4-20mA TRANSMITTING PANEL METER
WITH SERIAL I/O, MATH FUNCTIONS & ALARMS

NEW

MODEL TPM

FEATURES:
- Large 0.6" 4 1/2 LED Digits
- 750 OHM Load or Free 100 OHM Load on 4-20 Out
- 4-20 & 0-20mA Outputs
- 10-32VDC Power Input or 5VDC or 100-240VAC
- RS232, 485 & USB I/O
- Relays & O.C.T. Output
- V/mADC & RMS, TC, RTD, S-G, pH, ORP, %RH, Frequency Inputs and more
- CMTBF.: >100,000 Hours
- **OTEK's** Exclusive Lifetime Warranty

[meter display showing 10765]

OTHER 1/8 DIN PRODUCTS:
- SPM: Signal Powered Meter
- Din-Bar: Bargraph Meter
- OJ2000: 8" Digits DPM
- HI-Q112: Serial In Display
- See www.otekcorp.com-selection charts

SPECIFICATIONS @ 25⁰C
- Accuracy & Linearity: $\pm$0.05% of F.S.
- C.M.R.R.: 100dB @ 50-60Hz
- Temperature Coefficient: $\pm$100PPM/⁰C
- Conversion Rate: 2.5/Second
- Step Response: 0.1 Sec. 0-90%
- Output Load: 0-750 or 0-100 OHMS
- Baud Rate: 1200 - 19.2KB
- Protocol: ASCII (8N1)
- Temp. Range: -20 + 70⁰C
- Humidity: 5-95% RH N.C.
- Housing: ABS, 94VO/Metal
- Nuclear: To 10CFR50C (Class 1 E)
- Mil-Spec: To Specifications
- Connector: Screw Terminal

DESCRIPTION:
Now you can eliminate your 4-20mA transmitter and bring your sensors signal directly to the **TPM**, monitor it, display it, tansmit it and control your process with one compact meter-transmitter. The **TPM** will condition/excite your sensor, display the process, transmit (4-20mA and/or serial) the data and control it (4-20mA or relays). The **TPM** can be powered from your existing 24VDC power supply (typical) or we can put a DC-DC Isolated Converter to accept 5-48VDC or 100-240VAC 50-60Hz power supply. The modular construction of the **TPM** allows **OTEK** to install any signal conditioner (our 30+ years Library keeps on growing) listed and if we don't have it, we will make it.

The Transmitter: Programmable for either 0-16mA or 4-20mA and can operate as low as 5VDC plus your load. The DAC has a resolution of 15 Bits (10μA)! With 5VDC power you can drive up to 100 OHM loads (2V) with 24 VDC or 100-240VAC you can drive up to 750 OHM loads (15V).
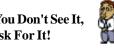
The Communications: You can order the **TPM** with or without the main **CPU**. Without it: all calibrations and scaling are done via the front panel zero and span. Range, D.P. selection, DAC output (4-20mA) and other features are via internal jumpers. With the **CPU** you have Serial I/O (RS232, 485 or USB) access to all configuration menus via the Serial Port including Polynomials and math (+, -, X, ÷, & square root) and X-Y tables for linearization, alarm set points (serial out), range selection, peak & hold, etc. and can even use your **TPM** as a remote display and computer controlled transmitter. Imagine the possibilities! (SCADA, DCS, Intranet).

Alarms: The **TPM** has 4 relays (SPST, N.O., N.C. on request) or 8 **O.C.T**. N.O. that are controlled by the **CPU** hence Serial I/O must be ordered (See Notes 3 & 6).

The Grades: A. Industrial (I) - See Specifications, B. Nuclear (N) - To 10CFR50-B through our qualifier *NLI* and C. Mil-Specs (M) - To specific requirements.

The Power Inputs: A. Non-Isolated 5VDC, B. Isolated 24VDC +/- 10%, C. Isolated 100-240VAC 50-60Hz and D. Custom to your needs.

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

TPM continued
THE SIGNAL CONDITIONERS

Options 04-08: <u>**VDC Externally Powered:**</u> Input impedance is 10 Mega Ohms on all VDC ranges.

Specs: See Front Page

<u>**Connections:**</u>

Option 09: <u>**Custom:**</u> Use this option to describe any custom input, scale or modification to the **TPM** and contact us for feasability and cost.

<u>**Connections:**</u>

Options 10-13: <u>**200μA - 200mADC:**</u>
Since the **TPM** 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!.

