

See UPM-R P.30 FOR LOG - ANTILOG (RADIATION) METER

Programmable Automatic Alphanumeric

Display



(UPM-5)

WHAT IS IT?

() = Model Number

- A DPM for >30 Analog Input Signals
- A Universal Up/Down Timer, Counter for 20 Input Functions
 - A Process PID Controller
- Scientific Controller-Display (> 10 Math. Functions)
 - An X-Y-Z Positioner/Controller
 - A Data Logger (32GB)
- A Process Automation Controller with Relays and Analog Output
- An HMI & MMI Full Alpha-Numeric Auto Tri-Color LED Display
 - A DCS/SCADA/PLC Terminal/Controller
- A Remote Display/Controller (RS485, USB, TTY & Ethernet MODBUS)
 - A Scrolling Message Display
 - An Automatic Tri-Color Go-NoGo Indicator
 - A Forecasting Center (Time/ Events to Go)
- A Complete Power/Quality/Generation/Consumption Center and Controller
 - Class1E & NEI 08-09 Cyber Security Compliant
 - One Instrument for All Your Needs
 - Field Configurable
- Nuclear Class1E Radiation Monitor See pg. 30. Replaces FF&F Model RM2300
- A TRC (Triple Redundant Controller) See pg. 9

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Note: The main difference between our UPM & NTM series is the display, UPM accepts analog and digital signals (counter); the NTM, only analog. All else is the same.



(UPM-3)



SCAN HERE
FOR OTEK'S
HOME-PAGE



(UPM-H)

UNIVERSAL PANEL METER

UPM™
11/28/23

*Analog Input: D.P.M. *Digital Input: U/D Counter-Timer-Clock
*Data Logger *Serial Input: Display *Relays & DAC Out: Controller

UPM-0



- 1 Channel
- 6 Digits
- 1/8 DIN
- 3.8 x 1.9"

UPM-3



- 1, 2 or 3 Channels
- 6 Digits Each
- ANSI 4" Switchboard

UPM-5



- 1, 2, 3 or 4 Channels
- 6 Digits Each
- 3 x 6"

UPM-X



- 1 Channel
- 4 Digits
- Explosion Proof

UPM-A



- 1, 2 or 3 Channels
- 6 Digits Each
- 1/4 DIN
- 3.8 x 3.8"

UPM-R



- 1 Channel
- 8 Digits
- 1.5 x 5" Case

UPM-L



- 1 Channel
- 6 Digits
- 2.9 x 1.5"

NOTE: All 6 digits (except UPM-X: 4 digits): 0.6" high tricolor; except UPM-R: 8 digits, 0.4" high unicolor (red).

UPM-F



- 1 Channel
- Flat Pack
- 6 Digits
- 2 x 3 x 1/2"
- No Panel Cutout Required

UPM-4



- 1, 2 or 3 Channels
- 6 Digits Each
- 22 Characters on Request
- 11.3 x 1.4"

UPM-H



- 1 or 2 Channel
- 6 Digits Each
- 6 x 1"

UPM SELECTION CHART

See pg. 27-28 for Mechanicals

MODEL	# CH.	SIZE (WxHxD")	SERIAL I/O	GRADE	POWER INPUT	CONTROL OUT	ANALOG OUT	SIGNAL INPUT	NOTES
UPM-0	1	1.9 x 3.8 x 2.7"	ALL	ALL	ALL	ALL	ALL	ALL	1/8 DIN
UPM-3	1, 2, 3	4 x 4 x 3"	ALL	ALL	ALL	ALL	ALL	ALL	SWBD 4"
UPM-4	1, 2, 3	11.3 x 1.4 x 3.2"	ALL	ALL	ALL	ALL	ALL	ALL	UP TO 18 DIGITS
UPM-5	1, 2, 3, 4	3.1 x 6 x 3"	ALL	ALL	ALL	ALL	ALL	ALL	
UPM-A	3	3.8 x 3.8 x 3"	ALL	ALL	ALL	ALL	ALL	ALL	1/4 DIN
UPM-F	1	3.3 x 2 x 0.6"	NONE	PLASTIC	5&7-32 Vdc	NONE	NONE	NO: 02-16, 58, 60-4C	FLAT PACK; NO CUT-OUT
UPM-H	1, 2	6 x 1 x 2.5"	ALL	PLASTIC	ALL	ALL	ALL	ALL	ONLY 1" WIDE
UPM-L	1	3 x 1.5 x 2.2"	ALL	ALL	ALL	O.C.T. ONLY	ALL	ALL	SMALLEST
UPM-R	1	4.9 x 1.5 x 3.6"	ALL	METAL	ALL	NONE	NONE	TTY ONLY	FF&F REPLACES RM2300
UPM-X	1	4.3 x 3.9 x 3"	ALL	EXP. PROOF	ALL	ALL	ALL	ALL	EXPLOSION PROOF

520-748-7900

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FAX: 520-790-2808 57861

E-MAIL: sales@otekcorp.com

https://www.otekcorp.com

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WHAT CAN YOU DO WITH OTEK'S NEW UPM FUNCTIONS?

UPM™
11/28/23

All models share the same award winning software and hardware (patented). This allows you to implement the following applications, restricted only by the hardware limitation of each model and your imagination.

Note: Contact us about **Otek's Powerless™ Technology**: If your signal cannot supply $\geq 10\text{mW}$ ($\sim 3\text{V}/3\text{mA}$), use an external power model. See pg. 13-21 for UPM-Counter functions and pg. 22 for remote display/controller.

1. One Channel Only Models: -0, -F*, -L, -R & -X:

Implement any math function via serial port: X-Y table (25 point), polynomials (9th order), offset, zero, scale, tare, log & anti-logarithmic to affect the unit's display at will. Some examples are: change the display & data using any combination as commanded by your algorithm, such as $\pm/\text{X}/\div/\sqrt{}$ or set a variable or linearize the display using X-Y tables or polynomials. This works well for odd shape containers. You can also change the reading from °F to °C or K or compress/expand the display (and data out) using the log and antilog functions. In addition, you can change the factory default alarm set points and colors or delete them. Zero & Span potentiometers **are included** for manual adjustment (best via serial).

***Note:** Model UPM-F only offers internally accessible USB serial I/O for configuration and mathematical functions. Use Digit 14 Option 9 and specify your custom calibration, or use our free GUI.

Contact Otek for custom access to micro **USB**.

2. Multi-Channel Model:

-3, -4, -5, -A, & -H Features include all those of the single channel models, each channel μC is 100% isolated* from each other. In addition, you can add, subtract, multiply, divide, find the square root between channels. You can also use one channel to monitor/control the input signal and the second channel to indicate deviation, differential such as **PID**, alarm override or one channel setpoint can be used to control another channel function. One channel may also function as a backup if the other channel becomes disabled or use them as volume & flow ($\sqrt{}$) monitors/controllers. The **New Technology** two channel model is also perfect as a REM/RAD indicator/controller (also see our RPM series with log-antilog functions for radiation monitoring).

