

NEW

Signal Powered
or 5-28VDC
Powered

**FLAT PACK PANEL METERS
NEED NO PANEL CUT OUT
> 40 INPUT SIGNALS ACCEPTED**

**MODEL
FPM**



FEATURES:

- 4 1/2 Digit (1.9.9.9.9) LED
- Signal Powered or Externally Powered
- High Accuracy & Resolution
- Self Test; Peak & Hold
- Signal Conditioners Embedded
- Installation Time: 2 Minutes
- NEMA 4X Case - No Adjustments
- Lifetime Warranted (LTD)

DESCRIPTION

Our new **FPM** series is the 2nd generation of our famous "No Panel Cut-Out Required" meters introduced in 1976! The **FPM** uses **ASIC** and Nanotechnology to bring you a universal meter for all your applications (See Ordering Information For Listing of Input Functions).

Mounting: Just drill a 3/8" (10mm) hole, pass the wires through it and connect them. That's all! Adhesive tape is included.

Display: Bright 0.6" **LED**.

Power Supply: Not needed for current loops or VDC signal inputs. That is why we call it **Power-less™** (5-28VDC for other input signals).

Signal Inputs: Signal Powered: 4-20, 10-50mA or 3-30VDC. **Externally Powered (5VDC):** V/mA DC & RMS, Strain-Gage, RTD, TC, Hertz, %RH, pH, ORP, Peak & Hold or your custom inputs!

Peak & Hold: The FPM has **Peak & Hold** with about 300us(3/sec) response. For high speed (>20KHz) see Option 37 Description.

Case:

- **NEMA 4X** (no adjustments)
- **NEMA 3** (Zero and Span adjustment holes)
- **Sanitary** to 250°F Steam Cleaning

The FPM replaces models:

516, 518, 521, 522, 523, 524, 525, 526, 527 and 528 with the newest technology!

**If You Don't See It
Ask For It!**



SPECIFICATIONS @ 25°C(+/- 2 Digits)

Current Loop Powered:

- Accuracy & Linearity: ± 0.05%
- Burden: 4.5V @ 20mA, 3.5V @ 4mA
- Min-Max Current: 3-36mA
- Standard Calibration: 4-20 = 0-10,000 Counts
- Zero & Span: ± 3000 Counts
- Max. Open Loop volts: 30/1 Sec.

VDC Signal Powered:

- Accuracy & Linearity: ± 0.03%
- Quiescent Current: ≤ 20mA
- Min-Max Input: See Ranges
- Standard Calibration: See Ranges
- Zero & Span: ± 3000 Counts
- A.C. Signal Powered; see Options 40 & 41
- **Externally Powered: (See Options)**
- Power: 5VDC @ 50mA Plus Signal Conditioner
- Loop Burden (4-20mA): 1 Volt
- Impedance (VDC): 100M Ohms
- V/mA RMS: True RMS Accy. & Lin.: +/- 0.5%
- Strain-Gage: Accy. & Lin.: +/- 0.5%
- RTD: PT100 (-200 + 800°C or °F)+/- 1% of F.S.
- TC: J or K 0°C to Max. +/- 2% of F.S.
- Hz: 30-20,000 Hz +/- 1%
- pH: 10¹⁵ Zin, 0-14pH +/- 0.1 pH
- % RH: To your Probe Specifications

Other Specifications:

- Displays: 0.6" LED
- Conversion Rate: 3/Second
- CMRR: 100dB (50-60Hz)
- Input Type: S.E./Differential
- Max. C.M.V.: 2VDC
- Op/Storage Temp: -10 to + 70°C/-30 to + 80°C
- Temp. Coefficient: 50PPM/°C
- CMTBF: >100,000 Hours

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TUCSON, AZ. 85714 U.S.A.

MADE
IN
USA



FPM Continued

THE SIGNAL CONDITIONERS:

Option 00: 4-20mA Powered:

First introduced in 1975, the current flows through a Zener and "Shunt" resistor. The Zener clamps the voltage to about 3.5 Volts and the voltage across the Shunt is measured and displayed. Because an LED acts as a Zener, instead of a Zener the LEDs of the backlite are used to power the meter. If the "burden" (3.5 - 4.5V) is too high for your application, use the externally powered Option 01.

Connections:

Red: +Loop
Black: - Loop

Option 01: 4-20mA Externally

Powered: It only drops 1V @ 20mA (50 Ohms) but the "FPM" needs 5VDC @ 20mA to operate (including the backlight or LEDs).

