



**LESLIE  
CONTROLS, INC.**

A division of CIRCOR International, Inc.

12501 Telecom Drive, Tampa, FL 33637

Installation, Operating and  
Maintenance Instructions

**26/2.6.1  
Rev. 0**

# PMC-2 ELECTRO-PNEUMATIC CONTROLLER

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# INTRODUCTION

Leslie PMC-2 Electro-pneumatic controller can be used to control pressure, temperature, liquid level, and other process variables. It accepts signals from standard 4-20 mA transmitters and RTD's and provides a pneumatic output to operate the diaphragm or piston actuator of a control valve, thus providing single loop control. All PMC-2 units have two types of solenoids: A large solenoid for supplying large volumes of air quickly and two sets of small solenoids for supplying small volumes of air for positioning accuracy. If the unit is connected to an actuator with a small volume of required air the large solenoid can be dialed out by increasing the Quick Response Setting.

The PMC-2 has the following features:

1. Controller provides 24 volts DC power for transmitter, eliminating the need for a separate DC power supply.
2. Controller provides high volume air output at pressures up to 100 psig (6.9 bar) to directly operate the diaphragm or piston actuator of a control valve. I/P transducers and valve positioners are not required or recommended.
3. No small air orifices to plug or foul (0.06-inch diameter Solenoid ports).
4. No air consumption at steady state. Air is only used when needed to reposition valve actuator stem.

The PMC-2 unit contains two microcomputers, one dedicated to control and one dedicated to communications. Input settings are changed through the communications microcomputer, which downloads changed settings to the control microcomputer. This allows the user to change settings without interrupting process control.

The PMC-2 unit will read and store data.

Unit setup is done using the LCD display and membrane push button switches located on front of the PMC-2. LCD display also signals when unit is running properly, when unit has been taken off-line (no longer controlling process) and when unit has detected a fault that must be attended to.

The unit will have MOD bus capabilities in the next release.

## Inspection

This equipment has been adequately packaged and protected for shipping; however, damage may have occurred in transit due to improper handling. When unit arrives at its final destination, it should be carefully inspected for damage and equipment malfunction. Serial number will be marked on unit.

## Storage

Units should be stored in a clean, cool and dry location and should be protected from dirt, chips, dust, and insects or other nesting animals.

## Replacement Parts

It is recommended that one set of Recommended Spare parts be inventoried for each unit. Recommended Spare Parts are identified on Assembly Drawing.

Replacement parts can be ordered from your local Leslie representative. Factory address is listed on back of this Instruction Manual.

When ordering parts please include serial number and type of control (temperature or pressure). Also include Part Name, Balloon Number and Quantity as shown on Assembly Drawing.

## Contact Information

For information concerning warranties, or for questions pertaining to installation, operation or maintenance of LESLIE products, contact:

LESLIE CONTROLS INC.  
12501 Telecom Drive  
Tampa, FL 33637  
USA Phone: (813) 978-1000  
USA Fax: (813) 978-0984  
[www.LESLIECONTROLS.com](http://www.LESLIECONTROLS.com)

To order replacement parts, contact LESLIE CONTROLS at address listed above, or call toll free:

USA/Canada/Caribbean Phone: (800) 323-8366

Note: Please include model and serial number of unit for which parts are being ordered. If ordering by phone, please have this information readily available.

## Leslie Service

Leslie service personnel are available to start up and repair our products. Leslie can also train your personnel to do this work. Contact Leslie representative nearest you for details.

## Description of Operation

Electronic circuit of controller converts 4-20 mA signal from transmitter to a 1 to 5 volt input voltage. Input voltage is compared with 1 to 5-volt set point voltage and an error signal is created. Error signal is fed to a microcomputer, which is compared to deadband setting, accuracy setting, deadband delay, and quick response setting. Microcomputer computes best response for solenoid valves and actuates them accordingly. Microcomputer develops best strategy for moving actuator stem as fast as possible without overshoot. If error correction requires one solenoid to click on and off for two milliseconds then this is response. If it requires all of solenoids to turn on, then this is response. Microcomputer re-calculates and can change required response at a rate of 100 MHz.

## Description of Parameters:

1. **Quick Response Setting**--% of full span error that large solenoid will be activated. For small actuators or temperature control this setting should be set at maximum.
2. **Accuracy Setting**--% of full span error that small solenoids will no longer try to adjust actuator. Use this setting to reduce duty cycle of small solenoids and prevent hunting.
3. **Deadband Setting**--% of full span error (+/-) that unit will not respond to. Use this setting to stop unit from responding to noisy signals.
4. **Deadband Delay Setting**--Time in seconds for microcomputer to delay implementing Deadband Setting. Use this setting to allow unit to position actuator closer to accuracy setting but not continue to adjust or hunt due to a noisy signal or sticking valve.

## Menu Button Listings:

1. Main Menu:

Press	First Line Display Information	Second Line Display Information
	PMC Okay & Off-Line	Navigate: > or >>
Main Menu >	PRODUCT INFO: ID	PMC MOD 2 /REV X
Main Menu >	CONFIG: DISPLAY UNITS	none, psig, bar, degF
Main Menu >	SET POINT: (local or Remote)	Set/SAVE = "XXXX"

5. A **Hard Start** is one in which controller will open or close valve as fast as possible to achieve Set Point Setting. Note: This may cause water hammer effects in some systems.
6. A **Soft Start** is one in which controller slowly increases set point over a chosen time period until chosen operational set point is reached. Used primarily on temperature applications

### CAUTION!

Controller can automatically or manually open valve it is connected to in piping system. Ensure that changes in connected valve opening do not result in dangerous conditions.

This installation section has been broken down into subsections that present a wide range of installation-related requirements.

### Mounting Position

(Ref Appendix M)

Normal controller installation is on valve or on wall near valve to be operated.

Controller can be mounted in any position to work around existing pipeline. Mount controller in a location that will allow access to front panel. See Appendix M for mounting dimensions. Unit should be mounted in a location where ambient temperature will be between -4 degrees F and 140 degrees F. Temperatures above or below these limits will affect the LCD display although the controller may continue to function. A **location within 25 feet of the control valve** actuator is recommended to reduce time lags in pneumatic signal.

### WARNING

Electrical power must be supplied through an external circuit breaker or fuse protection. An external switch must be provided to turn off power. Always turn off power before removing internal field-wiring panel.

Before controller is installed, ensure that pipe fittings are free of foreign material that may have been introduced during handling.

Clean connection piping of all debris such as loose weld spatter, scale, oil, grease or dirt.

Clean air regulator if one is used.

Main Menu >	OPERATE: MANUAL: use	Up/Down; Fast = Save
Main Menu >	OPERATE: START-UP	HARD SOFT-START
Main Menu >	<i>Recycle starting at “Product Info”</i>	

X = Place holder for number.

## 2. Sub-Menu Button Listings:

- Main Menu First Line = “PRODUCT INFO: ID”

Press	First Line Display Information	Second Line Display Information
Sub Menu>>	PRODUCT INFO: Battery	Good (5.5 vdc)
Sub Menu>>	PRODUCT INFO: Raw DCV	Good (23.7 vdc)
Sub Menu>>	PRODUCT INFO: Set-Pnt	Local SP = X psig
Sub Menu>>	PRODUCT INFO: Msrd	Value = X psig
Sub Menu>>	PRODUCT INFO: Service	Call (XXX-XXX-XXXX)
Sub Menu>>	<i>Recycle starting at “Product Info: ID”</i>	

- Main Menu First Line = “CONFIG: DISPLAY UNITS”

Press	First Line Display Information	Second Line Display Information
	CONFIG: DISPLAY UNITS	none, psig, bar, degF
Sub Menu>>	CONFIG: ACTUATOR	DIRECTN: DIRECT REVERSE
Sub Menu>>	CONFIG: AIR-ACTION	DIRECT REVERSE
Sub Menu>>	CONFIG: SET-POINT	LOCAL REMOTE
Sub Menu>>	CONFIG: CONTROLLER	DEADBAND = XX%
Sub Menu>>	CONFIG: CONTROLLER	ACCURACY = XX%
Sub Menu>>	CONFIG: CONTROLLER	QUICK RESPONSE = XX%
Sub Menu>>	CONFIG: CONTROLLER	DEADBAND DELAY XX SEC
Sub Menu>>	CONFIG: FAIL ACTION	LAST CLOSE OPEN
Sub Menu>>	CONFIG: SENSOR LIMIT	4 ma value: 0000 ( <i>display units picked</i> )
Sub Menu>>	CONFIG: SENSOR LIMIT	20 ma value: 0000 ( <i>display units picked</i> )
Sub Menu>>	CONFIG: SOFT-START	RAMP-TIME = XXX MIN
Sub Menu>>	CONFIG: SOFT-START	START-PNT: XXX( <i>display units picked</i> )
Sub Menu>>	<i>Recycle starting at “DISPLAY UNITS”</i>	

# INITIAL INSTALLATION

## Pneumatic Connections

It is recommended that air-piping system be flushed prior to initial start-up. Debris in pipeline could damage unit or associated components. Make sure all valves are open during flushing operation. Connect air supply through a 50-micron filter regulator that has a pressure gauge to 1/8-inch NPT connection marked INPUT (see appendix M). If supply air is mixed with traces of oil, a filter capable of removing oil should be used.