***Note:** Except if carry-borrow are connected in a counter/timer mode.

Contact OTEK for algorithms and formulas or any idea you wish to share with our audiences via our YouTube or Facebook page posts.

3. Three Channel Models:

-3, -4 and -A: Note: Also available on 4 channel model (-5). Otek's New Technology three channel models perform all the functions outlined in #1 and #2. Further, one channel can indicate the input variable and the other two channels can be setpoint indicators/controllers (Hi, Hi-Hi, Low and Low-Low limits), or subject the input/output to any mathematical function or algorithm such as **PID** or display the input vs. output and derivative, or switch scales when the input reaches a limit/band such as for flow-volume-pressure or temperature. Monitor Volts, Amps and Watts AC or DC or any of 3 variables, including Hertz, lead/lag, power factor, peak/valley or cost by adding a KW cost multiplier.

The **UPM** series brings **Process Automation Control** (PAC) within your reach and affordability. These models are compatible with any DCS/SCADA system using their USB/RS485/Ethernet I/O options and allow for ease of interface with wireless systems.

4. Four Channel Model:

-5: The four channel model offers all of the functions outlined in #1, #2 and #3. However, with the additional channel available, the **UPMs** rival flatscreens with superior HMI/MMI functionality and ease of viewing/analysis of any combination of 4 variables. For example, Volts/Amps/Watts/Hertz or temperature/pressure/pH/humidity. The four channel model can also be used to monitor/control the product of the other 3 variables, making it ideal for the petrochemical industry.

The UPM offers Data Logging. Some models offer optional μSD memory to record $\approx 1/2$ anything available via the serial I/O. Max capacity is 32 GB!

TRIPLE REDUNDANT CONTROL:

Since all channels are 100% isolated from each other and the CPU can communicate with any and all MCPUs, you can use the multi-channel **UPM** for triple redundancy control. Also see our model **TRC** (Triple Redundant Controller) that has all you need Select for the utmost in safety control. Select any model with 3 (or more) channels: UPM-3, -4, -A or -5. See pg. 9

IF YOU DON'T SEE IT ASK FOR IT!

520-748-7900 CAGE CODE
FAX: 520-790-2808 57861
E-MAIL: sales@otekcorp.com
https://www.otekcorp.com

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UNIVERSAL PANEL METER OVERVIEW ^{UPM™}

11/28/23

All models have a lifetime warranty. The UPM, like our NTM series and PNP (Plug & Play) products use generic (multi-vendor sources), organic LEDs and nanotechnology ASIC, reducing obsolescence.

THE DISPLAY:

Alphanumeric Auto-Tricolor (R/Y/G) Display: Each UPM digit has fifteen (15) segments. You can time share the display for intelligent messages to your operator when an alarm is enabled or via the serial port. You can also program the UPM to alternate between data and messages, such as: **2500 °F | High Alarm | -1.050 INPT FAIL**. The entire display is available for any alphanumeric character (in any one color) or you can scroll it as a continuous message (see remote display section C and pg. 12 for ASCII to 15 segment chart).



“CAL HOM”

NOTE: All 6 digits (except UPM-X: 4 digits & UPM-R: 8 digits, 0.4” high unicolor (red)): 0.6” high tricolor.

ABOUT POWERLESS™ TECHNOLOGY (Digits 8 & 9, Options 00-18 only and Digit 10, Option 0):

Over 40 years ago we developed this technology, and we continue to improve upon it every year! Powerless™ means the units **DO NOT** require any power other than what the signal can produce (just like analog meters), which is typically 10-80mW per channel. Obviously these options (00-18) can **NOT** drive relays or analog outputs (see SSAM), they can however drive the isolated O.C.T. (Open Collector Transistors), but you have to provide the Vcc! Isolated serial **USB** I/O is standard since it is powered by the USB host.

The Powerless™ feature is only available for 4-20mA, 10-50mA, 7-130Vdc, Vac, Aac, Wac and Hertz input signals. Isolated RS485 requires external 5Vdc<3mA. The automatic **Input Fail detections** and text is controlled by a factory set limit, but can be changed in the field or disabled (~ -0.1% of zero setting and lasts a few seconds after detection).



A) THE UPM-DPM:

D. P. M. (pg. 8-12):

1. It can function as a **Digital Panel Meter (D.P.M.)**: It measures and displays data from over 60 analog input signals (see the ordering information on pages 24-25) just like a **DPM**. The Powerless™ input signals include both V & A ac/dc and current loop and it uses the patented Powerless™ new technology of our **NTM Series bar-digital meters/controllers/transmitters**. It features **input signal failure detect/alarm** and isolated serial I/O, all powered by the signal it measures, just like an **analog panel meter without parallax, inaccuracy or “stuck needle”**. Powered models can have relays/O.C.T. & analog outputs to control your process, as well as ethernet & μSD for data logging.



B) THE UPM-COUNTER:

Counter-Timer-Clock (pg. 13-21):

1. All 32 functions are included and selectable via serial commands, but input signal conditioners must be selected.
2. Input levels (TTL/CMOS/open collector/dry contact/high voltage) are per option number selected (see ordering information on pg. 24-25).
3. Multichannel models allow you to perform all math functions between them and/or between their data stream and your serial input data. Single channel models also accept math functions or commands via the serial port. Examples: CHA + CHB/CHC – CHD; CHA – CHB + CHC ±; OFCO/GACO or polynomial or √ or compare to your own X-Y table. Since we use floating point math, the possibilities are limited by your needs.



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DESCRIPTION & NOTES (ALL MODELS) ^{UPM™} 11/28/23

DIGIT 5, SERIAL I/O & MEMORY:

Settings: 8N1N, 1200-19, 200 Baud, ASCII

Digit 5, Serial I/O: Option 0, USB: Complies 100% with V2.0 and if digit 10, option 1 is selected (USB powered) then digit 5 must be option 0. **Note:** On model UPM-F, USB is only for factory configuration and not available for communications (unless customized).

Note on USB Connectors: All models with Digit 5, Option 0 have a standard type "B" on the back. M & E grades might require "filter" connectors on back and must be specified. Use Digit 5, Option 9 and contact OTEK for **cyber security** compliance to NEI 08-09 & other regulations.

Digit 5, Option 1, RS485: Complies with industry standard and will require 5VDC@<3mA (if signal powered only) and a terminating <1K Ohm resistor at first and last unit in the BUS. Not available on model UPM-F.

