

Application Guidelines for the Emerson Closed Loop Digital Controller (XC643)

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Safety Instructions

Copeland™ compressors are manufactured according to the latest U.S. and European Safety Standards. Particular emphasis has been placed on the user's safety. Safety icons are explained below and safety instructions applicable to the products in this bulletin are grouped on page 3. These instructions should be retained throughout the lifetime of the compressor. **You are strongly advised to follow these safety instructions.**

Safety Icon Explanation

- 
DANGER indicates a hazardous situation which, if not avoided, will result in death or serious injury.
- 
WARNING indicates a hazardous situation which, if not avoided, could result in death or serious injury.
- 
CAUTION, used with the safety alert symbol, indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.
- 
NOTICE is used to address practices not related to personal injury.
- 
CAUTION, without the safety alert symbol, is used to address practices not related to personal injury.

Instructions Pertaining to Risk of Electrical Shock, Fire, or Injury to Persons

 WARNING	<p>ELECTRICAL SHOCK HAZARD</p> <ul style="list-style-type: none"> • Failure to follow these warnings could result in serious personal injury. • Disconnect and lock out power before servicing. • Discharge all capacitors before servicing. • Use compressor with grounded system only. • Molded electrical plug must be used when required. • Refer to original equipment wiring diagrams. • Electrical connections must be made by qualified electrical personnel.
 WARNING	<p>PRESSURIZED SYSTEM HAZARD</p> <ul style="list-style-type: none"> • Failure to follow these warnings could result in serious personal injury. • System contains refrigerant and oil under pressure. • Remove refrigerant from both the high and low compressor side before removing compressor. • Use appropriate back up wrenches on rotalock fittings when servicing. • Never install a system and leave it unattended when it has no charge, a holding charge, or with the service valves closed without electrically locking out the system. • Use only approved refrigerants and refrigeration oils. • Personal safety equipment must be used.
 WARNING	<p>BURN HAZARD</p> <ul style="list-style-type: none"> • Failure to follow these warnings could result in serious personal injury or property damage. • Do not touch the compressor until it has cooled down. • Ensure that materials and wiring do not touch high temperature areas of the compressor. • Use caution when brazing system components. • Personal safety equipment must be used.
 CAUTION	<p>COMPRESSOR HANDLING</p> <ul style="list-style-type: none"> • Failure to follow these warnings could result in personal injury or property damage. • Use the appropriate lifting devices to move compressors. • Personal safety equipment must be used.

Safety Statements

- Refrigerant compressors must be employed only for their intended use.
- Only qualified and authorized HVAC or refrigeration personnel are permitted to install, commission and maintain this equipment.
- Electrical connections must be made by qualified electrical personnel.
- All valid standards and codes for installing, servicing, and maintaining electrical and refrigeration equipment must be observed.

INTRODUCTION

The XC643CX is designed to manage one Copeland™ digital compressor on a single-compressor condensing unit, or two compressors in parallel, with one digital compressor in addition to a fixed-speed compressor. The controller also manages condenser fans. Control is based on the pressure or temperature sensed in the low pressure suction (compressors) and high pressure (condenser) circuits.

The front panel offers information on the system status, the status of loads, and any alarm conditions. The controller can be easily programmed through a hot key. The controller can be connected to a monitoring system via the serial TTL output, using the standard ModBus RTU protocol.

Overview

On refrigeration applications where the load may vary over a wide range, some means of capacity control is often desirable for optimum system performance and control. In addition, compressor capacity modulation can reduce power and energy consumption, reduce

compressor cycling, and decrease the starting electrical load. In order to achieve these objectives, Emerson Climate Technologies has developed the Copeland Discus Digital™ and Copeland Scroll Digital™ compressors.

The XC643 is one module (one part number) which can support scroll and Discus digital (3D, 4D, 6D) compressors. See **Table 1** for specific modulation ranges.

For more details on Copeland digital compressors refer to the following Application Engineering guidelines or contact your Emerson Climate Technologies representative:

AE21-1319, *Digital Capacity Control for Refrigeration Scroll Compressors*

AE21-1355, *Digital Capacity Control for Copeland and Intelligent Store Discus Refrigeration Compressors*

AE4-1357, *Upgrade Procedures for Parallel Applications Using Digital Capacity Control for Copeland and Intelligent Store Discus Refrigeration Compressors (for 3D Discus)*

AE4-1373, *Upgrade Procedures for Parallel Applications Using Digital Capacity Control for Copeland and Intelligent Store Discus Refrigeration Compressors (for 4D & 6D Discus)*

The simplest way to apply the XC643 digital controller is with one suction pressure transducer or evaporator temperature sensor. The controller reads the suction pressure and modulates the digital compressor as

Table 1 – Modulation Ranges

Compressor Family	Modulation Range of Full Load Capacity
Scroll Digital ZBD/ZRD/ZFD/ZPD	10-100%
3D Discus Digital	10-100%
4D Discus Digital	55-100%
6D Discus Digital	70-100%

Table 2 – Product Specifications

Housing:	Self extinguishing ABS.
Case:	Front panel 32x74 mm (1.26x2.91 inch), depth 70mm (2.76 inch)
Mounting:	“CX” format panel mounting in a 29x71 mm panel cut-out (1.14x2.80 inch)
Protection:	IP20
Frontal protection:	IP65
Connections:	Removable terminal block 6 and 14 wires
Power supply:	24Vac/dc * 10%, 50-60Hz.
Power absorption:	5VA max
Display:	4 digits red led and 4 digit orange led.
Serial output :	TTL standard Communication protocol: ModBus – RTU
Operating temperature:	-28 to +60°C (-20 to +140F); Storage temperature: -25-60°C (-13-140F)
Relative humidity:	20-85% (no condensing)

needed. If condenser fan control is also needed, a second pressure transducer or condenser temperature sensor can be added to read the high side pressure at the exit of the condenser (reading liquid pressure or liquid temperature).

This digital controller will also work with temperature sensors rather than pressure transducers. The two different types of sensors (temperature and pressure)

cannot be mixed. For example, you cannot use a pressure transducer for suction and a temperature sensor for condensing in an application.

Pressure transducers and NTC temperature sensors are available with the controller kit. If you want to use a different pressure transducer, consult your Application Engineer.

Table 3 – Components

Part Number	Description
998-0189-00	Complete kit with controller, wire harnesses, pressure and NTC temperature transducers
943-0017-00	Controller only
929-0005-00	Wire harness only
939-0007-00	Pressure transducer only, PP11 suction
939-0008-00	Pressure transducer only, PP30 discharge
939-0009-00	Temperature transducer only
943-0018-00	TTL/ RS485 Serial Converter
943-0019-00	Hot key
962-0007-00	Optional terminal box

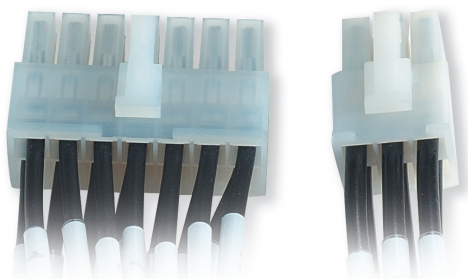


Figure 1 – XC643CX 14 and 6 Pin Connectors

The XC643CX is provided with 2 socket connectors with 14 and 6 pins. These cable harnesses must be used.