### CAUTION

Some lubricating oils can permanently damage solenoid valves.

Air exhaust connection has already been supplied with a porous metal filter/silencer that should not be removed. Corrosion-resistant 3/8 inch OD tubing is recommended for air lines to and from unit. For single acting actuators, connect PMC-2 connection labeled “C1” to actuator and install a 1/8 inch NPT pipe plug into PMC-2 connection labeled “C2”. For double acting actuators, connect PMC-2 connection labeled “C1” to top connection of

actuator. Connect PMC-2 connection labeled “C2” to bottom connection of actuator.

Connect a regulated air line to actuator and pressurize to operate valve through its full stroke manually.

If it does not operate smoothly, refer to actuator manual for cause of error.

## Field Wiring using any 4 to 20 MA Transmitter

After mounting PMC-2 at desired location, open cover by loosening 2 screws and side latch. Remove field-wiring panel by loosening 3 captive screws. See Terminal block-wiring diagram shown in Appendix D or F. Any signal lines should use shielded cable grounded at Terminal 17 or 18 to ensure against any RF interference.

1. Connect 4-20 mA transmitter wires as shown in Appendix D. A two-wire transmitter should be powered with 24v DC supplied from PMC-2 by connecting positive wire to Terminal 20 and transmitter signal return wire to Terminal 21 of

connection strip. Twisted pair wires can be used for connecting transmitter to PMC-2. If a shielded pair of wires is used, connect shield to Terminal 17 or 18 of connection strip.

2. Terminals 25(+) and 26(-) can be used to connect a remote set-point signal to unit. This connection can be used if PMC-2 is to have set point change by control room.
3. If all connections are good then Fault light in status section will be off.
4. Toggle Switch in PNEUMATICS section controls on/off operation of pneumatic valves. Placing switch in "up" position will cause valves to pump out air. Placing switch in "down" position disables air valves and no air is allowed in or out at any time. It is recommended that switch be placed in the down position during initial installation.

## ATTENTION

Unit will display Fault light and stop controlling if either pressure or temperature sensors become disconnected or remote set point connection is lost.

## WARNING

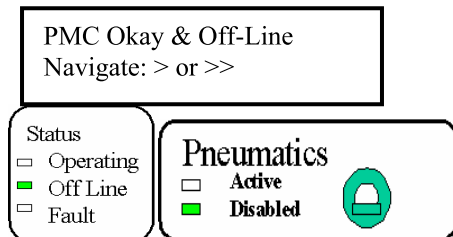
This instruction does not cover safety precautions and procedures required for safe start up of every system. Make sure you understand your system and its safe operation before start up.

## CONFIGURATION

### Start-Up

**USE THIS SECTION IF CONFIGURATION HAS NOT BEEN SET BEFORE OR CHANGES ARE REQUIRED. ALL VALUES FOR PARAMITERS ARE STARTING POINT REFERENCE VALUES ONLY**

1. Turn on electrical power to PMC-2.
2. PMC displays:



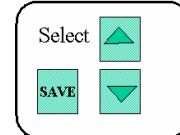
3. "OFF-LINE" is lit.
4. LED for "Disabled" is lit in PNEUMATICS section switch is in down position.

Note: No action by user in 90 seconds will cause unit to return to starting point.

5. Push right side Main Menu button twice, LCD displays:

**CONFIG: DISPLAY UNITS**  
**none, psig, bar, degF**

6. Press Up or Down button in Select section to choose measured units. Cursor will blink on units that are to be chosen. Note: Choosing "None" will eliminate display of units. Please mark units on tape and place on the display.



7. Press SAVE button to save your choice. Menu will cycle to:

**CONFIG: ACTUATOR**  
**DIRCTN: DIRECT REVERSE**

8. Press Up or Down button in Select section to choose actuator direction. Cursor will blink on choice that can be saved.
9. Press SAVE button to save your choice or keep choice shown and press right arrow Sub Menu button to scroll to next parameter.

10. Next menu item will be Air Action.

LCD displays:  
**CONFIG: AIR ACTION**  
**Direct Reverse**

11. Press Up or Down button in Select section to choose controller CYL 1 port air action with increasing signal.
12. Press SAVE button to save your choice or keep choice shown and press right arrow Sub Menu button to scroll to next parameter.

13. Next menu item will be Set Point control.

LCD displays:  
**CONFIG: SET PT**  
**LOCAL REMOTE**

14. Press Up or Down button in Select section to choose how set point will be set. Local at the unit or remote from a control room.
15. Press SAVE button to save your choice or keep choice shown and press right arrow Sub Menu button to scroll to next parameter.

16. Next menu item will be Deadband.

LCD displays:

**CONFIG: CONTROLLER**  
**DEADBAND = 01%**

---

17. Press Up or Down button in Select section to choose Deadband required for your control situation.

---

18. Press SAVE button to save your choice or keep choice shown and press right arrow Sub Menu button to scroll to next parameter.

---

19. Next menu item will be Accuracy.

LCD displays:

**CONFIG: CONTROLLER**  
**ACCURACY = 01%**

---

20. Press Up or Down button in Select section to choose Accuracy required for your control situation.

---

21. Press SAVE button to save your choice or keep choice shown and press right arrow Sub Menu button to scroll to the next parameter.

---

22. Next menu item will be Quick Response.

LCD displays:

**CONFIG: CONTROLLER**  
**QUICK RESPONSE = 10%**

---

23. Press Up or Down button in Select section to choose Quick Response required for your control situation.

---

24. Press SAVE button to save your choice or keep choice shown and press right arrow Sub Menu button to scroll to next parameter.

---

25. The next menu item will be Deadband Delay.

LCD displays:

**CONFIG: CONTROLLER**  
**DEADBAND DELAY = 02%**

---

26. Press Up or Down button in Select section to choose Deadband Delay required for your control situation.

---

27. Press SAVE button to save your choice or keep choice shown and press right arrow Sub Menu button to scroll to the next parameter.

---

28. The next menu item will be Fail Action.

LCD displays:

**CONFIG: FAIL ACTION**  
**LAST CLOSE OPEN**

---

29. Press Up or Down button in Select section to choose Fail Action required for your control situation.

---

30. Press SAVE button to save your choice or keep choice shown and press right arrow Sub Menu button to scroll to the next parameter.

---

31. Next menu item will be Sensor Limit low.

LCD displays:

**CONFIG: SENSOR LIMIT**

**4mA VALUE = 000 (unit of measure)**

---

32. Press Up or Down button in Select section to choose lower limit of your transmitter scale.

---

33. Press SAVE button to save your choice or keep choice shown and press right arrow Sub Menu button to scroll to next parameter.

---

34. The next menu item will be Sensor Limit high.

LCD displays:

**CONFIG: SENSOR LIMIT**

**20mA VALUE = XXX (unit of measure)**

---

35. Press Up or Down button in Select section to choose upper limit of your transmitter scale.

---

36. Press SAVE button to save your choice or keep choice shown and press right arrow Sub Menu button to scroll to next parameter.

---

37. The next menu item will be Soft Start ramp time.

LCD displays:

**CONFIG: SOFT START**  
**RAMP TIME = 060 MIN**

---

38. Press Up or Down button in Select section to choose ramp time of for start up of your system. If you are not using soft start then press right arrow Sub Menu button and skip this setting.