Digit 5, Option 2 Ethernet: Complies with 1- Base-T/100Base-TX RJ45. Maximum power consumption is <300mA@5V (1.5W). Only available in selected models. Connector: RJ45 on back.*

Digit 5, Options 3 & 4: µSD Flash Memory: µSD flash memory with up to 32 gigabytes capacity. You can store selected data at-will (i.e. when limits trip) via serial command and download or remove it as required. Connector: Same as options 0 or 1.*

Digit 5, Option 5: IRDA: Note: Only available for housing style "X" (explosion proof). IRDA meets industry standards for infrared data reception. You can access all commands/functions without opening -X in hazardous areas. See our model IR/USB that plugs into your USB port (also see IR/232 for RS232 to IRDA). Connector: µUSB.

Digit 5, Option 6: TTY Teletype (20mA Current Loop): Specifically designed to interface with GA's RM 2000 radiation transmitters. Contact OTEK for your customized TTY requirements. Only for model UPM-R.

***Note:** Check with Otek for availability.

Security: Password protected access to the UPM's HW and software cyber security.

Front Panel Controls: None for added security and safety.

Nuclear and MIL-Spec version comply with NEI 08-09 and/or 10CFR50, 10CFR59 and 10CFR 73.54 on request.

DIGIT 6, GRADE:

Industrial Grade (Options 0 or 1) is per these published specifications. Grades M and E per agreed specifications. Options E & M typically include an EMI/RFI shield all around and filtered connectors to meet EPRI-TR-102323-R4 [8.7] (MIL-STD-461F) (requiring ~2" deeper case). OTEK will build to certain nuclear or MIL-Standards but testing and confirmation of compliance, if required, will be quoted as a separate line item.

Option 0 is 94VO plastic, Option "1" is an aluminium nickel plated case and cover; bezel face has black powder coat finish to Mil-Specs. The back cover is either black plastic or nickel plated aluminium. **Exception:** Model UPM-L (Option "1") is an **aluminium nickel bezel** plated to Mil-Specs with a stamped stainless steel back cover. Typical Mil-Specs: 461, 462, 167, 901, 801, RTCA-160, IEEE344, etc. Contact Otek for custom colors.

NTM-X: Certified for Class I, Div. 1, Groups B-G; EX & IECEx: IM2, Exd1.

DIGIT 7, (# CHANNELS):

See images on pg. 2 and "Ordering Information" on pg. 24 for # of channels available, their location and exclusive conditions.

Case 0: 1 Channel/6 Characters (½ DIN)

Case 3: Up to 3 Channels/6 Characters each (ANSI 4" Swbd.)

Case 4: Up to 3 Channels/6 Characters each (1.4 x 11")

Case 5: Up to 4 Channels/6 Characters each (3 x 6")

Case H: Up to 2 Channels/6 Characters (1 x 6")

Case A: Up to 3 Channels/6 Characters (¼ DIN)

Cases 0, F, L & X: 1 Channel/6 Characters, except -X: 4 Characters

Case R: 1 Channel Unicolor (red), 8 Characters; see note #2. (1.5 x 5")

Note 1: Check mechanical drawing & mounting information when replacing HI-QSLIM1 series.

Note 2: Due to size restrictions, the UPM-R does **not** offer tricolor display, relays, O.C.T. or analog out (Digits 11 & 12 only offer Option "0" (or "None").

MULTIPLE CHANNELS (-3, -4, -5, -A & -H):

For color alarm zones all channels have the same color by default (green: >20% to <80% of F.S.; red: <10 and >90% of F.S.; yellow: <20 and >80% of F.S.). You can change the color or disable the limit color or change or enable a text message in any of the three colors on limit tripping. This will help avoid operator error. See page 6 Automatic Display Colors.

DIGITS 8 & 9 (INPUT SIGNAL): SECTION A: See Input Signal Conditioners section (pg. 8-11) for description and specifications.

Digit 10 (Power Input):

Digit 10, Option 0, Powerless, No Power Required: The **Input Fail** detect/Alarm (patented) flashes the display "INPT FAIL" (**INPT FAIL**) and transmits this serial message for ~20 seconds, after which it will cease. This feature is available in all models and its trip point can also be programmed by the user. If NOT desired, use Option 9 on Digit 10 and specify (see below). Signal Fail Requirement: unit must be "On" for at least 1 minute at >50% of full scale for it to operate. You can change the message via commands.

Digit 10, Option 1, USB Powered: The UPM uses < 20mA @ 5Vdc per channel for the display only and worst case < 300mA fully loaded per channel.

Digit 10, Option 2, Isolated 5Vdc: 5Vdc is also used to drive the relays (<100mA total) and/or the Dac via internal isolated 5-30Vdc-dc (<200mA). If you order relays and analog out, you will need ~300mA/channel. This option is also isolated from the input signal.

Digit 10, Option 3, Isolated 7-32Vdc: Same as option 2 but with wide input range of 7-32Vdc. Efficiency: >80%.

Digit 10, Option 4, Isolated 90-265Vac: This option accepts 50-60Hz. For 100-300Vdc or 400 Hz, use Digit 10, Option 9 and specify. Efficiency: >80%.

Flat Pack Conditions: See pg. 5 & 7 for other restrictions.

If Digit 4 = F, then Digit 10 must be Options 0, 2, 3 or 9 (custom). Power input is isolated from the Signal!

No control or analog output. Part #: UPM-F80-1??0/2/3 or 9?? (?? = any available 1 channel option).

Digit 5 (Serial) must be Option 8 (None) or Option 9 (Custom) and is not available for external use (for configuration only). For access to the Serial I/O, contact Otek to request an **un-sealed** case.

DIGIT 11 (CONTROL OUTPUTS) & DISPLAY COLORS:

Digit 11, Control Outputs: Options 1, 3, 5, or 7: Open Collector Transistors (O.C.T.): They are **NOT** isolated from each other (common emitter) but are **isolated** between channels and can sink a maximum of 30mA and sustain a maximum of 30V_{CE}. When you order relays (Digit 11, Options 2, 4, 6, or 8) we use the O.C.T. to drive the relays on "powered" models. 5Vdc is available to drive your loads. Max total current: 50mA. O.C.T. are ideal to drive S.S.R. for high speed switching. Power required: none.

Note: Relays are not available on UPM-F, -L, or -R.

Digit 11, Options 2, 4, 6, or 8: Relays: are S.P.D.T. (1C) and can switch maximum **resistive** loads of 1 Amp @ 120Vac or 30Vdc. They include 300V varistors at their contacts. Power required: 250mW @ 5Vdc/relay.

Digit 11, Options C, D, E, F: SPDT H.V. Reed Relays (100% signal or externally powered), 120Vac/dc; ≤100mA switching, vacuum sealed contacts (dry contacts). Ideal for annunciators. (PCB #: 80-SC-AL-2). **IMPORTANT NOTE FOR LOOP POWERED REED RELAYS:** Options C-F can be **loop powered** by 4-20mA CL with only <5V burden on the loop. Options "C-F" requires that "HI" alarm be set to > 12mA and "LOW" or "FAIL SAFE" alarm be set to ≥3.9mA.

