

PM LEGACY™

Express Limit Controller

User Guide



PM3



PM6

For Configurations:
PM(3,6)L _ _ _ - _ AAA H _ _

**TOTAL
CUSTOMER
SATISFACTION**
3 Year Warranty

 **WATLOW®**
Powered by Possibility

ISO 9001

Registered Company
Winona, Minnesota USA

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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 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

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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 back with the RMA number via an 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 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.

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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 available 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. Available at: https://www.watlow.com/resources-and-support/Technical-Library/ . Many other helpful documents are available 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:

Symbol	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 product.
	Unit protected by double/reinforced insulation for shock hazard prevention.
	Do not throw in trash, use proper recycling techniques or consult 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 QUXX, QUXX7. 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
	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 Temperature Indicating-Regulating Equipment per CSA C22.2 No. 24. See: www.csa-international.org

Overview

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 functions. An input and an output would be considered 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.

Inputs

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.



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 output. 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).



Figure 2: Input Terminal Connection Shown Here

(Overview Continued)

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 they 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 connected to digital output 5.



Figure 3: Output Wiring Example

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 programming 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 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 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 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 Watlow'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

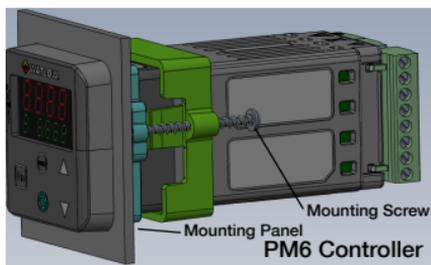


Figure 1: PM6 Installation

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.
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 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.



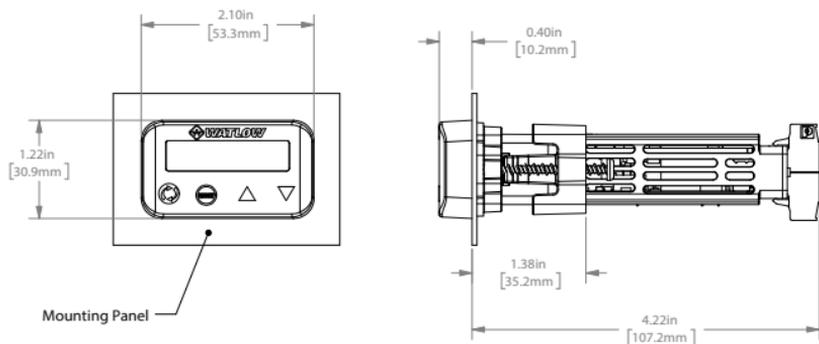
Figure 2: Slide Mounting Bracket over Controller