---

39. Press SAVE button to save your choice or keep choice shown and press right arrow Sub Menu button to scroll to next parameter.

---

40. Next menu item will be Soft Start ramp time.

LCD displays:

**CONFIG: SOFT START**

**START PT = XXX (unit of measure)**

---

41. Press Up or Down button in Select section to choose start point for ramping of your system. If you are not using soft start then press Sub Menu button and skip this setting.

---

42. Press SAVE button to save your choice or keep choice shown and press right arrow Sub Menu button to scroll to the next parameter.

---

43. Next menu item will be Set Point Value for local control. If you are not using Local set point control then this menu will be skipped.

LCD displays:

**SET POINT: LOCAL**

**SET/SAVE = XXX (unit of measure)**

44. Press Up or Down button in Select section to choose set point for your system.

45. Press SAVE button to save your choice or keep choice shown and press right arrow Main Menu button to scroll to the next parameter.

46. Next menu item will be Manual for local control of opening position of valve. Many people want to first manually open there valve a little before setting automatic controls in operation. Check that air is supplied to the unit to use this option.

## CAUTION

Check to ensure that applying air to actuator will not cause harm to people or systems.

47. Toggle switch in pneumatics section to Active.
48. Pressing the up or down buttons will cycle small solenoids to pump air into actuator slowly. Pressing SAVE button will change to large solenoid for changing air sent to actuator. If you do not want to use this then press Sub Menu button.

LCD displays:

**OPERATE; MANUALY:use**

**UP/DOWN; FAST = SAVE**

49. Press Up or Down button in Select section to choose actuator opening for your system.

50. Press SAVE button to change rate that air is supplied to actuator.

51. Next menu item will be Manual for local control of opening position of valve. Pressing the up or down buttons will cycle the large solenoid to pump air into actuator quickly.

LCD displays:

**OPERATE; MANUALY:use**

**SET PT = XXX (unit of measure)**

52. Press Up or Down button in Select section to choose opening point for your system.

53. Press left arrow Sub Menu button in Select section to toggle back to small solenoids.

54. Press Main menu right arrow when finished.

55. Next menu item will be Start up. If you are ready to start automatic controls then not using Local set point control then this menu will be skipped.

LCD displays:

**CONFIG: START UP**

**HARD SOFT-START**

56. Press Up or Down button in Select section to choose start up situation for your system.

57. If HARD start is pressed then LCD displays:

**HARD START**

**PRESS SAVE TO START**

58. Pressing SAVE operates unit, Operating LED in STATUS block is lit and LCD displays:

**OPRGT:S.P.: XXX UNITS**

**PMC ok Msr: XXX UNITS**

59. If SOFT-START is pressed, LCD displays:

**SOFT-START**

**PRESS SAVE TO START**

60. Pressing SAVE begins SOFT-START mode: Operating LED in STATUS block is lit, LCD switches between displays as set-point is ramped up.

61. When set-point is reached, LCD displays:

**OPRGT:S.P.: XXXXX UNITS**

**SOFT Msr: XXXXX UNITS**

## NOTICE

To stop controller at any time press Main menu right or left arrow once and then press SAVE button.

## Field Wiring Using RTD

After mounting PMC-2 at desired location, open cover by loosening 2 screws and side latch. Remove field-wiring panel by loosening 3 captive screws. See Terminal block-wiring diagram shown in Appendix B. Any signal lines should use shielded cable grounded at Terminal 17 or 18 to ensure against any RF interference.

1. Connect RTD wires as shown in Appendix D. If a shielded pair of wires is used, connect shield to Terminal 17 or 18 of connection strip.
2. Terminals 25(+) and 26(-) can be used to connect a remote set-point signal to unit. This connection can be used if PMC-2 is to have set point change by control room.
3. If connections are good then Fault light in status section will be off.
4. Toggle Switch in PNEUMATICS section controls on/off operation of pneumatic valves.

Placing switch in "up" position will cause valves to pump out air. Placing switch in "down" position disables air valves and no air is allowed in or out at any time. It is recommended that switch be placed in the down position during initial installation.

## ATTENTION

Unit will display Fault light and stop controlling if either pressure or temperature sensors become disconnected.

## WARNING

This instruction does not cover safety precautions and procedures required for safe start up of every system. Make sure you understand your system and its safe operation before start up.

## CONFIGURATION

### Start-Up

**USE THIS SECTION IF CONFIGURATION HAS NOT BEEN SET BEFORE OR CHANGES ARE REQUIRED. ALL VALUES FOR PARAMITERS ARE STARTING POINT REFERENCE VALUES ONLY**

1. Turn on electrical power to PMC-2.

2. PMC displays:

PMC Okay & Off-Line  
Navigate: > or >>



3. "OFF-LINE" is lit.

4. LED for "Disabled" is lit in PNEUMATICS section switch is in down position.

Note: No action by user in 90 seconds will cause unit to return to starting point.

5. Push right side Main Menu button twice, LCD displays:

**CONFIG: DISPLAY UNITS**  
**degF**

6. Press SAVE button or the right arrow Sub Menu button. Menu will cycle to:

**CONFIG: ACTUATOR**  
**DIRCTN: DIRECT REVERSE**

7. Press Up or Down button in Select section to choose actuator direction. Cursor will blink on choice that can be saved.

8. Press SAVE button to save your choice or keep choice shown and press right arrow Sub Menu button to scroll to next parameter.

9. Next menu item will be Air Action.  
LCD displays:  
**CONFIG: AIR ACTION**  
**Direct Reverse**

10. Press Up or Down button in Select section to choose controller CYL 1 port air action with increasing signal.

11. Press SAVE button to save your choice or keep choice shown and press right arrow Sub Menu button to scroll to next parameter.

12. Next menu item will be Set Point control.  
LCD displays:  
**CONFIG: SET PT**  
**LOCAL REMOTE**

13. Press Up or Down button in Select section to choose how set point will be set. Local at the unit or remote from a control room.

14. Press SAVE button to save your choice or keep choice shown and press right arrow Sub Menu button to scroll to next parameter.

15. Next menu item will be Deadband.  
LCD displays:  
**CONFIG: CONTROLER**  
**DEADBAND = XX%**

16. Press Up or Down button in Select section to choose Deadband required for your control situation.

17. Press SAVE button to save your choice or keep choice shown and press right arrow Sub Menu button to scroll to next parameter.

18. Next menu item will be Accuracy.  
LCD displays:  
**CONFIG: CONTROLER**  
**ACCURACY = XX%**

19. Press Up or Down button in Select section to choose Accuracy required for your control situation.



20. Press SAVE button to save your choice or keep choice shown and press right arrow Sub Menu button to scroll to the next parameter.

---

21. Next menu item will be Quick Response.  
LCD displays:  
**CONFIG: CONTROLLER**  
**QUICK RESPONSE = XX%**

---

22. Press Up button in Select section to choose maximum Quick Response. Temperature control is a slow response system and we do not need quick response.

23. Press SAVE button to save your choice or keep choice shown and press right arrow Sub Menu button to scroll to next parameter.

---

24. The next menu item will be Deadband Delay.  
LCD displays:  
**CONFIG: CONTROLLER**  
**DEADBAND DELAY = XX%**

---

25. Press Up or Down button in Select section to choose Deadband Delay required for your control situation.

26. Press SAVE button to save your choice or keep choice shown and press right arrow Sub Menu button to scroll to the next parameter.

---

27. The next menu item will be Fail Action.  
LCD displays:  
**CONFIG: FAIL ACTION**  
**LAST CLOSE OPEN**

---

28. Press Up or Down button in Select section to choose Fail Action required for your control situation.

29. Press SAVE button to save your choice or keep choice shown and press right arrow Sub Menu button to scroll to the next parameter.

---

30. Next menu item will be Sensor Limit low.  
LCD displays:  
**CONFIG: RTD deg RANGE**  
**32/212 32/400 0/100**

---

31. Press Up or Down button in Select section to choose RTD range of your RTD.

32. Press SAVE button to save your choice or keep choice shown and press right arrow Sub Menu button to scroll to next parameter.

---

33. The next menu item will be Soft Start ramp time.  
LCD displays:  
**CONFIG: SOFT START**  
**RAMP TIME = XXX MIN**

---

- 
34. Press Up or Down button in Select section to choose ramp time of for start up of your system. If you are not using soft start then press right arrow Sub Menu button and skip this setting.
- 

35. Press SAVE button to save your choice or keep choice shown and press right arrow Sub Menu button to scroll to next parameter.

