3.0

Chiller Parameters Configuration

This table shows all the parameters that can be configured according to application.

LABEL	DESCRIPTION	MIN	MAX	VALUE/TYPE	UNIT	RW	ADU
StU	General > Setup						
y01	ON/OFF	0	1	0 - OFF	Enum 1	RW	3001
y03	System heat/cool	0	1	0 - COOL	Enum 2	RW	3002
UT	Unit Type	0	1	0 - MOTHER	Enum 25	RW	3003
y05	Metric / Imperial Units	0	1	0 - METRICS	Enum 24	RW	3004
y07	Restore default parameters	0	1	0 - NO	Enum 3	RW	3005
ALA	General > Configuration						
BUZZ	Buzzer activation time	0	15	1	min	RW	3006
AdL	Alarm relay activation delay	0	999	0	s	RW	3007
AOF	Alarm relay active if unit in OFF	0	1	1 - YES	Enum 3	RW	3008
SEr	General > Serial settings						
SEr	Serial address (Modbus and CAN)	1	100	1		RW	3009
bAU	Serial baudrate (Modbus)	0	8	8 - 384	Enum 4	RW	3010
COM	Serial settings (Modbus)	0	2	1 - 8E1	Enum 5	RW	3011
CFG	Parameters > Unit config						
H11	Fans in common to all condensers	0	1	0 - NO	Enum 3	RW	3017
H40	Heat Pump Type	0	2	0 - NO	Enum 6	RW	3018
TEM	Parameters > Temperature control						
REG	Regulation Probe	0	1	1 - TOUT	Enum 7	RW	3019
RET	Regulation Type	0	1	1 - PI	Enum 8	RW	3020
STC	Temperature Setpoint in Cooling	0.0	100.0	6.6	°C	RW	3021
DFC	Temperature Differential in Cooling	0.0	100.0	4.0	°C	RW	3022
STH	Temperature Setpoint in Heating	0.0	100.0	40.0	°C	RW	3023
DFH	Temperature Differential in Heating	0.0	100.0	4.0	°C	RW	3024
SSC	Second Setpoint Offset in Cooling	-10.0	10.0	1.0	°C	RW	3025
SSH	Second Setpoint Offset in Heating	-10.0	10.0	-1.0	°C	RW	3026
INT	Temperature Integral Time	0	600	120	s	RW	3027
MA1	Enable Manual Demand	0	1	0 - NO	Enum 3	RW	3028
MA2	Manual Demand Value	0.0	100.0	66.0	%	RW	3029
CTI	Parameters > Compressor Times						
CT0	Minimum Time Between 2 ON	0	9999	10	s	RW	3030
CT1	Minimum Time Between 2 OFF	0	9999	4	s	RW	3031
CT2	Minimum OFF Time	0	9999	90	s	RW	3032
CT3	Minimum ON Time	0	9999	60	s	RW	3033
CT4	Min Time Between 2 ON Same Compressor	0	9999	90	s	RW	3034
CTA	Automatic Rotation	0	1	0 - NO	Enum 3	RW	3035
CT5	Maximum Gap on Running Hour	0	9999	2000	h	RW	3036
CT6	Delay From Evaporator Pump	0	120	10	s	RW	3037
CT8	Inverter Minimum Off Time	0	120	60	s	RW	3038
CT9	Inverter Minimum ON Time	0	120	60	s	RW	3039
INV	Parameters > Inverter Compressor						
I00	Enable Compressor Inverter	0	1	1 - YES	Enum 3	RW	3040

I01	Minimum Speed	0.0	100.0	30.0	%	RW	3041
I02	Maximum Speed	0.0	100.0	100.0	%	RW	3042
EVA	Parameters > Evaporator						
P01	Number of Evaporator Pumps	1	2	1		RW	3043
AFr	Flow Switch Alarm Reset Type	0	5	3		RW	3044
PdC	Parameters > Pump Down Config						
Pd1	Pump Down Startup Pressure Set	0.0	30.0	10.0	bar	RW	3045
Pd2	Pump Down Stop Pressure Set	0.0	30.0	5.0	bar	RW	3046
Pd3	Pump Down Max Time	0	300	5	s	RW	3047
Pd4	Pump Down Start Delay	0	300	5	s	RW	3048
REV	Parameters > Reversing valve						
rE1	Changeover delay	0	300	10	s	RW	3049
DEF	Parameters > Defrost						
d01	Defrost enable	0	1	1 - YES	Enum 3	RW	3050
d02	Defrost type	0	1	0 - SpEp	Enum 16	RW	3051
d09	Defrost start setpoint	0.0	100.0	5.0	bar	RW	3052
d10	Defrost stop setpoint	0.0	100.0	12.0	bar	RW	3053
d13	Defrost start verifying time	0	600	90	s	RW	3054
d14	Defost minimum time	0	600	60	s	RW	3055
d15	Defost maximum time	0	900	5	min	RW	3056
d16	Min time 2 defrost same circuit	0	900	30	min	RW	3057
d22	Forced Defrost Start Setpoint	0.0	100.0	1.0	bar	RW	3058
d21	Start verifying time	0	600	0	s	RW	3059
EXV	Parameters > Electronic Expansion						
EEN	Electronic Expansion Valve	0	1	1 - YES	Enum 3	RW	3060
E02	Enable Cool/Heat Changeover	0	1	0 - NO	Enum 3	RW	3062
GAS	Gas Type	0	49	410A 454B	Enum 13	RW	3063
SPH	Parameters > Superheat						
SUP	Enable Superheat	0	1	1 - YES	Enum 3	RW	3064
N02	Startup mode	0	2	2 - Fixed	Enum 14	RW	3065
N15	Startup time	1	600	30	s	RW	3066
104	Minimum startup time	1	240	15	s	RW	3067
N17	Startup OD	0	100	50	%	RW	3068
N21	SH reference mode	0	3	0 - Fixed	Enum 15	RW	3069
N07	SH fixed setpoint	2.0	40.0	7.0	K	RW	3070
N09	SH maximum	2.0	40.0	12.0	K	RW	3071
N10	SH minimum	2.0	40.0	5.0	K	RW	3072
SHO	Superheat Reference Offset	-100.0	100.0	0.0	K	RW	3073
N05	SH Tn	20	900	90	s	RW	3074
N19	SH Kp Min.	0.1	1.0	0.6		RW	3075
N04	SH Kp	0.1	20.0	1.5		RW	3076
N20	SH KpTe	0.0	20.0	3.0		RW	3077
I66	Minimum OD	0	100	0	%	RW	3078
N32	Maximum OD	0	100	100	%	RW	3079
117	SH close function	0	1	1 - ON	Enum 1	RW	3080
119	SH close setpoint	-5.0	20.0	2.0	K	RW	3081

