Manuals+ — User Manuals Simplified.

WATLOW PM3 PM6 LEGACYTM Express Limit Controller

WATLOW PM3 PM6 LEGACYTM Express Limit Controller User Guide

Contents

WATLOW
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WATLOW PM3 PM6 LEGACYTM Express Limit Controller

Warranty

The PM3/PM6 LEGACY™ Express Limit Controller is manufactured by ISO 9001 registered processes and is backed by a three-year warranty to the first purchaser for use, providing that the units have not been misapplied. Watlow's obligations hereunder, at Watlow's option, are limited to replacement, repair or refund of the purchase price, and parts which upon examination prove to be defective within the warranty period specified. This warranty does not apply to damage resulting from transportation, alteration, misuse or abuse. The purchaser must use Watlow parts to maintain all listed ratings.

If you encounter a problem with your Watlow® controller, review your configuration information to verify that your selections are consistent with your application: inputs, outputs, alarms, limits, etc. If the problem persists, you can get technical assistance from your local Watlow representative, by e-mailing your questions to wintechsupport@watlow.com or by dialing +1 (507) 494-5656 between 7 AM and 5 PM. Central Time USA & Canada. Ask for an

Applications Engineer. Please have the complete model number available when calling. Please have the following information available when calling:

- Complete model number
- All configuration information
- User's Guide
- Factory Page

Copyrights
The PM3/PM6 LEGACY™ Express Limit Controller User Guide is copyrighted by Watlow Electric, Inc., © April 2020 with all rights reserved.

MODEL

PM3   PM6

Return Material Authorization (RMA)

1. If you are an End User, and this PM is installed in an OEM System, please contact the OEM to get the PM repaired. If you are an OEM or Watlow Distributor, please go to www.watlow.com/rma to start the RMA process. Watlow Customer Service will then respond with the RMA number via email.

2. A Return Merchandise Authorization number from the Customer Service Department is required when returning any product for credit, repair or evaluation. Make sure the Return Merchandise Authorization number is on the outside of the carton and on all paperwork returned. Ship on a Freight Prepaid basis.

3. After we receive your return, we will examine it and try to verify the reason for returning it.

4. In cases of a manufacturing defect, we will enter a repair order, replacement order or issue credit for material returned. In cases of customer misuse, we will provide repair costs and request a purchase order to proceed with the repair work.

5. To return products that are not defective, goods must be in new condition, in the original boxes and they must be returned within 120 days of receipt. A 20 percent restocking charge is applied for all returned stock controls and accessories.

6. If the unit cannot be repaired, you will receive a letter of explanation and be given the option to have the unit returned to you at your expense or to have us scrap the unit.

7. Watlow reserves the right to charge for no trouble found (NTF) returns.

Available PM LEGACY™ Series Literature and Resources	
Contact Watlow Directly:	For technical assistance contact Watlow at: **www.watlow.com** Or call at : 1-800-WATLOW2 Or (1-800-928-5692) Or email at: **wintechsupport@watlow.com**
PM6 LEGACY™ Express Limit Controller Quick Start Guide Document No. 10-41692, **Part No. 2126-4403**	A Quick Start Guide to help you get your controller set up is available for download at **https://www.watlow.com/resources-and-support/Technical-Library/**. Many other documents are avaiable in Watlows Technical library.
PM LEGACY™ Series Panel Mount Controller Specification Sheet	This Specifications Sheet describes the PM LEGACY™ Series hardware options, features, benefits and technical specifications. Avaialble at: **https://www.watlow.com/resources-and-support/Technical-Library/**. Many other helpful documents are avaiable in Watlows Technical library.

Safety Information

We use note, caution, and warning symbols throughout this book to draw your attention to important operational and safety information.

- A "NOTE" marks a short message to alert you to an important detail.
- A "CAUTION" safety alert appears with information that is important for protecting your equipment and performance. Be especially careful to read and follow all cautions that apply to your application.
- A "WARNING" safety alert appears with information that is important for protecting you, others, and equipment from damage. Pay very close attention to all warnings that apply to your application.
- The electrical hazard symbol precedes an electric shock hazard CAUTION or WARNING safety statement. Further explanations follow:

Explanation
CAUTION – Warning or Hazard that needs further explanation than label on unit can provide. Consult users manual for further information.
ESD Sensitive product, use proper grounding and handling techniques when installing or servicing the product.
Unit protected by double/reinforced insulation for shock hazard prevention.
Do not throw in trash, use proper recycling techniques or consult the manufacturer for proper disposal.
Unit can be powered with either alternating current (ac) voltage or direct current (dc) voltage.
Unit is a Listed device per Underwriters Laboratories®. It has been evaluated to United States and Canadian requirements for Process Control Equipment. UL 61010 and CSA C22.2 No. 61010. File E185611 QUYX, QUYX7. See: **www.ul.com**
Unit is a Listed device per Underwriters Laboratories®. It has been evaluated to United States and Canadian requirements for Hazardous Locations Class 1 Division II Groups A, B, C and D. ANSI/ISA 12.12.01-2007. File E184390 QUZW,   QUZW7. See: **www.ul.com**
The unit is compliant with European Union directives. See Declaration of Conformity for further details on Directives and Standards used for Compliance.
Unit has been reviewed and approved by Factory Mutual as a Temperature Limit Device per FM Class 3545 standard. See: **www.fmglobal.com**
Unit has been reviewed and approved by CSA International for use as Tem- perature Indicating-Regulating Equipment per CSA C22.2 No. 24. See: **www.csa-international.org**

Overview

Figure 1: PM6 Controller Shown Here

A Conceptual View of the PM

- The flexibility of the PM software and hardware allows for a large range of configurations. Acquiring a better understanding of the controller's overall functionality and capabilities while at the same time planning out how the controller can be used will deliver maximum effectiveness in your application.
- It is useful to think of the controller in terms of functions; there are internal and external func-tions. An input and an output would be consid-ered external functions where the limit, PID or alarm function would be an internal function. Information flows from an input function to an internal function to an output function when the controller is properly configured.

- A single PM controller can carry out several functions at the same time, for instance (but not limited to), checking for a limit condition, monitoring for several different alarm situations, etc…

- To ensure that the application requirements are being met, it is important to first give thought to each external process and then configuring the controller's internal functions to properly accommodate the application requirements.

Figure 1: PM6 Controller Shown Here
A PM with digital input/output (DIO) hardware includes two sets of terminals where each of which can be used as either an input or an out-put. Each pair of terminals must be configured to function as either an input or output with the direction parameter in the Digital Input/Output Menu (Setup Page). Each digital input reads whether a device is active or inactive.
The Reset Key on the front panel of the PM also operates as a digital input by toggling the function assigned to it in the Digital Input Function parameter in the Reset Key Menu
(Set-up Page).

Inputs

Figure 2: Input Terminal Connection Shown Here

- The inputs terminal connections are located on the back side of the controller. See Figure 2. The controller, properly wired and configured will provide the information that any given programmed procedure can act upon. In a simple form, this information may come from an operator pushing a button or from a sensor monitoring the temperature of a part being heated or cooled.

- Each analog input typically uses a thermocouple or RTD to read the process temperature. It can also read volts, current or resistance, allowing it to use various devices to read a wide array of values. The settings in the Analog Input Menu (Setup Page) for each analog input must be configured to match the device connected to that input.

Internal Functions

The controller will use input signals to calculate a value and then perform an operation. A sample of some functions may be as simple as:

- Detect a failure of the primary sensing device and trip a contactor to remove power from the heating element.
- Reading a digital input to set a state to true or false.
- Evaluate an incoming temperature to determine an alarm state (on or off).
- Compare an input value to the set point and calculate the optimal power for a heater.

To set up a function, it's important to define the source, or instance, to use. For example, if the control is equipped with DIO it can be configured to respond to an alarm. If configured as such, the digital output must be tied to the desired alarm instance (1 to 4). Using this as an example, the Function for the digital output would be defined as

an Alarm where the Instance would be selected as 1, 2, 3, or 4 corresponding to the alarm instance that will drive the output.

Keep in mind that a function is a user-programmed internal process that does not execute any action outside of the controller. To have any effect outside of the controller, an output must be configured to respond to a function.

Outputs

The Output Wire Terminals are located on the back side of the controller. See Figure 3. The Outputs properly wired and configured can perform various functions or actions in response to information provided by a function such as, removal of the control voltage to a contactor; operating a heater, turning a light on or off, unlocking a door, etc. Assign a Function to any available output on the Setup Page within the Output Menu or Digital Input/Output Menu. Then select which instance of that function will drive the selected output. For example, you might assign an output to respond to alarm 4 (instance 4). You can assign more than one output to respond to a single instance of a function. For example, alarm 2 could be used to trigger a light connected to output 1 and a siren con-nected to digital output 5.

Features and Benefits

Simplified Menu

• Fits basic applications with a user-friendly interface supported by two menus and a streamlined list of parameters.

• Eliminates user complexity often experienced with more advanced controllers and unnecessary features.