Connections:

Red: V+
Black: Ground
Yellow: +Loop
White: -Loop

Option 02: 4-30VDC Signal Pow-

ered: Another OTEK innovation. The voltage signal powers an LDO to protect the FPM and a divider network is used to measure and display the signal. If the relatively low impedance (500 Ohms) and current (3-20mA) required by this Powerless™ technique is unacceptable, use Options 04-08 (externally powered).

Connections:

Red: V+ (+ Signal)
Black: V- (-Signal)

Options 04-08: VDC Externally

Powered: Input impedance is 1Mega Ohms. (See power input Digit 4).

Connections:

Red: V+
Black: Ground
Yellow: +Signal
White: -Signal

Option 09: Custom: Use this option to describe any custom input, scale or modification to the FPM and contact us for feasibility and cost.

Connections:

To Be Determined

Options 10-13: 20mA - 200mADC:

Since the FPM is 200mV full scale (20,000 Counts) the "Shunt" resistors used are 1K, 100, 10 or 1 Ohm. Don't forget that maximum display is 19,999 not 20,000!

Connections:

Red: V+
Black: Ground
Yellow: +Signal
White: -Signal

Options 14-22: V & mA RMS:

Here we use a **True RMS-DC** Converter for accurate ($\pm 0.05\%$) measurement of sine waves up to 10KHz ($\pm 0.5\%$, 10-20KHz) and SCR's fired to $\pm 2\%$. Input impedances vs. range are the same as for VDC ranges.

Connections:

Red: V+
Black: Ground
Yellow: AC High
White: AC Low

Option 23: 5Amps AC:

Specifically for current transformers (**C.T.**) this option requires an externally mounted (supplied) 0.05 Ohm, 0.1% 5 Watt resistor. You can mount the "Shunt" at your **C.T.** or next to the **FPM** but make sure the connections are "Perfect" to electrical codes. The C.T. might have **Lethal High Voltage** without a "shunt" (Open) and the **FPM** will smoke. See OTEK's New **ACS & CTT** models for **C.T.** powered instruments (Patent Pending).

Connections:

Red: V+
Black: Ground
Yellow: AC High
White: AC Low

Option 28: Thermocouple (Type

J): This **TC** has a range of -210 to + 760°C (-350 + 1390°F). Its color is white (+) and Red (-), cold junction (CJ) is inside the **FPM** at the connector base. Make sure the connections from the **FPM** 6" wires and your **TC** are as close to the **FPM's** terminals as possible to avoid errors and calibrate after connecting. If you short out the **FPM's** TC wires together, the **FPM** will read the ambient temperature due to its built-in C.J.C.

Connections:

Red: V+
Black: Ground
Yellow: TC+(White)
White: TC-(Red)

Option 30: TC (Type K):

This is yellow (+) and red (-) and has a range of -270 + 1370°C (-440 + 2500°F). Use same notes as Option 28.

Connections:

Red: V+
Black: Ground
Yellow: TC+(Yellow)
White: TC-(Red)

Option 31: TC (Type T):

This blue (+) and red (-) **TC** wire has the range of -270 + 400°C (-440 + 750°F). Use same notes as Option 28.

Connections:

Red: V+
Black: Ground
Yellow: TC+(Blue)
White: TC-(Red)

FPM Continued

Options 32-33: Frequency Input:

We use an **F-V** to accept frequencies from 40 - 20KHz and amplitudes from 1-400V peak or dry contact or open collector transistor (O.C.T.) for 40 or 440 Hz power line frequency measurement. Use Option # "33" or see our **ACS** Powerless™ Series.

Connections:

Red: V+
Black: Ground
Yellow: Hi
White: LO

Option 34: %RH: This conditioner is designed to interface to a typical (capacitance type) 2-3pF/% of **RH** made by several manufacturers. Use Option "09" and contact **OTEK** to specify your sensor's specifications.

Connections:

Red: V+
Black: Ground
Yellow: + Sense
White: - Sense

Option 35: pH (Acidity): We use a FET input (10^{15}) amplifier and calibrate the **FPM** for 0-14.00 pH using the Industry's standard + 413 mV = + 7pH coefficient.

Accuracy: +0.05% of F.S

Connections:

Red: V+
Black: Ground and Shield
Yellow: + Signal
White: - Signal

Option 36: ORP(Oxygen Reduction Potential): Our FET amplifier (109) accepts the industry standard 2000mV.F.S. of the probe and the FPM displays it in % (0-100.00%)

Connections:

Red: V+
Black: Ground and Shield
Yellow: + Signal
White: - Signal

Option 37: Hi Speed Peak & Hold (P&H): Now you can capture fast transients greater than 50 microseconds (even faster soon) with resolution greater than 0.1% of F.S. and retention of greater than 10 years (Due to OTEK's new and patent-pending **P&H Option**).