120	SH close Tn divide	1	5	3		RW	3082
121	SH close Kp factor	0.5	10.0	1.5		RW	3083
N18	MSS Stability	0.0	10.0	5.0		RW	3084
129	MSS T0 stability factor	0.0	1.0	0.0		RW	3085
130	MOP function	0	1	0 - OFF	Enum 1	RW	3086
N11	MOP setpoint	-70.0	60.0	0.0	°C	RW	3087
140	LOP function	0	1	0 - OFF	Enum 1	RW	3088
141	LOP setpoint	-90.0	40.0	-40.0	°C	RW	3089
142	LOP priority mode	0	1	0 - OFF	Enum 1	RW	3090
131	LOP maximum time	0	600	120	s	RW	3091
132	LOP oscillation detection	0	1	1 - ON	Enum 1	RW	3092
SA1	Enable Low Superheat Alarm	0	1	1 - YES	Enum 3	RW	3093
SA2	Low Superheat Alarm Differential	0.0	100.0	2.0	K	RW	3094
SA3	Low Superheat Alarm Delay	0	600	20	s	RW	3095
SA4	Enable High Superheat Alarm	0	1	1 - YES	Enum 3	RW	3096
SA5	High Superheat Alarm Differential	0.0	100.0	20.0	K	RW	3097
SA6	High Superheat Alarm Delay	0	600	20	s	RW	3098
Oil	Parameters > Oil Management						
O00	Oil Boost Type	0	2	1 - OLEV	Enum 17	RW	3099
O01	Min Speed Limit Percent	0.0	O04	50.0	%	RW	3100
O02	Low Speed Running Time	1	O03	3	min	RW	3101
O03	Fixed Oil Boost Interval	O02	600	20	min	RW	3102
O04	Oil Boost Speed Percent	O01	100.0	90.0	%	RW	3103
O05	Oil Boost Duration	1	60	3	min	RW	3104
O06	Pump-Out Time	0	1000	200	s	RW	3105
O07	Interval between 2 lack of Oil Alarm	0	60	4	min	RW	3106
O08	Interval between 2 lack of Oil Warning	0	60	6	min	RW	3107
O09	Oil Boost Serious Alarm	0	1	1 - YES	Enum 3	RW	3108
O10	Lack of Oil Delay	0	10	5	s	RW	3109
O11	Recovery of Oil Delay	0	10	5	s	RW	3110
O12	Boost Speed-up Max Time	0	60	2	min	RW	3111
O13	Start Without Oil Window	0	1000	10	s	RW	3112
O14	Start Pump-Out Time	0	1000	200	s	RW	3113
MP1	Timer Shutdown Alarm Serious	0	1	1 - YES	Enum 3	RW	3114
MP2	Timer Shutdown Alarm Delay to Reset	10	3600	60	s	RW	3115
DRV	Parameters > Drive Config						
VS1	VS Compressor Output Type	0	1	1 - MBUS	Enum 18	RW	3116
VS2	Serial baudrate	0	8	6 - 192	Enum 4	RW	3117
VS3	Serial settings	0	2	0 - 8N1	Enum 5	RW	3118
VS4	Minimum Speed RPM	0	10000	1500	RPM	RW	3119
VS5	Maximum Speed RPM	0	10000	6000	RPM	RW	3120
VS6	Demand Sensibility	0.0	10.0	1.0	%	RW	3121
VS7	Minimum On	0	1800	0		RW	3122
VS8	Minimum Off	180	3600	180		RW	3123
VSE	Ramp Up	15	1000	180	s	RW	3124