• Reduces user training costs and user pro- gramming errors

PID Auto-Tune

• Provides auto-tune for fast, efficient start-up

Standard Bus Communications

• Allows easy product configuration via PC communications protocol and free software.

• Saves time, simplifies programming process and improves the reliability of controller setup

Factory Mutual (FM) Approved Over and Under Limit with Auxiliary Outputs.

• Increases user and equipment safety for over and under-temperature conditions.

Function Key

• Enables simple, one-touch operation of user-defined, repetitive activities

Touch-Safe Package

• Increases installer and operator safety

• Complies with IP2X requirements

EZ-LINK™ Mobile Application for iPhone® and Android™

• Expedites controller setup with intuitive navigation

• Simplifies setting parameters with plain text names and descriptions

• Connects quickly and easily via Bluetooth® wireless communications

SMOOTH TOUCH™ Keypad

• Eliminates contamination points on the front of the controller.

• Prevents premature failure of mechanical components

• Creates a better seal on the front panel.

• Ensures an easy-to-clean surface.

Agency approvals: UL® listed, CSA, CE, RoHS, W.E.E.E., FM, SEMI F47-0200, Class

1, Div. 2 rating on selected models

• Assures prompt product acceptance

• Reduces end-product documentation costs

P3T Armor Sealing System

• Compiles to NEMA 4X, IP66 and IP67 specifications

• Allows the controller to be cleaned and washed

• Certified UL® 50 independent to NEMA 4X specification

Consistent Termination Labeling (CTL) Connection System

• Simplifies switching between products

• Speeds up user's system documentation

Three-Year Warranty

• Demonstrates Wat low's reliability and product support

High-Amperage Power Control Output (1/16 DIN only)

• Drives 15-ampere resistive loads direct

• Reduces component count

• Saves panel space and simplifies wiring
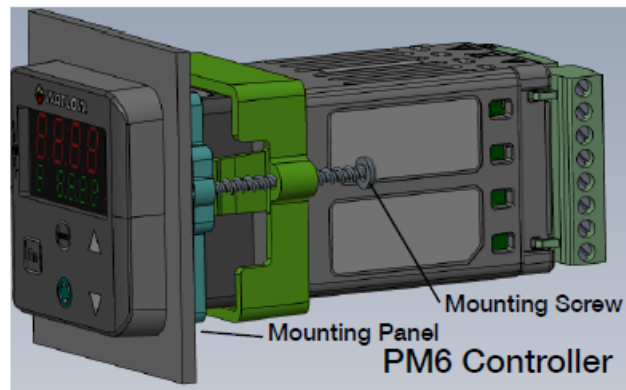
• Reduces cost of ownership

Installation

Figure 1: PM6 Installation

1. For a PM3 Controller, make the panel cutout using the measurements shown on page 9.
2. For a PM6 Controller, make the panel cutout using the measurements shown on page 10.
3. Remove the green terminal connectors and the mounting collar assembly.

Figure 2: Slide Mounting Bracket over Controller

Figure 3: Tighten the Mounting Screws

4. Insert the controller into the panel cutout from the front. See Figure 2. The controller shown is a PM6 Controller.

5. Orient the collar base so the flat side faces the front and the screw openings are on the sides (see Figure 2), then slide the base over the back of the controller..

6. Slide the mounting bracket over the controller with the screws aligned to the collar base. See Figure 2. Push the bracket gently but firmly until the hooks snap into the slots in the case.

7. Tighten the two #6-19 x 1.5 in. screws with a Phillips screwdriver until the device is flush to the panel (3 to 4 in-lbs torque). See Figure 3.

