SULLAIR

Micro Compressor Controller (MCC)

Operation Manual

Preface

This manual describes the system structure, function, usage and maintenance method for Micro Compressor Controllers.

Before installing and operating this machine, customer shall carefully read this manual. After fully understanding the structure and function of each part of the machine set can they operate and maintain the machine set.

From time to time, the product is being redesigned to seek improvement. After certain period, there will be discrepancies between this manual and the product itself. The user should be aware of it.

If there is any point that is not described in this manual but is unclear during the operation and use by the user, you can contact your local distributor of Sullair co., or Customer Care by Sullair of Sullair Co.

——Editor
January, 2008

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1. GENERAL INFORMATION

Warning:

DO NOT install, operate, maintain, adjust or service Micro Compressor Controllers without thoroughly reading this manual.

Disclaimer:
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2. SAFETY INSTRUCTION

When using air compressors and compressed air accessories, basic safety rules and precautions must always be followed including the following:

I) Read all instructions fully.

II) Electrical Safety Precautions.

WARNING : **Risk of Danger**

WARNING : **Risk of Electric Shock**

WARNING : **Risk of High Pressure**

WARNING : **Consult Manual**

When installing, commissioning, operating or carrying out maintenance on the MCC unit, the respective persons must use safe working practices and observe all relevant local health and safety requirements and regulations.

Use extreme cautions when carrying out electrical checks. Isolate the power supply before starting any maintenance work.

Do not operate the MCC unit with damaged wiring/ parts after the controller unit have been dropped or damaged in any manner. Notify authorized service facility for examination, repair or other adjustments.

It is not possible to anticipate every circumstance, which might represent a potential hazard. If the user employs an operating procedure, an item of equipment or a method of working which is not specifically recommended, the user must ensure that unit will not be damaged or made unsafe and that there is no risk to persons or property. Failure to observe safety precautions or implement safe working practices may be considered dangerous practice or misuse of the product.

3.   INTRODUCTION

Micro Compressor Controller (Abbr. MCC) displays   temperature, pressure, operation time and working status of the compressor through 2×8 liquid crystal display (LCD).

The information can be displayed in Chinese or English or other languages (The language requirement should be stated in sales order).Compressor information can be uploaded via RS485 Modbus protocol.

Operator can control the compressor, set parameters and display needed parameters through the keypad on the control panel. Indicator lights on the panel reflect the basic status of the device (refer to Fig.1).

4.   SPECIFICATION

1.   Digital Inputs: Digital input 4-channel
2.   Digital Output: Digital switching output 5-channel.
3.   Analog Inputs: Pt1000 temperature input 1-channel; 4～20mA transferred input 1-channel;
4.   USB port for program downloads in different languages.
5.   Power supply: 90-130VAC, 50/60HZ, 40mA   .
6.   Display ranges
    a)   Temperature: -20～150℃; Accuracy: ±1℃
    b)   Run time: 0～999999H
7． Temperature Protection: When the actual temperature is higher than the rated allowed temperature, the function will be activated in less than 2s.
8.   Output relay contactor capacity: 250VAC/5A; 500000 switching times;
9.   Ambient temperature: -20°C – 65°C

5.   OPERATORS' INTERFACE

Fig. 1

| Pantone 423 | RAL6021 | Pantone Black 7 | Pantone Red 032 | White |
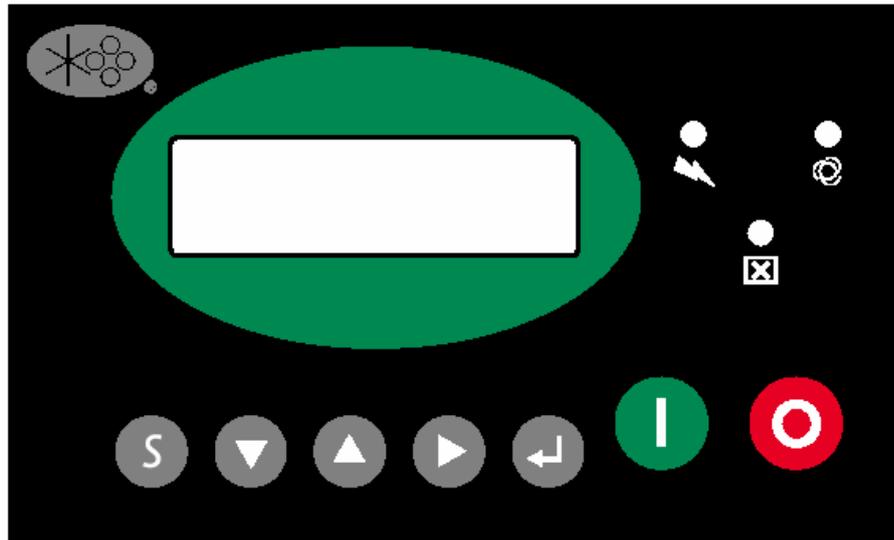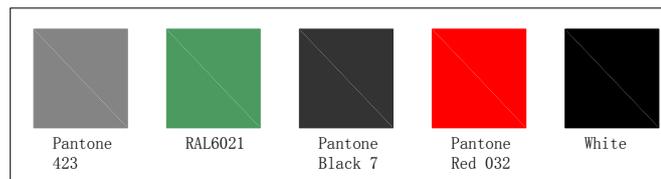
I   Start Key: Press this key to start the compressor.