VSF	Ramp Down	15	1000	180	s	RW	3125
VSG	DI 18	0	6	0 - No Operation	Enum 19	RW	3126
VSH	DI 19	0	2	0 - No Operation	Enum 20	RW	3127
VSI	DI 27	0	6	6 - StopInverse	Enum 21	RW	3128
VSJ	Start Delay	0.0	360.0	180.0	s	RW	3129
VSK	Start Speed	1800	10000	1800		RW	3130
DT8	VZH Discharge Temper. Serious Alarm	0	1	1 - YES	Enum 3	RW	3131
HS7	Heatsink Serious Alarm	0	1	0 - NO	Enum 3	RW	3132
SH5	Superheat Control Serious Alarm	0	1	0 - NO	Enum 3	RW	3133
HS1	VZH Enable Heatsink Temper. Control	0	1	0 - NO	Enum 3	RW	3134
SH1	VZH Enable Superheat Control	0	1	0 - NO	Enum 3	RW	3135
Typ	Drive Type	0	3	2 - CDS303	Enum 22	RW	3136
ECC	External Coil > Configuration						
F01	Regulation Mode	0	3	3 - Prb	Enum 9	RW	3137
F02	Regulation Type	0	2	1 - PI	Enum 10	RW	3138
ECR	External Coil > Regulation						
FC1	Cooling Min Amb FSP	1.0	40.0	21.1	°C	RW	3139
F1B	Cooling Max Amb FSP	20.0	60.0	35.0	°C	RW	3189
FC2	Cooling Gain	-500	500	80		RW	3140
FC3	Cooling Integral Time	0	600	300	s	RW	3141
CSF	Cooling Single Fan SP	13.0	30.0	15.9	bar	RW	3197
FC4	OffTimer Override	0.0	33.5	23.1	bar	RW	3195
FC5	OffTimer Ambient Enable	-10.0	50.0	15.0	°C	RW	3196
FH1	Heating Setpoint	-40.0	100.0	8.0	bar	RW	3143
FH2	Heating Differential	0.0	10.0	2.0	bar	RW	3144
FH3	Heating Integral Time	0	600	120	s	RW	3145
FH4	Heating Derivative Time	0	600	20	s	RW	3146
FEN	Enable Override	0	1	0 - Off	Enum 26	RW	3190
FEV	Fan Override Value	0.0	100.0	100.0	%	RW	3191
EDb	ExtCoilDeadband	0.0	1.0	0.4	bar	RW	3192
SFS	StartingFanSeconds	0	100	10	s	RW	3193
FOT	Fan Off Timer	0	240	120	s	RW	3194
ECS	External Coil > Speed Control						
F12	Maximum speed	0.0	100.0	100.0	%	RW	3147
F13	Starting speed	0.0	100.0	5.0	%	RW	3148
F11	Minimum speed	0.0	100.0	5.0	%	RW	3149
DTL	Parameters > Data Log						
SDL	Enable SD Card Log	0	1	1 - YES	Enum 3	RW	3150
ICE	Alarm Config > ICE Water Alarm						
AIT	Ice Water Alarm Threshold	-20.0	20.0	4.2	°C	RW	3151
AID	Ice Water Alarm Differential	0.0	20.0	1.0	°C	RW	3152
AIA	Ice Water Alarm Action With Unit Off	0	1	1 - PON	Enum 11	RW	3153
ICL	Alarm Config > ICE Alarm						