<u>**Connections:**</u>

Options 14-22: <u>**V & mA RMs:**</u>
Here we use a <u>**True RMS-DC**</u> Converter for accurate ($\pm$ 0.05%) measurement of sine waves up to

10KHz ($\pm$ 0.1% for 10-20KHz) and SCR;s fired to $\pm$ 1%. Input impedances vs. range are the same as for VDC & mADC ranges.

<u>**Connections:**</u>

Option 23: <u>**5Amps AC:**</u>
Specifically for current transformers (<u>**C.T.**</u>) this option requires an externally mounted (supplied) 0.05 Ohm, 0.1% 3 Watt resistor. You can mount the "Shunt" at your **C.T.** or next to the **TPM** but make sure the connections are "Perfect" to electrical codes. The C.T. might have <u>**"Lethal" High Voltage**</u> without a "Shunt" (Open) and the **TPM** will "Smoke". See OTEK's New <u>**ACS**</u> & <u>**CTT**</u> models for **C.T.** powered instruments (Patent Pend.)

<u>**Connections:**</u>

Option 24: <u>**Strain-Gage (350 Ohm Type):**</u> Here we use a "tracking" $\pm$ excitation of $\pm$2.5VDC and a differential amplifier to convert the 2 or 3mV/V (typical) sensitivity of your "Loadcell". Specify your Strain-Gage sensitivity and full scale and the **TPM's** display at Zero and Full Scale Please!

<u>**Connections:**</u>

Option 25: <u>**Strain-Gage ($\geq$1K < 5K Ohm):**</u> These are typically "Monolithic" <u>**S-G**</u> that require constant current (preferably) excitation. We use 100μA and diff. op. amp for high stability and accuracy. <u>**Specify**</u> your S-G impedance and sensitivity and the <u>**TPM's**</u>

Option 26: <u>**RTD (PT100):**</u> We excite your 2 or 3 or 4 wire RTD with 200μA to avoid the "self heating" effect. The range of the <u>**TPM**</u> is the same as your <u>**RTD**</u> typically -200^{0}C to +800^{0}C (-328 + 1562^{0}F). You can place the decimal point at will (typically -200.0 to 800.0 (-328.0 to 1562.0)). The <u>**PT100**</u> has a temperature coefficient of 0.00385 Ohms/Ohm/^{0}C. (For legacy 0.00392 TC (known as ANSI 392) contact **OTEK** and use Option "09".)

<u>**Connections:**</u>

Note: For 2 wire, jump - S to - E and +S to +E. For 3 wire only Jump -S to -E.

Option 27: <u>**RTD (PT1000):**</u> Same as PT100 except it is 1000 Ohms at 0^{0}C instead of 100 Ohms @ 0^{0}C. The same technique is used for copper **RTD** (10 Ohm), contact **OTEK**. Same connections as Option 26 apply.

<u>**Connections:**</u>

TPM continued

Option 28: Thermocouple (Type J): This **TC** has a range of -210 to + 760⁰C (-350 + 1390⁰F). Its color is white (+) and Red (-), cold junction (CJ) is inside the **TPM** at the connector base. Make sure the connections from the **TPM** and your **TC** are as close to the **TPM's** entrance as possible to avoid errors. If you short out the **TPM's** +**TC** & -**TC** together, the **TPM** will read the ambient temperature due to its built-in C.J.C.

Connections:

Option 30: TC (Type K): This is yellow (+) and red (-) and has a range of -270 + 1370⁰C (-440 + 2500⁰F). The same notes as Option 28.

Connections:

Option 31: TC (Type T): This blue (+) and red (-) **TC** wire has the range of -270⁰ + 400⁰C (-440 + 750⁰F). Same notes as Option 28.

Connections:

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 50 or 60Hz power line frequency measurement. Use Option #"33" or see our **ACS** Powerless™ Series.

Connections:

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:

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

Connections:

Option 36: ORP (Oxygen Reduction Potential): Our FET amplifier (10^9) accepts the industry standard 2000mV F.S. of the probe and the **TPM** displays it in % (0-100.00%).

