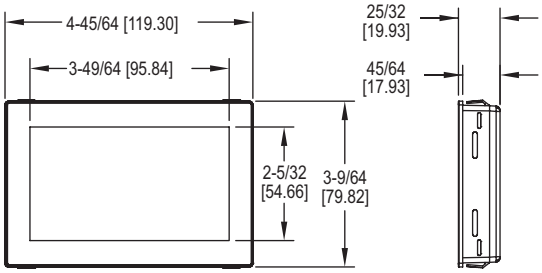
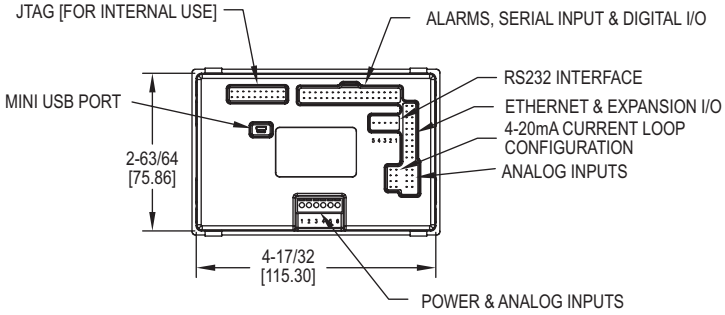
Series SPPM2 Graphical User Interface Panel Meter

Specifications - Installation and Operating Instructions





The **SERIES SPPM2** Graphical User Interface Panel Meter is a configurable, full-color 4.3″ (109 mm) touch screen display that can be used in a variety of applications. By using the free Windows® based Interface Panel Design Studio software, users can personalize the display to suit their needs. A development kit is also available, which a development board with buttons, dials, LEDs, and screw terminals to test the functionality of all inputs and outputs.

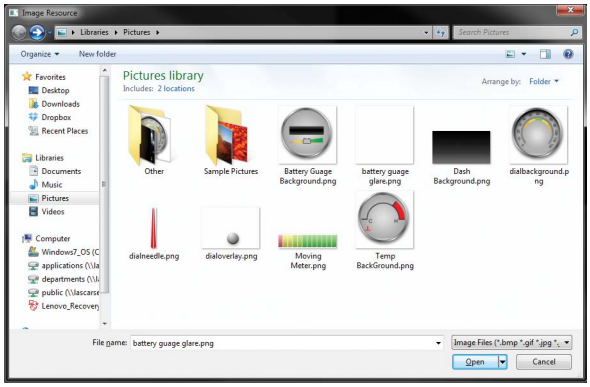
DOWNLOADING SOFTWARE

Customization software is available at www.dwyer-inst.com/SPPM2. To download, follow these instructions:

1. To begin downloading, click “Run” when prompted.
2. When a security warning appears, click “Run” a second time.
3. As soon as the InstallShield Wizard screen appears, follow the on-screen instructions.
4. When installation is complete, click “Finish” to quit the installer. The software can now be used by clicking on the new icon on the desktop.

BUILDING AN APP

1. Open the software by double-clicking on the icon.
2. Connect the SPPM2 model to the PC using a mini-USB cable.
3. Gather any extra images to be used other than what is already included in the app.



SPECIFICATIONS

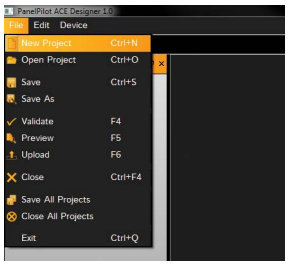
Inputs: Mini-USB, 6-line screw terminal analog, 4 x ±40 V, or 4 to 20 mA, 8 x digital I/O.
Outputs: 4 x PWM, 2 x alarms (open collector).
Accuracy: ±0.05% ±0.1 mV (typ).
Resolution: 0.04 mV (max) or 4 decimal places.
Power Supply: USB port or 5 to 30 VDC.
Current Consumption: 400 mA at 5 VDC.
Display: 4.3″ (10.9 cm) TFT LCD with 262k colors.
Display Resolution: 480 x 272 pixels.
Sampling Rate: 10 samples/sec.
Temperature Limits: 32 to 104°F (0 to 40°C).
Warm Up: 15 sec.
Mounting: Panel mount.
Electrical Connection: Multi-pin DIL’s, 1 mini-USB, and 1 RS232.
Computer Requirements: Compatible with Windows® 7, Windows® 8, and Windows® 10.
Weight: 6.7 oz (181 g).
Approvals: CE.