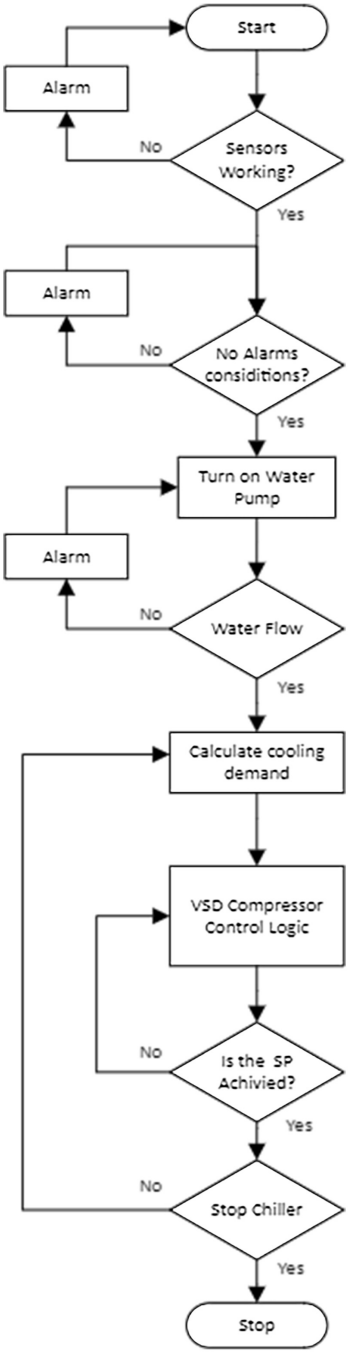
ICA	Ice Alarm Threshold	-20.0	20.0	2.7	°C	RW	3154
ISA	Ice Alarm Differential	0.0	20.0	1.0	°C	RW	3155
IXA	Ice Alarm Action With Unit Off	0	1	1 - PON	Enum 11	RW	3156
HPR	Alarm Config > High Pressure						
ALt	High Pressure Alarm Reset Typer	-1	10	3		RW	3157
AL2	Delay from compressor starting	0	600	20	s	RW	3158
HPE	Enable HP Alarm from Sensor	0	1	1 - YES	Enum 3	RW	3159
HPS	High Pressure Alarm Setpoint	0.0	45.0	40.0	bar	RW	3160
HPD	High Pressure Alarm Differential	0.0	10.0	10.0	bar	RW	3161
LPR	Alarm Config > Low Pressure						
ALr	Low Pressure Alarm Reset Type	-1	10	3		RW	3162
AL1	Delay from compressor starting	0	600	5	s	RW	3163
LPC	Enable when compressors OFF	0	1	0 - NO	Enum 3	RW	3164
ALE	Enable LP Alarm from Sensor	0	1	1 - YES	Enum 3	RW	3165
LPS	Low Pressure Alarm Setpoint	0.0	30.0	3.0	bar	RW	3166
LPD	Low Pressure Alarm Differential	0.0	10.0	2.0	bar	RW	3167
LEK	Alarm Config > DGS Alarm						
LE1	DGS Enable	0	1	0 - Off	Enum 26	RW	3168
LE2	DGS Address	1	127	2		RW	3169
LE3	Leak Level	0	20000	500	ppm	RW	3170
DGF	DGS DI Alarm Fan speed	0.0	100.0	20.0	%	RW	3198
CPF	Panel Fan > Control Panel Fan						
ECF	Enable Ctrl Panel Fan	0	1	1 - YES	Enum 3	RW	3171
CPF	SP Ctrl Panel Fan	0.0	100.0	24.0	°C	RW	3172
DCF	Dif Ctrl Panel Fan	0.0	100.0	1.0	°C	RW	3173
dO1	Delay OFF Ctrl Panel Fan	0	600	60	s	RW	3174
DPF	Panel Fan > Drive Panel Fan						
EDF	Enable Drive Panel Fan	0	1	1 - YES	Enum 3	RW	3175
CDF	SP Drive Panel Fan	0.0	100.0	24.0	°C	RW	3176
DPF	Dif Drive Panel Fan	0.0	100.0	1.0	°C	RW	3177
dO2	Delay OFF Drive Panel Fan	0	600	60	s	RW	3178
CKC	Parameters > Cranckcase Control						
SCK	Setpoint Cranckcase	0.0	100.0	35.0	°C	RW	3179
DCK	Diferential Cracnkcase	0.0	100.0	5.0	°C	RW	3180
MNT	Parameters > Maintenance						
MN1	Disable Circuit 1	0	1	0 - NO	Enum 3	RW	3181
MN3	Disable Compressor 1 C1	0	1	0 - NO	Enum 3	RW	3183
EXV	Parameters > Service EXV						
MOD	Mode OD EXV	0	1	1 - AUTO	Enum 23	RW	3187
OPD	Open Degree EXV	0	10000	5000		RW	3188
	I/O CONFIGURATION						
AI	ANALOG INPUTS						
1	Tin Evaporator	-50.0	110.0	NTC-10K		Read	18502
2	Tout Evaporator	-50.0	110.0	NTC-10K		Read	18503
3	Liquid Pressure	0.0	45.0	0-5 V		Read	18511
4	Suction Temperature	-50.0	110.0	NTC-10K		Read	18506
5	Suction Pressure	0.0	45.0	0-5 V		Read	18505

6	Discharge Pressure	0.0	45.0	0-5 V		Read	18504
7	Crankcase Temp	-50.0	110.0	NTC-10K		Read	18510
8	Main Water Iny Temp	-50.0	110.0	NTC-10K		Read	18512
9	Main Water Ret Temp	-50.0	110.0	NTC-10K		Read	18513
10	Discharge Temperature	-50.0	110.0	NTC-10K		Read	18507
11	Liquid Temperature	-50.0	110.0	NTC-10K		Read	18509
12	Air Ambient Temperature	-50.0	110.0	NTC-10K	°C	Read	18508
13	Control Panel Temp	-50.0	110.0	NTC-10K		Read	18514
14	Drive Panel Temp	-50.0	110.0	NTC-10K		Read	18515
DI	DIGITAL INPUTS						
1	On/Off	0	1	N.O.		Read	17502
2							
3	High Pressure Switch	0	1	N.C.		Read	17505
4	Compressor Status	0	1	N.O.		Read	17504
5							
6	Flow Switch Evap	0	1	N.C.		Read	17508
7	Phase Protector Switch	0	1	N.C.		Read	17515
8	Pump/Fan1 Evaporator Overload	0	1	N.O.		Read	17509
9	Detector Gas Sensor	0	1	N.C.		Read	17517
10	Inv Fan 1 Alarm	0	1	N.C.		Read	17518
11	Inv Fan 2 Alarm	0	1	N.C.		Read	17519
12	Oil Level Switch	0	1	N.C.		Read	17516
13							
14	Ovld Comp Relay Son	0	1	N.O.		Read	17520
15	Overload Compressor Son	0	1	N.C.		Read	17521
16	Mother/Son Switch	0	1	N.O.		Read	17522
17							
18							
AO	ANALOG OUTPUTS						
1	Inv Speed Fan 2	0	100	0-10 V		Read	19003
2	Inv Speed Fan 1	0	100	0-10 V		Read	19002
3	Inv Speed Comp	0	100	0-10 V		Read	19004
4	Hot Gas Bypass	0	100	0-10 V		Read	19006
5	Inv Speed Pump	0	100	0-10 V		Read	19007
6							
7	EXV Valve	0	100	EXV	%	Read	19005
8							
DO	DIGITAL OUTPUTS						
1							
2	4 Way Valve	0	1	N.O.		Read	18010
3	Start Fan 1	0	1	N.O.		Read	18011
4	Start Fan 2	0	1	N.O.		Read	18012
5	Liquid Valve	0	1	N.O.		Read	18006
6	Start Water Pump	0	1	N.O.		Read	18008
7	Cranckcase Heater	0	1	N.O.		Read	18016
8	Control Panel Fan	0	1	N.O.		Read	18015
9	Drive Panel Fan	0	1	N.O.		Read	18014