O   Stop Key: Press this key to stop the compressor (when pressing this key, the compressor immediately turns to unload mode and stops after ** seconds (which can be set in CUSTOMER SET). If the compressor has been unloaded for ** seconds (saved number) before pressing the key, the unit will stop immediately.)

S   Set key / Load / Unload: Press this key to save modified data. When compressor is running, press this key to send load or unload command to the compressor.

▲   Up key**:** Press this key to move upward (add) in data modification or move upward scroll in menu operation.

▼   Down key: Press this key to move downward (reduce) during data modification or downward scroll in menu operation.

►   Cursor/Confirm Key: This key is treated as cursor during data modification and as confirm key during menu selection

⏎   Return / Reset Key: Press this key to return to upper menu during the menu operation / long held to reset the unit current state when the compressor is stopped due to a failure. Press this key to stop buzzing.

6. DISPLAYS, CONFIGURATION & SETPOINTS

6.1 STARTUP

After power on, the MCC will display the following two interfaces. Each menu lasts up to 3 seconds before turn to main interface, e.g.:

```
┌─────────────────────┐     ┌─────────────────────┐
│      SULLAIR        │     │    RUN: xxxxxx H    │
│    CO3-CXXXXXX      │     │  REV:03     2007/01 │
└─────────────────────┘     └─────────────────────┘
```
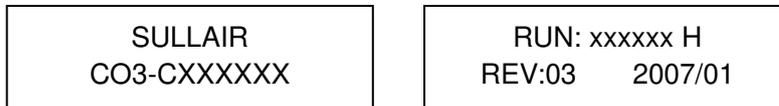
SULLAIR is the logo of SULLAIR Corporation.
CO3-CXXXXXX is the serial number of the compressor unit.
RUN: XXXXXX H is overall operation time of the device.
REV: 03 is the software version.
2007/01 is shipping date of MCC.

The main interface:

```
┌─────────────────────┐
│        STOP         │
│   180°F     75PSI   │
└─────────────────────┘
```

6.2 STATUS DISPLAY

Press "▼" key to read the running parameters directly.   For example, if pressing "▼" key for the first time, the overall operation time displayed as bellow.

```
┌─────────────────────┐
│   TOTAL RUN TIME:   │
│     ****** H **M    │
└─────────────────────┘
```

Press "▼" key to read the following status:

LOADED TIME	FLUID	PRODUCTION DATE
	GREASE	SERIAL NO.
THIS RUN TIME	ALARM1	CUSTOMER SET
THIS LOADING	ALARM2	FACTORY SET
OIL FILTER	ALARM3	
A-O SEPARATOR	ALARM4	
AIR FILTER	ALARM5	

6.3 SETUP GUIDE

Note: The customer and factory parameters are prevented from being modified while the unit is running or in the stop delaying period.

Navigate to the last two menus: 'CUSTOMER SET' and 'FACTORY SET' by pressing '▼',or by pressing '▲' on the main interface to the   'CUSTOMER SET' and 'FACTORY SET' immediately.

```
┌─────────────────────┐
│   CUSTOMER SET      │
│   FACTORY SET       │
└─────────────────────┘
```

⇨ From a menu, the various items within it can be viewed by scrolling with the "▼" or

"▲" key.