DEVELOPMENT BOARD SPECIFICATIONS

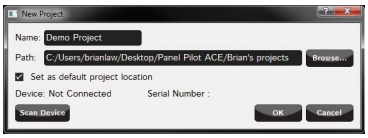
Inputs: 4 x ± 5 VDC.
Outputs: 8 x digital I/O’s, 4 x PWM outputs.
Serial Communication: RS232.
Power Supply: USB port or 5 to 30 VDC.
Weight: 19.7 oz (560 g).

DWYER INSTRUMENTS, INC.
P.O. BOX 373 • MICHIGAN CITY, INDIANA 46360, U.S.A.
Phone: 219/879-8000 **www.dwyer-inst.com**
Fax: 219/872-9057 **e-mail: info@dwyermail.com**

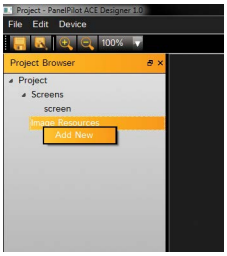
4. In the GUI software, choose “New Project”.



5. In the window that pops up, name it, choose where it will save, and press “OK”.

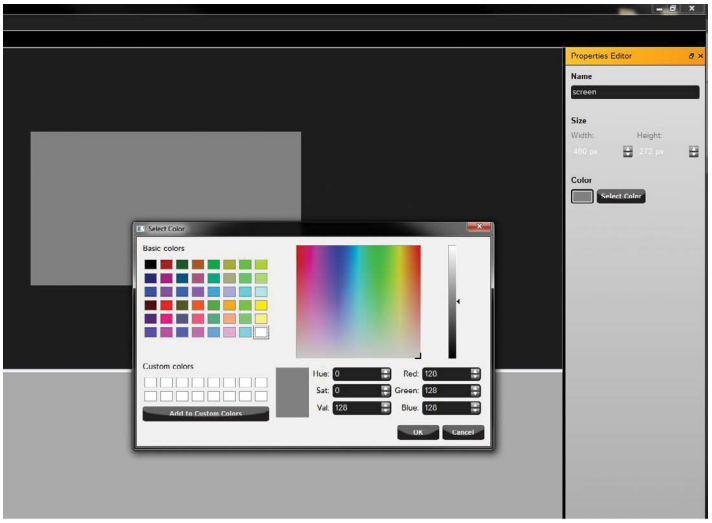


6. Bring the images in by right-clicking “Image Resources” and choosing “Add New”.

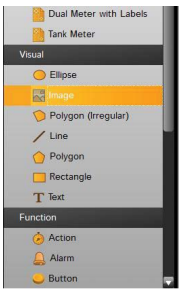


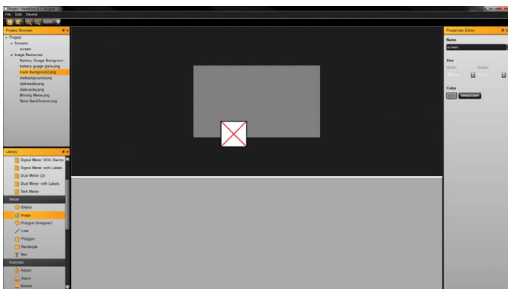
7. Navigate to the location where the pictures are stored and select the picture to bring in. The image will now appear under image resources in the project browser.

8. To use a color as the background: a) Click on the gray box in the middle of the screen where the display preview will be. b) Choose the background color in the “Properties Editor” menu that appears on the right.

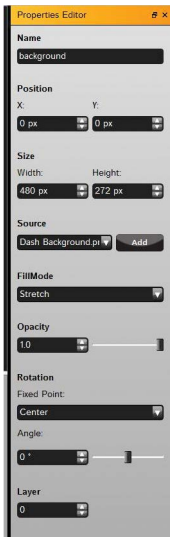


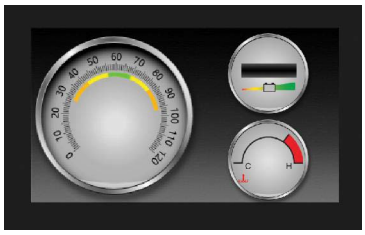
9. To use an image as the background: a) Choose “Image” under the library window and drag it onto the gray box. b) Give the image an appropriate name and use the appropriate size settings to fill the entire screen. c) Select the image background in “Source”.