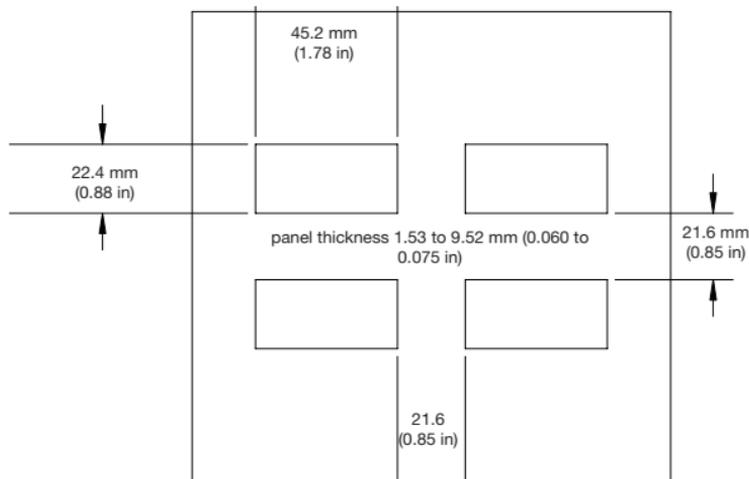
Figure 3: Tighten the Mounting Screws

Installation and Wiring

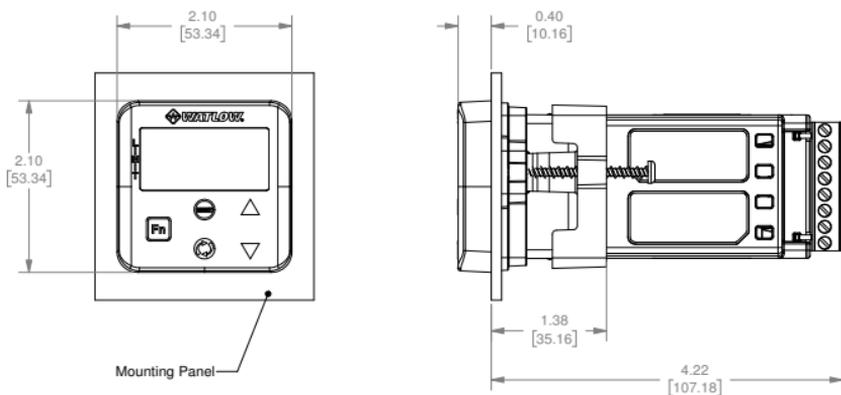
1/32 DIN (PM3) Dimensions



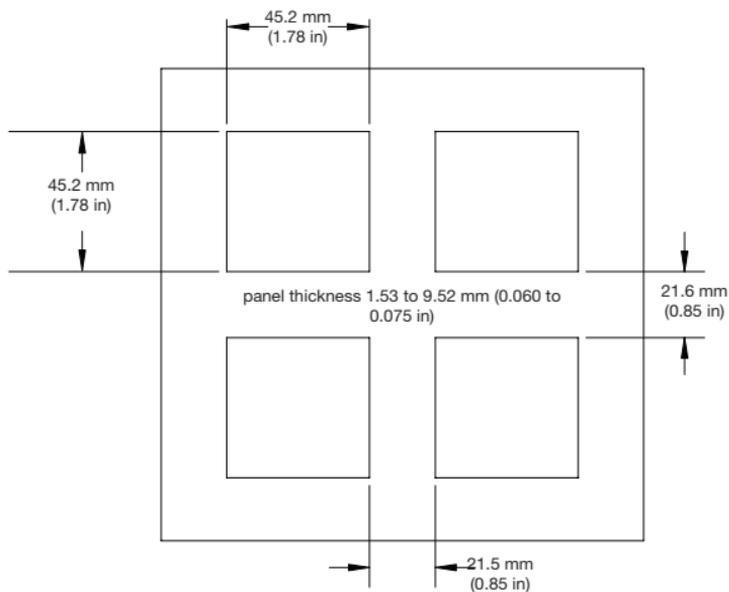
1/32 DIN (PM3) Recommended Panel Spacing



1/16 DIN (PM6) Dimensions



1/16 DIN (PM6) Recommended Panel Spacing



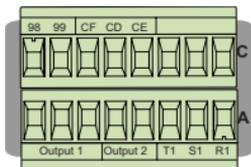
Terminal Definitions

Slot C	Terminal Function	Model
98 99	power input: ac or dc+ power input: ac or dc-	PM6L ___ - _ AAA H_ _
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 S1 R1	(RTD) or current +, (RTD), thermocouple -, current - or volts -, thermistor S1 (RTD), thermocouple + or volts +, thermistor	Universal Sensor input 1: all configurations
Outputs	Terminal Function	Configuration
1	2	
X1 W1 Y1	common (Any switched dc output can use.) dc- (open collector) dc+	Switched dc/open collector, output 1: PM6L_ C_ - _AAAH _ _
L1 K1 J1	normally open common normally closed	Mechanical Relay 5 A, Form C, out- put 1: PM6L_ E_ - _AAAH _ _
	L2 K2	normally open common
		Mechanical Relay 5 A, Form A, out- put 2: PM6L _ _J- _AAAH _ _

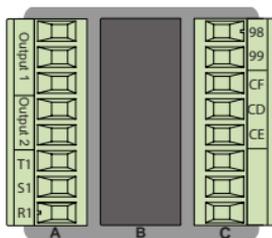
Note:

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.

PM3



PM6



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.