10	Water Valve	0	1	N.O.		Read	18017
11	Chiller Status On.Off	0	1	N.O.		Read	18013
12	Alarm Status	0	1	N.O.		Read	18002
13							
14							
15	Start Compressor	0	1	N.O.		Read	18004

The program was developed in MCXDesing and there is only one single program for both units. There is parameter where the service technician must select between mother or son configuration. The functionality is basically the same, but it changes on compressor control because on Mother unit we need to use VZH and Oil Management features (for variable compressors) and in the son unit (fix speed) these are disabled. The following flow chart describes the general control sequence.

Figure 14. General Flow Chart for Mother Unit



- **ON/OFF Control – Main Loop Control:** Chiller can be started/ stopped by a digital input number 1 (on/off switch) and HMI command.

- **Sensors Control:** Each sensor in the chiller is validated by this block where the program identifies if a sensor has a failure or not. If a sensor has a problem the logic will trip an alarm and the user has to clear and check the root cause of the failure.

LP Alarms: Same logic as HP Alarm.

Ice Alarm: The objective of this alarm is to protect the MPHE. There are two alarms:

- Ice Water Alarm
- Ice Alarm

Both alarms are defined by user, and they stopped the unit. The first alarm to trip is Ice Water Alarm and if the temperature continuing decreases and the unit has not stopped the Ice alarms must trip immediately.

DGS Alarm: When the DGS detects a leak of refrigerant a dry contact will close and the MXC controller will detect by a digital input and the chiller will trip by DGS High Level alarm and the chiller will stop immediately and the Fans condenser will keep running until an operator resets manually on MCX display.

NOTE: Only the version with refrigerant 454B includes the gas sensor.

Table 3. List of alarms with levels and type of alarms

LABEL	DESCRIPTION	MIN	MAX	VALUE/TYP	UNIT	RW	Modbus
	ALARMS						
LABEL	DESCRIPTION	MIN	MAX	RESET	IN OFF		
E01	Temperature Evaporator In Fault	0	1	AUTO	ACTIVE	Read	1901 .08
E02	Temperature Evaporator Out Fault	0	1	AUTO	ACTIVE	Read	1901 .09
E03	Suction Temperature Fault	0	1	AUTO	ACTIVE	Read	1901 .10
E05	Discharge Pressure Fault	0	1	AUTO	ACTIVE	Read	1901 .11
E07	Evaporating Pressure Fault	0	1	AUTO	ACTIVE	Read	1901 .12
E09	Discharge Temperature Fault	0	1	AUTO	ACTIVE	Read	1901 .13
E11	Air Ambient Temperature Fault	0	1	AUTO	ACTIVE	Read	1901 .14
A01	General alarm	0	1	MANUAL	ACTIVE	Read	1901 .15
A03	Evaporator flow switch alarm	0	1	AFr	INACTIVE	Read	1901 .00
AP1	Evap. pump/fan 1 overload alarm	0	1	AUTO	INACTIVE	Read	1901 .01
AP2	Evap. pump2 overload alarm	0	1	AUTO	INACTIVE	Read	1901 .02
AP3	Backup evap. pump running	0	1	AUTO	ACTIVE	Read	1901 .03
HP1	High Pressure	0	1	ALt	INACTIVE	Read	1901 .04
LP1	Low Pressure	0	1	ALr	INACTIVE	Read	1901 .05
C11	General Compressor 1	0	1	AUTO	ACTIVE	Read	1901 .06
A06	Evaporator ice water Alarm	0	1	AUTO	ACTIVE	Read	1901 .07
E10	EXV 1 - Connection Error	0	1	AUTO	ACTIVE	Read	1902 .08
E11	EXV 1 - Configuration Error	0	1	AUTO	ACTIVE	Read	1902 .09
E12	EXV 1 - Battery Fault	0	1	AUTO	ACTIVE	Read	1902 .10
LG1	SD Card Data Logging Fault	0	1	AUTO	ACTIVE	Read	1902 .11
ELG	SD Card Event Logging Fault	0	1	AUTO	ACTIVE	Read	1902 .12
LG2	Internal Data Logging Fault	0	1	AUTO	ACTIVE	Read	1902 .13
OV1	Compressor Overload	0	1	MANUAL	ACTIVE	Read	1902 .14
PHV	Phase Volt Monitor	0	1	MANUAL	ACTIVE	Read	1902 .15
SH1	Superheat Error	0	1	AUTO	ACTIVE	Read	1902 .00
MPA	VZH Map Safety Shutdown Alarm	0	1	5	ACTIVE	Read	1902 .01
MPW	VZH Map Timer Shutdown Alarm	0	1	4	ACTIVE	Read	1902 .02
MP1	VZH Map - Low Suction Pressure	0	1	AUTO	ACTIVE	Read	1902 .03