Digit 11, Options G, H, J, K: SPDT H.V. MOSFET (100% signal or externally powered): 250Vac/dc; ≤50mA switching true "Break Before Make" action, <500 Hz Line. Min switching current: 50μA, voltage: 3Vac/dc. PCB #: 80-SC-AL-0.

AUTOMATIC DISPLAY COLORS:

Limits/Colors Factory Default (% of Full Scale): Also see Digit 14, Range/Calibration.

Lo-Lo Limit, <10%: Red Display, OCT1/K1 & OCT2/K2 "ON"

Low Limit, <20%: Yellow Display, OCT2/K2 "ON"

High Limit, >80%: Yellow Display OCT3 & K3 "ON"

Hi-Hi Limit, >90%: Red Display, OCT4/K4 & OCT3/K3 "ON"

Safe Area, >20<80%: Green will follow signal input and if outside the limits, it will change its color to the limit's color (yellow or red).

For other custom configurations, use Option 9 on Digit 14 (field configurable). Max power consumption per relay: 50mA @ 5Vdc (0.25W). See pg. 7 Digit 14.

DIGIT 11 (CONTROL OUTPUTS) & DISPLAY COLORS:

Digit 11, Options 2, 4, 6, or 8: Relays (Continued)

External Control: You can control the O.C.T./Relays via the serial port with simple commands. They don't have to be assigned to the display colors/set points, but are by default.

Note: Digit 11 is governed by Digit 7 (# of Channels) & Digit 4 (Housing).

Fail Safe: O.C.T. and relays are normally "Off" by factory default. For "Fail Safe" mode, you can program them in the field or use Option 9 (Custom) on Digit 11 when ordering and specify "Relays (or O.C.T.) normally on."

DIGIT 12 (ANALOG /POWER OUTPUT):

Digit 12, Analog Output, Options 1, 3, 5, or 7: This isolated output is factory set to follow the input (0-F.S. in = 4-20mA out) but can also be set for other outputs or it can be serially controlled by simple commands via the serial port. For other outputs, use Option 9 and specify, including reverse scale (0-FS = 20-4), bipolar and **PID**.

Power consumption: 200mA @ 5Vdc (1W)/channel.

Note: Not available on the **UPM-F, UPM-L, or UPM-R**.

Analog Output Via Your External Control (Use Option 9 and specify):

A) 0-100mVdc in = 4-20mA out

B) 0-10K Ohm in = 4-20mA out

C) Use Options 58, 68, 78 or 88 and control it via serial port exclusively (**no** input signal).

Digit 12, 30 Vdc Out, Options 2, 4, 6, or 8: Use this option to power your 4-20mA transmitter or other transducer. Maximum current is 25mA dc. It is isolated and is the same power source we use for Options 1, 3, 5, and 7.

Power consumption: 200mA @ 5Vdc (1W)/channel.

Notes:

Digits 11 & 12 are governed by Digits 4 (Housing) & 7 (# of Channels). Reason: Digit 11 & 12 cannot have more outputs than input channels (but it can have none), which is governed by Digit 4 (Housings).

DIGIT 13 (SCALE PLATE):

Digit 13, Scale Plate: Option 0 is a standard scale plate with no text. Use Option 9 for custom printing and contact Otek.

DIGIT 14 (RANGE/CALIBRATION):

Option 0 = Factory Default = 0-Full Scale = 0.0-100.0 digits. Colors: <10>90%: Red; <20>80%: Yellow; >20<80%: Green. For custom colors, use Option 9 (custom) and contact Otek. Also see Control Outputs (Digit 11). You can program it for other values, none or via the serial port. Default messages:

INPUT FAIL, LLAL, LALM, HHAL & HALM.

OTHER IMPORTANT DATA:

Math Functions: +, -, x, ÷, √, Log/Anti-Log, 25 Point X-Y table, Polynomials to 9th order, zero, offset, span, and tare. You can +, -, x, ÷, (etc.) one channel to/from another channel and display the result in the other channel. i.e. V (Ch.1 x A (Ch.2) = W (Ch.3)). We do it for Watts on Options 12, 13, 14, 70-75 and 80-83.

PID: Programmable (best with 2 or more channel models) automatic or manual with external 10KOhm potentiometer (Option 56). See models in **NTT Series** for dedicated 4-20mA transmitters (same technology).

SAME HOUSINGS, DIFFERENT FUNCTIONS



The NTM (New Technology Meter):

The same patented technology for analog input only. All else is the same as the UPM, but has an automatic tricolor bargraph for trend indication.



The NTM/T (New Technology Meter/Transmitter): Since the NTM & UPM have 4-20mA outputs, they are transmitters. So, we build them specifically for 4-20mA transmission, change the housing for DIN-Rail or panel mount or explosion proof and you're the winner. No NRE, NO R&D! What's next?

THE PLUG & PLAY METER PNP!

ABOUT OUR INPUT FAIL DETECTION

Only available on Powerless™ models (Digits 8 & 9, Options 00-18). While in normal operation, we store excess energy and use it to power the **UPM** if and when the signal fails (post mortem).



SECTION A: DPM

Input & Display: See Below For Input Signals:

Note 1: E and M grade electrical specifications are the same as Industrial unless otherwise specified in your RFQ.

Note 2: OTEK reserves the right to change specifications without prior notice to improve the performance of its products.

- * A/D: Accuracy, Linearity & Resolution: $\pm 0.5\%$ of F.S., \pm LSD. Conversion Rate: 40/sec, Averaging: 0-255, zero, span, offset, tare, and math functions.
- * Digits: Four Full Active Digits (9.9.9.9 & -1.9.9.9); 0.6" High, Alphanumeric Auto-Tricolor (R/Y/G), 15 segments.
- * Typical Power Consumption of Display: 10-100mW @ 3.3V-5V; loop/signal power version best at $>8\text{mA}$.
- * Temperature Coefficient: $\pm 50\text{PPM}/^\circ\text{C}$
- * Operating Temperature: -10 to $+60$; Storage: -20 to $+70^\circ\text{C}$
- * CMRR: $>90\text{dB}$ @ 50-60Hz
- * Isolation: $>500\text{Vdc}$ to any other I/O & P.S.
- * Humidity: 5-95% RH non-condensing
- * Front Panel: NEMA 3. NEMA 4X on request.
- * Failed Signal Detect: ~ 20 seconds after >1 minute @ **50%** of F.S. only on loop & signal powered models.

Note 3: See pg. 26 for environmental specs vs. housing.