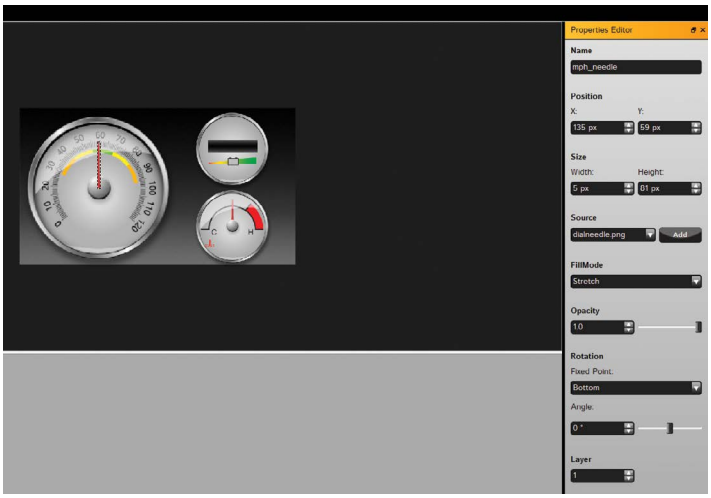


10. To add the meters: a) Add in meter images in the same way as mentioned in step 9. b) To resize the images, grab the corners or sides and stretch them to the necessary size. c) Once finished, click on the individual meters and name them for easy access later.

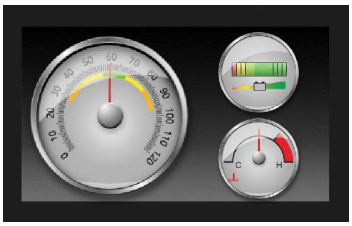




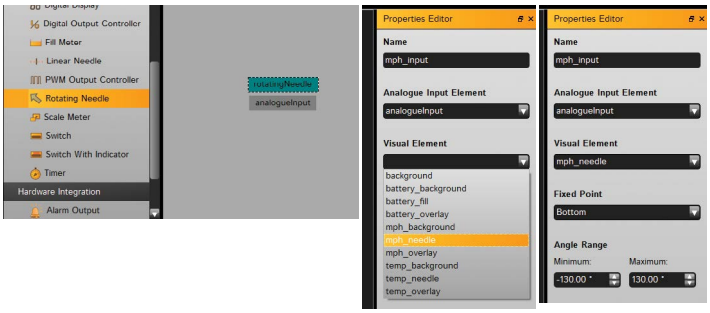
11. To add the needles for each display: a) Add in needle images as mentioned in step 9. b) Position the bottom of the needle to be in the center of the dial. c) Set the transform origin to the bottom center of the picture in the “Properties Editor” menu on the right. (This is the fixed point that will be the “hinge” that the dial turns on.) d) Under “Rotation”, change the angle to check how the image will rotate and verify it is moving in the expected way. (Make a note of the angles where the needle needs to start and stop.)



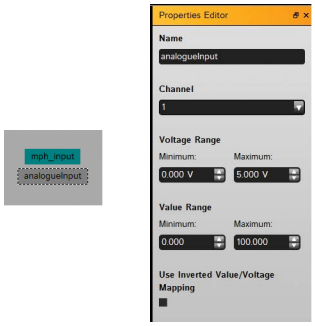
12. To add the battery gauge: a) Add the gauge photo as mentioned in step 9. b) Drop the image into position and name it.