PP11 - PP30 - Bar

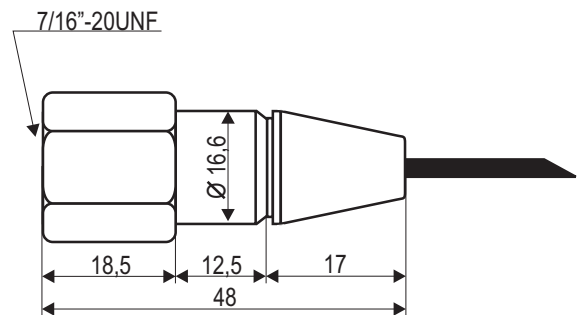


Figure 2 – Standard Pressure Transducer

PP11 -0.5 to 7 bar (-7 to 100 psig) suction, female
 PP30 0 to 30 bar (0 to 435 psig) discharge, female

Note: Alternative pressure transducers may be used. Refer to **Table 7**.

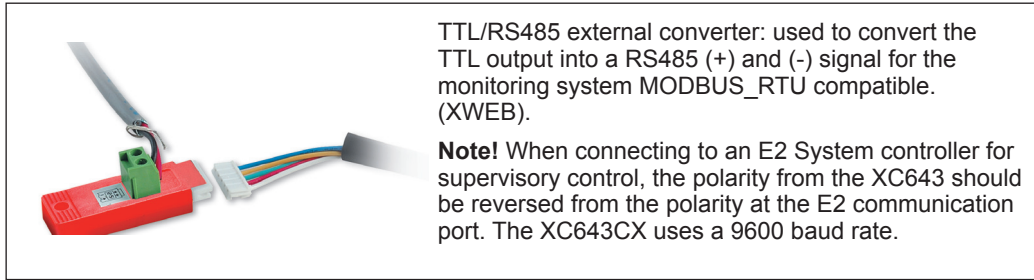


Figure 3 – TTL / RS485 Serial Converter

INSTALLATION AND CONTROLLER OPERATING INSTRUCTIONS

Wiring and Electrical Connections

Before connecting cables make sure the power supply complies with the rated voltage requirements. Separate the probe cables from the power supply cables, the outputs and the power connections. **Do not exceed the maximum current allowed on each relay (3A resistive)**. In case of heavier loads use a suitable external relay or contactor. Always use a Class 2 transformer with minimum power 5VA.

The power supply for the controller is 19-28VAC, 48-62Hz. The maximum load is 5 VA. 24V power to the module must be on any time the unit is on and should not be interrupted by any control. Center tap transformers are not to be used.

Probes Connection

If using terminal ends be sure there are no bare parts which could cause short circuiting or introduce noise disturbance at high frequencies. To minimize the induced disturbances use shielded cables with the shield connected to earth.

Pressure probe (4 - 20 mA): respect the polarity. Pb1 is suction; Pb2 is condenser.

Temperature probe (NTC 10K): Temperature probes should be insulated from direct air streams to correctly measure the temperature.

Probe Wiring

The XC643CX is capable of regulating the compressors and condenser fans on any of the following types of pressure/temperature sensors. The user must use the same type of sensor to control the compressors and the fans.

- 4-20mA pressure transducers (refer to **Figure 4a**)
- 0.5-4.5V ratiometric pressure transducers (refer to **Figure 4b**)
- NTC 10K temperature sensors (refer to **Figure 4c**)

Note! The 14-pin connector consists of low voltage wires. Keep the cables away from the power cables. Use shielded cable to lengthen the cables.

- PIN 4** is the common line for the temperature probes
- PIN 6** gives a 12Vdc supply for the 4-20mA pressure transducers
- PIN 10** is the ground connection for ratiometric pressure transducers