Note:

Maximum wire size termination and torque rating:

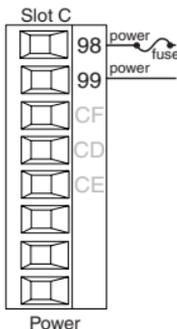
- 0.0507 to 3.30 mm² (30 to 12 AWG) single-wire termination or two 1.31 mm² (16 AWG)
- 0.56 Nm (5.0 lb.-in.) torque

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

- 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:

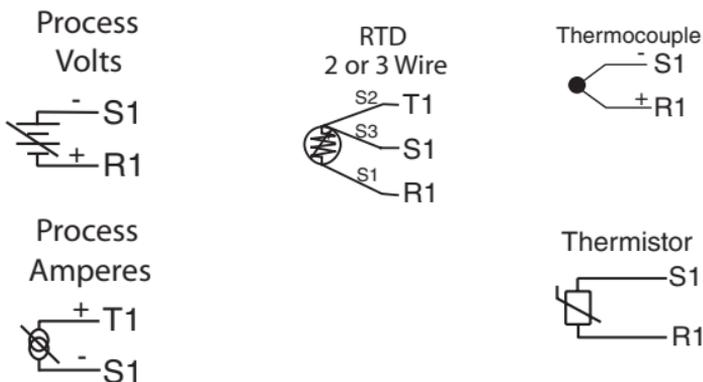
In the drawings below for each input notice that the Slot A connector labeling is identified.

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 and Amperes**

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

Resistance Temperature Detector (RTD)

- Platinum, 100 Ω @ 0°C
- Calibration to DIN curve (0.00385 $\Omega/\Omega/^{\circ}\text{C}$)
- 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 K Ω maximum source resistance
- >20 M Ω 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

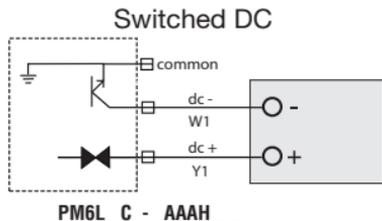
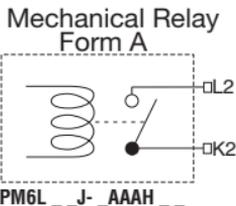
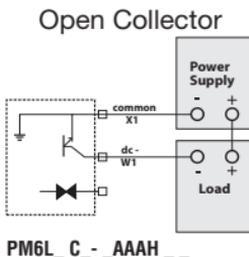
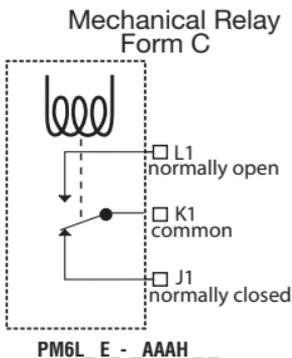
- >20 M Ω input impedance
- 3 microampere open-sensor detection

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.



Note:

Output 2 is always the limit.

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).

Outputs (cont.)

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 $\overline{\text{---}}$ (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 \sim (ac)) or 30V $\overline{\text{---}}$ (dc) maximum resistive load, output 1
- 20 mA at 24V minimum load
- 125 V \sim (ac) pilot duty at 120/240V \sim (ac),
25 V \sim (ac) at 24V \sim (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 \sim (ac) or 30V $\overline{\text{---}}$ (dc) maximum resistive load
- 20 mV at 24V minimum load
- 125 V \sim (ac) pilot duty @ 120/240V \sim (ac),
25 V \sim (ac) at 24V \sim (ac)
100,000 cycles at rated load
- Output does not supply power.
- for use with ac or dc

See Quencharc note (previous page).

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

[R] = 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 **[FR L]** or **[SRFE]**.

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.

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.



Advance Key:

Advances through parameter prompts.

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



Advance Key: Advances through menu prompts.

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

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

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

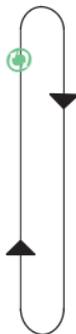
To enter the Operations Menu, press  to return to the Home Page. Press the green Advance Key  to scroll through the various prompts found in the Operations Menu. Press the  Reset Key at any point to return to the Home Page. Use Arrow Keys

 +  to adjust settings or change selection.

Set Up Menu

To enter the Setup Menu press Reset Key  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  to return to the Home Page.