Yes! You can have the **UPM** (DPM mode only) powered by the input signal and have controlling outputs such as relays, O.C.T. & analog output!

How it works: Your input signal (Digit 8 & 9, Options 00-18 only) powers the display, CPU, serial I/O and isolators. Your external power source powers the outputs (if included).

Benefit: You have two independent and isolated sources (fail safe).

Requirement: Your signal must produce $>10\text{mW}$ (current loop, Vdc, Vac or Aac) and sustain $<4\text{V}$ burden. If not, use external power (Options 20-85 on Digits 8 & 9).

AC Signal Power & Outputs? Yes, you can have both input Options 01-18 (Digits 8 & 9) and relays (2 maximum) without external power!

Requirements: Vac input via P.T must be $>90<140\text{Vac}$, and Aac input must be $>1.5<4$ Aac via C.T. Ideal to monitor and control 120Vac mains! Contact OTEK for details.

SECTION A: DPM INPUT SIGNAL SPECIFICATIONS (Digits 8 & 9)

Important Note on A.C. Powerless

The NTM, UPM & NTT Series can extract energy from your A.C. signal to power itself and opto isolated serial, optional O.C.T. (Digit 11, Options 1, 3, 5 or 7), and to power the optional 4-20mA output driver (not 20-4mA out) from a wide input range (see specifications on pg. 8-11).

External power is required to power the optional relays (Digit 11, Options 2, 4, 6 & 8) (200mW each). If you need relays, either use the external powered options on Digits 8 & 9 (33, 37, 40 or 42) and Digit 10 power input options (1-4) or use Powerless™ Options 01-04 on Digits 8 & 9 and Power Input Option 09 (custom) on Digit 10 and specify (09 = Power for relays and Dac).

Result: The signal will power the instrument and will include our patented **Signal Fail Detection & Alarm**. The relays and analog output are powered by the external power option (all 100% isolated).

Note: All ± 1 LSD and $\pm 0.5\%$ full scale range unless noted. Also see Note 1 in "Section A: DPM" above.

Option 00 For Loop Power Only:

Option 00, Loop Powered: Burden: $<4\text{V}$; Range: 3.5-26mA; Accuracy & Linearity: $\pm 0.5\%$ of F.S., ± 1 LSD.

INPUT SIGNALS (Digits 8 & 9):

Note: Otek's exclusive Input Fail detection (open or short) is standard on all signal powered inputs. Use Option 29 and specify if you want it disabled (also field configurable).

Note: Actual connection will vary. See the User's Manual for specific connection information.

SECTION A: UPM INPUT SIGNAL SPECIFICATIONS (Digits 8 & 9) ^{UPM™}

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Note: You can change factory standard calibration via the serial port.

Options 01 through 14 for A. C. Signal Powered Only

FUSE IT! Use external 1/2 ASB for Volts and 6 ASB for Amps.

Note: C.T. (Current Transformer) are sensitive and limited to the secondary (output) impedance. Otek A.C. signal powered products present an input impedance of ~0.2 Ohms (~1v @ 5A). Make sure your C.T. can drive a >0.3 Ohm load without saturating or losing linearity. Contact Otek for assistance.

Best C.T. to use: >100:5.

Note: All inputs for 50-60Hz lines. Contact Otek for 400Hz lines.

Option 01, Volts AC P.T. (Potential Transformer): Burden: 0.2 Ohm & <100mW; Range: 30-140V/40-100Hz; Accuracy & Linearity: $\pm 0.5\%$ of F.S.

Note: Not available in “-F” (4th digit) case.

Option 02, 5Amps AC (C.T.): Burden: 0.2 Ohm & <100mW; Range: 0.5-5A; Accuracy & Linearity: $\pm 0.5\%$ of F.S.

Best range 2-4 Amps. Not available on **case -F**

Option 03, Watts AC (C.T. & P.T.): Range: >100<600W / 50-60Hz; Accuracy & Linearity: $\pm 0.5\%$ of F.S. at 90-140Vac & 1-4Aac. Best operating range: 100-500 Watts. For 400 Hz lines, use Option 09 and specify (09 = 400Hz line) after the complete part number.

Note: Not available in “-F” (4th digit) case.

Option 04, Hertz VAC: Range: >30V<140V & >30<100Hz; Accuracy & Linearity: $\pm 0.5\%$ of F.S. For 400 Hz lines, use option 09 and specify (09=400 Hz line) after the complete part number.

Note: Not available in “-F” (4th digit) case.

Option 05-14: Same description and functionality as Options 01 through 04 above.

PROPORTIONAL CONTROL?

For proportional control, use a two-channel model. Channel 1 is powered by your signal and the display signal (using a 4-20 mA out) to drive the Channel 2 input. Channel 2's 4-20mA output allows you to control your generator.

The result: Channel 1 displays your AC signal and Channel 2 displays its 4-20mA output. Only Channel 2 needs power for its analog output and/or relays.

Use part number UPM-(3 or 5)??-269-??1-99?. Note: “?”= any available options on Digits 5, 6 & 10 and specify (9 = Ch. 1 Signal Power, Ch. 2 External Power).

Also see the new model **NTT-1**.

Vac/dc Signal Power Only:

Option 16, 7-130Vdc: Now you can monitor and control your DC line, UPS, battery bank or power supply from 7-130Vdc with only power from the signal. The UPM requires >10<80 mW (~3mA - 20mA). Imagine the possibilities! Almost like analog (only signal wires), but with 21st century digital technology ready for your PAC/DCS/SCADA system.

Scaling: 7-130Vdc in = 7.0-130.0 digital display.

See Digits 13 & 14 for custom calibration and scale.

Accuracy & Linearity: $\pm 0.5\%$ of full scale, ± 1 LSD.

Alarm Outputs (Signal Power): Open collector transistors (4) optional. See the ordering information on pg. 24-25, Digit 11, Option 1. For relays, contact Otek (custom).

4-20mA Analog Output: Custom, contact Otek.

Option 17: 10-50mA Loop Power: Calibration: 10-50mA Input = 0-100% & 4-20mA output.

Option 18: 10-500mAdc Signal Power: Calibration: 10-500mAdc = 10.0-500.0

For other calibrations, use Option 9 on Digit 14 and specify.

Triple Redundant Control (TRC)

Use any model with 3 or more input channels (disable 4th channel or use for a message or other signal) such as Digit 4 Options 3, 4, 5, or A. 1. Go to our website www.OtekCorp.com

2. Under “New Products” and **NTM**, click on **NTM GUI** and follow instruction.

The NTM & UPM series share the same hardware and firmware except for specific automatic tricolor displays (bar-digital or alpha-numeric) and input functions (NTM is only analog inputs, UPM is analog) Digits 8 & 9 and digital (Digit 15) that's all!