---

36. Next menu item will be Soft Start ramp time.  
LCD displays:  
**CONFIG: SOFT START**  
**START PT = XXX (unit of measure)**

---

37. Press Up or Down button in Select section to choose start point for ramping of your system. If you are not using soft start then press Sub Menu button and skip this setting.

38. Press SAVE button to save your choice or keep choice shown and press right arrow Sub Menu button to scroll to the next parameter.

---

39. Next menu item will be Set Point Value for local control. If you are not using Local set point control then this menu will be skipped.  
LCD displays:  
**SET POINT: LOCAL**  
**SET/SAVE = XXX (unit of measure)**

---

40. Press Up or Down button in Select section to choose set point for your system.

41. Press SAVE button to save your choice or keep choice shown and press right arrow Main Menu button to scroll to the next parameter.

42. Next menu item will be Manual for local control of opening position of valve. Many people want to first manually open their valve a little before setting automatic controls in operation. Check that air is supplied to the unit to use this option.

### CAUTION

Check to ensure that applying air to actuator will not cause harm to people or systems.

- 
43. Toggle switch in pneumatics section to Active.
- 

44. Pressing the up or down buttons will cycle small solenoids to pump air into actuator slowly. Pressing SAVE button will change to large solenoid for changing air sent to actuator. If you do not want to use this then press Sub Menu button.

LCD displays:  
**OPERATE; MANUAL:use**  
**UP/DOWN; FAST = SAVE**

---

45. Press Up or Down button in Select section to choose actuator opening for your system.

46. Press SAVE button to change rate that air is supplied to actuator.

47. Next menu item will be Manual for local control of opening position of valve. Pressing the up or down buttons will cycle the large solenoid to pump air into actuator quickly.

LCD displays:

**OPERATE; MANUAL:use  
SET PT = XXX (unit of measure)**

48. Press Up or Down button in Select section to choose opening point for your system.

49. Press left arrow Sub Menu button in Select section to toggle back to small solenoids.

50. Press Main menu right arrow when finished.

51. Next menu item will be Start up. If you are ready to start automatic controls then not using Local set point control then this menu will be skipped.

LCD displays:

**CONFIG: START UP  
HARD SOFT-START**

52. Press Up or Down button in Select section to choose start up situation for your system.

53. If HARD start is pressed then LCD displays:

**HARD START  
PRESS SAVE TO START**

54. Pressing SAVE operates unit, Operating LED in STATUS block is lit and LCD displays:

**OPRGT:S.P.: XXX UNITS  
PMC ok Msr: XXX UNITS**

55. If SOFT-START is pressed, LCD displays:

**SOFT-START  
PRESS SAVE TO START**

56. Pressing SAVE begins SOFT-START mode: Operating LED in STATUS block is lit, LCD switches between displays as set-point is ramped up.

57. When set-point is reached, LCD displays:

**OPRGT:S.P.: XXXXX UNITS  
SOFT Msr: XXXXX UNITS**

## NOTICE

To stop controller at any time press Main menu right or left arrow once and then press SAVE button.

## Run Time

PMC-2 will adjust opening and closing of valve to change in measured parameter (pressure, temperature, or level) that is being sent to it by a transducer or RTD. If during operation system parameters need to be changed for any reason, operator can use menu system to select desired parameter and then change it. Microcomputer will read and store new parameter during its next clock cycle. Thus, parameter changes are implemented immediately without stopping process control. This allows fine-tuning of control and changing of control when controlled system changes.

Example: A system to control pressure began that had very slow changes in down stream pressure. Quick Response on setting on PMC-2 was set to 18% (Quick Response was not needed unless there was a sudden change and error became 18% or more). Over time system has changed and now there are very fast pressure changes. PMC-2 Quick Response setting can now be changed to 4% while PMC-2 is controlling pressure. Procedure is:

1. Press right arrow Main menu button three times.
2. Press right arrow sub menu button to scroll to next menu item; Quick Response.

LCD displays:

**CONFIG: CONTROLLER  
QUICK RESPONSE = XX%**

3. Press Up button in Select section to choose maximum Quick Response. Press SAVE button to save your choice or keep choice shown and press right arrow Sub Menu button to scroll to next parameter if needed.
4. Once the save button is pushed the system will automatically use what you put in and go to run menu.

PMC-2 will now cause the control valve actuator to respond much more quickly to rapidly changing controlled pressure.

Ideal tuning of PMC-2 is with a minimum setting of Quick Response setting, Accuracy setting, and Deadband setting that can be used without system going into constant oscillation after an upset

## Change SET POINT while running

1. Press right Main menu arrow four times.
2. Next menu item will be Set Point Value for local control. If you are not using Local set point control then the control room can change the set point at any time.

LCD displays:

**CONFIG: SET POINT**  
**SET PT = XXX (unit of measure)**

3. Press Up or Down button in Select section to choose new set point for your system.
4. Press SAVE button to save your choice.
5. System will automatically use saved set point and return to the run menu.

**or**  
**CONFIG: DISPLAY UNITS**  
**degF**

3. Press press right arrow Sub Menu button to scroll to t parameter needed to be changed.
4. Press SAVE button to save your choice.
5. System will automatically use saved set point and return to the run menu.

## Change any parameter while running

1. Press right Main menu arrow three times.
2. Next menu item will be Display units.

LCD displays:

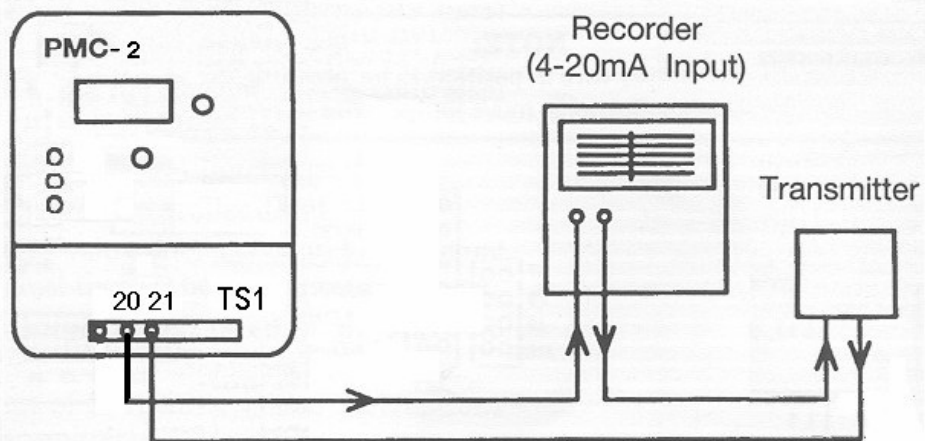
**CONFIG: DISPLAY UNITS**  
**none, psig, bar, degF**

## Trouble Shooting

If....	Then....
Controller does not operate at all and no lights are shown.	Check power connections.
Final control valve operates in opposite direction.	Check that controller is in expected mode (Direct or Reverse) Check that pneumatic piping is connected to proper connection at actuator and at controller (Cyl 1 to bottom and Cyl 2 to top of actuator).
Valve repeats up and down motion quickly or in large changes.	Increase Quick Response setting to maximum and then reduce setting in small steps until cycling resumes. Change Quick Response setting back to setting before cycling began.
Valve cycles up and down in small changes	Increase Deadband setting to maximum and then reduce setting in small steps until cycles return. Change Deadband setting back to setting before cycling began.
Controller will not clear "Fault" light.	Check and make sure connections to RTD or pressure sensor are secure. Check RTD or pressure sensor wires for continuity.
If all status lights are on and LCD is lit but no control.	+24 V DC power or current supplied to unit is too low to operate the unit. Check power supplied to the unit.
Loss of remote set point	Fault light come on, Set point is 0, unit fails to "Fail Action" setting
Fault light is off when unit is "Off Line", Fault light is on when unit is "ON Line"	4-20 transmitter wires are connected backwards. Positive is connected to negative and negative to positive. Reverse wire connections.