⇨ Menus are accessed with the "►"key, pressing this key will a sub-menu is displayed will activated that particular sub-menu:

```
LOAD PRESS:
    006.5BAR
```
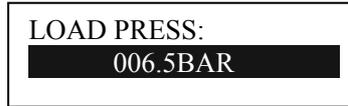
⇨ To scroll to another sub-menu press "▼".
⇨ To modify parameter within the same menu, press "►" on the parameter, the password input screen will be displayed.

```
    PASSWORD ****
```

Note: Customer password can be modified in customer parameter.

If the entered password is correct the parameter to be modified will return to the display and flash.

⇨ The parameter now can be modified by pressing "▼" or "▲" key.
⇨ To modify another parameter within the same menu,"►" is used to move the cursor to the next number. Press "S" key as confirmation.
⇨ To modify other parameters within the same menu, scroll to the new parameter and depress "►"key.
⇨ To end the parameters modification, press "⏎"key to return to the main interface.

6.4 CUSTOMER SETTING

All the customer parameters have been preset by SULLAIR according to SULLAIR product requirements.

Parameter	Preset Value	Description
LOAD PRESS	***.* BAR	Load pressure value
UNLOAD PRESS	***.* BAR	Unload pressure value
MTR START TIME	0008 S	To protect motor, MTR START TIME must be longer than the STAR DELTA TIME plus LOAD DELAY TIME
DRAIN/REMOTE	Remote	When set as DRAIN, the No. 18 terminal is the connector for drain control, draining periodically. When ON/OFF MODE is set as REMOTE and here set as REMOTE, the No. 18 terminal is the connector for remote control indication.
STAR-DELTA TIME	0006S	Y-△ starting transition time. For full voltage starting, set the value as "0"
LOAD DELAY TIME	0002S	The delayed time from star-delta transition or full-voltage starting completion to be on loading.
UNLOAD RUN TIME	1200S	Maximum time from unloading to standby mode.
STOP DELAY TIME	0010S	The delayed time from pressing the stop key to be shutdown.
RESTART TIME	0060S	Delay time before restart.
ON/OFF MODE	LOCAL	Press ⓘ key to enable remote control mode. If compressor is shutdown by pressing ⊙, remote control will be disabled.
LOAD MODE	AUTO	The Load / Unload function can be modified by pressing "S" key in manual mode.

CLEAR OIL FILT	0000H	Reset time after oil filter changed
CLEAR A-O SEP	0000H	Reset time after oil separator changed
CLEAR AIR FILT	0000H	Reset time after air filter changed
CLEAR FLUID ALM	0000H	Reset time after fluid changed
CLEAR GREASE AL	0000H	Reset time after grease changed
OIL FILT CHANGE	1000H	Set to '0000H' to disable the oil filter alarm function
A-O SEP CHANGE	4000H	Set to '0000H' to disable the oil separator alarm function
AIR FILT CHANGE	1000H	Set to '0000H' to disable the air filter alarm function
FLUID CHANGE	8000H	Set to '0000H' to disable the fluid alarm function
GREASE REQ	2000H	Set to '0000H' to disable the grease alarm function
USER PASSWORD	****	To modify the customer password
COM MODE:	PC	If DISABLE, communication cannot work. If SEQ, multiple machines can work in sequence mode. If PC, communicate as slave with external equipment according to MODBUS protocol
COM ADDRESS	0001	Communication address
SEQUENCE STATE	MASTER	Master or Slave mode when there are more than one compressors running in SEQUENCE mode
SEQUENCE NO.	0004	Total number of compressors in sequence network.
SEQ LOAD PRESS	***.*BAR	During sequence control, when master pressure is lower than SEQ LOAD PRESS, and SEQ DELAY is up, the master will find a compressor in the net to load or start.
SEQ UNLOAD PR	***.*BAR	During sequence control, when master pressure is higher than SEQ UNLOAD PR, and SEQ DELAY is up, the master will find a loading compressor in the net to unload or stop.
SEQ DELAY	0015S	During sequence control, continuously send control interval time.
LANGUAGE SEL	CHINESE	Select display languages
DRAIN OPEN	0010S	Draining time in auto drain control (only effective in on load mode)
DRAIN CLOSE	0003M	Interval time in draining (only effective in on load mode)
TEMP UNITS	℃	Temperature unit can be set as ℃ or ℉.
PRESSURE UNITS	BAR	Pressure unit can be set as BAR or PSI
ROTATE HOURS	0001H	Rotate hours between slaves in sequencing network