TRC can be enabled for analog or digital input signals comparison.

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SECTION A: UPM INPUT SIGNAL SPECIFICATIONS (Digits 8 & 9) [©] UPM™

Options 20 through 58: For Externally Powered Only

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Notes: You can change factory standard calibration via the serial port.

All input channels have the same specifications unless noted. See Options 60-89 for mixed signals.

Option 20, 4-20mA: Burden: 250 Ω (0.5V);
Range: 3-26mA; Accuracy & Linearity: $\pm 0.5\%$ of F.S.

Options 21 thru 24, Vdc: Input impedance 1M Ω ;
Range: Per Option; Accuracy & Linearity: $\pm 0.5\%$ of F.S.

Options 25 & 26, mAdc: Input impedance Option
25: 50 Ω ; Option 26: 5 Ω ; Accuracy & Linearity:
 $\pm 0.5\%$ of F.S.

Option 27, Watts DC (1V x 1Adc): VZin Ω : 1M Ω /
AZin: 1.0 Ω , 5W; Range: 1W; Accuracy & Linearity:
 $\pm 0.5\%$ of F.S.

Option 28, Watts DC (1V x 1V): VZin: 1M for both
inputs; Range: 0-1V; Accuracy & Linearity: $\pm 0.5\%$
of F.S.

NOTE: Always use P.T. or C.T. with AC Lines.

Options 30 thru 34: VRMS: Zin: 1M Ω ; Range; per
options; Accuracy & Linearity: $\pm 0.5\%$ of F.S.

Options 35-37, Amps RMS: Zin: Option 35: 2 Ω ;
Option 36: 0.2 Ω ; Option 37: 0.02 Ω ; Range: Per op-
tion; Accuracy & Linearity: $\pm 0.5\%$ of F. S.

Option 38: Watts RMS (1V x 1Vac/dc): Zin: 1M Ω
for both inputs; Range: 1V RMS; Accuracy & Lin-
earity: $\pm 0.5\%$ of F.S.

Option 40, Watts RMS (120Vac P.T. x 5Aac C.T.):
Zin: 1M for V & 0.02 Ω for A; Range: 0-750W; Ac-
curacy & Linearity: $\pm 0.5\%$ of F.S.
Note: Shunt resistor (0.04 Ω) supplied.

Option 41, Frequency (10KHz/5V Logic): Zin:
1M; Range: 30-10KHz; Accuracy & Linearity:
 $\pm 0.5\%$ of F.S.

Option 42, Hertz (120V, 40-100Hz): Zin: 1M;
Range: 50-150V/40-100Hz; Accuracy & Linearity:
 $\pm 0.5\%$ of F.S.

Option 43, Hertz (240V, 30-100Hz): Zin 1 M;
Range: 100-260V/30-100Hz; Accuracy & Linearity:
 $\pm 0.5\%$ of F.S.

Option 44, Hertz (120V, 500 Hz): Available on a
Powerless (90-140Vac/370-420 Hz) or external pow-
ered unit. For external power, just use Option 44 on
Digits 8 & 9 and specify. On the Powerless model,
use Option 09 (Custom) on Digit 8 & 9 and specify
Option #44 (requires >1 watt from input signal).
For 240 Vac/400 Hz, use Option 29 & specify.
Zin: 1M; Range: 50-150V/300-500Hz; Accuracy &
Linearity: $\pm 0.5\%$ of F.S.

Option 45, Strain Gage (<1K Ω): Excitation: 4V;
Range: 300-1K Ω ; Accuracy & Linearity: $\pm 0.5\%$ of
F.S.

Option 46, Strain Gage (>1K Ω): Excitation: 4V;
Range: 1K-5K Ω ; Accuracy & Linearity: $\pm 0.5\%$ of
F.S.

Note on Strain Gages: Specify impedance, sensitiv-
ity, range and calibration. Example: 350 Ω , 2mV/V,
10mV = 0-100.0%.

Option 47 & 48, RTD: 47: 100 Ω (PT100); 48: 1K Ω
(PT1000); Range: same as RTD; Excitation: 0.5mA;
Accuracy & Linearity: $\pm 0.5\%$ of F.S.; 2, 3 or 4 wire
RTD. For 3 wire, connect -E to -S. For 2 wire, also
connect +E to +S. Warning: Max distance to sensor:
~300 Feet (100M) or use our NT transmitters.

Note for Options 47-52: You can switch from $^{\circ}$ F to
 $^{\circ}$ C via serial port or use Option 9 on Digit 14 and
specify. Default: $^{\circ}$ C (uses internal linearized table).

SECTION A: UPM-DPM INPUT SIGNAL SPECIFICATIONS (Digits 8 & 9) [©]

Options 20 through 58: For Externally Powered Only

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Option 50, Type “J” TC: Range: -210 to 760°C;
Colors: red and white; CJC: Included; Accuracy &
Linearity: $\pm 2^\circ\text{C}$ of F.S.

Option 51, Type “K” TC: Range: -270 to 1370°C;
Colors: yellow and red; CJC: Included; Accuracy &
Linearity: $\pm 2^\circ\text{C}$ of F.S.

Option 52, Type “T” TC: Range: -270 to 400°C;
Colors: blue and red; CJC: Included; Accuracy &
Linearity: $\pm 2^\circ\text{C}$ of F.S.

Note for Thermocouples (TC): Shorting out the +/-
TC input terminals will display the ambient tempera-
ture of the C.J.C. at the input terminals.

Option 53, pH: Range: 0-14.00; $Z_{in} > 10^{15}\Omega$; Tem-
perature compensation: None; Accuracy & Linearity:
 $\pm 0.5\%$ of F.S.

Option 54, ORP: Range: 0-2000mV; $Z_{in} > 10^9\Omega$;
Accuracy & Linearity: $\pm 0.5\%$ of F.S.

Option 55, % RH: Range: Per sensor; Input Type:
2-3 pF Capacitance; Accuracy & Linearity: $\pm 0.5\%$ of
F.S. State sensor’s specifications.

Option 56, Resistance Range: 0-10K Ω = 0-100% =
0-100.0; Accuracy & Linearity: $\pm 0.5\%$ of F.S.

Option 57, 10-50mA Range: 10 Ω input resistance
Accuracy & Linearity: $\pm 0.5\%$ of F.S. ± 1 Digit.

Option 58, None: Serial input only as per Digit 5 for
remote/display controller.

Options 60-89:

For multichannel mixed signals. Same specifications
as per Options 20 through 56 on pg. 24.

For User-Software or drivers, visit:
<http://otekcorp.com/support-downloads/>



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14 SEGMENT ALPHANUMERIC CHART (ASCII) [©]

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Notes:

1. You can “tag” any message (or none) when the set points are enabled or at-will via the serial port.
2. You can change the color when the set points are enabled (see pg. 7 Digit 14) or at-will via simple commands.
3. If you want customized messages, use Option 9 on Digit 14 and OTEK will program it for you!