Operations Menu



-  Limit Low Set Point
-  Limit High Set Point
-  Alarm Low Set Point
-  Alarm High Set Point
-  Calibratin Offset

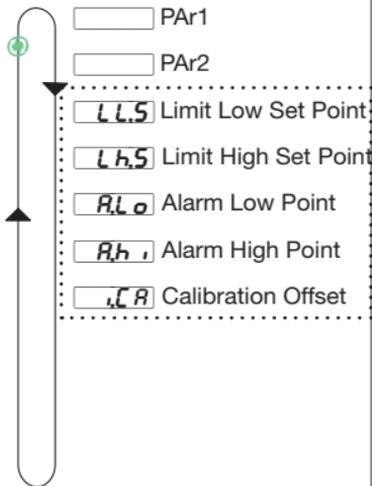
Set Up Menu



-  Lockout Menu
-  Sensor Type
-  Linearization
-  Thermistor Curve
-  Resistance Range
-  Decimal
-  Display Units
-  Range Low
-  Range High
-  Function Output 1
-  Function Output 2
-  limit Sides
-  Limit Hysteresis
-  Alarm Type
-  Alarm Hysteresis
-  Alarm Logic
-  Alarm Latching
-  Alarm Blocking
-  Alarm Silencing
-  Alarm Display
-  Red Display Parameter
-  Green Display Parameter
-  Zone Address
-  Bluetooth

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 **RESET** key.

Operations Menu



Display	Parameter Name Description
LLS [L.L.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 [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
ALo [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.h.i [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 [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 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 **[ESC]** 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
- [ALY]** Alarm Type
- [ALHy]** Alarm Hysteresis
- [ALG]** Alarm Logic
- [ALR]** Alarm Latching
- [AbL]** Alarm Blocking
- [AS]** Alarm Silencing
- [AdSP]** Alarm Display
- [PAr1]** Upper or Left Display
- [PAr2]** Lower or Right Display
- [AdS]** Zone Address
- [bEEh]** Bluetooth

Setup Menu

Display	Parameter Name Description
[LoC] [LoC]	<p>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</p>
[SEn] [SEn]	<p>Sensor Type Set the analog sensor type to match the device wired to this input. Appears if: Always Range (Defaults are shown bold) [t.C] Thermocouple [mV] Milliamps dc [vdc] Volts dc [RTD] RTD 100 Ω [t.C] Thermistor</p>
[Lin] [Lin]	<p>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 [K] K [C] C [H] H [I] I [D] D [N] N [E] E [R] R [F] F [S] S</p>
[t.C] [t.C]	<p>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 [USE] Custom</p>

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 **RESET** key.

Setup Menu

- L o C** Lockout Menu
- S E n** Sensor Type
- L i n** Linearization
- E C** Thermistor Curve
- r r** Resistance Range
- d E C** Decimal
- C _ F** Display Units
- r L o** Limit Set Point Range Low
- r h i** Limit Set Point Range High
- F n 1** Function Output One
- F n 2** Function Output Two
- L S d** Limit Sides
- L h y** Limit Hysteresis
- A L Y** Alarm Type
- A h y** Alarm Hysteresis
- A L g** Alarm Logic
- A L A** Alarm Latching
- A b L** Alarm Blocking
- A S ,** Alarm Silencing
- A d S P** Alarm Display
- P A r 1** Upper or Left Display
- P A r 2** Lower or Right Display
- A d S** Zone Address
- b l e t h** Bluetooth

Display	Parameter Name Description
r r [r.r]	Resistance Range Set the maximum resistance of the thermistor input. Range (Defaults are shown bold) <input type="text" value="5"/> 5K, <input type="text" value="10"/> 10K, <input type="text" value="20"/> 20K, <input type="text" value="40"/> 40K
d E C [dEC]	Decimal Set the precision of the displayed value. Appears if: Always Range (Defaults are shown bold) <input type="text" value="0"/> Whole <input type="text" value="00"/> Tenths <input type="text" value="000"/> Hundredths
C _ F [C_F]	Display Units Select which units will be displayed. Appears if: Always Range (Defaults are shown bold) <input type="text" value="F"/> °F <input type="text" value="C"/> °C
r L o [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 h i [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 **RESET** key.

Setup Menu

- 
- L o C** Lockout Menu
 - S E n** Sensor Type
 - L i n** Linearization
 - E C** Thermistor Curve
 - r r** Resistance Range
 - d E C** Decimal
 - L _ F** Display Units
 - r L o** Limit Set Point Range Low
 - r h i** Limit Set Point Range High
 - F n 1** Function Output One
 - F n 2** Function Output Two
 - L S d** Limit Sides
 - L h y** Limit Hysteresis
 - A L y** Alarm Type
 - A h y** Alarm Hysteresis
 - A L g** Alarm Logic
 - A L A** Alarm Latching
 - A b L** Alarm Blocking
 - A S ,** Alarm Silencing
 - A d S P** Alarm Display
 - P A r 1** Upper or Left Display
 - P A r 2** Lower or Right Display
 - A d S** Zone Address
 - b l e t h** Bluetooth

Setup Menu (cont.)