8. Reinstall the terminal connectors to their original locations.

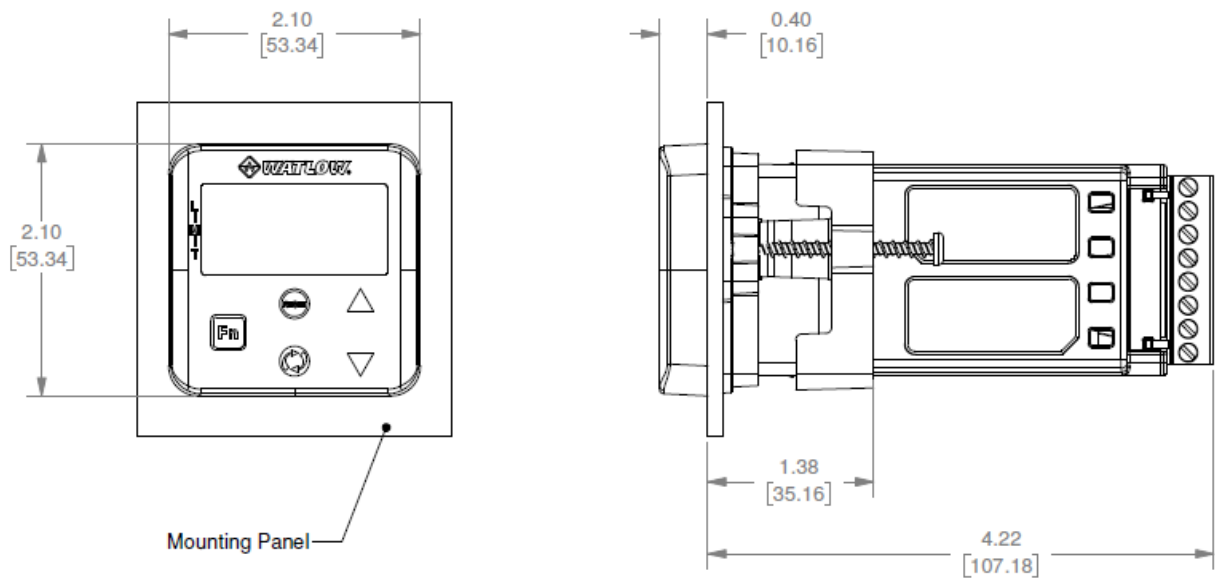## Installation and Wiring

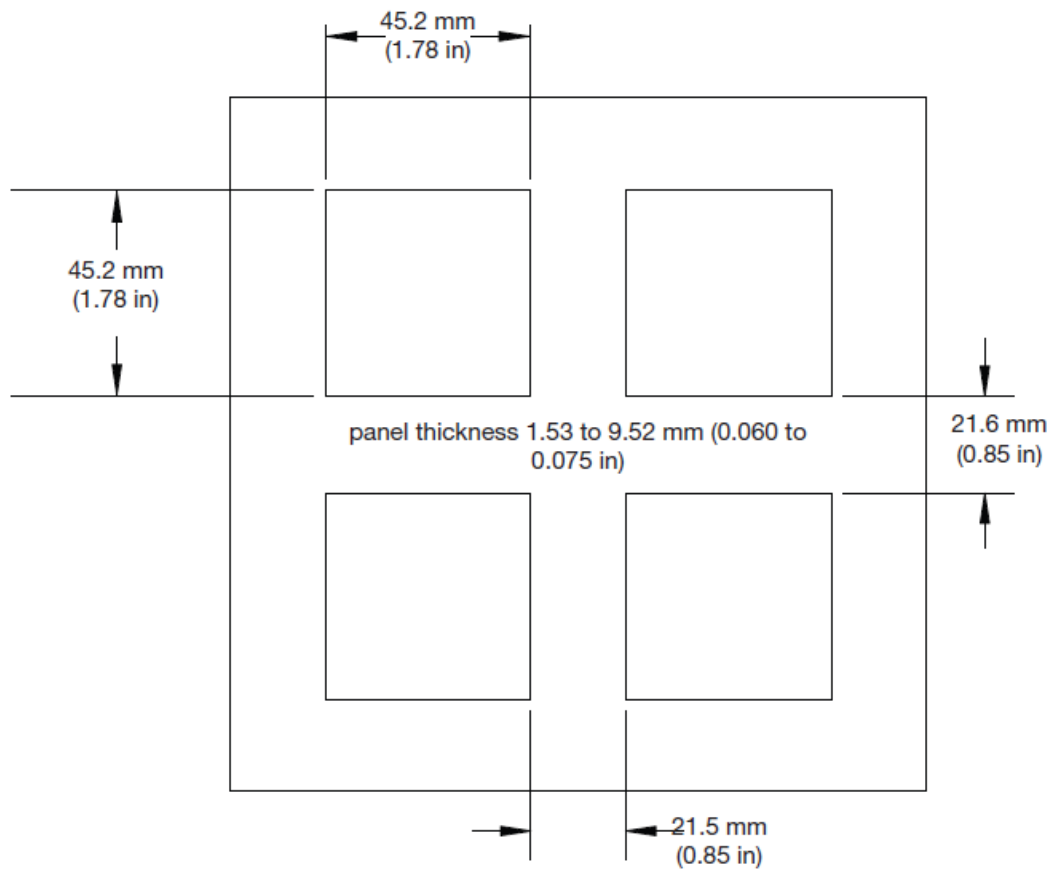### 1/32 DIN (PM3) Dimensions
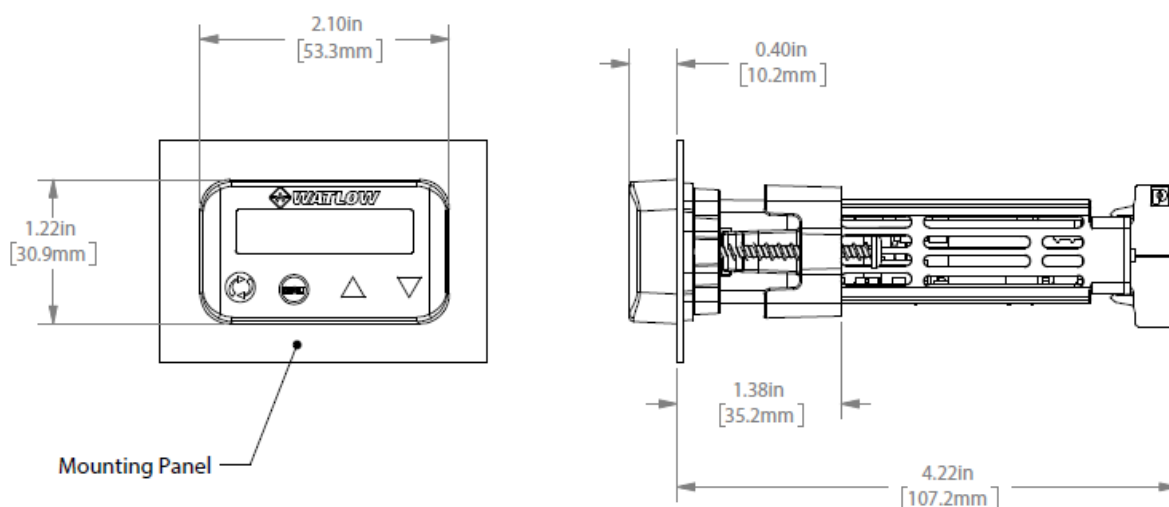
1/32 DIN (PM3) Recommended Panel Spacing
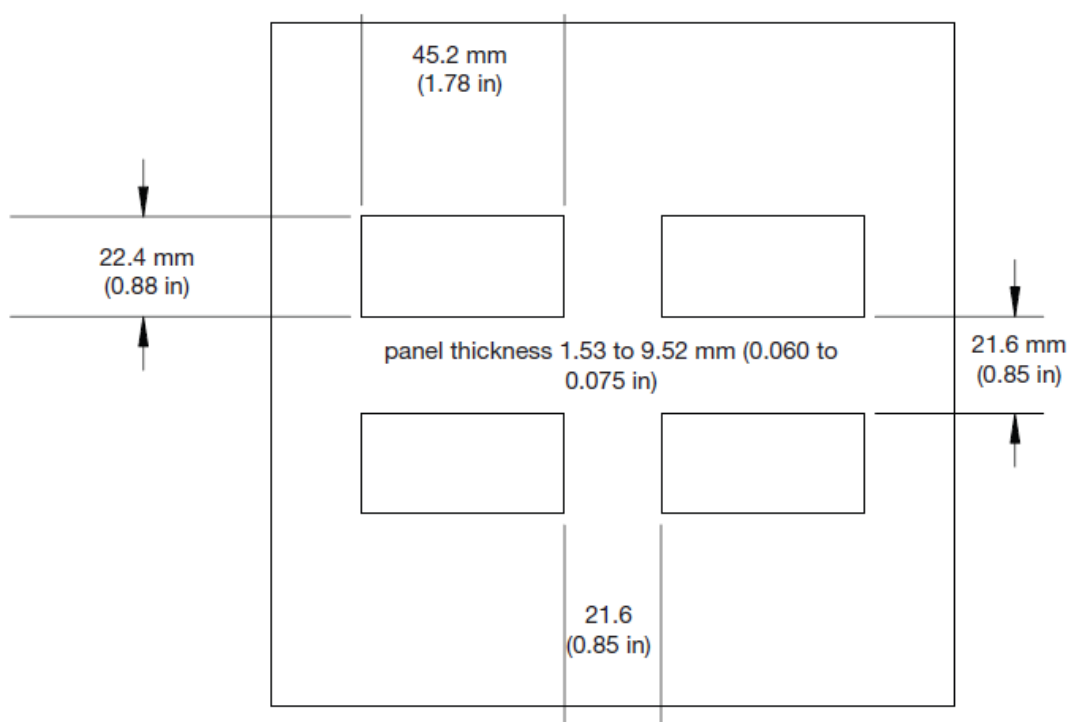
Dimensions

1/16 DIN (PM6) Dimensions

### 1/16 DIN (PM6) Recommended Panel Spacing

Terminal Definitions

Slot C	Terminal Function	Model
98	power input: ac or dc+	PM6L_____ AAA H_ _
99	power input: ac or dc-	
CF CD CE	Standard Bus EIA-485 common Standard Bus EIA-485 T-/R- Standard Bus EIA-485 T+/R+	PM6L_____ AAA H_ _
Slot A		
Input 1		
T1	(RTD) or current +,	Universal Sensor
S1	(RTD), thermocouple -, current – or volts -, thermistor	input 1: all configurations
R1	S1 (RTD), thermocouple + or volts	
	+, thermistor	

| Outputs		Terminal Function	Configuration
1	2		
X1		common (Any switched dc output	Switched dc/open collector, output 1:
		can use.)	PM6L_ C_- _AAAH _ _
W1		dc- (open collector)	
Y1		dc+	
L1		normally open	Mechanical Relay 5 A, Form C, out-
K1		common	put 1:
J1		normally closed	PM6L_ E_- _AAAH _ _
	L2 K2	normally open common	Mechanical Relay 5 A, Form A, out- put 2: PM6L _ _J- _AAAH _ _

Note:
In the graphics below notice that the Slot A connector does not show labeling for the outputs. Labeling for Slot A outputs is based on the controller part number.
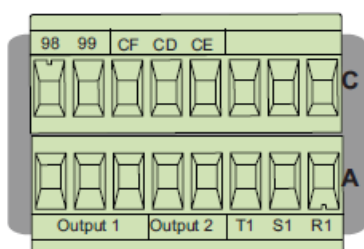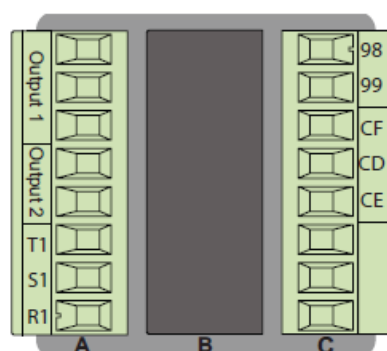
Warning:
Use National Electric (NEC) or other country-specific standard wiring and safety practices when wiring and connecting this controller to a power source and to electrical sensors or peripheral devices. Failure to do so may result in damage to equipment and property, and/or injury or loss of life.

- 47 to 63 Hz
- 10VA maximum power consumption (PM3 and PM6)

Low Power
- 12 to 40V$=$ (dc)
- 20 to 28V$\sim$(ac) Semi Sig F47

High Power
- 85 to 264V $\sim$(ac)
- 100 to 240V$\sim$ (ac) Semi Sig F47
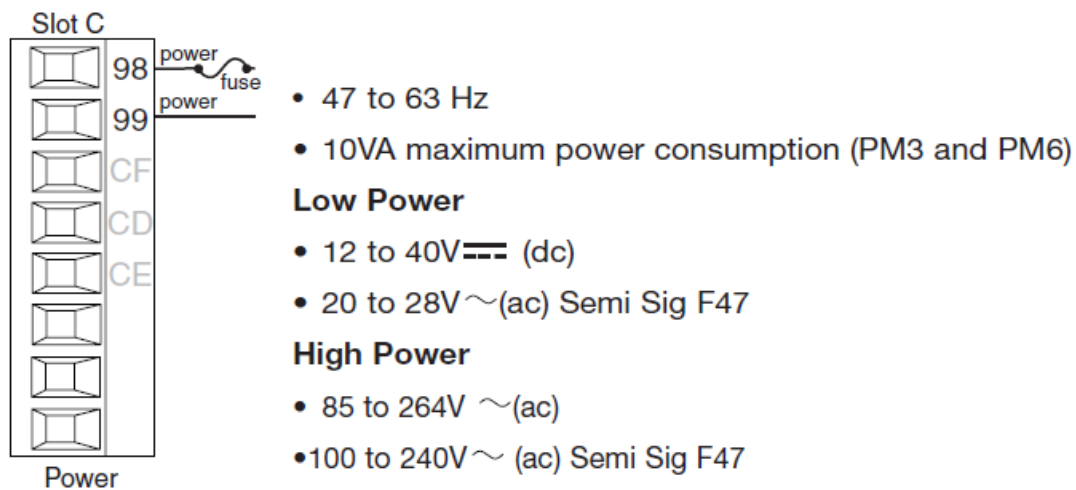
Note:
Maximum wire size termination and torque rating:

- 0.0507 to 3.30 mm2 (30 to 12 AWG) single- wire termination or two 1.31 mm2 (16 AWG)
- 0.56 Nm (5.0 lb.-in.) torque

Note:
Adjacent terminals may be labeled differently, depending on the model number.