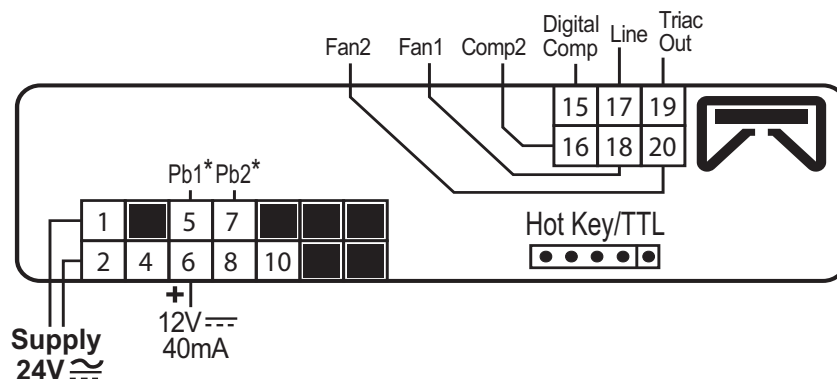


Figure 4 – XC643 Module Connections

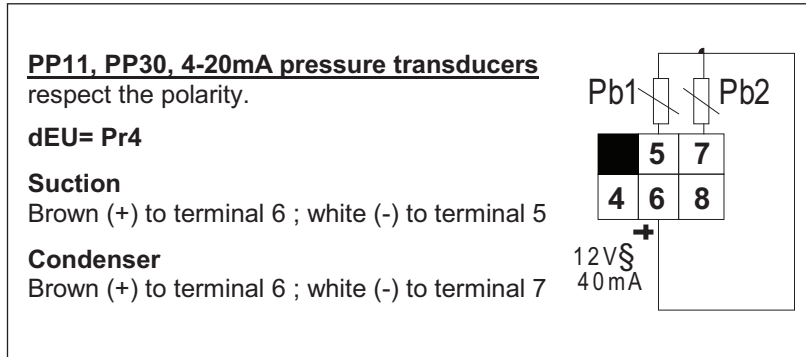


Figure 4a – Wiring Diagram for 4-20 mA Pressure Transducer

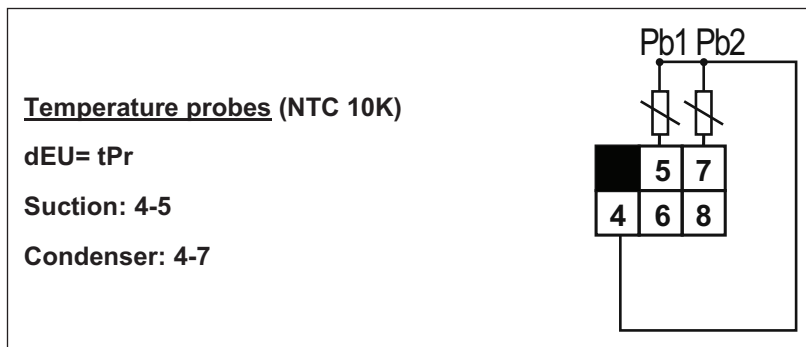


Figure 4b – Wiring Diagram for NTC 10K Temperature Probes

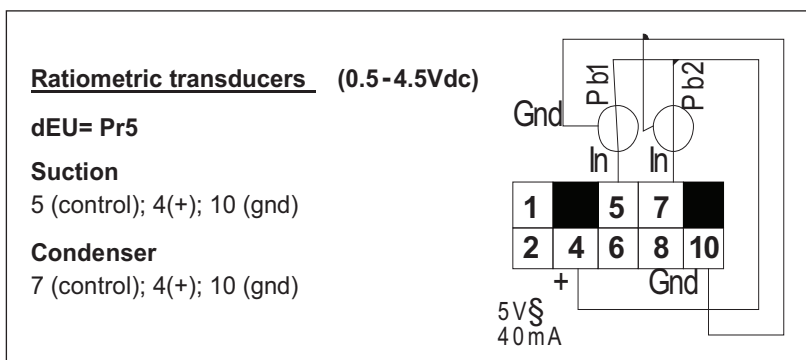


Figure 4c – Wiring for Ratiometric Pressure Transducers

Systems with Compressor Pumpdown Cycle

In systems that require a compressor pumpdown, special attention should be paid to the control logic for the digital unloader coil. Inherent to the digital control, the compressor will effectively ramp down and track the suction pressure by loading and unloading to decreasing modulation rates. In order to avoid an extended compressor pumpdown cycle, the digital solenoid should be wired/controlled such that when a pump down cycle is initiated the coil is de-energized. This will force the compressor to run fully loaded (100% capacity). Refer to **AE-1182** and **AE-1221** for more details on pumpdown cycles.

Note: The Digital unloader solenoid is always energized for 2 seconds upon start-up and at shut down of the compressor.

Mounting and Installation

If this controller is used outside, it should be enclosed in a box with IP65 rating. Controllers should be mounted on panel, in a 29x71 mm (1.14x2.80 inch) hole, and fixed using the special brackets supplied. The controller should not be mounted on the compressor nor in the compressor terminal box.

The ambient operating temperature range is between 14-140 degrees F. (Can operate in ambients as low as -40°F when applied with an enclosure.)

Ensure ventilation around the controller.

Note! For systems applied in low ambient conditions, special attention should be paid to the digital compressor's minimum allowable pressure differential (Absolute Discharge Pressure - Absolute Suction Pressure). Copeland Scroll compressors must maintain at least a 75 PSID while the Copeland Discus must have a 45 PSID to operate correctly.

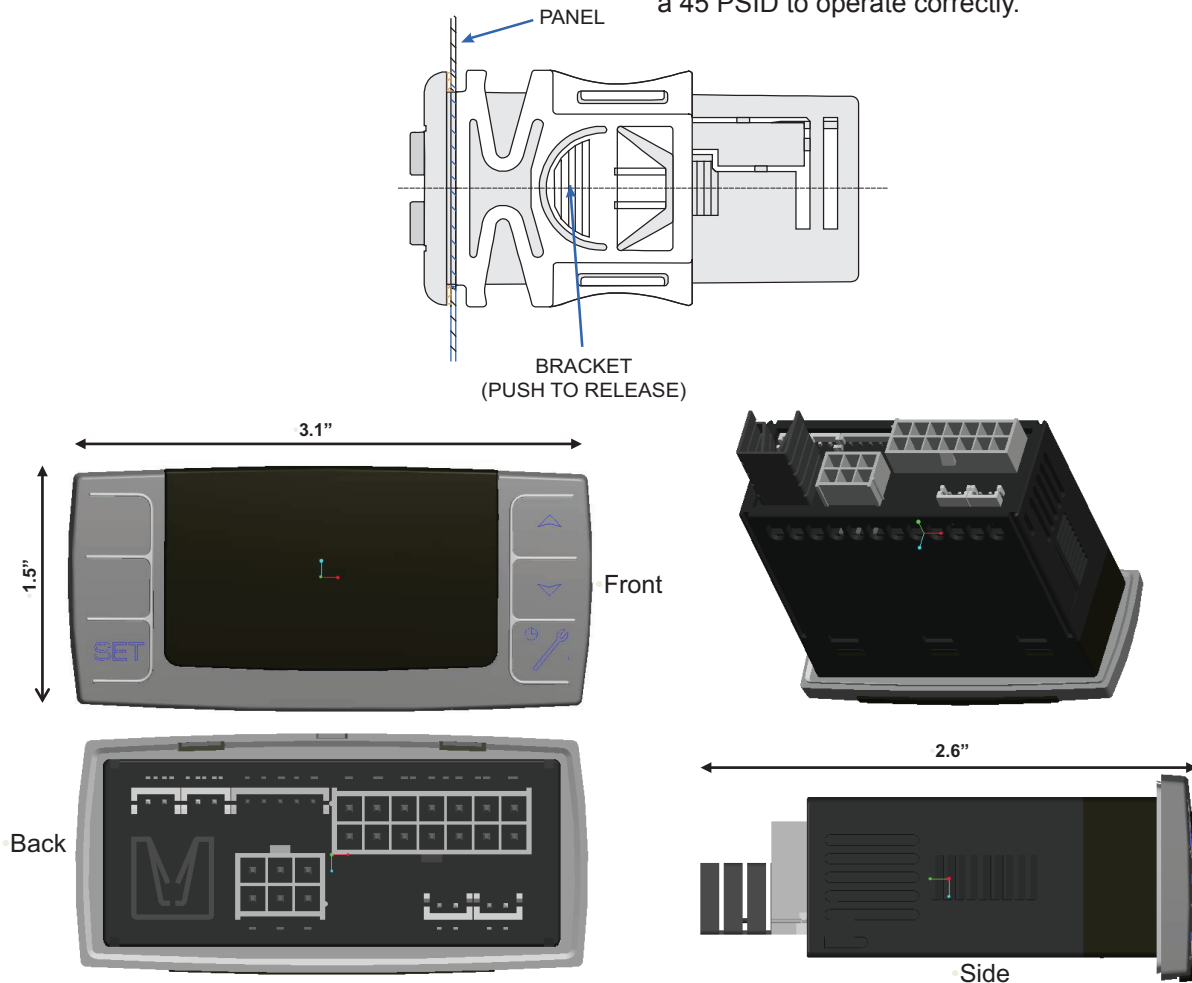


Figure 5 – XC643 Dimensions and Mounting

Table 4 – Display Legend

UPPER DISPLAY	LOWER DISPLAY	ICONS
Suction temperature or pressure	Discharge temperature or pressure	- Active loads - Measurement unit



Figure 6 – Controller Display

Table 5 – Icon Legend

LED	FUNCTION	MEANING
°C	ON	Celsius degrees
°F	ON	Fahrenheit degrees
bar	ON	bar displaying
PSI	ON	PSI displaying
kPa	ON	KPA displaying
[1]	ON	Copeland Scroll Digital compressor on
[1]	Flashing	Digital compressor is waiting to start (flash once per second) or digital input alarm for DIGITAL COMPRESSOR (flash twice per second) or DIGITAL COMPRESSOR in maintenance status.
[2]	ON	Compressor 2 on
[2]	Flashing	Compressor 2 is waiting to start (flash once per second)
[3]	ON	Fan 1 on
[3]	Flashing	Fan 1 is waiting to start (flash once per second)
[4]	ON	Fan 2 on
[4]	Flashing	Fan 2 is waiting to start (flash once per second)
[⚡]	ON	The digital solenoid valve coil is energized

Keyboard

SET (SET)

Standard view: to see or modify the set point. In programming mode use SETP to select a parameter or confirm an operation.