Decimal		Hexa-Decimal		ASCII	Display
65	97	41	61	A	A
66	98	42	62	B	B
67	99	43	63	C	C
68	100	44	64	D	D
69	101	45	65	E	E
70	102	46	66	F	F
71	103	47	67	G	G
72	104	48	68	H	H
73	105	49	69	U	I
74	106	4A	6A	J	J
75	107	4B	6B	K	K
76	108	4C	6C	L	L
77	109	4D	6D	M	M

Decimal		Hexa-Decimal		ASCII	Display
78	110	4E	6E	N	N
79	111	4F	6F	O	O
80	112	50	70	P	P
81	113	51	71	Q	Q
82	114	52	72	R	R
83	115	53	73	S	S
84	116	54	74	T	T
85	117	55	75	U	U
86	118	56	76	V	V
87	119	57	77	W	W
88	120	58	78	X	X
89	121	59	79	Y	Y
90	122	60	80	Z	Z

Decimal	Hexa-decimal	ASCII	Display
48	30	0	0
49	31	1	1
50	32	2	2
51	33	3	3
52	34	4	4
53	35	5	5
54	36	6	6
55	37	7	7
56	38	8	8
57	39	9	9

!	"	#	\$	%	_
*	+	,	-	.]
=	>	?	@	['
()	&	:	;	<
/	\	^	NOTE: The UPM display also has a clock format (dots) between digits 2 & 3 and 4 & 5.		

Simple Serial Commands (See Command Set and Ordering Information)

•Batch	•Custom: Contact OTEK if not listed here	•Draw	•Frequency
•Integration (Totalizer)	•Julian Clock (RTC)	•Logarithmic (Anti-Log)	•Period
•Phase Angle	•Quadrature	•Rads	•Range
•Rate	•Ratio	•REMs	•Square Root
•Stop Watch	•Time Interval	•Up/Down Counter	•Voltage to Frequency
•Zero Datum	•Math Functions	•User's X-Y Tables	•User's Polynomials
•OFFCO, GACO, TARE	•ZERO, and SPAN: Only for analog input signals		

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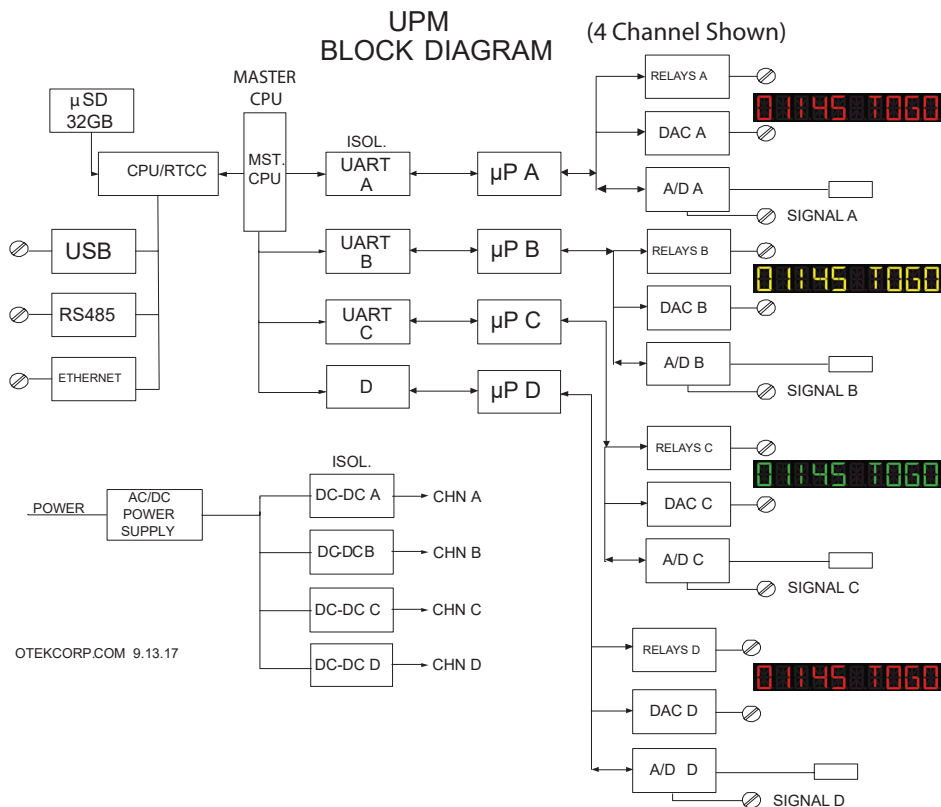
First of all, you can enable any listed functions (1-9 and A-M) on Digit 15 (see pg. 24), but you must select the input level by selecting options 1A-4A or 1B-4B or 1C-4C on Digits 8 & 9 (see pg. 25) when ordering. Since the **UPM-Counter** is field programmable for any listed function, you have a truly **universal counter** at your warehouse! No need to order a timer only, or any other needed functions and hold your production until arrival. Assume you have a 3 channel **UPM-Counter** assigned for Ch. A: Frequency; Ch. B: Batch; and Ch. C: Rate, and you need to display/control the total. All you need to do is establish a serial connection to the **UPM-Counter** and change the least required function to totalizer (Digit 15, Option 2), set your limits and colors and continue your process.

HOW DO WE DO IT?

1. Each channel has its own isolated ASIC, signal conditioner, DAC, (solid-state) relay, and power supply.
2. The isolated CPU all communications are via internal UARTs and interface to the outside world via one common serial port.
3. All available functions, including math functions, algorithms can be implemented on any and all channels via simple serial command. This includes continuous data streams that can be compared with each other. This is ideal for redundant control!

WHAT'S REDUNDANT CONTROL?

Suppose your nuclear vessel temperature is being monitored by a 3 channel **UPM-DPM** (or **UPM-Counter** for RAD counting) and channel A trips its high limit, but channels B and C do not. After comparing the data from all 3 channels, the UPM-DPM applies the democratic majority rule, disables channel A, sends a report via the serial port, enables warning visual messages/color and/or relays and/or analog outputs. The rest is up to you. Also see our model **TRC** for triple redundant control.