7. INSTALLATION

7.1CONTROLLER INSTALLATION

The controller is installed with bolts' size 72 x 122. Certain space should be left around controller for wiring. The specific dimensions are as follows:
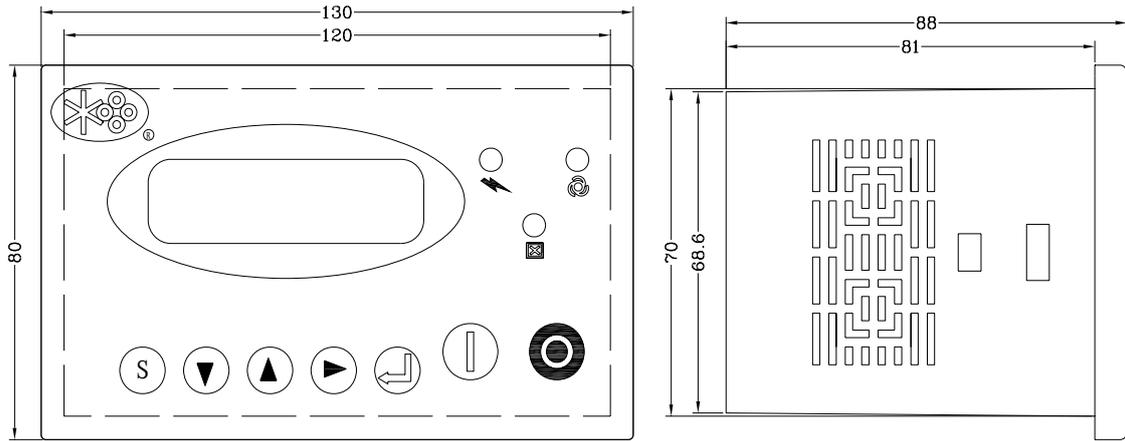
Fig.2 Controller outline dimensions