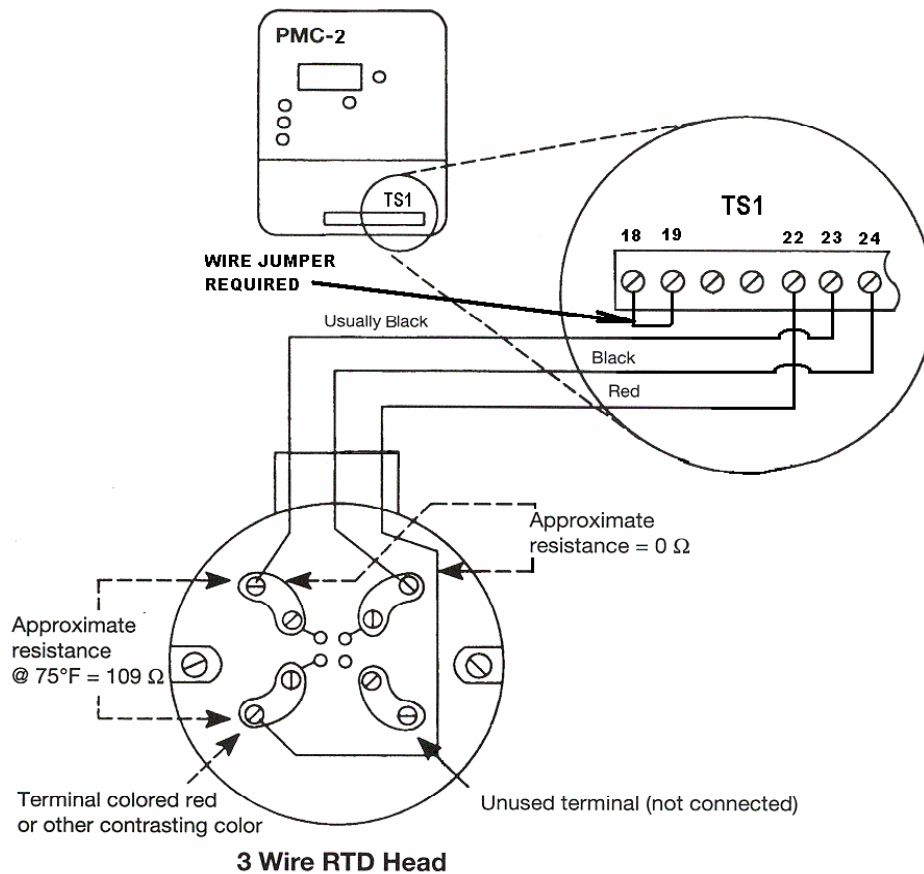
## APPENDIX A

### WIRING MULTIPLE DEVICES IN SERIES WITH THE PMC-2



## APPENDIX B

### CONNECTING AN RTD TO THE PMC-2



## APPENDIX C

### RTD Wiring Considerations

When using PMC-2 to control temperature with a 3-wire RTD, consideration must be given to distance of RTD from PMC-2.

Since RTD changes resistance in proportion to temperature change, signal received by PMC-2 is a variable voltage signal. PMC-2 voltage signal into 4-20 mA signal, which can be used by PMC-2.

Wire connecting RTD to PMC-2 provides additional resistance, which varies according to gauge and length of wire. Although additional resistance of wire is insignificant over short distances, it can affect accuracy over long distances. The following guideline can be used to ensure that any error induced by wire length will be less than 1%.

#### RTD DISTANCE LIMITATIONS

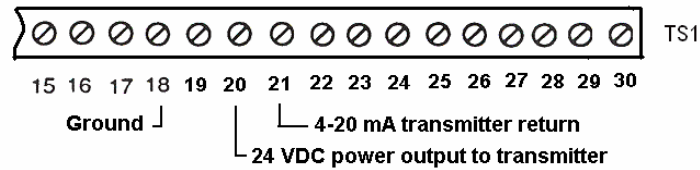
Wire Gauge		Max. Length for 3-wire RTD	
AWG	Mm2	Feet	Meters
20	.50	90	27.4
22	.25	55	16.8
24	.22	30	9.1

If unit used is a 4-wire interface then two wires from each side of sensor are run back to electronics interface. The electronics interface uses a “Kelvin” bridge method to cancel out cable wiring resistance.

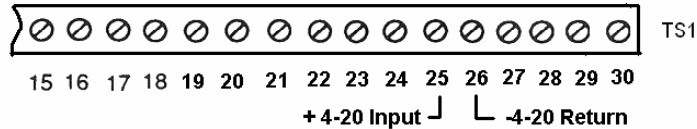
# APPENDIX D

## WIRING DIAGRAMS FOR TYPICAL INSTALLATIONS

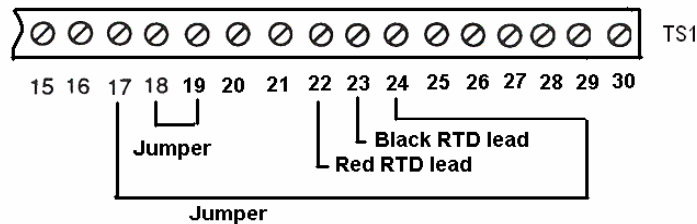
Wiring Connections for 4—20 mA Transmitter (e.g. pressure or level)



Wiring Connections for External Set Point



Wiring Connections for Two—Wire RTD (temperature)



# APPENDIX E

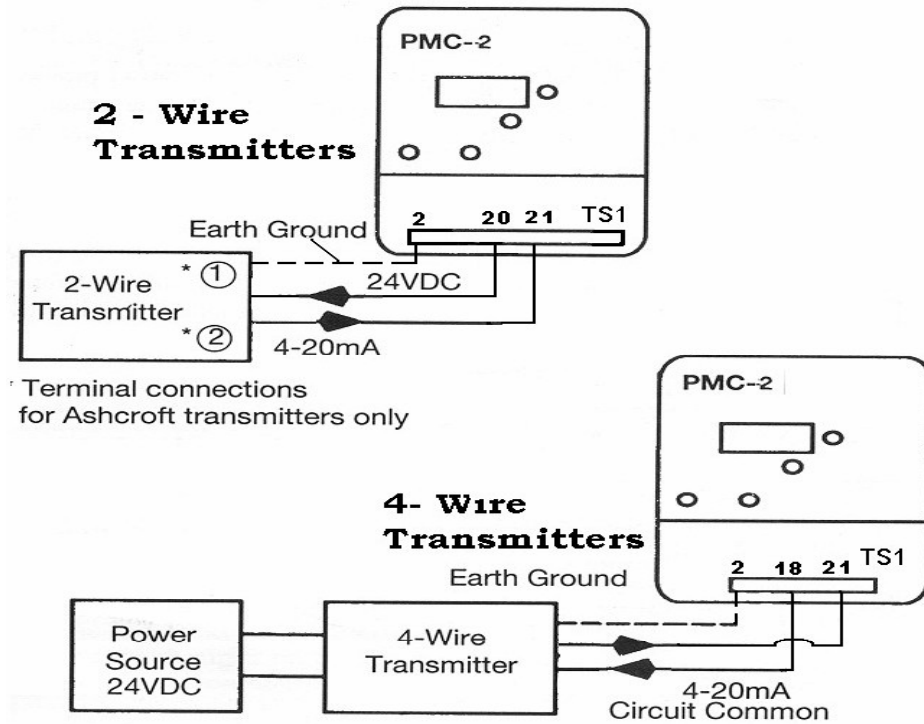
## TERMINAL BOARD LABELS

Terminal #	Label	Use
1	CHAS	Chassis Ground
2	GND	Power input Ground
3	CAN	AC Voltage Neutral Power Input
4	ACH	AC Voltage Hot Power Input
5	+24 V	Plus 24 Volts DC Power Input
6	COM	Common Ground
7	HiLim	Normally Open Limit Switch, Normally Closed when measured value reaches maximum
8	HiLim	Normally Open Limit Switch, Normally Closed when measured value reaches maximum
9	LoLim	Normally Open Limit Switch, Normally Closed when measured value reaches minimum
10	LoLim	Normally Open Limit Switch, Normally Closed when measured value reaches minimum
11	OpSlo	Used for System Diagnostics
12	ShSlo	Used for System Diagnostics
13	OpFst	Used for System Diagnostics
14	ShFst	Used for System Diagnostics
15	U24	+24 Volt Supply Voltage
16	COM	Common Ground
17	COM	Common Ground