Note:
To prevent damage to the controller, do not connect wires to unused terminals

Power

Note:
In the drawings below for each input notice that the Slot A connector labeling is identified.

Note:
When using a 2 wire RTD, jumper S1 and T1 together

Inputs
All inputs shown below represent input 1 (the only input) and are to be connected to slot A of the Limit Control.

Process
Volts

− S1

+ R1

RTD
2 or 3 Wire

S2 — T1

S3

— S1

S1

— R1

Thermocouple

− S1

± R1

Process
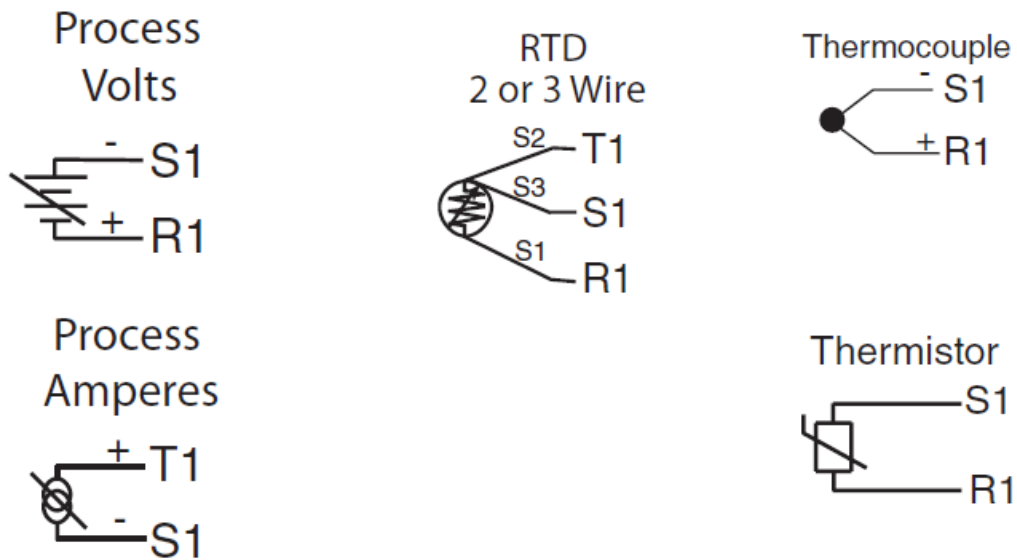Amperes

+ T1

− S1

Thermistor

— S1

— R1

Process Volts and Amperes

- 4 to 20 mA @ 100 Ω input impedance
- 0 to 10V (dc) @ 20 kΩ input impedance
- Scalable

Resistance Temperature Detector (RTD)

- Platinum, 100 Ω @ 0°C
- Calibration to DIN curve (0.00385 Ω/Ω/°C)
- 20 Ω total lead resistance
- RTD excitation current of 0.09 mA typical. Each ohm of lead resistance may affect the reading by 0.03°C.
- For 3-wire RTDs, the S1 lead must be connected to R1.
- For best accuracy use a 3-wire RTD to compensate for lead-length resistance. All three lead wires must have the same resistance.

Thermocouple

- 2 KΩ maximum source resistance
- >20 MΩ input impedance
- 3 microampere open-sensor detection
- Thermocouples are polarity sensitive. The negative lead must be connected to S1.
- To reduce errors, the extension wire for thermocouples must be of the same alloy as the thermocouple.
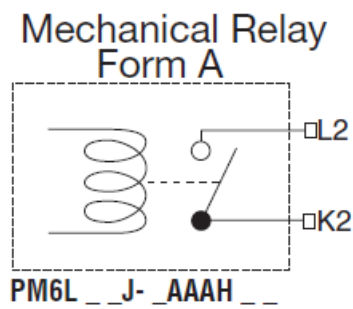
Thermistor

- >20 MΩ input impedance
- 3 microampere open-sensor detection

Outputs

Please note all outputs are connected exclusively to slot A. Output availability is based on the part number of your Limit Control.

Note:
In the drawings below for each output notice that the Slot A connector labeling is identified with the corresponding part number below.

Mechanical Relay Form C

□ L1
normally open

□ K1
common

□ J1
normally closed

PM6L_ E_- _AAAH _ _

Open Collector

common
X1

dc -
W1

Power Supply
- +
Load

PM6L_ C_- _AAAH _ _

Mechanical Relay Form A

□L2

□K2

PM6L _ _J- _AAAH _ _
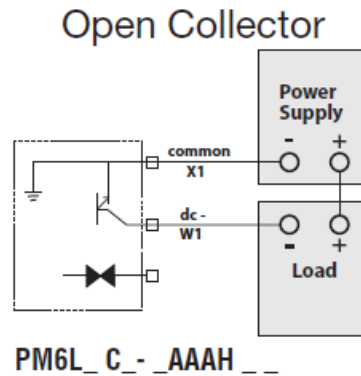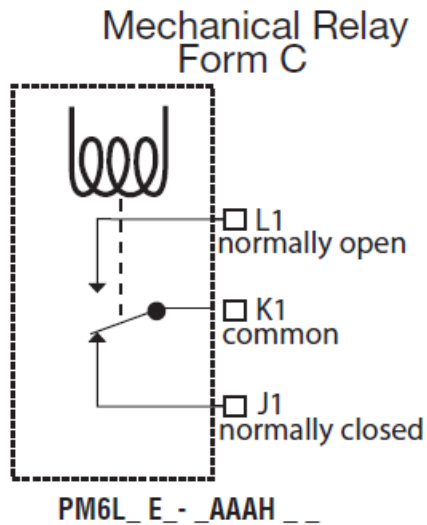
Note:
Output 2 is always the limit.

Switched DC

common

dc -
W1

dc +
Y1

-
+

PM6L_ C_- _AAAH _ _
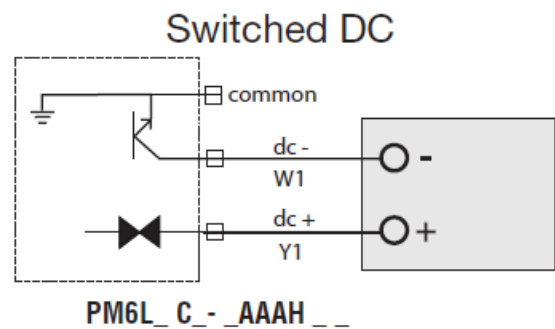
Quencharc Note:
Switching pilot duty inductive loads (relay coils, solenoids, etc.) with the mechanical relay, or open collector output options requires use of an R.C. suppressor (Quencharc).

Switched DC

- Supplied current up to a maximum of 30 mA. See Power Supply note above.
- Short circuit limited to <50 mA
- 22 to 32V (dc) open circuit voltage
- Use dc- and dc+ to drive external solid-state relay
- DIN-A-MITE compatible
  - single-pole: up to 4 in parallel or 4 in series
  - 2-pole: up to 2 in parallel or 2 in series
  - 3-pole: up to 2 in series

Open Collector

- 100 mA maximum output current sink
- 30V(dc) maximum supply voltage
- Use an external power supply to control a dc load, with the load positive to the positive of the power supply, the load negative to the open collector and common to the power supply negative.

See Quencharc note

Mechanical Relay Form C

- 5 A at 240V(ac)) or 30V(dc) maximum resistive load, output 1
- 20 mA at 24V minimum load
- 125 V (ac) pilot duty at 120/240V(ac), 25 V (ac) at 24V(ac)
- 100,000 cycles at rated load
- Output does not supply power.
- for use with ac or dc See Quencharc note.

Mechanical Relay Form A

- 5 A at 240V(ac) or 30V(dc) maximum resistive load
- 20 mV at 24V minimum load
- 125 V (ac) pilot duty @ 120/240V (ac), 25 V (ac) at 24V(ac) 100,000 cycles at rated load
- Output does not supply power.
- for use with ac or dc
  See Quencharc note (previous page).

LIMIT Controller

Keys & Displays 16th DIN LIMIT Controller

Zone Display:
When `ZonE` (found in the Factory Page) is set to on, indicates the controller zone.
`1` to `9` = zones 1 to 9
`A` = zone 10   `E` = zone 14
`b` = zone 11   `F` = zone 15
`C` = zone 12   `h` = zone 16
`d` = zone 13

Lower Display:
Indicates the current state of the limit `FA iL` or `SAFE`.

Function Key:
Performs reset function.

RESET Key:
Press to reset limit after a trip condition has been cleared.

Upper Display:
On power up, displays the process value, otherwise displays the value of the parameter in the lower display.

PM6

Advance Key:
Advances through parameter prompts.

Temperature Units Indicator Lights:
Indicates whether the temperature is displayed in Fahrenheit or Celsius.

Output Activity:
Number lights indicate activity of outputs 1 and 2.

Communications Activity:
Flashes when another device is communicating with this controller.