(UP)

In programming mode: used to browse the parameter codes or increase the displayed value.

With Hot key inserted: UP starts the Hot key programming procedure.

To access the INFO menu: push and release UP to access the INFO menu.



(DOWN)

In programming mode: used to browse the parameter codes or decrease the displayed value.



Not used





Displays running hours for each load



Not used

Key Combinations

 +  Lock and unlock keyboard

SET +  Exit programming mode

SET +  Enter programming mode

Table 6 – Value Pre-Set According to the Kind of Refrigerant

	R-404A	R-22	R-410A	R-507	R-134a	R-407A	R-407C
SETC (psig)	55	43	78	55	17	42	37
SETF (psig)	220	181	295	220	114	194	179
LSE (psig)	5	1	11	5	-7	-1	-1
HSE (psig)	114	93	155	114	51	99	95
LSF (psig)	170	131	245	169	63	143	130
HSF (psig)	270	231	345	269	163	243	230
Pbd	10	10	10	10	10	10	10
Pb	58	58	58	58	58	58	58

Controller Start-Up

First installation

At first installation:

1. Select the kind of refrigerant.
2. Select the kind of transducer
3. For systems with master controller supervisory control, set the module node address.

How to Set the Kind of Refrigerant

The controller has been programmed with several refrigerants.

The pre-set refrigerant is: R-404A.

By modifying the refrigerant (FtyP), other defaults will also change. Refer to **Table 6**.

If another refrigerant is used:

1. Enter the Programming mode by pressing the **Set** and **DOWN** key for 3s.
2. Select the **FtyP, kind of refrigerant**, parameter.
3. Press the “**SET**” key: the value of the parameter will start blinking.
4. Use “**UP**” or “**DOWN**” to change the refrigerant among the following:
r22(0) - 134(1) - 404(2) - 407A(3) - 407C(4) - 410(5) - 507(6)

5. Press **“SET”** to store the new value and move to the following parameter.

To exit: Press **SET + UP** or wait 30s without pressing a key.

NOTE: the set value is stored even when the procedure is exited by waiting the time-out to expire.

How to Set the Kind of Probes

1. Enter the programming as described in the previous parameter
2. Select the dEU kind of probe parameter according to the following:
 - a. 4-20mA pressure transducers: **dEU = Pr4**
 - b. 0.5-4.5V pressure transducers: **dEU = Pr5**
 - c. NTC 10K temperature sensors: **dEU = tPr**

According to the kind of probe the controller will display the pressure or the temperature.

Refer to **Table 7** for recommended probe settings for some common pressure transducers.

Programming procedure:

(Example based on changing from default pressure transducer to Ratiometric Pressure transducer)

1. Hold down the **SET** and **DOWN** key for 3 seconds.
2. The controller displays the name of the parameter in the Lower display, its value on the Upper display. Select **Pr2** and Press **“SET”**
3. Flashing “0---“ is displayed, use the up and down arrows to set to 3210 and press **SET** for each digit.
4. Once the password is entered go to dEU, press SET, using up and down set to **Pr5**, press **SET**.

5. Set the following parameters PA04, PA20, FA04, and FA20:

dEU = Pr5

PA04 = Minimum pressure reading on Pb1

PA20 = Maximum pressure reading on Pb1

FA04 = Minimum pressure reading on Pb2

FA20 = Minimum pressure reading on Pb2

Probe Errors

If the display shows a flashing P1 or P2, verify the probe is wired correctly. If there is a fault on P1, the Digital compressor will run at 100% loaded. If P2 is found to be faulty, one fan will be forced on.

A probe error will also be displayed if the probe reads a value outside the pre-set range.

How to See and Modify the Set Point(s)

How to see the set point of compressors and/or fans

If the controller is managing both compressors and fans, both the set points are displayed in sequence, otherwise only the set point of the enabled section will be displayed.

1. Push and release the **SET** key;
2. The Lower display will show the **“SEtC”** label, while the Upper display will show its value.
3. To see the fan set point, push again the **SET** key.
4. The Lower display will show the **“SEtF”** label, while the Upper display will show the fan set point.

To exit: push the **SET** key or wait for 30 without pressing any keys.

Table 7 – Standard Probe Settings





Manufacturer	CPC	Emerson Flow Controls	Dixell
Suction Transducer	800-2200	PT5-07M (802 350)	PP11 (939-0007-00)
Discharge Transducer	800-2500	PT5-18M (802 351)	PP30 (939-0008-00)
Sensor Type	Ratiometric pressure	4-20 mA pressure	4-20 mA pressure
dEU	Pr5	Pr4	Pr4
PA04	0	0	0
PA20	200	100	200
FA04	0	0	0
FA20	500	260	500

How to Modify the Set Point of Compressors and/or Fans

NOTICE

Before setting the target set points for the first time, check and, if necessary, modify the type of refrigerant (parameter FtyP) and pressure or temperature units. Refer back to the section titled How to Set the Kind of Refrigerant.

Procedure

1. Push the **SET** key for more than 2 seconds;
2. The Lower display will show the "**SetC**" label, the Upper display will show its value flashing.
3. To change the value, push the  or  within 30s.
4. To memorize the new value and pass to the fan set point, push the **SET** key.
5. The Lower display will show the "**SetF**" label, the Upper display will show the fan set point flashing.
6. To change its value, push the  or  within 30s. Push **SET** to save and exit.

The INFO Menu

The controller can display important information directly from the main menu. The INFO menu is accessible by pushing and releasing the **UP** key:

NOTE: This information is displayed only if the related function is enabled

- **dStO:** percentage of the Pulse Width Modification output driving the valve of the digital compressor.
- **dSFr:** value of temperature or pressure when the regulation filter of digital compressor is enabled.

The "regulation filter" function calculates the average value of the pressure/temperature during a PWM cycle, and uses this value for the control algorithm.

To exit: push the **SET+UP** keys together

How to Enter the "Pr1" Parameter List

To enter the "Pr1" parameter list, user accessible, operate as follows:

1. Hold pressed the **SET** and **DOWN** key for 3s.

2. The controller displays the name of the parameter in the Lower display, its value on the Upper display.
3. Press the "**SET**" key: the value of the parameter will start blinking.
4. Use "**UP**" or "**DOWN**" to change the value.
5. Press "**SET**" to store the new value and move to the following parameter.

To exit: Press **SET + UP** or wait 30s without pressing a key.



NOTE: the set value is stored even when the procedure is exited by waiting for the time-out to expire.


How to Enter in Parameters List "Pr2"

The "Pr2" parameter list is protected by a security code (Password).