18	COM	Common Ground
19	eRTD	Connect to Ground if RTD is used for temperature measurement
20	+EXC	+24 Volts DC for powering 4-20 mA Devices
21	Isen	4-20 mA Device return line for measurements
22	RTD+	+ RTD Connection, Red wire
23	RTD-	- RTD Connection, Black wire
24	RTD-	- RTD Connection, Black wire
25	Isp+	+ 4-20 mA Connection for Remote Setpoint Control
26	Isp-	- 4-20 mA Connection for Remote Setpoint Control
27	Im+	+ DC Connection for Remote Sensing of the Measured Controlled Pressure or Temperature in terms of a 4-20 mA reading.
28	Im-	- DC Connection for Remote Sensing of the Measured Controlled Pressure or Temperature in terms of a 4-20 mA reading
29	BusA	Mod Buss Connection
30	BusB	Mod Buss Connection

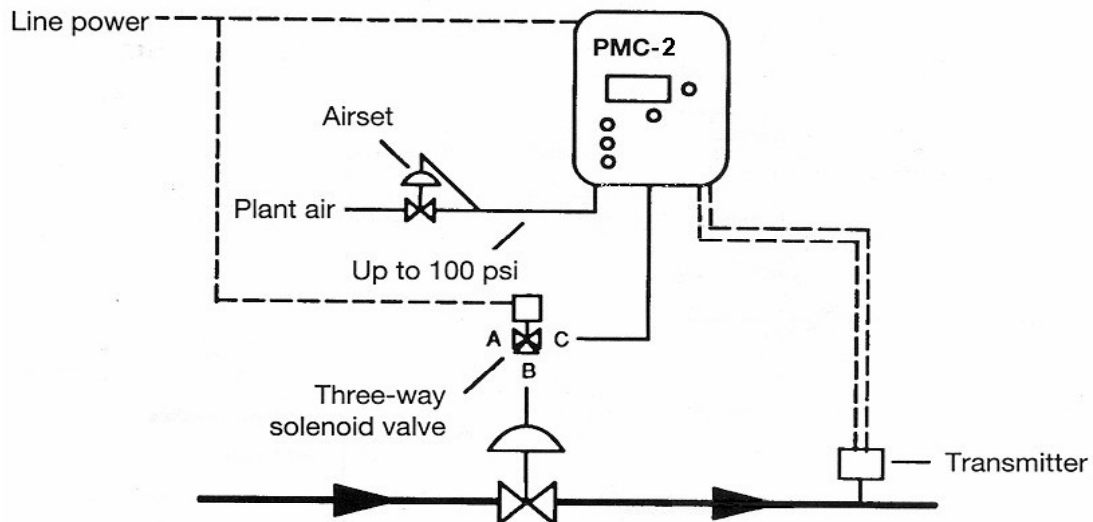
## APPENDIX F

## CONNECTING 2-WIRE AND 4-WIRE TRANSMITTERS TO THE PMC-2



## APPENDIX G

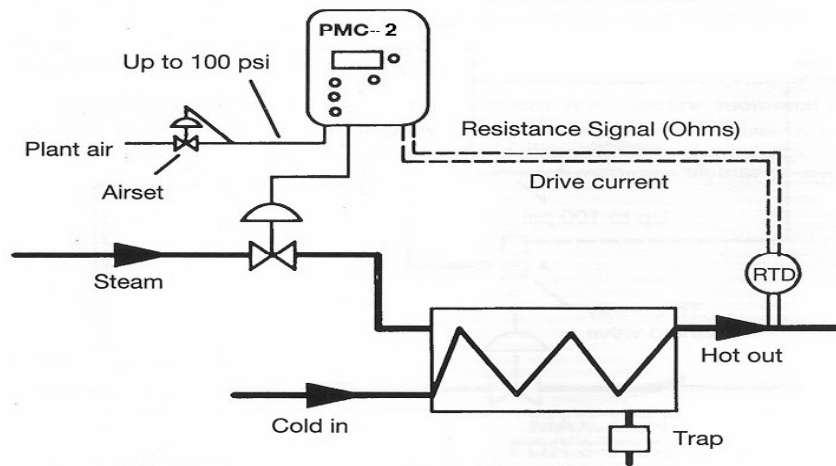
### CONTROL OF AIR SIGNAL ON POWER LOSS FOR PMC-2 ELECTRO-PNEUMATIC CONTROLLER





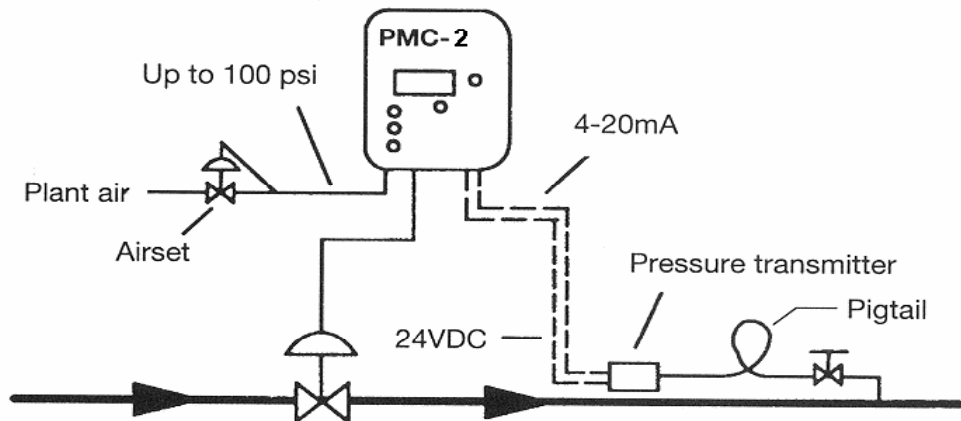
## APPENDIX H

### TYPICAL TEMPERATURE CONTROL APPLICATION FOR PMC-2 ELECTRO-PNEUMATIC CONTROLLER



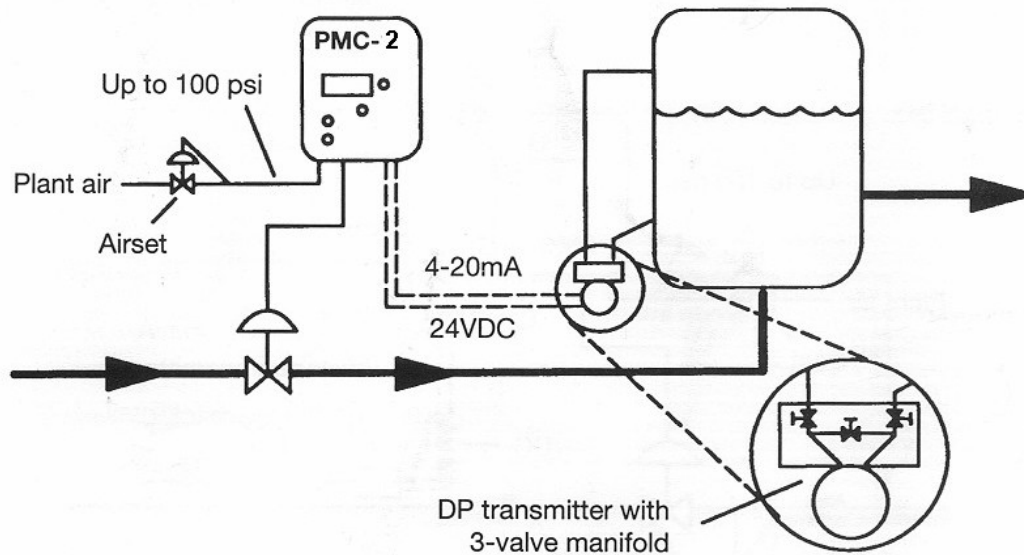
## APPENDIX I

### TYPICAL PRESSURE CONTROL APPLICATION FOR PMC-2 ELECTRO-PNEUMATIC CONTROLLER



## APPENDIX J

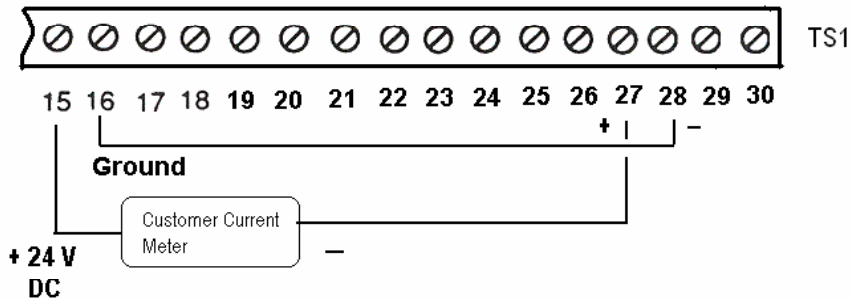
### TYPICAL LEVEL CONTROL APPLICATION FOR PMC-2 ELECTRO-PNEUMATIC CONTROLLER



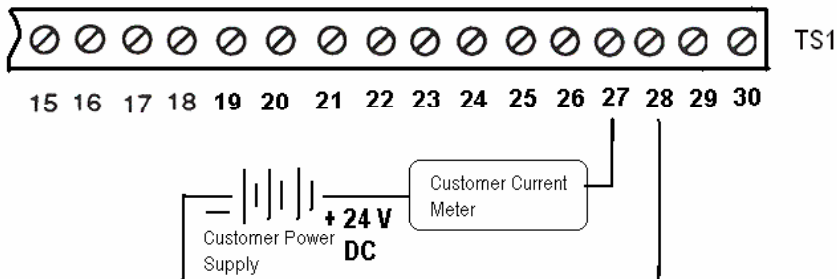
## APPENDIX K

### WIRING DIAGRAMS FOR REMOTE MEASUREMENT OF CONTROLLED PROCESS VALUE

Wiring connections for internal powered 4-20 mA remote indication of process value