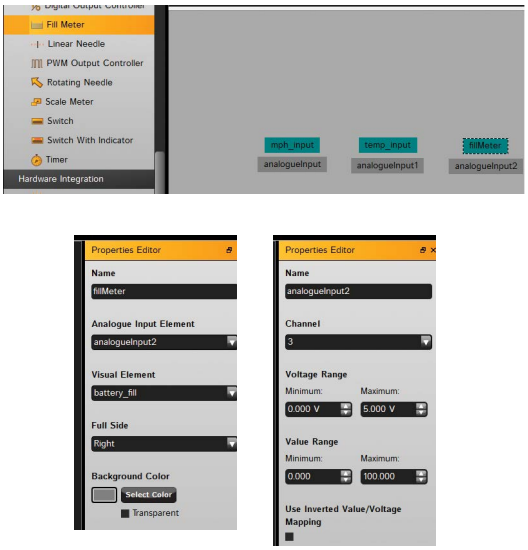
13. To make the dials move: a) Choose “rotating needle” under the function setting of the library and drag it to the gray area to the right. b) Click on rotatingNeedle and name it appropriately. c) The analogueInput will default to channel one. d) The visual element is the picture of the needle. e) The angle range is where the needle needs to start and stop. (Noted in step 11.)



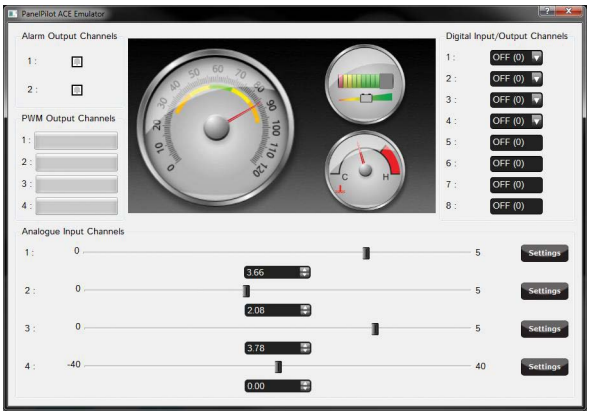
14. Click on analogueInput and assign the wanted channel to control the mph_needle. Here, also set the voltage range and what value that voltage range translates to on the display. Follow the same instructions to add any other needle channels.



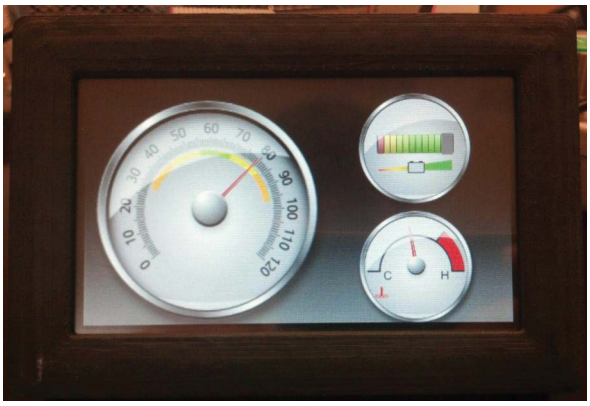
15. To add bar graph fill graphics, drag in the “fill meter” function and another analogueInput and follow the directions above.



16. To test the app, click File>Preview or press F5 to bring up the simulation window. Inputs can be simulated in this screen to verify that everything is working properly.



17. Once satisfied with the simulation, click File>Upload or press F6 with the meter still plugged in to send the app to the display.



MOUNTING

1. Punch out a rectangular hole in the panel of the enclosure 4.6″ x 3.07″ (117 x 78 mm).
2. For panels between 0.04″ and 0.12″ (1 and 3 mm) in thickness, use the integral clips to attach the SPPM2 to the panel.
3. For panels between 0.01″ and 0.15″ (0.5 an 4 mm) in thickness, place the gasket around the bezel of the display, slide the display through the front hole in the panel, and attach the mounting clip from the rear, as shown in Figure 1.