SECURITY CODE is 3210

To access parameters in "PR2":

1. Enter the "Pr1" level.
2. Select "**Pr2**" parameter and press the "**SET**" key.
3. The flashing value "0 ---" is displayed.
4. Use  or  to input the security code and confirm the figure by pressing "**SET**" key.
5. Repeat operations 2 and 3 for the other digits.

NOTE: Each parameter that can be edited in "Pr2" can be removed or put into "Pr1" (user level) by pressing "**SET**" + . Additionally, any "Pr1" parameter can be moved to "Pr2" by pressing "SET" + draw down arrow while in the Pr2 list.

How to Change Parameter Values



1. Enter the Programming mode.
2. Select the required parameter with  or .
3. Press the "**SET**" key the value start blinking.
4. Use  or  to change its value.
5. Press "**SET**" to store the new value and move to the following parameter.

To exit: Press **SET + UP** or wait 15s without pressing a key.

NOTE: the new programming is stored even when the procedure is exited by waiting the time-out.

Keyboard Locking

How to Lock the Keyboard

1. Keep the  and  keys pressed together for more than 3s.
2. The “POF” message will be displayed and the keyboard is locked. At this point it is only possible to view the set point and INFO menu and enter the parameter list.

To Unlock the Keyboard

Keep the  and  keys pressed together for more than 3s till the “POn” flashing message appears.

Parameters

The XC643CX is pre-set to drive a Copeland Digital compressor. The relay 15-17 is set to manage the compressor contactor, while the TRIAC output 17-19 drives the digital solenoid valve.

oA2 (terminal 16-17) output 2 configuration: Second relay according to the configuration of the oA2 parameter can work as:

- **Compressor:** oA2 = cPr,
- **Not used:** oA2 = nu

oA3 (term. 17-18) output 3 configuration: third relay according to the configuration of the oA3 parameter can work as:

- **Fan:** oA3 = FAn,
- **Not used:** oA3 = nu

oA4 (term. 17-20) output 4 configuration: fourth relay according to the configuration of the oA4 parameter can work as:

- **Fan:** oA4 =FAn,
- **Not used:** oA4 = nu

Compressor Regulation

Pbd: Proportional band or neutral zone width (0.1-5.0bar/0.5-30°C or 1-150PSI/1-50°F) The band (or zone) is symmetrical compared to the target set point, with extremes: set-Pbd/2 - set+Pbd/2. It is used as proportional band for PI algorithm.

The measurement unit depends on the dEU, CF, PMU parameters.

inC: Integration time: (0 - 999s) PI integration time

tdS: Digital cycle time: (10-40s) it sets the cycle time for the digital valve modulation. 15-20 seconds is the recommended Digital cycle time. 20 seconds is the default setting.

don: Time delay between the insertion of second compressor (0-99.5min; res. 10s).

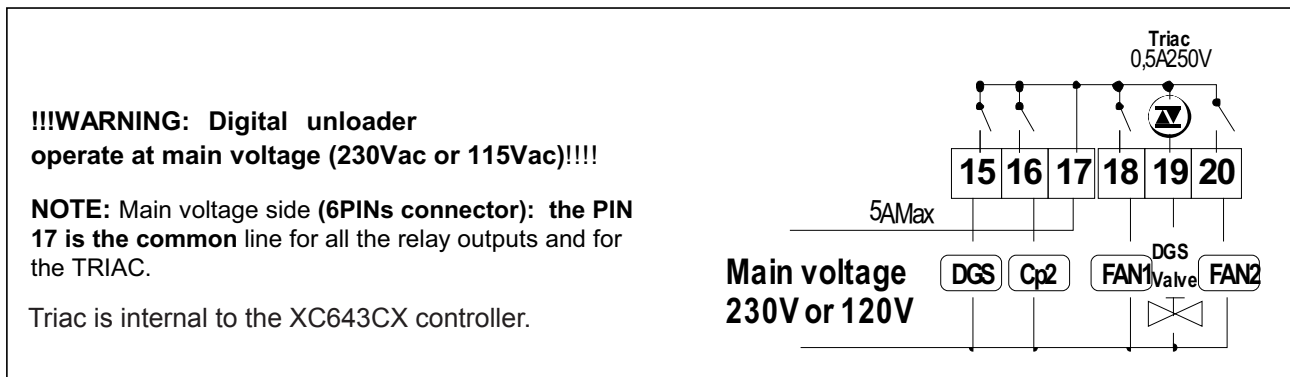


Figure 7 – Relays in XC643

Digital Compressor Regulation

The pressure is adjusted by a PI regulation.

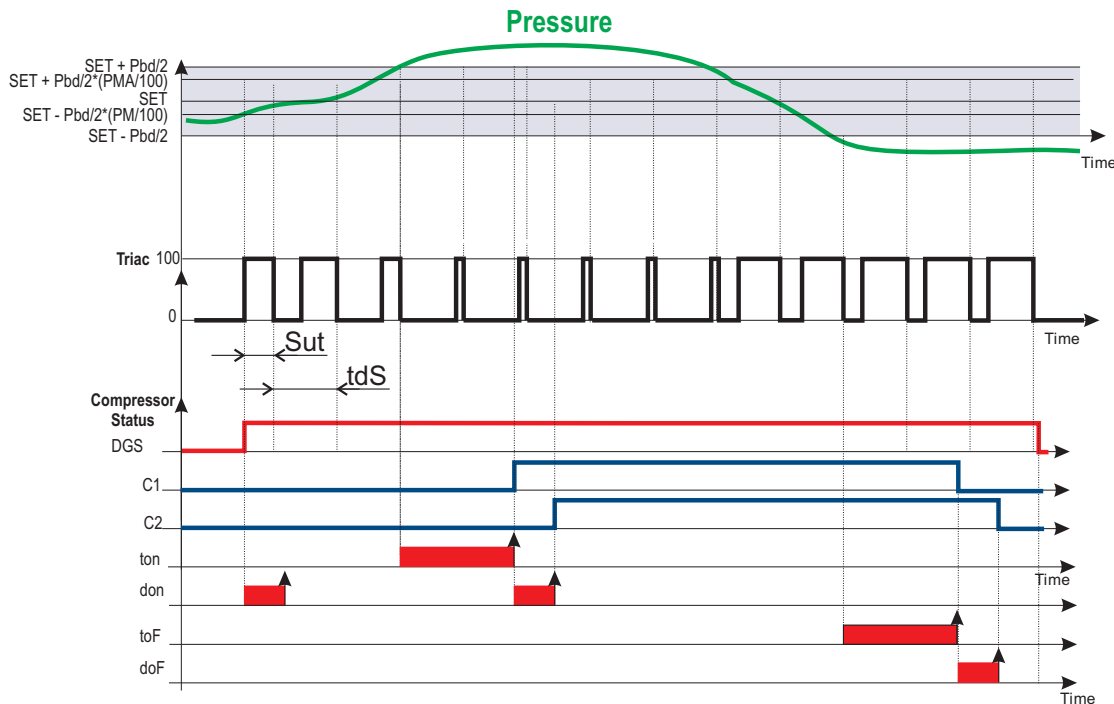


Figure 8 – Digital Compressor Regulation

Regulation Start: Increasing Capacity

- The regulation starts when the suction pressure (temperature) increases and reaches the value $SET - Pbd/2 + (Pbd \cdot 10\%) / 100$. At first, if available, the digital compressor is powered, and it is modulated in PWM mode.