Display	Parameter Name Description
F n 1 [fn1]	Function of Output 1 Select which function will drive this output. Appears if: Always Range (Defaults are shown bold) o F F Off, L i n g Limit*, A L P g Alarm *Note: Switched DC/Open Collector option should only be used to control an external mechanical relay if Limit function is selected.
F n 2 [fn2]	Function of Output 2 Select which function will drive this output. Appears if: Always Range (Defaults are shown bold) L i n g Limit
L S d [L.Sd]	Limit Sides Select which side or sides of the process value will be monitored. Appears if: Always Range (Defaults are shown bold) b o t h Both h i g h High L o w Low
L h y [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 L y [A.ty]	Alarm Type Select how the alarm will or will not track the set point. Appears if: Always Range (Defaults are shown bold) o F F Off P r A L 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 **RESET** key.

Setup Menu

- L o C** Lockout Menu
- S E n** Sensor Type
- L i n** Linearization
- E C** Thermistor Curve
- r r** Resistance Range
- d E C** Decimal
- C _ F** Display Units
- r L o** Limit Set Point Range Low
- r h i** Limit Set Point Range High
- F n 1** Function Output One
- F n 2** Function Output Two
- L S d** Limit Sides
- L h y** Limit Hysteresis
- A E y** Alarm Type
- A h y** Alarm Hysteresis
- A L g** Alarm Logic
- A L A** Alarm Latching
- A b L** Alarm Blocking
- A S ,** Alarm Silencing
- A d S P** Alarm Display
- P A r 1** Upper or Left Display
- P A r 2** Lower or Right Display
- A d S** Zone Address
- b l e h** Bluetooth

Setup Menu (cont.)

Display	Parameter Name Description
A h y [A.hy]	<p>Alarm Hysteresis</p> <p>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.</p> <p>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</p>
A L g [A.Lg]	<p>Alarm Logic</p> <p>Select what the output condition will be during the alarm state.</p> <p>Appears if: Always Range (Defaults are shown bold) A L C Close on Alarm A L o Open on alarm</p>
A L A [A.LA]	<p>Alarm Latching</p> <p>Turn alarm latching on or off. A latched alarm has to be turned off by the user.</p> <p>Appears if: When alarm type is set to process. Range (Defaults are shown bold) n L A E Non-Latching L A E Latching</p>
A b L [A.bL]	<p>Alarm Blocking</p> <p>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.</p> <p>Appears if: When alarm type is set to process. Range (Defaults are shown bold) o F F Off S t r Startup S t P t Set Point b o t h Both</p>

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 **RESET** key.

Setup Menu

- LoL** Lockout Menu
- SEn** Sensor Type
- Lin** Linearization
- EC** Thermistor Curve
- RR** Resistance Range
- dEC** Decimal
- CF** Display Units
- rLo** Limit Set Point Range Low
- ch** Limit Set Point Range High
- Fo1** Function Output One
- Fo2** Function Output Two
- LSd** Limit Sides
- LhY** Limit Hysteresis
- REY** Alarm Type
- RhY** Alarm Hysteresis
- RL9** Alarm Logic
- RLA** Alarm Latching
- RbL** Alarm Blocking
- RS** Alarm Silencing
- RdSP** Alarm Display
- PRr1** Upper or Left Display
- PRr2** Lower or Right Display
- RdS** Zone Address
- bEeH** Bluetooth

Setup Menu (cont.)