Up and Down Keys:
When in a menu scrolls through available options for any given prompt. In other menus can change set points and modify the upper display to a higher or lower value.

PM3 32nd DIN LIMIT Controller

Left Display: Home at beginning displays process value (PV). Entering into menus displays the value or setting of parameter

Output Activity: Indicate activity of outputs 1 & 2, dio 5 & 6

Right Display: Home at beginning displays limit status. Displays page name when entering pages. Entering into menus displays the parameter name

Up and Down Keys: ▲▼
Changes limit set points when displayed. Changes menu inside pages. Inside menus, changes the selected setting in left display

Advance Key: ⟳
Advances through menu prompts.

Reset Key: ⟲
Reset limit, clears or silence alarm when active else return home

Menu and Keypad Basics

NOTE: You must read and understand the role of each key on your controller keypad before proceeding. Refer to the drawing and callouts on the previous page. It is recommended to stop and spend some time and practice the steps of navigating the
Operators and Set Up Menus on your controller before proceeding with the instructions
The instructions below will introduce you how to
navigate to frequently used areas of your controller. Refer to the Operating and Set Up Menus listed on the following pages for more detailed instructions.

NOTE: These diagrams might vary depending on the Controller programming.

Introduction to the Set Up & Operating Menus
Upon power-up, the display will default to the home page in the Operations Menu. The upper red row displays the process value (PV). The lower green row displays the set point (SP).

Operations Menu
To enter the Operations Menu, press Reset to return to the Home Page. Press the green Advance Key to scroll through the various prompts found in the Operations Menu. Press the Reset Reset Key at any point to return to

the Home Page. Use Arrow Keys ▲ + ▼ to adjust settings or change selection

Set-Up Menu

To enter the Setup Menu press Reset Key Reset to return to Home. Press and hold the Up and Down Arrow Keys
▲ + ▼ for 6 seconds. Press the green Advance Key ⟳ to scroll through to the prompt of choice.
Use the Up and Down

Arrow Keys ▲ + ▼ to change the range. At any point within the Setup Menu, press the Reset Key
Reset to return to the Home Page

Operations Menu

Display	Description
L.LS	Limit Low Set Point
L.HS	Limit High Set Point
A.Lo	Alarm Low Set Point
A.hi	Alarm High Set Point
i.CA	Calibratin Offset

Set-Up Menu

LoC	Lockout Menu
SEn	Sensor Type
Lin	Linearization
t.C	Thermistor Curve
r.r	Resistance Range
dEC	Decimal
C_F	Display Units
r.Lo	Range Low
r.hi	Range High
Fn1	Function Output 1
Fn2	Function Output 2
L.Sd	limit Sides
L.hY	Limit Hysteresis
A.tY	Alarm Type
A.hY	Alarm Hysteresis
A.Lg	Alarm Logic
A.LA	Alarm Latching
A.bL	Alarm Blocking
A.Si	Alarm Silencing
A.dSP	Alarm Display
P.Ar1	Red Display Parameter
P.Ar2	Green Display Parameter
Ad.S	Zone Address
btth	Bluetooth

Operations Menu

Upon power up of the control, using the advance key will scroll through the various prompts found in the Operations Menu. At any point within the Operations menu to return to the default display push the Reset key.

PAr1

PAr2

$LL.S$	Limit Low Set Point
$Lh.S$	Limit High Set Point
$A.Lo$	Alarm Low Point
$A.h\,i$	Alarm High Point
$i.CA$	Calibration Offset

Operations Menu

Display	Parameter Name Description
[LL.S]	**Limit Low Set Point** Set the low process value that will trigger the limit. Appears if: Limit sides set to low or both. Range (Defaults are shown **bold**) -1,999.000 to 9,999.000°F or units -1,128.000 to 5,537.000°C **Units, 32°F or 0°C**
[Lh.S]	**Limit High Set Point** Set the high process value that will trigger the limit. Appears if: Limit sides set to high or both. Range (Defaults are shown **bold**) -1,999.000 to 9,999.000°F or units -1,128.000 to 5,537.000°C **Units, 300°F or 150°C**
[A.Lo]	**Alarm Low Set Point** Process - set the process value that will trigger a low alarm. Appears if: Alarm Type (A.ty) is set to Process Alarm. Range (Defaults are shown **bold**) -1,999.000 to 9,999.000°F or units -1,128.000 to 5,537.000°C **Units, 32.0°F or 0.0°C**
[A.hi]	**Alarm High Set Point** Process - set the process value that will trigger a high alarm. Appears if: Alarm Type (A.ty) is set to Process Alarm. Range (Defaults are shown in **bold** below) -1,999.000 to 9,999.000°F or units -1,128.000 to 5,537.000°C **Units, 300.0°F or 150.0°C**
[i.CA]	**Calibration Offset** Set an offset value for a process output. Appears if: Always Range (Defaults are shown **bold**) -1,999.000 to 9,999.000°F or units -1,110.555 to 5,555.000°C **0.0**

To enter the Setup Menu push and hold the up and down arrow keys for approximately 3 seconds. Once there, push the green advance key to scroll through to the prompt of c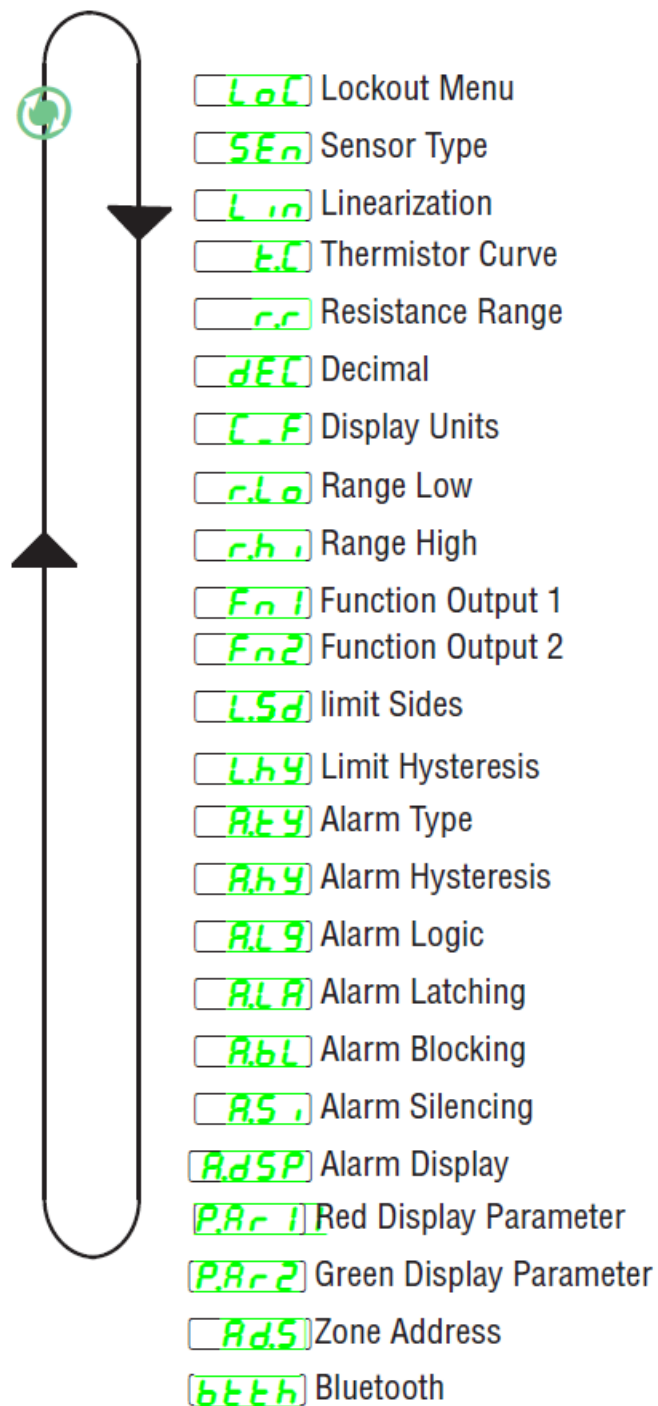hoice and then use the up and down arrow keys to change the range. At any point within the Setup menu to return to the default display push the Reset key.