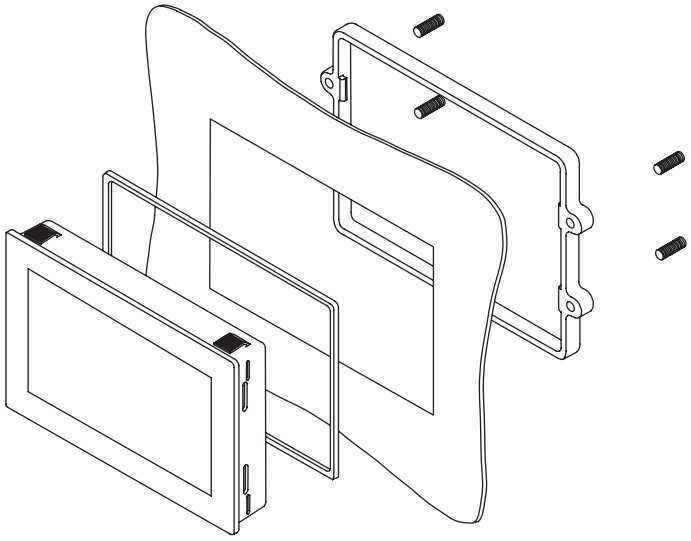


Figure 1

WIRING

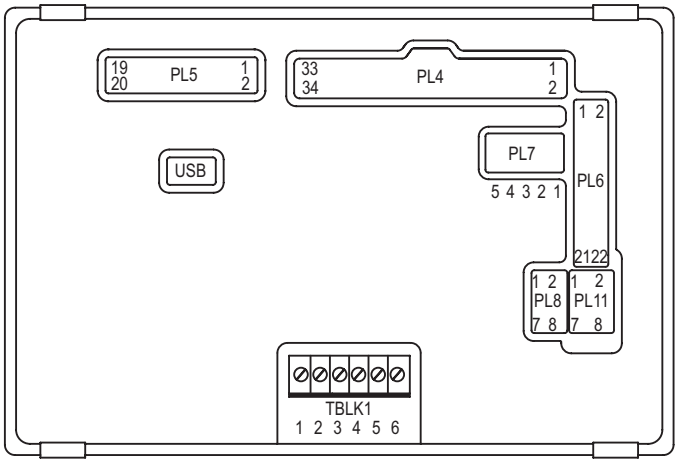


Figure 2

TBLK1: POWER & ANALOG INPUTS	
PIN Number	**Function**
1	Supply Voltage (V+)
2	0 V
3	Analog Input 4 (IN4)
4	Analog Input 3 (IN3)
5	Analog Input 2 (IN2)
6	Analog Input 1 (IN1)

PL4: ALARMS, SERIAL INPUT, & DIGITAL I/O	
PIN Number	**Function**
1	0 V
2	Supply Voltage (V+)
3	Alarm 1 (ALM1)
4	Alarm 2 (ALM2)
5	I2C0 SCL
6	I2C0 SDA
7	SPI SS1
8	SPI MOSI
9	SPI MISO
10	SPI SCK
11	Digital I/O Channel 1 (DIG1)
12	Digital I/O Channel 2 (DIG2)
13	Digital I/O Channel 3 (DIG3)
14	Digital I/O Channel 4 (DIG4)
15	Digital I/O Channel 5 (DIG5)
16	Digital I/O Channel 6 (DIG6)
17	Digital I/O Channel 7 (DIG7)
18	Digital I/O Channel 8 (DIG8)
19	PWM Channel 1 (PWM1)
20	PWM Channel 2 (PWM2)
21	PWM Channel 3 (PWM3)
22	PWM Channel 4 (PWM4)
23	DUART TX (for internal use)
24	DUART TX (for internal use)
25	USB D+
26	USB D-
27	I2C1 SDA (for internal use)
28	I2C1 SCL (for internal use)
29	+5 V Output Voltage
30	High Speed ADC
31	+3 V3 Output Voltage
32	0 V
33	Shorted together to enable firmware upgrade
34	Shorted together to enable firmware upgrade

PL5: PROGRAMMING INTERFACE (JTAG)	
PIN Number	**Function**
1	+3 V3 Output Voltage
2	N/C (no connection)
3	JTAG_TRST
4	OV
5	JTAG_TDI
6	0V
7	JTAG_TMS
8	0V
9	JTAG_TCK
10	0V
11	JTAG_RTCK
12	0V
13	JTAG_TDO
14	0V
15	n_reset
16	0V
17	N/C
18	0V
19	0V via a 47 kΩ resistor
20	0V