NOTE: At start up the valve is energized for two seconds.

- Within the adjustment range ($SET - Pbd/2 \div SET + Pbd/2$) the digital scroll compressor is activated in PWM mode in accordance with the value of the control variable. (NOTE: When the TRIAC is on, the compressor is unloaded; when the TRIAC is off, the compressor is loaded).
- When the pressure is greater than $[SET + Pbd/2]$ and the TRIAC output is already at maximum, if applicable, the second compressor is started after the “don” delay time.

NOTE: If the Digital compressor is not available due to pre-set time delays or otherwise, and the pressure exceeds the value $SET + Pbd/2$, the fixed compressor (if available) would be started.

Decreasing Capacity and Regulation Stop

- When the pressure is lower than $[SET - Pbd/2]$, the DIGITAL compressor is still modulated to minimum capacity for 5 seconds.
- At the end of the 5 seconds the load with more working hours is shut down. If the load must stay on because 10 seconds is not over yet, the next load is considered, and so on until a load that can be shut down is available.
- This procedure continues with all active loads, with the shutdowns spaced out by the doF time setting.
- When only the digital compressor remains on, at the end of the doF time the digital compressor is shut down too.

Limitation of Digital Compressor Capacity

The capacity of the digital compressor can range from 10-100%.

Proportional Band Regulation - Only for Fans

The fan regulation band **Pb** is divided by the number of fans:

The numbers of fans switched ON is proportional to the value of the input signal: when this distances itself from the target set point and enters the various bands, the compressors are switched ON, to be then turned OFF when the signal brings near the set point.

In this way if the pressure is greater than regulation band, all the fans are on, if the pressure (temperature) is lower than the regulation band all the fans are off.

Regulation According to the Running Hours

The algorithm switch on and off the loads according to the running hours of each load. In this way the running hours are balanced.

Example

2 Fans: **oA2 = FAn; oA3 = FAn;**

Fan Regulation

Pb Proportional band zone width
(00.10-5.00bar/0.5-30°C or 1-80PSI/1-50°F).


Set the dEU parameter and the target set point for fans before setting this parameter.


The band is symmetrical compared to the target set point, with extremes: SETF+Pb/2 - SETF -Pb/2.
The measurement unit depends on the dEU parameters.

Use of the Programming Hot Key

(Requires Optional Hot Key Programming Kit)

How to Program a Hot Key from the Controller (UPLOAD)

1. Program one controller with the front keypad.
2. When the controller is ON, insert the Hot Key and push the  key; the "uPL" message appears followed a by flashing "End"
3. Push "SET" key and the End will stop flashing.
4. Turn OFF the controller remove the Hot Key, then turn it ON again.

NOTE: The "Err" message is displayed for failed programming. In this case push the  key again if you want to restart the upload again or remove the Hot Key to abort the operation.

How to Program a Controller using a Hot Key (DOWNLOAD)

1. Turn OFF the controller.
2. Insert a **programmed Hot Key into the 5 PIN receptacle** and then turn the Controller ON.
3. Automatically the parameter list of the Hot Key is downloaded into the Controller memory, the "doL" message is blinking followed a by flashing "End".
4. After 10 seconds the controller will restart working with the new parameters.
5. Remove the Hot Key.

NOTE: The message "Err" is displayed for failed programming. In this case turn the unit off and then on if you want to restart the download again or remove the Hot Key to abort the operation.

The unit can UPLOAD or DOWNLOAD the parameter list from its own internal memory to the Hot Key and vice-versa.

Parameters – Default Values and Descriptions

Parameter	Default Value	Description	Range
SEtC	55	Set point for compressors	LSE - HSE
SEtF	220	Set point for fans	LSF - HSF
OA2	CPr	Load 2 configuration	Cpr,Nu
Ptb	1	Parameter table code	Readable only
rEL	2.7	Release firmware	Readable only
Adr	1	Serial address	1 - 247
oFF	no	off function enabled	no - yES
Pb	58	Proportional band for fan regulation	(BAR) 0.1-10.0 (°C) 0.1-30.0 (PSI) 1-150 (°F) 1-50 kPa
don	0:30	Time delay between the insertion of two different loads	0 - 99.5 (min.10sec)
tdS	20	Cycle time for digital compressor	10,15,20
inC	300	Integral time	0 - 999 secondi
Pbd	10	Proportional band for compressors regulation	(BAR) 0.1-10.0 (°C) 0.1-30.0 (PSI) 1-150 (°F) 1-50 kPa
PMU	PSI	Measurement unit for pressure	Bar,PSI,Pa
CF	°F	Measurement unit for temperature	°F,°C
dEU	Pr4	Displaying measurement unit: pressure or temperature	tPr(0) - Pr4(1) - Pr5 (2)
FCAL	0	P2 probe offset	(dEU=bar o °C) -12.0 - 12.0(dEU=PSI o °F) -20 - 20
FA20	435	20mA or 4.5V readout for P2 probe	(FA04 - 51.0)BAR (FA04 - 750)PSI (FA04 - 5100) kPa
FA04	0	4mA or 0.5V readout for P2 probe	(-1.0 - FA20)BAR (-15 - FA20)PSI (-100 - FA20) kPa
P2C	yES	P2 probe	no - yES
CAL	0	P1 probe offset	(dEU=bar or °C) -12.0 - 12.0(dEU=PSI or °F) -20 - 20; (dEU=kPA) -120 - 120;
PA20	160	20mA or 4.5V readout for P1 probe	(PA04 - 51.0)BAR (PA04 - 750)PSI (PA04 - 5100) kPa
PA04	-7	4mA or 0.5V readout for P1 probe	(-1.0 - PA20)BAR (-15 - PA20)PSI; (-100 - PA20) kPa
FtyP	404	Freon Type	R-404A, R-22, R-410A, R-507, R-134A, R-407A, R-407C
OA3	FAn	Load 3 configuration	FAn,Nu
OA4	FAn	Load 4 configuration	FAn,Nu
LSE	5	Minimum set point (compressors)	see Table 6 (depending on refrigerant)
HSE	114	Maximum set point (compressors)	see Table 6 (depending on refrigerant)
LSF	170	Minimum set point (fan)	see Table 6 (depending on refrigerant)
HSF	270	Maximum set point (fan)	see Table 6 (depending on refrigerant)