Setup Menu

Setup Menu

Setup Menu

- [LoC] Lockout Menu
- [SEn] Sensor Type
- [Lin] Linearization
- [t.C] Thermistor Curve
- [rr] Resistance Range
- [dEC] Decimal
- [C_F] Display Units
- [r.Lo] Limit Set Point Range Low
- [r.hi] Limit Set Point Range High
- [Fn1] Function Output One
- [Fn2] Function Output Two
- [LSd] Limit Sides
- [LhY] Limit Hysteresis
- [AtY] Alarm Type
- [AhY] Alarm Hysteresis
- [ALg] Alarm Logic
- [ALA] Alarm Latching
- [AbL] Alarm Blocking
- [AS.i] Alarm Silencing
- [AdSP] Alarm Display
- [PAr1] Upper or Left Display
- [PAr2] Lower or Right Display
- [AdS] Zone Address
- [bEth] Bluetooth

Display	Parameter Name Description
[LoC] [LoC]	**Lockout Menu** Set the security clearance level. The user can access the selected level and all lower levels. Appears if: Always Range (Defaults are shown **bold**) 1 to 5 1 Operations Menu (read only)* 2 Operations Menu (Set point R/W)* 3 Operations Menu (Set point R/W, Control Mode R/W)* 4 Operations Menu R/W access)* **5 Operations Menu & Setup Menu full R/W access** *You can change the security level at any level
[SEn] [SEn]	**Sensor Type** Set the analog sensor type to match the device wired to this input. Appears if: Always Range (Defaults are shown **bold**) [tC] **Thermocouple** [mA] Milliamps dc [uoLt] Volts dc [rO.1H] RTD 100 Ω [thEr] Thermistor
[Lin] [Lin]	**Linearization** Set the linearization to match the thermocouple type wired to this input. For example, select [H] for a type K thermocouple. Appears if: Sensor Type is set to Thermocouple. Range (Defaults are shown **bold**) [b] B [J] J [t] T [c] C [H] K [d] D [n] N [E] E [r] R [F] F [S] S
[t.C] [t.C]	**Thermistor Curve** Select a curve to apply to the thermistor input. Range (Defaults are shown **bold**) [A] **Curve A,** [b] Curve B, [C] Curve C [CUSt] Custom

To enter the Setup Menu push and hold the up and down arrow keys for approximately 3 seconds. Once there, push the green advance key to scroll through to the prompt of choice and then use the up and down arrow keys to change the range. At any point within the Setup menu to return to the default display push the Reset key.

Setup Menu

- **LoC** Lockout Menu
- **SEn** Sensor Type
- **Lin** Linearization
- **t.C** Thermistor Curve
- **r.r** Resistance Range
- **dEC** Decimal
- **C_F** Display Units
- **r.Lo** Limit Set Point Range Low
- **r.hi** Limit Set Point Range High
- **Fn1** Function Output One
- **Fn2** Function Output Two
- **LSd** Limit Sides
- **LhY** Limit Hysteresis
- **AtY** Alarm Type
- **AhY** Alarm Hysteresis
- **ALg** Alarm Logic
- **ALA** Alarm Latching
- **AbL** Alarm Blocking
- **AS.i** Alarm Silencing
- **AdSP** Alarm Display
- **PAr1** Upper or Left Display
- **PAr2** Lower or Right Display
- **AdS** Zone Address
- **bEEh** Bluetooth

Setup Menu (cont.)

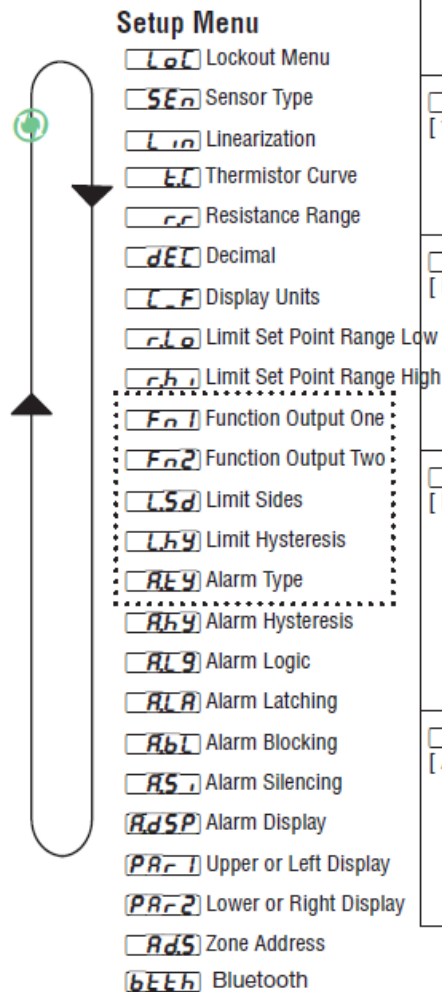| Display	Parameter Name Description
r.r [r.r]	**Resistance Range** Set the maximum resistance of the thermistor input. Range (Defaults are shown **bold**) **5** 5K, **10** 10K, **20** 20K, **40** 40K
dEC [dEC]	**Decimal** Set the precision of the displayed value. Appears if: Always Range (Defaults are shown **bold**) **0** Whole **0.0** Tenths **0.00** Hundredths
C_F [C_F]	**Display Units** Select which units will be displayed. Appears if: Always Range (Defaults are shown **bold**) **F** °F **C** °C
r.Lo [r.Lo]	**Limit Set Point - Range Low** Sets the low limit of the set point adjustment using a T/C and RTD; scales for process inputs. Appears if: Always Range (Defaults are shown **bold**) -1,999.00 to 9,999.000 °F or Units -1,110.555 to 5,555.000 °C **0.0**
r.hi [r.hi]	**Limit Set Point - Range High** Sets the high limit of the set point adjustment using a T/C and RTD; scales for process inputs. Appears if: Always Range (Defaults are shown **bold**) -1,999.00 to **9,999.000** °F or Units -1,110.555 to 5,537.000 °C

To enter the Setup Menu push and hold the up and down arrow keys for approximately 3 seconds. Once there, push the green advance key to scroll through to the prompt of choice and then use the up and down arrow keys to change the range. At any point within the Setup menu to return to the default display push the Reset key.

Setup Menu
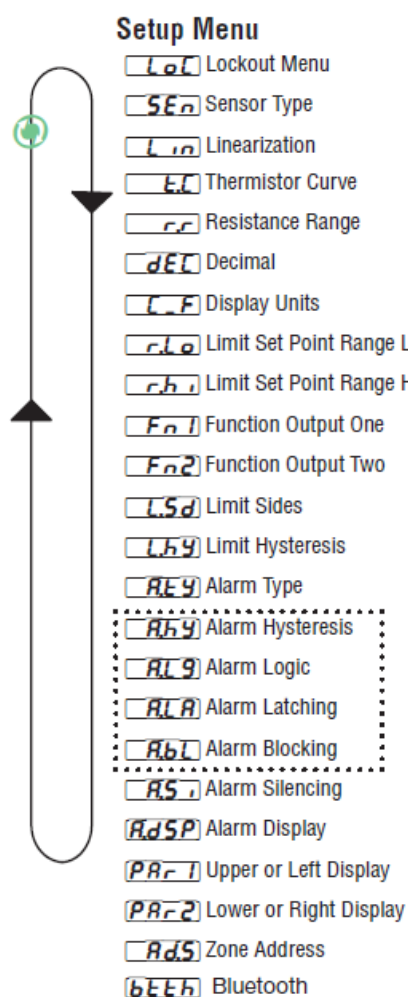
- [LoC] Lockout Menu
- [SEn] Sensor Type
- [Lin] Linearization
- [t.C] Thermistor Curve
- [r.r] Resistance Range
- [dEC] Decimal
- [C_F] Display Units
- [r.Lo] Limit Set Point Range Low
- [r.hi] Limit Set Point Range High
- [Fn1] Function Output One
- [Fn2] Function Output Two
- [L.Sd] Limit Sides
- [L.hy] Limit Hysteresis
- [A.tY] Alarm Type
- [A.hY] Alarm Hysteresis
- [AL9] Alarm Logic
- [ALA] Alarm Latching
- [A.bL] Alarm Blocking
- [AS.i] Alarm Silencing
- [AdSP] Alarm Display
- [PAr1] Upper or Left Display
- [PAr2] Lower or Right Display
- [AdS] Zone Address
- [bEEh] Bluetooth

Setup Menu (cont.)

Display	Parameter Name Description
[Fn1] [fn1]	**Function of Output 1** Select which function will drive this output. Appears if: Always Range (Defaults are shown **bold**) [oFF] Off, [Lim] Limit*, [ALm] Alarm ***Note:** Switched DC/Open Collector option should only be used to control an external mechanical relay if Limit function is selected.
[Fn2] [fn2]	**Function of Output 2** Select which function will drive this output. Appears if: Always Range (Defaults are shown **bold**) [Lim] **Limit**
[L.Sd] [L.Sd]	**Limit Sides** Select which side or sides of the process value will be monitored. Appears if: Always Range (Defaults are shown **bold**) [both] **Both** [h.9h] High [LoW] Low
[L.hY] [L.hy]	**Limit Hysteresis** Set the hysteresis for the limit function. This determines how far into the safe range the process value must move before the limit turns the output back on. Appears if: Always Range (Defaults are shown **bold**) 0.001 to 9,999.0°F or units 0.001 to 5,555.0°C **Units, 3.0°F or 2°C**
[A.tY] [A.ty]	**Alarm Type** Select how the alarm will or will not track the set point. Appears if: Always Range (Defaults are shown **bold**) [oFF] **Off** [PrAL] Process Alarm