PL6: ETHERNET & EXPANSION I/O	
PIN Number	**Function**
1	ENT CLK
2	ENT MDC
3	ENT MDIO
4	ENT RXD0
5	ENT RXD1
6	ENT RX EN
7	ENT TXD0
8	ENT TXD1
9	ENT TX EN
10	Digital I/O 9 (expansion)
11	Digital I/O 10 (expansion)
12	Digital I/O 11 (expansion)
13	Digital I/O 12 (expansion)
14	Digital I/O 13 (expansion)
15	Digital I/O 14 (expansion)
16	Digital I/O 15 (expansion)
17	Digital I/O 16 (expansion)
18	Digital I/O 17 (expansion)
19	+5 V
20	0 V
21	External Module Hardware ID
22	External Module Hardware ID

PL7: RS232 INTERFACE	
PIN Number	**Function**
1	TX
2	RTS
3	RX
4	CTS
5	0 V

PL8: 4-20 mA CURRENT LOOP MEASUREMENT	
PIN Number	**Function**
1-2	4-20 mA Current Loop Measurement (IN1) when shorted
3-4	4-20 mA Current Loop Measurement (IN1) when shorted
5-6	4-20 mA Current Loop Measurement (IN1) when shorted
7-8	4-20 mA Current Loop Measurement (IN1) when shorted

PL11: ANALOG INPUTS	
PIN Number	**Function**
1	Analog Input 1 (IN1)
2	0 V
3	Analog Input 2 (IN2)
4	0 V
5	Analog Input 3 (IN3)
6	0 V
7	Analog Input 4 (IN4)
8	0 V

SUPPLY VOLTAGE

Supply to the display module can be connected to either the screw terminals (TBLK1), pins (PL4), or the mini-USB connector. (**Note:** For best results, ensure the power supply is free from electrical noise.

Supply Voltage	Screw Terminals (TBLK1)	PIN (PL4)
V+	1	2
0 V	2	1

MEASURING AN ANALOG VOLTAGE

An analog voltage can be connected to either the screw terminals (TBLK1) or pins (PL11).

Analog Input		Screw Terminals (TBLK1)	PIN (PL11)
1	IN1	6	1
	0 V	2	2
2	IN2	5	3
	0 V	2	4
3	IN3	4	5
	0 V	2	6
4	IN4	3	7
	0 V	2	8

To minimize offsets, it is best practice to connect the analog grounds directly to the meter pins (PL11) or screw terminals (TBLK1). The SPPM2 uses a programmable gain amplifier (PGA) together with a 16-bit analog to digital converter (ADC) for its analog voltage measurements. The PGA is automatically set when the analog range of a channel is input into the design software.

The table below shows the maximum resolution of the SPPM2's analog measurements across a number of voltage ranges

Analog Input	Resolution
±1.25 V	0.04 mV
±2.5 V	0.08 mV
±5 V	0.16 mV
±10 V	0.33 mV
±20 V	0.66 mV
±40 V	1.3 mV

MEASURING A 4-20 mA CURRENT

The 4-20 mA signal should be connected as for "Measuring an Analog Voltage", but a jumper link should be placed across pins PL8 for each analog channel being used.

Analog Voltage	Jumper Link (PL8)
IN1	1 & 2
IN2	3 & 4
IN3	5 & 6
IN4	7 & 8

Scaling: The sense resistors used are 110Ω. Therefore, in software scaling, 4 mA equates to 0.44 V and 20 mA equates to 2.2 V. (Note: Transmitter terminals + or – must be isolated from the power supply.).

DRIVING AN ALARM OUTPUT

The alarm outputs are open-collector. When an alarm is active, the output can sink as much as 10 mA. Alarm outputs are connected via PL4.