Connections:

More: New Signal Conditioners will be added as per your requests and popularity, such as Ohms, Conductivity, Shock, Vibration, Position etc. Contact **OTEK**.
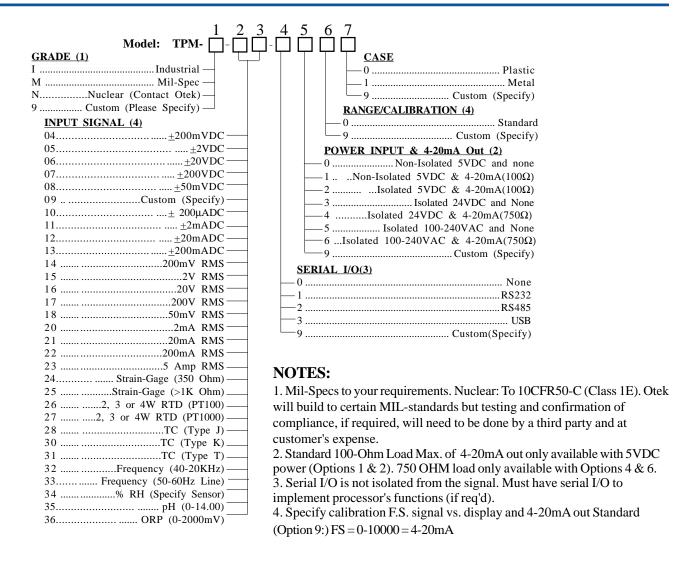
NOTES:
1. Self Diagnostics: The **TPM** will test all segments and I/O Signals for about 13 seconds on power up.

All Models Dec. Points, Peak & Hold: See User's Manual

TPM SERIES
ORDERING INFORMATION   6-09-09

Model: TPM- ☐ - ☐☐ - ☐☐☐☐
(positions: 1 2 3 4 5 6 7)

GRADE (1)
I ....Industrial
M .... Mil-Spec
N................Nuclear (Contact Otek)
9 .... Custom (Please Specify)

INPUT SIGNAL (4)
04................................±200mVDC
05..................................... ±2VDC
06.....................................±20VDC
07................................ ±200VDC
08.................................. ±50mVDC
09 .. ..Custom (Specify)
10.................................± 200µADC
11..................................... ±2mADC
12.....................................±20mADC
13.....................................±200mADC
14 ....200mV RMS
15 ....2V RMS
16 ....20V RMS
17 ....200V RMS
18 ....50mV RMS
20 ....2mA RMS
21 ....20mA RMS
22 ....200mA RMS
23 ....5 Amp RMS
24............ .... Strain-Gage (350 Ohm)
25 ....Strain-Gage (>1K Ohm)
26 ....2, 3 or 4W RTD (PT100)
27 ....2, 3 or 4W RTD (PT1000)
28 ....TC (Type J)
30 ....TC (Type K)
31 ....TC (Type T)
32 ....Frequency (40-20KHz)
33...........…... Frequency (50-60Hz Line)
34 .....…..........% RH (Specify Sensor)
35............................ .... pH (0-14.00)
36.................... .... ORP (0-2000mV)

CASE
0 .... Plastic
1 .... Metal
9 .... Custom (Specify)

RANGE/CALIBRATION (4)
0 .... Standard
9 .... Custom (Specify)

POWER INPUT & 4-20mA Out (2)
0 ....Non-Isolated 5VDC and none
1 .. ..Non-Isolated 5VDC & 4-20mA(100Ω)
2 ....Isolated 5VDC & 4-20mA(100Ω)
3 ....Isolated 24VDC and None
4 ....Isolated 24VDC & 4-20mA(750Ω)
5 .... Isolated 100-240VAC and None
6 ...Isolated 100-240VAC & 4-20mA(750Ω)
9 ....Custom (Specify)

SERIAL I/O(3)
0 .... None
1 ....RS232
2 ....RS485
3 .... USB
9 .... Custom(Specify)

NOTES:
1. Mil-Specs to your requirements. Nuclear: To 10CFR50-C (Class 1E). Otek will build to certain MIL-standards but testing and confirmation of compliance, if required, will need to be done by a third party and at customer's expense.
2. Standard 100-Ohm Load Max. of 4-20mA out only available with 5VDC power (Options 1 & 2). 750 OHM load only available with Options 4 & 6.
3. Serial I/O is not isolated from the signal. Must have serial I/O to implement processor's functions (if req'd).
4. Specify calibration F.S. signal vs. display and 4-20mA out Standard (Option 9:) FS = 0-10000 = 4-20mA

MECHANICAL INFORMATION

FRONT VIEW
SPAN
DP1 DP2 DP3
-19.2.8
DP1   DP2   DP3
1.88 / 48mm
3.75 / 96mm

REAR VIEW
1 2 3 4 5 6
7 8 9 10 11 12
1.70 / 43.2mm
3.55 / 90.2mm

SIDE VIEW
2.20 / 56mm
.275 / 7mm
.75 / 19mm

PANEL CUT-OUT
3.61 / 92mm
1.76 / 45mm
NO RADII (4 PLCS)