To enter the Setup Menu push and hold the up and down arrow keys for approximately 3 seconds. Once there, push the green advance key to scroll through to the prompt of choice and then use the up and down arrow keys to change the range. At any point within the Setup menu to return to the default display push the Reset key
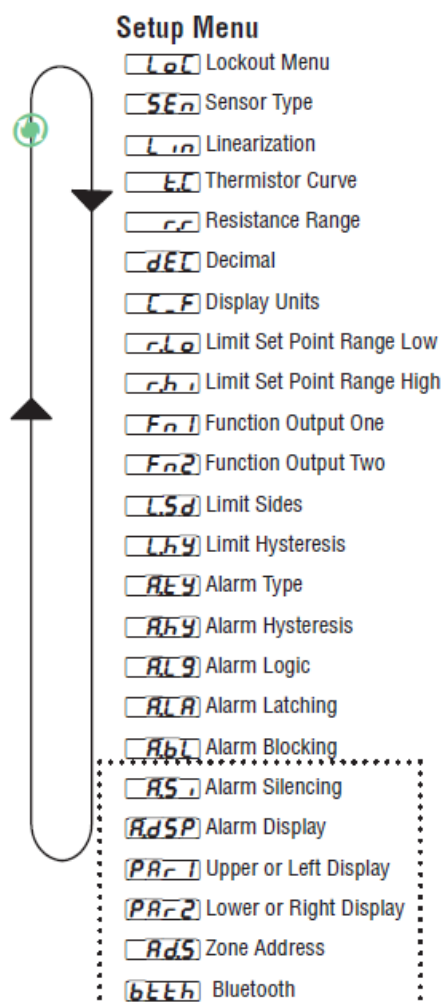
Setup Menu

- [LoC] Lockout Menu
- [SEn] Sensor Type
- [Lin] Linearization
- [t.C] Thermistor Curve
- [rr] Resistance Range
- [dEC] Decimal
- [C_F] Display Units
- [r.Lo] Limit Set Point Range Low
- [r.hi] Limit Set Point Range High
- [Fn1] Function Output One
- [Fn2] Function Output Two
- [L.Sd] Limit Sides
- [L.hY] Limit Hysteresis
- [AtY] Alarm Type
- [A.hY] Alarm Hysteresis
- [AL9] Alarm Logic
- [ALA] Alarm Latching
- [AbL] Alarm Blocking
- [AS i] Alarm Silencing
- [AdSP] Alarm Display
- [PAr1] Upper or Left Display
- [PAr2] Lower or Right Display
- [AdS] Zone Address
- [bEEh] Bluetooth

Setup Menu (cont.)

Display	Parameter Name Description
[A.hy]	**Alarm Hysteresis** Set the hysteresis for an alarm. This determines how far into the safe region the process value needs to move before the alarm can be cleared. Appears if: When alarm type is set to process. Range (Defaults are shown **bold**) 0.001 to 9,999.000°F or units 0.001 to 5,537.000°C **Units, 1.0°F or 1.0°C**
[A.Lg]	**Alarm Logic** Select what the output condition will be during the alarm state. Appears if: Always Range (Defaults are shown **bold**) [ALC] **Close on Alarm** [ALo] Open on alarm
[A.LA]	**Alarm Latching** Turn alarm latching on or off. A latched alarm has to be turned off by the user. Appears if: When alarm type is set to process. Range (Defaults are shown **bold**) [nLAt] **Non-Latching** [LAt] Latching
[A.bL]	**Alarm Blocking** Select when an alarm will be blocked. After startup and/or after the set point changes, the alarm will be blocked until the process value enters the normal range. Appears if: When alarm type is set to process. Range (Defaults are shown **bold**) [oFF] **Off** [Str] Startup [SEPt] Set Point [both] Both

To enter the Setup Menu push and hold the up and down arrow keys for approximately 3 seconds. Once there, push the green advance key to scroll through to the prompt of choice and then use the up and down arrow keys to change the range. At any point within the Setup menu to return to the default display push the Reset key.

Setup Menu

| [Lo[] Lockout Menu
| [SEn] Sensor Type
| [L in] Linearization
| [t.[] Thermistor Curve
| [r.r] Resistance Range
| [dE[] Decimal
| [[_F] Display Units
| [r.Lo] Limit Set Point Range Low
| [r.h i] Limit Set Point Range High
| [Fn 1] Function Output One
| [Fn2] Function Output Two
| [LSd] Limit Sides
| [L.hY] Limit Hysteresis
| [REY] Alarm Type
| [R.hY] Alarm Hysteresis
| [RL9] Alarm Logic
| [RLR] Alarm Latching
| [R.bL] Alarm Blocking
| [R.S i] Alarm Silencing
| [RdSP] Alarm Display
| [PRr 1] Upper or Left Display
| [PRr2] Lower or Right Display
| [RdS] Zone Address
| [btth] Bluetooth

Setup Menu (cont.)

Display	Parameter Name Description
[R.S i] [A.SI]	**Alarm Silencing** Turn alarm silencing on to allow the user to disable the output tied (configured) to this alarm Appears if: Always Range (Defaults are shown **bold**) [oFF] **Off** [on] On
[RdSP] [A.dSP]	**Alarm Display** Display an alarm message when an alarm is active. Appears if: When alarm type is set to process. Range (Defaults are shown **bold**) [oFF] **Off** [on] **On**
[PRr 1] [PAr1]	**Upper or Left Display** Select parameter to display. Appears if: Always Range (Defaults are shown **bold**) [R[Pu] **Active Process Value** [nonE] None
[PRr2] [PAr2]	**Lower or Right Display** Select parameter to display. Appears if: Always. Range (Defaults are shown **bold**) [L.St] **Limit State** [L.hS] Limit High Set Point [L.LS] Limit Low Set Point [nonE] None
[RdS] [Ad.S]	**Zone Address - Standard Bus Communication** Set zone address from 1-16. Appears if: Always. Range (Defaults are shown **bold**) 1-16 **1**
[btth] [btth]	**Bluetooth** Sets the power to the Bluetooth® module to on or off. Appears if: Always. Range (Defaults are shown **bold**) **On,** Off The Bluetooth radio can only be turned on via the front panel once turned off.

Specifications

Line Voltage/Power

• 85 to 264VAC, 47 to 63Hz

• 20 to 28VAC, +10/-15%; 50/60Hz, ±5%

• 12 to 40VDC

• 10VA (1/32 and 1/16 DIN)

• Data retention upon power failure via non- volatile memory

• Compliant with SEMI F47-0200, Figure R1-1 voltage sag

requirements @ 24VAC or higher

Controller

• User selectable heat/cool, on-off, P, PI, PD, PID or alarm action, not valid for limit controllers

• Auto-tune with control algorithm

• Control sampling rates: input = 10Hz, outputs = 10Hz

• Input and output capacity per controller type ordering information

Environment

• 0 to 149°F (-18 to 65°C) operating tem- perature

• -40 to 185°F (-40 to 85°C) storage tem- perature

• 0 to 90% RH, non-condensing

Accuracy

• Calibration accuracy and sensor con- formity: ±0.1% of span, ±1°C @ the calibrated ambient temperature and rated line voltage

• Type S: 0.2%

• Type T below -50°C: 0.2%

• Calibration ambient temperature @ 77°F

±5°F (25°C ±3°C)

• Accuracy span: 1000°F (540°C) min.

• Temperature stability: ±0.1°F/°F (±0.1°C/°C) rise in ambient max.

Agency Approvals

• cULus® UL/EN/CSA C22.2 No 61010-1 Listed, File E185611

• CSA C22.2 No. 24, File 158031

• UL® 50 4X indoor locations, NEMA 4X, IP66, IP67 front seal

• cULus® ANSI/ISA 12.12.01-2007, CSA- C22.2 No. 213-1987,

Class 1, Div. 2, Groups A, B, C and D, temperature code T4A, File E184390 (optional)

• CE, RoHS by design, W.E.E.E.

• FM Class 3545 (limit controls)

Serial Communications

• Isolated communications

• Standard bus configuration protocol

Wiring Termination—Touch-Safe Termi- nals

• Input, power and controller output termi- nals are touch safe removable

12 to 22 AWG

Universal Input

• Thermocouple, grounded or ungrounded sensors, greater than 20MΩ input imped- ance, 2kΩ source resistance max.