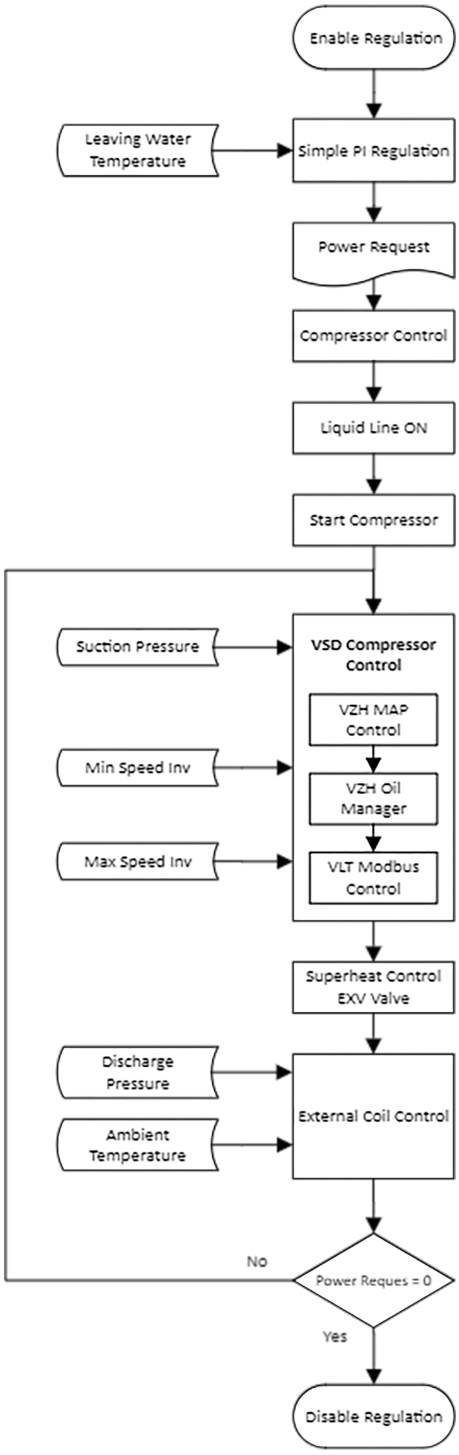
MP2	VZH Map - HP Ratio/HP	0	1	AUTO	ACTIVE	Read	1902 .04
MP3	VZH Map - High Suction Pressure	0	1	AUTO	ACTIVE	Read	1902 .05
MP4	VZH Map - LP Ratio/Low Cond	0	1	AUTO	ACTIVE	Read	1902 .06
MP5	VZH Map - Abnormal DischP/SuctP	0	1	AUTO	ACTIVE	Read	1902 .07
DTA	Discharge Temperature Emergnecy Level	0	1	2	ACTIVE	Read	1903 .08
DTW	Discharge Temperature Warning Level	0	1	AUTO	ACTIVE	Read	1903 .09
OI1	Lack of Oil Alarm	0	1	MANUAL	ACTIVE	Read	1903 .10
OI2	Between Two Lack of Oil Alarm	0	1	MANUAL	ACTIVE	Read	1903 .11
OI3	Between Two Lack of Oil Warning	0	1	AUTO	ACTIVE	Read	1903 .12
OI4	Boost Speed-up Warning	0	1	AUTO	ACTIVE	Read	1903 .13
OI5	Lack of Oil Status	0	1	AUTO	ACTIVE	Read	1903 .14
OI6	Start Without Oil Alarm	0	1	MANUAL	ACTIVE	Read	1903 .15
E54	Boost Start	0	1	AUTO	ACTIVE	Read	1903 .00
W01	Oil Level Switch Warning	0	1	AUTO	ACTIVE	Read	1903 .01
T27	T27 Active	0	1	AUTO	ACTIVE	Read	1903 .02
T37	T37 Active	0	1	AUTO	ACTIVE	Read	1903 .03
T18	T18 Active	0	1	AUTO	ACTIVE	Read	1903 .04
T19	T19 Active	0	1	AUTO	ACTIVE	Read	1903 .05
VSC	VS Compressor Modbus Connection	0	1	AUTO	ACTIVE	Read	1903 .06
W69	Drive Safe Stop	0	1	AUTO	ACTIVE	Read	1903 .07
D01	Drive Trip No Lock	0	1	AUTO	ACTIVE	Read	1904 .08
D02	Drive Trip Lock	0	1	MANUAL	ACTIVE	Read	1904 .09
D03	Drive Error No Trip	0	1	AUTO	ACTIVE	Read	1904 .10
A99	Drive Not Auto	0	1	AUTO	ACTIVE	Read	1904 .11
W68	Drive Warning Safe Stop	0	1	AUTO	ACTIVE	Read	1904 .12
E53	Drive Start Delayed	0	1	AUTO	ACTIVE	Read	1904 .13
A77	Evaporator ice Alarm	0	1	AUTO	ACTIVE	Read	1904 .14
E70	Liquid Temperature Fault	0	1	AUTO	ACTIVE	Read	1904 .15
E71	Control Panel Temp Fault	0	1	AUTO	ACTIVE	Read	1904 .00
E72	Drive Panel Temp Fault	0	1	AUTO	ACTIVE	Read	1904 .01
E73	Crankcase Temp Fault	0	1	AUTO	ACTIVE	Read	1904 .02