Display	Parameter Name Description
RS [A.Si]	<p>Alarm Silencing</p> <p>Turn alarm silencing on to allow the user to disable the output tied (configured) to this alarm</p> <p>Appears if: Always</p> <p>Range (Defaults are shown bold)</p> <p>OFF Off</p> <p>on On</p>
RdSP [A.dSP]	<p>Alarm Display</p> <p>Display an alarm message when an alarm is active.</p> <p>Appears if: When alarm type is set to process.</p> <p>Range (Defaults are shown bold)</p> <p>OFF Off</p> <p>on On</p>
PRr1 [PAR1]	<p>Upper or Left Display</p> <p>Select parameter to display.</p> <p>Appears if: Always</p> <p>Range (Defaults are shown bold)</p> <p>RLPv Active Process Value</p> <p>none None</p>
PRr2 [PAR2]	<p>Lower or Right Display</p> <p>Select parameter to display.</p> <p>Appears if: Always.</p> <p>Range (Defaults are shown bold)</p> <p>LSE Limit State</p> <p>LhS Limit High Set Point</p> <p>LLS Limit Low Set Point</p> <p>none None</p>
RdS [Ad.S]	<p>Zone Address - Standard Bus Communication</p> <p>Set zone address from 1-16.</p> <p>Appears if: Always.</p> <p>Range (Defaults are shown bold)</p> <p>1-16</p> <p>1</p>
bEeH [btth]	<p>Bluetooth</p> <p>Sets the power to the Bluetooth® module to on or off.</p> <p>Appears if: Always.</p> <p>Range (Defaults are shown bold)</p> <p>On, Off</p> <p>The Bluetooth radio can only be turned on via the front panel once turned off.</p>

Specifications

Line Voltage/Power

- 85 to 264VAC, 47 to 63Hz
- 20 to 28VAC, +10/-15%; 50/60Hz, $\pm 5\%$
- 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

Environment

- 0 to 149°F (-18 to 65°C) operating temperature
- -40 to 185°F (-40 to 85°C) storage temperature
- 0 to 90% RH, non-condensing

Accuracy

- Calibration accuracy and sensor conformity: $\pm 0.1\%$ of span, $\pm 1^\circ\text{C}$ @ the calibrated ambient temperature and rated line voltage
- Type S: 0.2%
- Type T below -50°C : 0.2%
- Calibration ambient temperature @ 77°F $\pm 5^\circ\text{F}$ ($25^\circ\text{C} \pm 3^\circ\text{C}$)
- Accuracy span: 1000°F (540°C) min.
- Temperature stability: $\pm 0.1^\circ\text{F}/^\circ\text{F}$ ($\pm 0.1^\circ\text{C}/^\circ\text{C}$) 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)

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

Serial Communications

- Isolated communications
- Standard bus configuration protocol

Wiring Termination – Touch-Safe Terminals

- Input, power and controller output terminals are touch safe removable 12 to 22 AWG

Universal Input

- Thermocouple, grounded or ungrounded sensors, greater than 20M Ω input impedance, 2k Ω source resistance max.
- Non-isolated to switched dc and process output
- RTD 2- or 3-wire, platinum, 100 Ω @ 0°C calibration to DIN curve (0.00385 Ω/C)
- Process, 4-20mA @ 100 Ω , or 0-10VDC @ 20k Ω 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

Specifications (Continued)

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

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

4 Primary Functions	
L =	Limit controller with universal input

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

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®

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

12 Model Selection	
H =	PM LEGACY™ EXPRESS Limit Version

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



Declaration of Conformity - Series EZ-ZONE[®] PM

WATLOW Electric Manufacturing Company

1241 Bundy Blvd. Wimona, 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).
 Electrostatic discharge immunity
 Radiated, radio-frequency electromagnetic field immunity 10V/M 80–1000 MHz, 3 V/M 1.4–2.7 GHz
 Electrical fast-transient / burst immunity
 Surge immunity
 Immunity to conducted disturbances induced by radio-frequency fields
 IEC 61000-4-2:2008
 IEC 61000-4-3:2007 +A1/2008, A2/2010
 IEC 61000-4-4:2012
 IEC 61000-4-5:2014 +A1/2017
 IEC 61000-4-6:2013 + Corrigendum 2015
 IEC 61000-4-11:2004 + A1/2017
 IEC 61000-3-2:2014
 EN 61000-3-3¹:2013 + A1/2017
 SEMI F47-0812
 Voltage dips, short interruptions and voltage variations immunity
 Limits for harmonic current emissions for 16 Amps per phase
 Voltage fluctuations and flicker ≤ 16 Amps per phase
 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) 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 PM5XXXX – (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

- Japanese Radio Law (日本電波法)
 Type certification (工事設計認証)



R001-P00500

Output Power: Frequency Range 2402.0 - 2480.0
 Output Power 0.001 Watts Antenna gain: -0.6 dBi PCB antenna

Doug Kuchta
 Name of Authorized Representative

Wimona, Minnesota, USA
 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 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, pursuant to 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 in accordance with 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 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

Japan

- Japanese Radio Law (日本電波法)
Type certification (工事設計認証)



R001-P00500

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



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