Alarm Output	PIN (PL4)
ALM1	3
ALM2	4

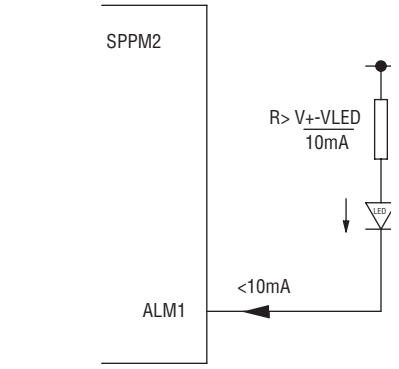


Figure 3: Driving an LED using Alarm Output

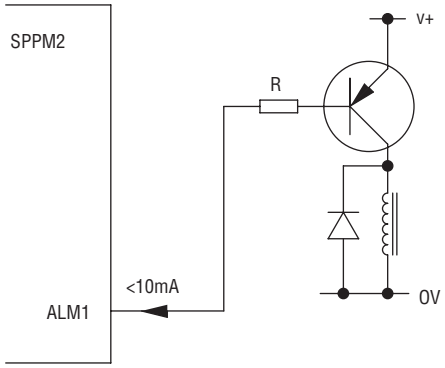


Figure 4: Driving a Relay using Alarm Output

USING DIGITAL INPUT/OUTPUT PINS

Digital inputs/outputs are connected via PL4.

Digital I/O	PIN (PL4)	Digital I/O	PIN (PL4)
DIG1	11	DIG5	15
DIG2	12	DIG6	16
DIG3	13	DIG7	17
DIG4	14	DIG8	18

The characteristics of the digital I/O pins are as follows:

Parameter	Min	Max	Unit
Input Voltage (High)	2	3.3	V
Input Voltage (Low)	0	0.8	V
Output Voltage (High)	2.6	3.3	V
Output Voltage (Low)	0	0.4	V
Output Source Current	-11.4	-	mA
Output Sink Current	9.0	-	mA

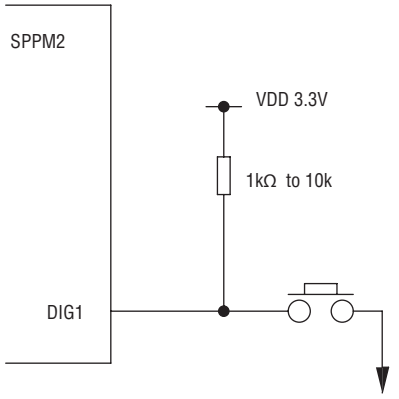


Figure 5: Generating a Digital Input with a Push Button

USING PWM OUTPUT

If the SPPM2 is configured to have a PWM output, it can be used to drive a buzzer or produce a simple digital-to-analog converter. The PWM outputs are connected via PL4.

PWM Output	PIN (PL4)
PWM1	19
PWM2	20
PWM3	21
PWM4	22

The characteristics of the PWM output pins are as follows:

Parameter	Min	Max	Unit
Voltage	0	3.3	V
Output Source Current (PWM)	-9.5	-	mA
Output Sink Current (PWM)	7.7	-	mA

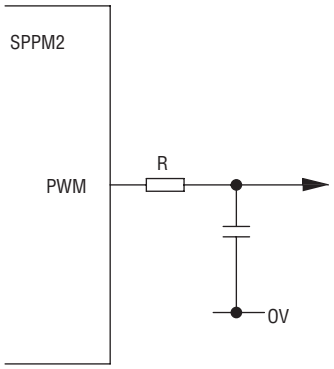


Figure 6: Using PWM Output to Convert Digital to Analog

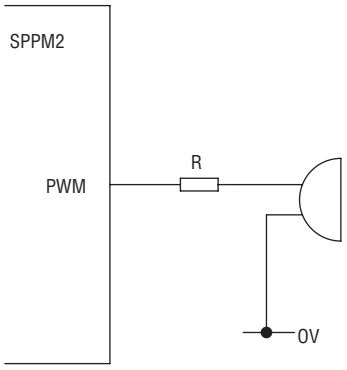


Figure 7: Using PWM Output to Drive a Buzzer

MAINTENANCE/REPAIR

Upon final installation of the Series SPPM2 Graphical User Interface Panel Meter, no routine maintenance is required. The Series SPPM2 is not field serviceable and is not possible to repair the unit. Field repair should not be attempted and may void warranty.

WARRANTY/RETURN

Refer to “Terms and Conditions of Sale” in our catalog and on our website. Contact customer service to receive a Return Goods Authorization number before shipping the product back for repair. Be sure to include a brief description of the problem plus any additional application notes.

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DWYER INSTRUMENTS, INC.

P.O. BOX 373 • MICHIGAN CITY, INDIANA 46360, U.S.A.

Phone: 219/879-8000 **www.dwyer-inst.com**

Fax: 219/872-9057 **e-mail: info@dwyermail.com**