• Non-isolated to switched dc and process output

• RTD 2- or 3-wire, platinum, 100Ω @ 0°C calibration to DIN curve (0.00385 Ω/Ω/°C)

• Process, 4-20mA @ 100Ω, or 0-10VDC @ 20kΩ input impedance; scalable

Functional Operating Range

Type J: -346 to 2192°F (-210 to 1200°C) Type K: -454 to 2500°F (-270 to 1371°C) Type T: -454 to 750°F (-270 to 400°C) Type E: -454 to 1832°F (-270 to 1000°C) Type N: -454 to 2372°F (-270 to 1300°C) Type C: 32 to 4200°F (0 to 2315°C)

Type D: 32 to 4200°F (0 to 2315°C) Type F: 32 to 2449°F (0 to 1343°C) Type R: -58 to 3214°F (-50 to 1767°C) Type S: -58 to 3214°F (-50 to 1767°C) Type B: 32 to 3300°F (0 to 1816°C)

RTD (DIN): -328 to 1472°F (-200 to 800°C)

Process: -1999 to 9999 units

Output Hardware

- Switched dc = 22 to 32VDC @ 30mA
- Open collector = 30VDC max. @ 100mA max. current sink
- Solid state relay (SSR), Form A, 0.5A @ 24VAC min., 264VAC max., opto-isolated, without contact suppression
- Electromechanical relay, Form C, 24 to 240VAC or 30VDC max., 5A resistive load, 100,000 cycles at rated load
- Electromechanical relay, Form A, 24 to 240VAC or 30VDC max., 5A resistive load, 100,000 cycles at rated load

- Output 2 is limit for limit models
- NO-ARC relay, Form A, 24 to 240VAC, 15A @ 122°F (50°C), resistive load, no VDC, 2 million cycles at rated load

Operator Interface

- Dual 4 digit, 7 segment LED displays
- Typical display update rate 1Hz
- Advance, infinity (RESET), up and down keys plus a FUNCTION Key for limit (not available in 1/32 DIN)
- Infinity key is labeled RESET on limit control models

Ordering Information

PM LEGACY™ Limit Configuration Information

1-2	3	4	5 Power Supply, Digital I/O	6-7 Output 1 and 2 Hardware Options	8	9	10-11 Output 3 and 4 Hardware Options	12	13-14
	Package Size	Primary Functions			Comm. Options	Future Options		Model Selection	Custom Options
PM						A		H	

3	Package Size	
3 =	1/32 DIN (coming soon)	
6 =	1/16 DIN	

10-11	Output 3 and 4 Hardware Options	
	Output 3	Output 4
AA =	None	None

4	Primary Functions
L =	Limit controller with universal input

12	Model Selection
H =	PM LEGACY™ EXPRESS Limit Version

5	Power Supply, Digital Inputs/Outputs
1 =	100 to 240VAC
3 =	20 to 28VAC or 12 to 40VDC

13-14	Custom Options
WP =	Watlow logo face plate
WN =	No logo/no name face plate
AG =	Conformal coating

6-7	Output 1 and 2 Hardware Options	
	Output 1	Output 2
AJ =	None	Mechanical relay 5A, Form A
CJ =	Switched dc/open collector	Mechanical relay 5A, Form A
EJ =	Mechanical relay 5A, Form C	Mechanical relay 5A, Form A

8	Communication Options
Standard bus always included	
A =	None
B =	Bluetooth®

Declaration of Conformity

Series EZ-ZONE® PM WATLOW Electric Manufacturing Company 1241 Bundy Blvd. Winona, MN 55987 USA Declares that the following product meets the essential requirements of the following European Union Directives by using the relevant standards show below to indicate compliance.

- Designation: Series EZ-ZONE® PM (Panel Mount)
- Model Numbers: PM (3, 6, 8, 9 or 4)(Any Letter or number)(1, 2, 3 or 4)(A, C, E, F or K) (A, C, H, J or K) – (Any

letter or number)(Any letter or number)(A, C, E, F or K)(A, C, H, J or K) (Any three letters or numbers)

- Classification: Temperature control, Installation Category II, Pollution degree 2, IP65
- Rated Voltage and Frequency: 100 to 240 V~ (ac 50/60 Hz) or 15 to 36 V dc/ 24 V~ac 50/60 Hz
- Rated Power Consumption: 10 VA maximum PM3, PM6 Models. 14 VA maximum PM8, PM9, PM4 Models

2014/30/EU Electromagnetic Compatibility Directive

- EN 61326-1:2013 Electrical equipment for measurement, control and laboratory use – EMC requirements (Industrial Immunity, Class B Emissions).
- IEC 61000-4-2:2008 Electrostatic discharge immunity
- IEC 61000-4-3:2007 +A1/2008, A2/2010 Radiated, radio-frequency electromagnetic field immunity 10V/M 80–1000 MHz, 3 V/M 1.4–2.7 GHz IEC 61000-4-4:2012 Electrical fast-transient / burst immunity
- IEC 61000-4-5:2014 +A1/2017 Surge immunity
- IEC 61000-4-6:2013 + Corrigendum 2015 Immunity to conducted disturbances induced by radio-frequency fields
- IEC 61000-4-11:2004 + A1/2017 Voltage dips, short interruptions and voltage variations immunity
- EN 61000-3-2:2014 Limits for harmonic current emissions for equipment ≤ 16 Amps per phase
- EN 61000-3-31:2013 + A1/2017 Voltage fluctuations and flicker ≤ 16 Amps per phase
- SEMI F47-0812 Specification for semiconductor sag immunity Figure R1-1 1For mechanical relay loads, cycle time may need to be extended up to 160 seconds to meet flicker requirements depending on load switched and source impedance.

2014/35/EU Low-Voltage Directive

EN 61010-1:20102 Safety Requirements of electrical equipment for measurement, control and laboratory use. Part 1: General requirements 2 Compliance with 3rd Edition requirements with use of external surge suppressor installed on 230 Vac~ power line units. Recommend minimum 1000 V peak to maximum 2000 V peak, 70 joules or better part be used.
Compliant with 2011/65/EU RoHS2 Directive Per 2012/19/EU W.E.E.E Directive Please Recycle Properly. Models PM(4, 8 or 9)E contain a type BR1225 coin cell battery which shall be recycled at end of life per 2006/66/EC Battery Directive as amended by 2013/56/EU Directive. Models PM6XXXX – (B, E, F, G, H, J, K)XXXXXX where (X = any letter or number allowed above) Include Bluetooth® wireless technology and have been reviewed to the following additional requirements.

2014/53/EU Radio Equipment Directive (RED)

- EN 61010-1:2010 Safety Requirements of electrical equipment for measurement, control and laboratory use. Part 1: General requirements Covering the essential requirements of article 3.1(a) or Directive 2014/53/EU
- EN 61326-1:2013 Electrical equipment for measurement, control and laboratory use – EMC requirements (Industrial Immunity, Class A Emissions).
CAUTION: This equipment not intended for use in residential environments and may not provide adequate protection to radio reception in such environments.
- EN 301 489-1 V2.1.1 ElectroMagnetic Compatibility (EMC) standard for radio equipment and services; Part 1: Common technical requirements; Harmonized Standard covering the essential requirements of article 3.1(b) of Directive 2014/53/EU and the essential requirements of article 6 of Directive 2014/30/EU
- EN 301 489-17 V3.1.1 ElectroMagnetic Compatibility (EMC) standard for radio equipment and services; Part

17: Specific conditions for Broadband Data Transmission Systems; Harmonized Standard covering the essential requirements of article 3.1(b) of Directive 2014/53/EU

- EN 300 328 V1.9.1 Electromagnetic compatibility and Radio spectrum Matters (ERM); Wideband transmission systems; Data transmission equipment operating in the 2,4 GHz ISM band and using wide band modulation techniques; Harmonized

- EN covering the essential requirements of article 3.2 of the R&TTE Directive NVLAP Test Report 10928545H-A EN 300 328 V2.1.1 Additional Receiver blocking test for to cover requirements for 2014/53/EU. NVLAP Test Report 11649468H-E

Contains Module FCC ID: VPYLBZY Part 15C 2. Contains Module IC: 772C-LBZY RSS 210 Output Power: Frequency Range 2402.0 – 2480.0 Output Power 0.001 Watts Antenna gain: -0.6 dBi PCB antenna DougSU ,atosenniM ,anoniW athcuK A Name of Authorized Representative Place of Issue Director of Operations May 2018 Signature of Authorized Representative

Bluetooth Enabled Product Statement

Bluetooth® Enabled Product

Models PM6XXX-(B, E, F, G, H or K)XXXXXX contain an embedded Bluetooth module. Output Power: Frequency Range 2402.0 - 2480.0 Output Power 0.001 Watts Antenna gain: -0.6 dBi PCB antenna

FCC

The transmitter module is mounted on the top of the display PC board partially under the LED display module. Visible when display removed from the bezel. Module FCC ID: VPYLBZY Part 15C 2. Unit is assembled from tested components, complete system not tested. NOTE: This equipment has been tested and found to comply with the limits for a Class B digital device, under Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used by the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and the receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

Industry Canada

Contains IC: 772C-LBZY Specification : RSS210

CE

See current Declaration of Conformity for full details.
Directive 2014/53/EU Radio Equipment Directive

Standards

- EN 300 328 V1.9.1 NVLAP Test Report 10928545H-A

- EN 300 328 V2.1.1 Receiver blocking test. NVLAP Test Report 11649468H-E

1241 Bundy Boulevard., Winona, Minnesota USA 55987
Phone: +1 (507) 454-5300, Fax: +1 (507) 452-4507 **http://www.watlow.com**
PM3/PM6 LEGACY™ Express Limit

Documents / Resources

WATLOW PM3 PM6 LEGACYTM Express Limit Controller [pdf] User Guide
PM3, PM6, PM3 PM6 LEGACYTM Express Limit Controller, LEGACYTM Express Limit Controller, Express Limit Controller, Limit Controller

References

- **User Manual**