**7.2** ELECTRICAL   WIRING   DIAGRAM
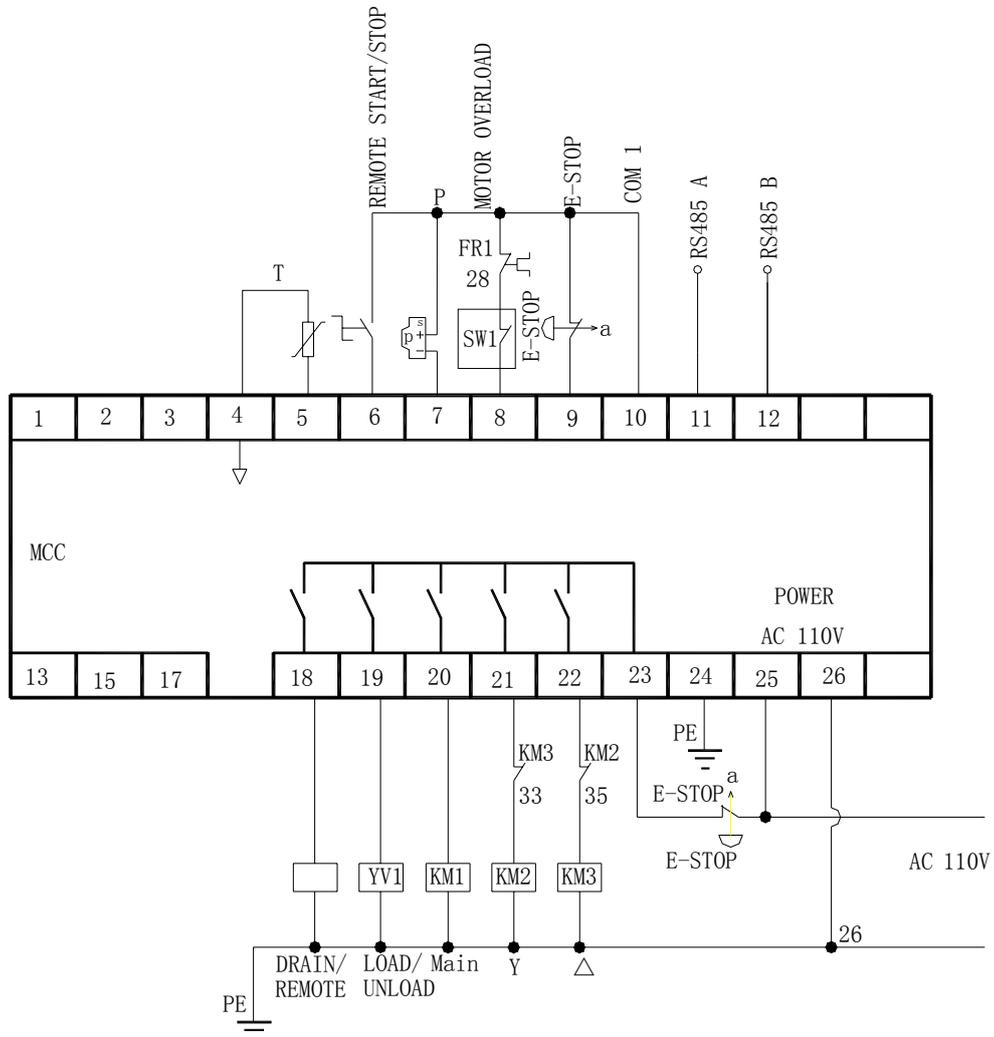
Figure 3. Electrical wiring diagram

7.3 CONTROLLER CONNECT TERMINALS

Controller terminals:

4 and 5 are RTD signal input; 6 is remote controlled on/off signal input terminal; 7 is PR XDCR signal input terminal; 8 is input terminal for overheat signal of fan motor; 9 is input terminal for emergent stop signal; 10 is common terminal for input signals; 11 is RS485 A; 12 is RS485 B; 18 is electronic drain valve/remote control (optional) output; 19 loading valve; 20 controls main contact switch; 21 star contactor; 22 delta contactor; 23 is common terminal COM1 of output relay; 24 is the analog grounding; 25 and 26 are the AC 110V power source input.

NOTE! The magnetic coils of valves and contactor must be connected to a surge absorber.

8. CONTROL FUNCTIONS

8.1 AUTOMATIC CONTROL – LOCAL MODE
   (Load mode: Automatic On/off, local start control mode)

① MOTOR STARTING:

The controllers perform a 6 seconds self-checking after power on during which the ⏺ key can not start the machine. Starting procedure of compressor is: KM1 (Main/Line contactor) power on →, Motor in Y starting→Transition time over(Y—△ transition time) ,KM2 power off(KM2 and KM3 interlocked)→Motor running in △ mode, motor starting over.
Note: All the solenoid valves are power off during the motor starting to ensure the no-load starting.
If compressor is full voltage (not Y—△) starting, power on KM1.

② AUTOMATIC RUNNING CONTROL:

The load solenoid valve power on after the motor is running in △ mode for certain time (LOAD DELAY TIME), the inlet valve opens and pressure rises.
The load solenoid valve will power off when the air pressure reaches the rated unload pressure (UNLOAD PRESS), the compressor will change into unload process.
If in the specified time (UNLOAD RUN TIME) the air pressure turns to be lower than the set load pressure (LOAD PRESS), the load solenoid valve will restart and the compressor will changes into on-load process.
If the unload run time exceeds the "UNLOAD RUN TIME" set in the customer parameters, the compressor will automatically stop.
Only if the pressure reaches lower than the load pressure limit (LOAD PRESS), the compressor will restart according to the normal starting process and so on.

③ NORMAL STOPPING:

By pressing the ⏺ key the load solenoids valve powers off, after certain time (STOP DELAY TIME), all controller relays will power off, main and fan motor stop running. The compressor can be restarted only after the restart delay time decrease to "0".

④ ANTI-FREQUENTLY-STARTING CONTROL
The motor can not be started immediately after stopping unless after (RESTART TIME), or if the compressor stopped after (UNLOAD RUN TIME). Whatever the situation is, the controller will display remain time of delay (such as 90s). The motor can only be started when the delay time is 0.

8.2 AUTOMATIC CONTROL – REMOTE MODE
   (Load mode: Automatic On/off, Remote start control mode)

① MOTOR STARTING:

The controller performs a 6 second self-check prior to press the '⏺' key to start the machine. If "DRAIN/REMOTE" is set as remote, the No.18 terminal serves as remote control enable signal input. After ⏺ key has been pressed, the compressor can be started or stopped by controller No.

6 terminal. Start signal is to be received via the No.6 terminal, the motor starts as in the local control mode.

② AUTOMATIC RUNNING CONTROL:
Refer to the local automatic running mode.

③ REMOTE STOPPING:
To signal a remote stop, terminals 6 and 10 must be open circuit and then the load solenoid valve will lose power, all controller relays will lose power after the stop delay time (STOP DELAY TIME), the main and fan motor will stop running thus remotely stopped the compressor. Only when the restart delay time counts to "0" can the compressor be restarted remotely by remote start signal from terminals 6 and 10. Only when user presses the local ⭕ key will the remote start/stop enable signal clear off, the compressor can not be started by remote control.