Input: V or mADC (Specify Range). Contact OTEK for V/mA RMS or Loop Powered).

Accuracy: +/- 0.1% of F.S. +/- 1 Digit

Linearity & Resolution: +/- .05% of F.S.

Response time: >20KHz (<50us)

Retention: >10 years (with power on).

Connections:

Red: V-
Black: Ground & - Signal
Yellow: + Signal
White: Reset (connect to black to run. Open to reset).

Option 40: Signal Powered for

VAC: No power supply req'd! Just connect to your P.T.(non-isolated) and display value. Analog meter replacement, range: 40-150VAC, 50-400Hz. Burden 0.1W, Accuracy & Linearity : +/- 0.5% of F.S.

Connections:

Warning: No Isolation.

Yellow: A.C. High
White: A.C. Low
Note: Connect required Dec. Point before connecting A.C

Option 41: Signal Powered Amps

AC: No Power Supply Req'd! Just connect to your C.T. & P.T. range: VAC: 40-150; AAC; 0-5Amp; 50-400Hz; burden; 0.1W Accuracy & Linearity: +/- 0.5% of F.S.
Note: NO Isolation, use with P.T. & C.T. only. Must use shunt on C.T. 0.05% Ohm, 5W. **Warning no isolation.** Connect D.P. if req'd before powering.

Connections: Warning:

No Isolation

Yel: VAC Hi,
White & Black: VAC Lo & Amp Lo
Red: Amp Hi.

More: New Signal Conditioners will be added as per your requests and popularity, such as Ohms, Conductivity, Shock, Vibration, Position etc. Contact **OTEK**.

Option 42: Hertz (Frequency) Signal Powered: Warning! No Isolation!

This option uses the same power technique as Option 40 above and the same precautions and warnings apply. Here we use a "Zero Crossing" detector and a F-V converter to give you the **A.C.** line frequency display with 0.1 Hz resolution. Range: VAC: 50-150VAC/Frequency: 40-440Hz; Accuracy & Linearity: $\pm 0.05\%$ of F.S.

Connections: Warning:

No Isolation

Yellow: AC High
White: AC Lo
Note: Connect desired decimal point per table before applying power.

TYPICAL CONNECTIONS
(See Description for Specific Option)

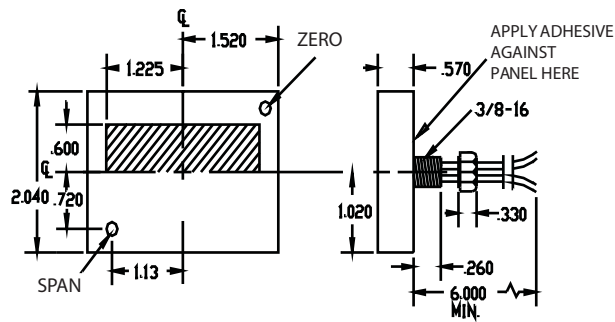
NOTES:

1. Self Diagnostics: The **FPM** will test all segments and I/O Signals for about 5 seconds on power up.
2. "X" = any Option Listed

WIRE	FUNCTION
RED	+VDC in / + Loop Powered
BLACK	Power GND /- LOOP Powered
YELLOW	+SIGNAL in (External Powered)
WHITE	-SIGNAL in (External Powered)

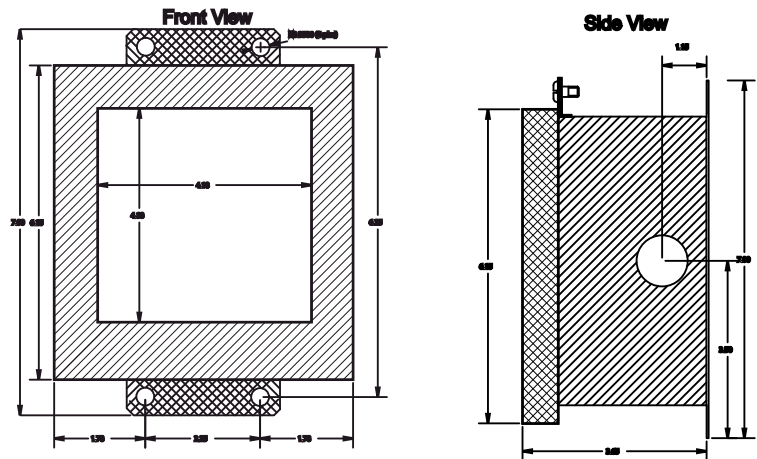
FUNCTION	COLOR	CONNECT TO:
PEAK	BROWN	RED
HOLD	ORANGE	RED
NO. DECIMAL POINT	VIOLET	BLACK
D.P. 1.XXXX		NO CONNECTION
1X.XXX	BLUE	BLACK
1XX.XX	GRAY	BLACK
1XXX.X	BLUE & GRAY	BLACK

MECHANICAL



- Mounting Instructions:**
1. Drill a 3/8 - 1/2" diameter hole.
 2. Attach supplied double sided tape to back of FPM.
 3. Pass wires through hole.
 4. Align and Press FPM on panel (that is all!)