E74	Liquid Press Fault	0	1	AUTO	ACTIVE	Read	1904 .03
E75	Main Water Iny Temp Fault	0	1	AUTO	ACTIVE	Read	1904 .04
E76	Main Water Ret Temp Fault	0	1	AUTO	ACTIVE	Read	1904 .05
W70	Ovld Comp Relay Warning	0	1	AUTO	ACTIVE	Read	1904 .06
W71	Overload Compressor Warrnig	0	1	AUTO	ACTIVE	Read	1904 .07
W72	Detector Gas Sensor Alarm	0	1	MANUAL	ACTIVE	Read	1905 .08
W73	DGS High Level Alarm	0	1	MANUAL	ACTIVE	Read	1905 .09
W74	DGS Modbus Fault	0	1	AUTO	ACTIVE	Read	1905 .10
FA1	Fan 1 Inv Alarm	0	1	AUTO	ACTIVE	Read	1905 .11
FA2	Fan 2 Inv Alarm	0	1	AUTO	ACTIVE	Read	1905 .12

Evaporator Pump control: After the chiller has been started the PumpRequest flag send the signal to Twin Pumps components and it starts the Pump. In this sequence the Flow switch is monitored and if 5 second after the pump is started and the flow switch is not closed the Evaporator flow Switch Alarm appears.

Regulation control: On this section the program with calculate the Cooling Power demand according to the value of actual Leaving Water Temperature versus the Set Point defined by the user. The function that calculates that value is a PI (Proportional & integral) block. The Flow chart of this section is as follows:

Figure 15. Flow chart of compressor regulation sequence for mother unit.



The compressor has an oil level switch, and the VZH oil manager is configured based on oil lever sensor, it means that only when the switch detected low level, the oil boost sequence will start.

- **Expansion Valve Control:** For controlling the Electronic Expansion valve the program uses a brick named Superheat Control, where the logic work like an EKE controller. For basic superheat control, one Evaporator temperature sensor (TetempeatureValue), and one pressure sensor (suction pressure) are needed. The actual superheat is calculated based on these two sensor readings, and the controller will adjust the OD (open Degree) of the valve to bring the superheat to the desired reference. If superheat is too low the flow in the expansion is decreased and superheat will be higher and vice versa.

NOTE: The mcx152b has the EXV driver included, and it is controlled by stepper motor driver

- **External Coil Control:** this section controls the 2 Fan condenser speed to keep the discharge pressure at the SP.

General Principle:

- Control fan speed and number of fans running based on compressor discharge pressure.
- Increase air flow (fan speed, number of fans) when pressure is higher than target.
- Reduce air flow (fan speed, number of fans) when pressure is lower than target.
- Increase target discharge pressure when the EEV is fully open (this may be happening for Data Center applications, and or chiller starting in a building after being off for a long time and with high water temperature e.g. 80F).
- Eliminate constant fan cycling between 2 fans and 1 fan.
- Minimize fan cycling in low ambient conditions between no fans and one fan running to the extent possible (very frequent fan cycling could cause MCHE condenser coil thermal fatigue failure).
- When running one fan only – run the fans that is nearer to the condenser inlet/outlet piping Vand turn off the one farther away.

Target Pressure Setting: [Coding Priority 1]

- The value is determined based on the fan power consumption vs compressor power. We found discharge pressure corresponding to 90°F sat temperature to be optimum.

Ptarget = Amb(70-95°F) + dT psig (condensing)
- Minimum Ptarget = 70°F
- Maximum Ptarget = 121.12 °F

dT = 0.0024(Comp Speed[0-6000RPM]) + 11.83

Deadband Control[Coding Priority 1]:

Deadband parameter is set by the User: Param_Db.
Actual Deadband values: ±Db = Ptarget ± Param_Db
Deadband Mode enabled IF: -Db < P_Disc < +Db

What it does:
Deadband mode holds the value from when the control variable (P_disc) enters the Deadband range. When exiting either side of the deadband the PI controller is given the held value as a starting point. Normal PI control operations resume.

How Fans Respond to PI output: [Coding Priority 1] Fan mode will be switched on two conditions:

If Mode = 2 Fan, 2 fans run from 5%< PI output < 5%, switch to 1 Fan.