Commissioning the XC643CX

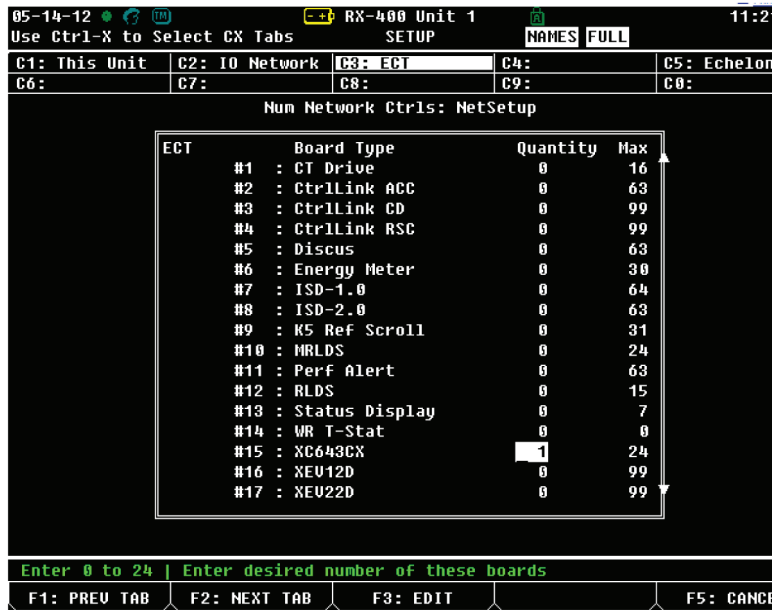
Before connecting the XC643 to the E2, set a unique address for each module. If the module is on the same network as other devices (CoreSense Protection, XR75CX case display, etc.), Be sure the address is also unique to those devices. All devices must be on the same baud rate (9600).

To change address in the XC643:

1. Enter the **Pr2** menu (password is 3210)
2. Using the UP and DOWN keys select **Adr.** Press the SET key
3. Change the address (value between 1 - 247) to the desired value using UP/DOWN keys and press SET to save.

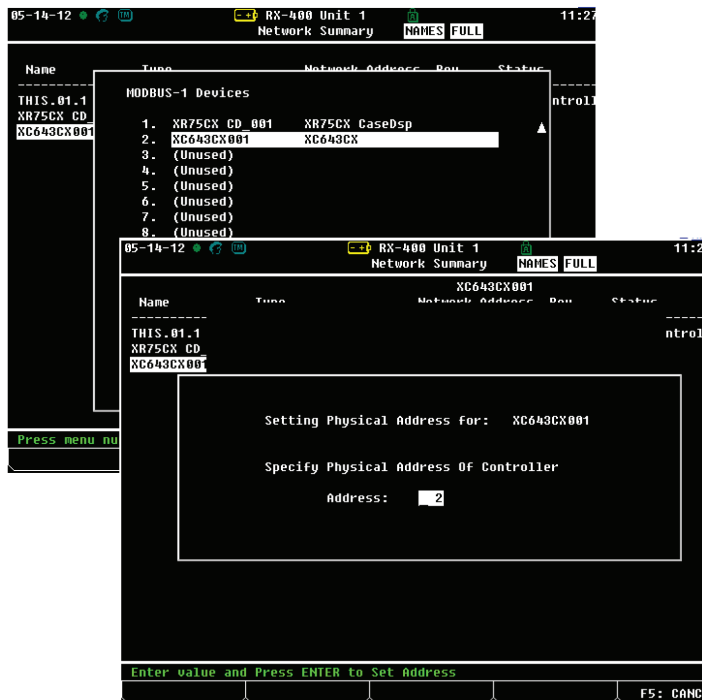
Commissioning the XC643 in the E2

From the main menu, press 7, 7, 2. Go to the C3:ECT tab. Enter the number of XC643 modules that will be connected to the E2. Press the  to back out and save your changes.

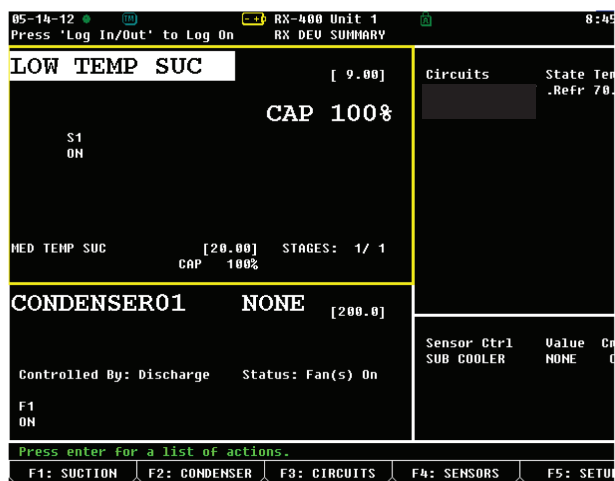


Commissioning the XC643 in the E2 continued

Press Alt + N to enter the Network Summary screen. Select the module to commission, press F4: Commission. Enter the address corresponding to the device. Press  to save changes.



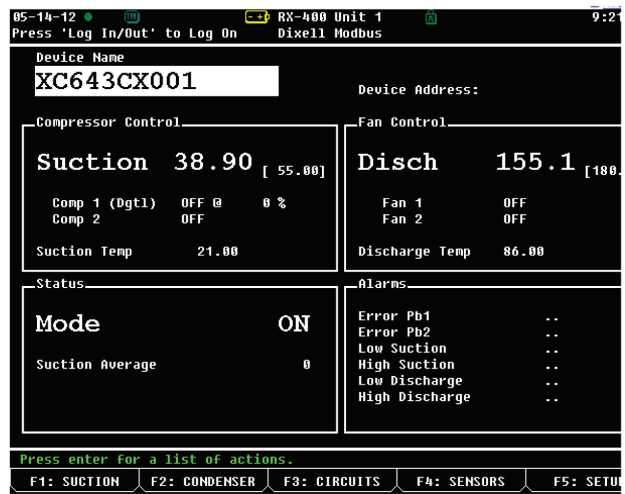
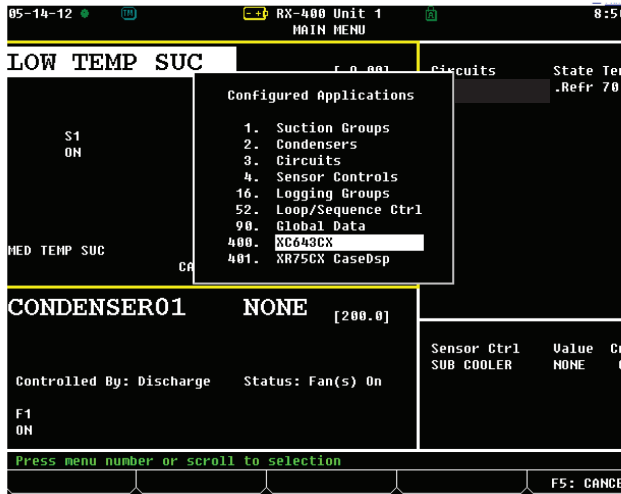
Press the  to access the Main Menu