④ FREQUENT STARTING PREVENTION CONTROL
Refer to local starting procedure descript above.

9. ALARM AND FAILURE PROTECTION

9.1 FAILURE STOP AND EMERGENCY STOP
When there is any electronic sensor failure, overload failure or high discharge temperature failure, the controller will stop the motor running immediately. The motor can only be restarted after the failures are cleared.
The emergency stop key is to be pressed to cut off the power supply of the controller and contactors in any emergent errors situation, which will immediately stop the compressor motor.

9.2   AIR FILTER ALARM
When air filter reaches the set run time limit, the display will read "AIR FILTER ALM".

9.3   OIL FILTER ALARM
When oil filter reaches the set run time limit, the display will read "OIL FILTER ALM".

9.4   OIL SEPARATOR ALARM
When oil separator reaches the set run time limit, the display will read "A-O SEPARATOR".

9.5   FLUID ALARM
When lube reaches the set run time limit, the display will read "FLUID CHANGE".

9.6   GREASE ALARM
When grease reaches the set run time limit, the display will read "GREASE CHANGE"

9.7   HIGH DISCHARGE PROTECTION
When discharge temperature exceeds the set temperature limit, the controller will alarm or stop, the display will read "HIGH DISCH TEMP"

9.8 SENSOR FAILURE PROTECTION
When a pressure or temperature sensor fails, controller will alarm and stop. The failure displayed on the controller is "PR XDCR FAULT" or "RTD FAULT".

10. TROUBLESHOOTING GUIDE

Example: The fault caused by exterior parts can be display on the control panel. e.g.

```
STOP:
        RTD FAULT
```

In this condition check the temperature sensor to see whether wire is broken or damaged.

The relevant warning information shall popup on the screen in case of other faults.

The following table listed minor issues, causes and solutions.

Alarm	Causes	Solutions
OIL FILTER ALM	Improper parameter setting and consumable life expires	Parameter adjustment, maintenance
A-O SEPARATOR	Improper parameter setting and consumable life expires	Parameter adjustment, maintenance
AIR FILTER ALM	Improper parameter setting and consumable life expires	Parameter adjustment, maintenance
FLUID CHANGE	Improper parameter setting and consumable life expires	Parameter adjustment, maintenance
GREASE CHANGE	Improper parameter setting and consumable life expires	Parameter adjustment, maintenance
HIGH DISCH TEMP	Poor cooling, oil shortage, improper parameter setting	Parameter adjustment, vent enhancement, proper lubrication

The following table lists big issues, causes and solutions.

Faults	Causes	Solutions
PR XDCR FAULT	Wire broken, transducer damaged, etc	Check wiring, replace damaged transducer
RTD FAULT	Cable off, PT1000 failure, etc	Check wiring, Replace PT1000
HIGH DISCH TEMP	High temperature, inaccurate sensor and wrong parameter	Check machine temperature sensors, check parameter
HIGH PRESSURE	Over pressure, inaccurate sensor and wrong parameter	Check machine pressure, pressure sensor, check parameter
MOTOR OVERLOAD	Low voltage, high pressure, bearing failure, separator blocked or other mechanical damages or data distortion etc.	Check the set data, Voltage, bearings, separator tubes and other mechanical faults
Main contactor failure	Emergency stop key wiring loose	Check wiring. Check Contactor

11. MCC CONTROLLER REPLACEMENT AND SET-UP INSTRUCTIONS

1   Read Section 1—Safety in MCC Controller User Interface Manual. Follow all safety guidelines.
2   Disconnect incoming power.
3   Open starter enclosure door and unplug connectors from existing controller.
4   Loosen screws on installation clips and remove controller.
5   Install new controller and gasket.
6   Plug connectors into controller, close enclosure door and turn on power to machine.
7   Modify setting accordingly
8   Confirm pressure setting as follows:
     a. Slowly open the shut-off valve to the service line.
     b. Press the START pad to start the compressor in default mode (AUTO).
     c. Check for leaks in service air piping.
     d. Slowly close the service line shut-off valves to verify nameplate pressure unload setting.
The compressor should unload when nameplate pressure is achieved.
9   Adjust other customer settings (maintenance intervals, units, operating mode) as desired.
     Refer to the Micro Compressor Controller Operation Manual
     Section 6.4— Customer setting

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