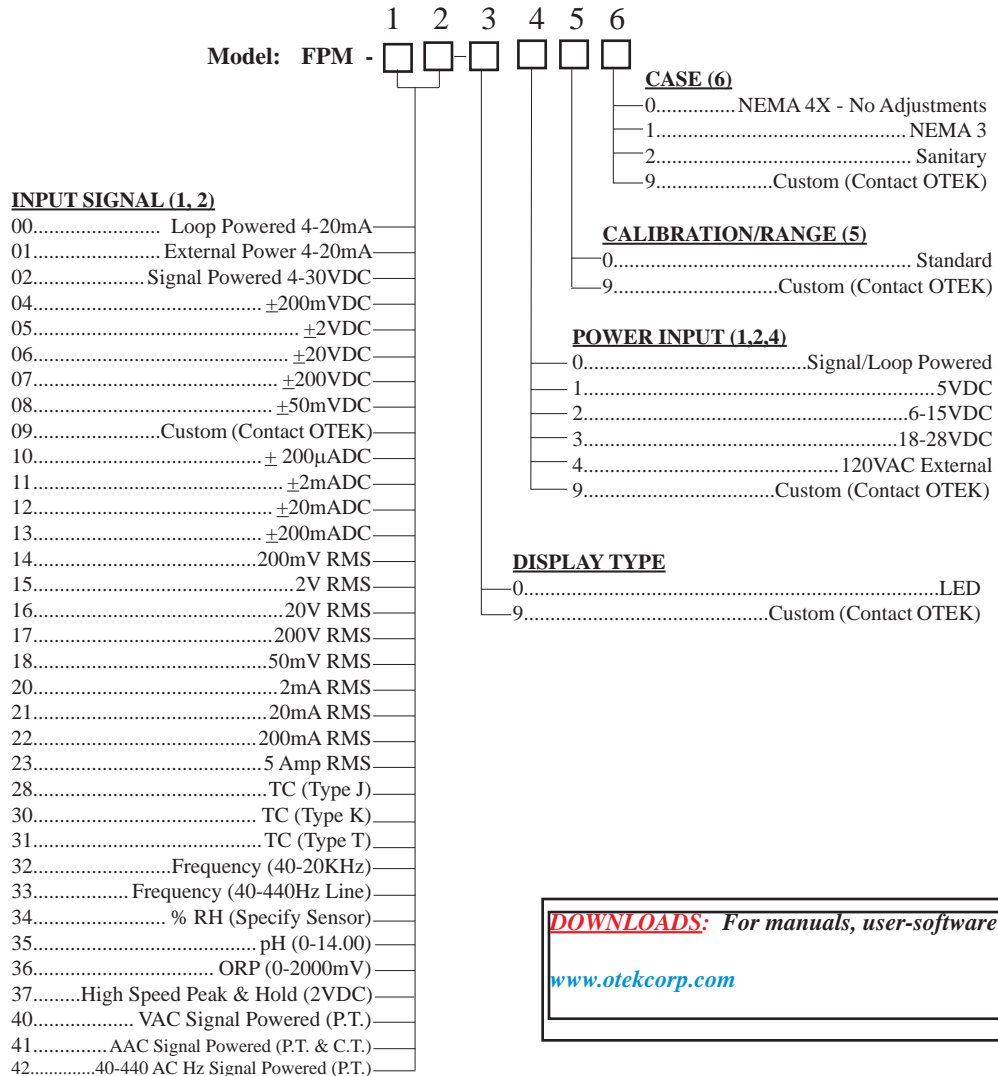
Sanitary Case
(Option 02)



FPM SERIES ORDERING INFORMATION 12-10-14

NOTE: Please READ BEFORE building part number:

1. If digit 1 & 2 is option 00,02, 40, 41 or 42, then digit 4 must be option 0.
2. If digits 1&2 are options 14-37, then digit 4 (Power input) must be options 1 or 4 (and conversely).
3. See notes at bottom of page.



NOTES:

4. 120VAC (Option 4) has AC Duplex Plug-In Module.
5. Standard calibration is 0-20,000 counts for V Input, 0-10,000 for 4-20mA (0-100.00%) or per sensor's range.
6. NEMA 4X has no Zero and Span adjustments.