Select 5. Configured Applications

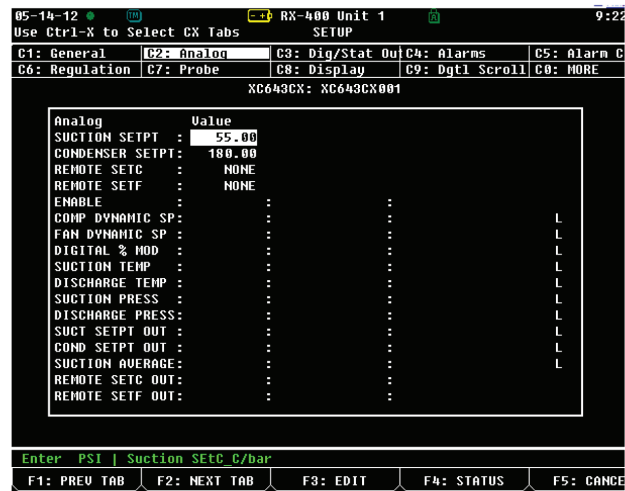
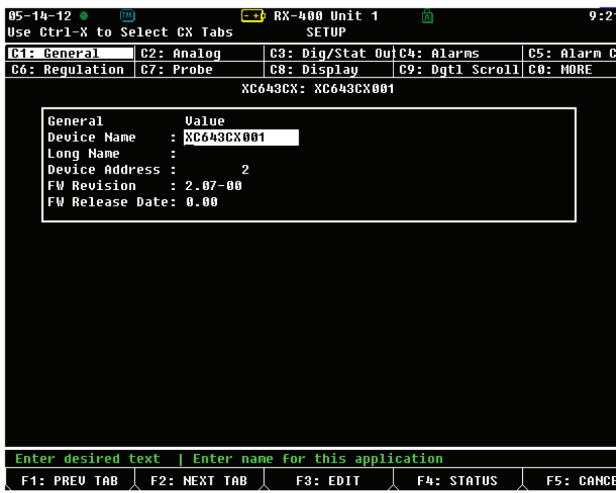
Commissioning the XC643 in the E2 continued

From the Configured Applications menu select 400. XC643CX for the Closed Loop Digital Controller application



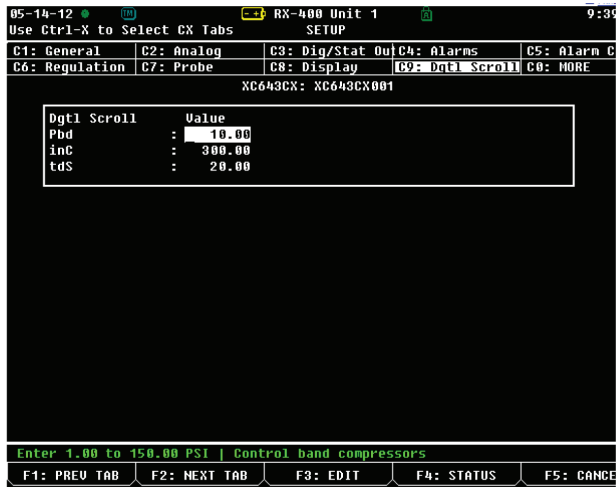
Press F5: Setup to enter the Setup screen

Setup Screens

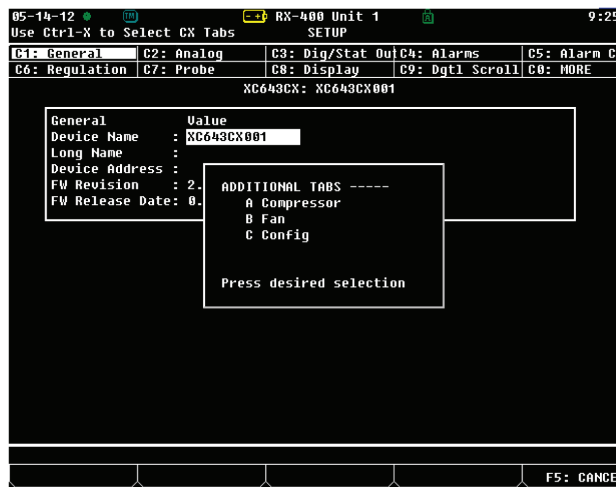


You can modify the Suction and Discharge setpoints from the C2: Analog tab

Setup Screens continued

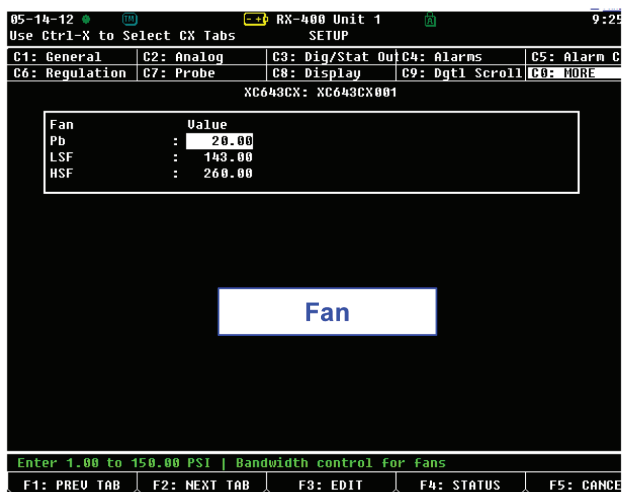
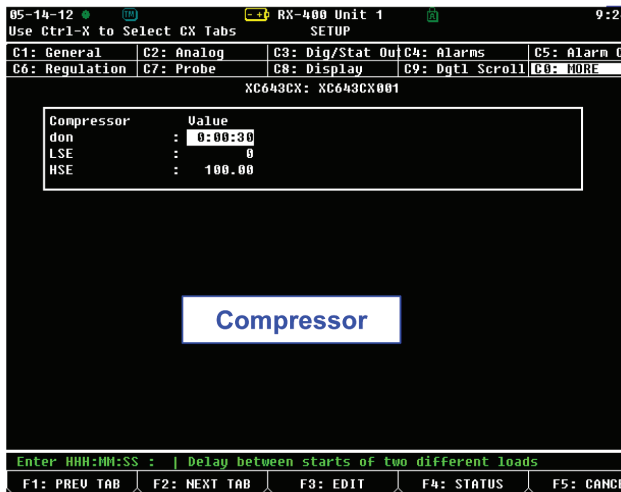


In the C9: Dgtl Scroll tab, the PI algorithm for compressor control can be modified. tdS corresponds to the Digital Compressor Duty Cycle.



Press Ctrl + 0 to view additional tabs.

Additional Tabs



- d0n = delay between starts of two different loads
- LSE = Low limit of compressor setpoint (SETC)
- HSE = High limit of compressor setpoint (SETC)
- Pb = Proportional band zone width for fan regulation
- LSF = Low limit of fan setpoint (SETF)
- HSF = High limit of fan setpoint (SETF)

Additional Tabs continued



OA2 = Load #2 (nu = none, Cpr = Fixed Compressor)

OA3 = Load #3 (nu, Fan)

OA4 = Load #4 (nu, Fan)

FtyP = Refrigerant

oFF = If set to YES, controller can be shut off at the module by pressing the SET key for more than 4s.

Note!

When using the Emerson Closed Loop Digital Controller with E2 Communication, setpoints should be changed via the E2 for proper supervisory control. When setpoints are changed at the module, they will not be sent back to the E2.

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