Wiring connections for externally powered 4-20 mA remote indication of process value



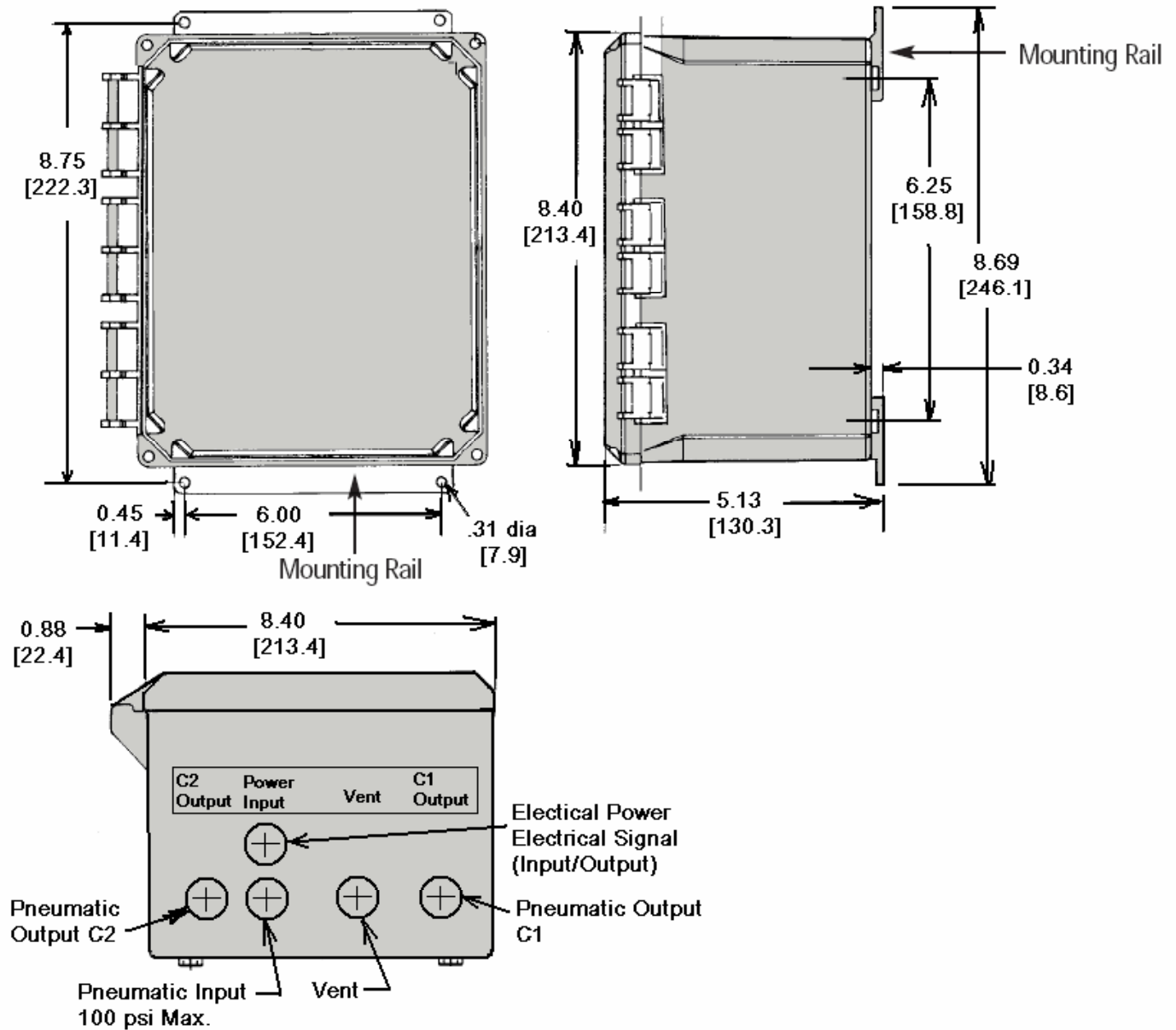
# APPENDIX L

## SPECIFICATIONS

SUPPLY VOLTAGE:	115 VOLTS 50/60 HZ 24V DC
OPERATING VOLTAGE RANGE:	90 TO 110% OF RATED VOLTAGE
POWER CONSUMPTION:	10 WATTS (MAX.), 0.7W STEADY STATE
INPUT RESISTANCE TO CURRENT LOOP	250 Ohms
INPUT SIGNAL:	4 – 20 ma(STD), PROTECTED AGAINST ACCIDENTAL OVERVOLTAGE. INPUT TERMINALS FOR RTD VOLTAGES , RANGES 32° F TO 212° F AND 32 ° F TO 400 ° F
OUTPUT:	4 – 20 Ma(STD), ACCURACY = +/- 5% SETTING LOAD = 350 OHMS MAX.
CONTROL ACTION:	DIRECT OR REVERSE (MENU SELECTABLE)
OUTPUT MODES	AUTO AND MANUAL
LOCAL SET POINT ADJUSTMENT:	MENU SELECTABLE
REMOTE SET POINT ADJUSTMENT:	ANALOG INPUT OR MODBUS RTU
AIR SUPPLY:	100 PSIG (6.9 BAR) MAX., 40 MICRON FILTERED
AIR OUTPUT:	0 TO MAXIMUM SUPPLY PRESSURE
AIR DELIVERY:	1.7 SCFM (0.05 CMM) AT 90 PSIG (6.2 BAR) MIN 10.6 SCFM ( .3 CMM ) AT 90 PSIG (6.2 BAR) MAX
AIR CONSUMPTION:	NO AIR CONSUMPTION AT STEADY STATE
PNEUMATIC FITTINGS	1/8 NPT (FEMALE)
DEADBAND SETTING	0 TO 15% OF FULL SPAN
ACCURACY SETTING	0 TO 10% OF FULL SPAN
DEADBAND DELAY SETTING	0 TO 3 SEC
QUICK RESPONSE SETTING	0 TO 20% OF FULL SPAN
AMBIENT TEMPERATURE	-4 DEGREES F TO 140 DEGREES F( -20 DEGREES C TO 60 DEGREES C)
ENCLOSURE MATERIALS	ENCLOSURE: NORYL HINGED COVER: POLYCARBONATE
ENCLOSURE APPROVAL	NEMA 1-2-3-3S-4-4X-12-13
OVERALL MOUNTING DIMENSIONS (INCLUDING BRACKET)	SEE APPENDIX M
WEIGHT	8 LBS (3.6KG)