If Mode = 1 Fan, 1 fan runs from 2.5%< PI output 25%, switch to 2 Fans.

Initial Fan speed with a hold for X seconds

Setting the initial speed: [Coding Priority 2]:

If Ambient > 27°C, starting PI value is 100%
If Ambient < 27°C, starting PI value is 95%
If Ambient < 24.5°C, starting PI value is 90%
If Ambient < 22C, starting PI value is 85%
If Ambient < 19.5°C, starting PI value is 80%
If Ambient < 17°C, starting PI value is 75%
If Ambient < 14.5°C, starting PI value is 70%
If Ambient <12°C, starting PI value is 65%
If Ambient < 9.5°C, starting PI value is 60%
If Ambient < 7°C, starting PI value is 55%
If Ambient < 5°C, starting PI value is 50%
If Ambient < 0°C, starting PI value is 45%
If Ambient < -5°C, starting PI value is 40%
If Ambient < -10°C, starting PI value is 35%
If Ambient < -15°C, starting PI value is 30%
If Ambient < -20°C, starting PI value is 25%
If Ambient < -25°C, starting PI value is 20%

Parameter for keeping the starting speed held for X Seconds.

Set timer for keeping the fans off : [Coding Priority 3]
Parameter for amount of time off: A timer for keeping the fans from switching off and back on again.
Starts when PI _ouput = 0 and Ambient < Cutoff_amb_enable

- Only active after Ambient < Cutoff_amb_enable
- Override fans if Timer.Elapsed() < Param_Fan_Off_timer o Default 2 min, test if this is too long
- Override the Timer if P_Disc > Cutoff_overide

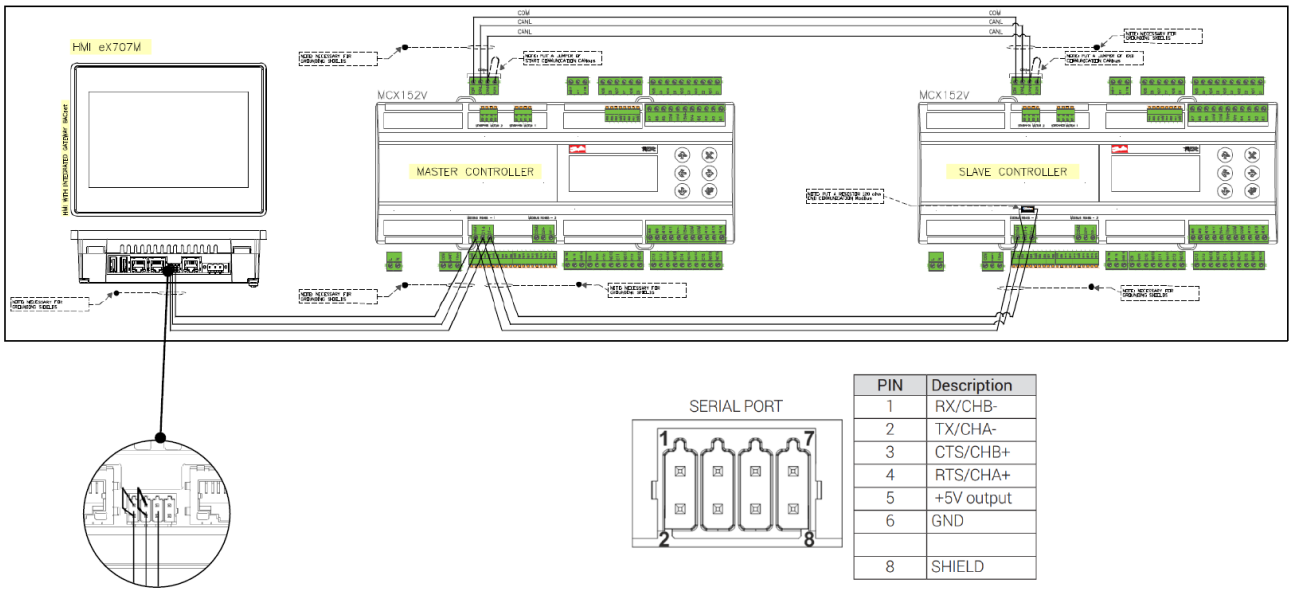
The set point of the discharge pressure is a floating SP that will change according to ambient temperature.

- The PI gain and Integral time have been tuned a bit. An offset has been added to the PI.
- Fan selection now occurs based on Jordan's logic.
- Both fans turn off at 183PSI no matter what.
- DGS alarm has priority over the fans no matter what.

- **SD Card Log Control:** It is possible to record 32 values in the SD card with an adjustable Sample rate. Factory default is 10 seconds.

For the integration with the MCX controller you need to follow the next wiring; It´s very important validate the polarity of the Modbus protocol in both devices also assure in RS-485 of HMI pins 1-2 and 4-3 must be connected externally.

Figure 16. Modbus Integration And Wiring



PIN	Description
1	RX/CHB-
2	TX/CHA-
3	CTS/CHB+
4	RTS/CHA+
5	+5V output
6	GND
8	SHIELD

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