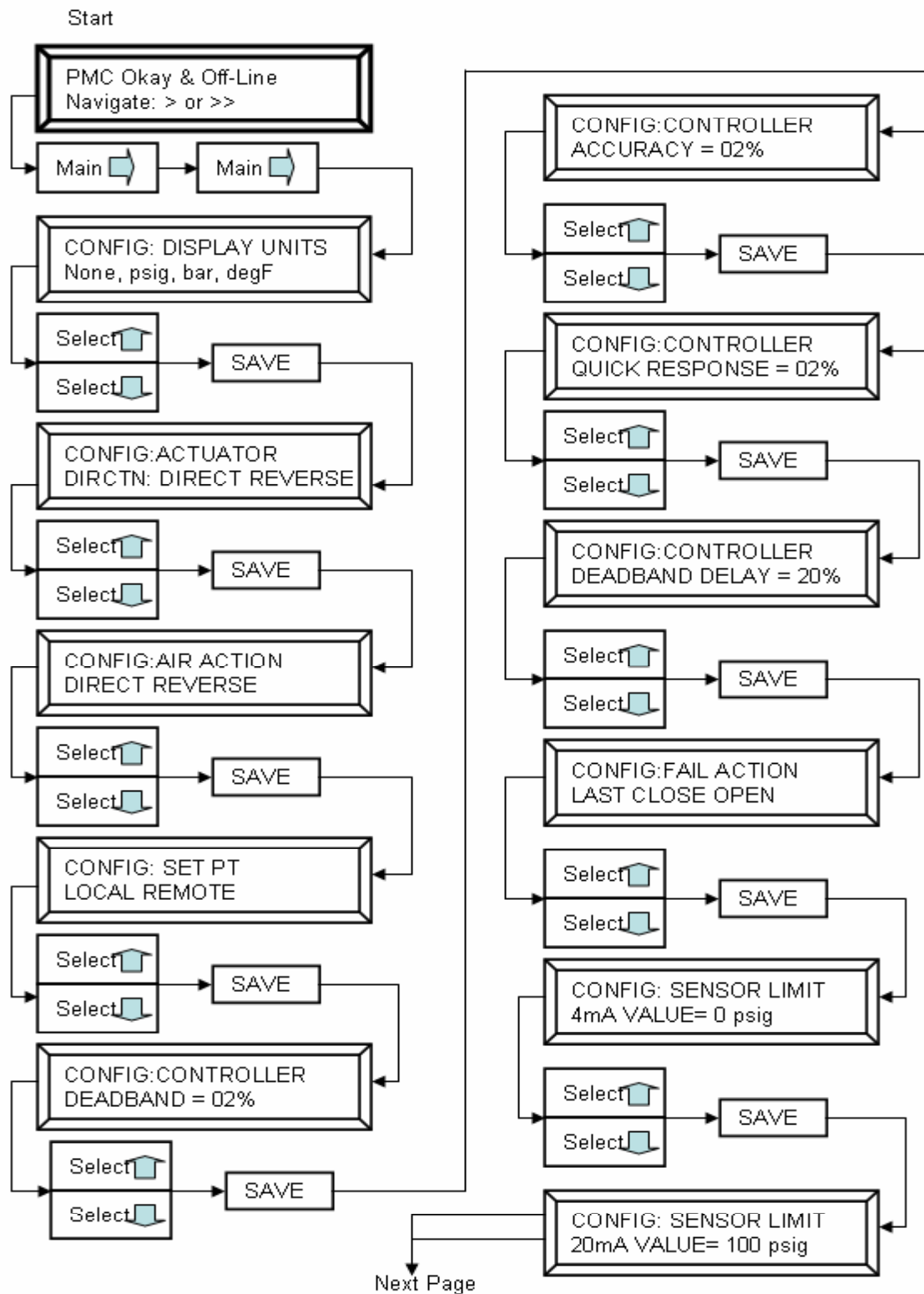
## APPENDIX M

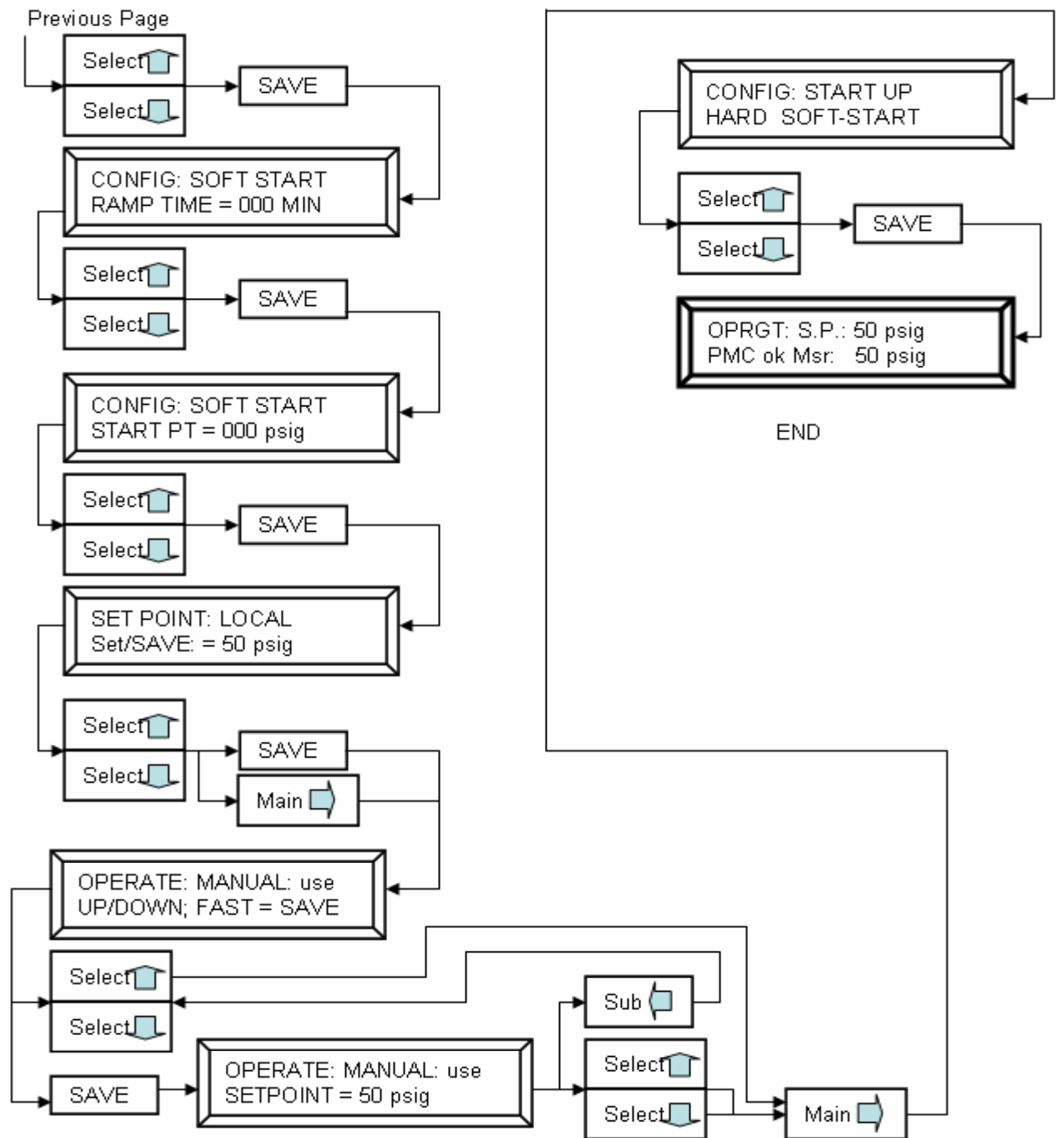
### PMC-2 CONTROLLER MOUNTING DIMENSIONS



# APPENDIX N

## PMC-2 CONTROLLER MENU DIAGRAM









A division of CIRCOR International, Inc.

12501 Telecom Drive, Tampa, FL 33637

*It is solely the responsibility of the system designer and the user to select products and materials suitable for their specific application requirements and to ensure proper installation, operation, and maintenance of these products. Assistance shall be afforded with the selection of the materials based on the technical information supplied to Leslie Controls Inc.; however, the system designer and user retain final responsibility. The designer should consider applicable Codes, material compatibility, product ratings, and application details in the selection and application. Improper selection, application or use of the products described herein can cause personal injury or property damage. If the designer or user intends to use the product for an application or use other than originally specified, he must reconfirm that the selection is suitable for the new operating conditions.*



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