B) THE UNIVERSAL COUNTER/TIMER CLOCK

(Digit 15, Options 1-9 and A-L):

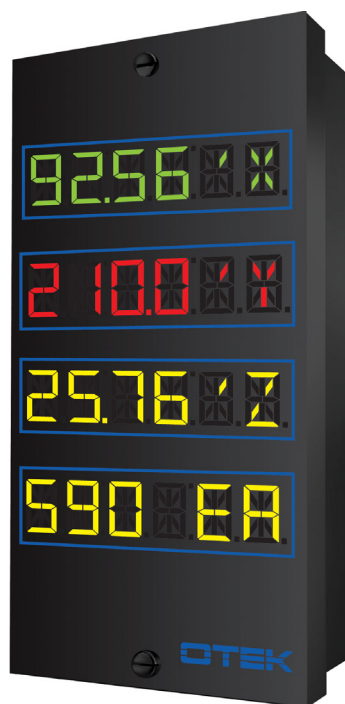
The UPM can function as a **universal counter**: It accepts digital inputs to perform over 20 functions, all of which can be selected by serial input commands.

Features: Fully configurable for any listed function via serial port.

- * Same features as **DPM** section except it is only offered in external power (Digit 10, Options 1-4).
- * Same features as **NTM** series except instead of a bargraph it has an Alpha-Numeric Tricolor display.
- * Multiple isolated displays (up to four) allow for complex math functions/display/control of process variables such as Volts/Amps/Watts/Frequency/Pressure/Flow/Volume and temperature, and PID or **redundant control**.
- * Three angle positioning (X, Y, Z).
- * Intelligent HMI moving messaging, up to 18 characters.
- * Automatic process control (MMI)

Functions

- Batch
- Debouncer
- Draw
- Frequency
- Integrations
- Julian Clock (RTC)
- Log/Anti-Log Extractor
- Period
- Phase Angle
- Positioning
- Quadrature
- Range
- Rate (1/F)
- Ratio
- Square Root
- Stopwatch
- Time Interval
- Totalizer
- Up/Down Counter
- Up/Down Timer, milliseconds to years!



Input & Output Terminals & How To Use Them:

Note: Not to be confused with input signals for measurement.

Besides the regular input signal terminals, the UPM has other external terminals to control its functionality. These functions can be enabled via serial command or managed by the internal function selected. Refer to customized user's manual.

Terminals that are already dedicated and controlled externally have a 5K pull up to the isolated 5Vdc of its channel and only accept 5V logic levels or dry contacts.

Borrow (only in the first stage of a string): Connect "Borrow" pin to "Carry" pin of previous unit (or channel) to expand the number of digits (i.e. 6-12).

Carry (only in the last stage of a string): Connect "Carry" pin from the first unit to the "Borrow" pin of the next unit (or channel) to expand the number of characters.

Count Hold: "Grounding" this pin (5K pull up) forces the counter to stop counting.

Display Hold: "Grounding" this pin (5K pull up) holds the display, but allows the counter to continue counting.

Frequency out: This pin is the F out of the signal conditioner after it has been converted to 5V logic levels. Minimum load = 1KΩ. Useful for F-V.

Run/Stop: This pin is functionally the same as "Counter Hold" except has a <1μS response time.

Frequency Response (No De-Bouncer): Useful for DCS/SCADA/PAC interface, <1μS response time.

Reset: This pin is used to reset the internal accumulated count and has no De-Bouncer since its used in "Frequency" counter (up/down) modes. Response time:<1μS.

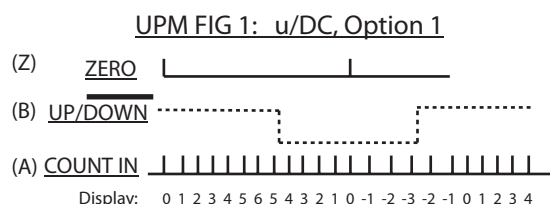
Input & Output Terminals & How To Use Them

(Continued):

Up/Down: Leave this pin open for “UP” count or “ground” it for “DOWN” count. If connected to an encoder, connect “UP” into “A” and “DOWN” into “B” and “RESET” to “Z” for rotary zero detect encoders.

Inputs/Functions: Conditions: If Digits 8 & 9 have Options 00 through 58, 60-68, 70-78 or 80-88, then Digit 15 must be Option “0 (None).”

Up/Down Counter (Option 1): (also see “Quadrature” counter) A counter is a totalizer that can be enabled/disabled by several means such as an input (gate), a command (serial), or a result of another action produced by your algorithm, such as CHA+CHB/CHC = 0. Therefore, start/stop counts or times on CHD, which can be useful to synchronize 3 phase power lines or radiation counters. If you use the F-V option, you can convert analog signals to digital format for higher accuracy synchronizing. Imagine the possibilities limited by your algorithm!



Totalizer (Counter), Options 2 & 1A-4C: This function accumulates the number of pulses received on Input A after Input B has been taken high, will sum the events for as long as Input B remains high and will decrement on the falling edge of Input B. You can switch the logic of Inputs A and B via simple commands and by using the command “TOTDN” (totalizer down) instead of “TOTUP” (totalizer up), you can enable any controlling output/message (relay, O.C.T., DAC, color change, message, etc.).

Multiplier: (also see “Divider”) In some applications the input data needs to be multiplied to arrive at unity count such as tanker to barrels, barrels to gallons, gallons to liter, etc. Select the appropriate multiplier of your choice with up to four decimals (xxxx.yyyy).

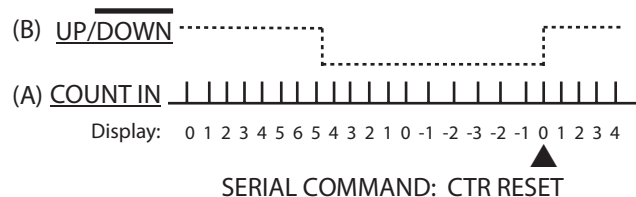
Divider: (also see “Multiplier”): Some applications require counting in multiples of units such as dozens/bag, gallons/barrel, liters/cask, etc.

Just select the divider number and count in desired unit of measurement ($\frac{1}{2}$, $\frac{1}{56}$, $\frac{1}{500}$, etc.).

Quadrature (Option 3): (also see “Datum Zero”) This function includes inputs for Input A (count), Input B (direction), and Input Z (datum zero). When Input A rising edge leads Input B rising edge, the UPM will increment its count by one (1). When Input B leads Input A, it will decrement its count by one (1). Regardless of Logic state of Inputs A or B, when Input Z transitions from Logic 0 to 1, the UPM will reset to zero. This is important when using rotary encoders to indicate the zero degree point. Again, the resolution of the measurement is determined by the number of pulses/rotation of your encoder and the multiplier you select. But you can display/control the process in decimal or clock (360°:60M:60S) format. Linear encoder is used for length measurements/control, rotational encoders for rotational (degrees) applications. The automatic tricolor change will warn the operator of anomalies.

The UPM can be forced to zero count via a serial command or an OR connection at the Z Input since it has a 10K Ω pull up to 5V (high to reset to zero, low to run). The Z (zero) pulse should be as short as possible ($>1\mu\text{S}$) to avoid missing a count.

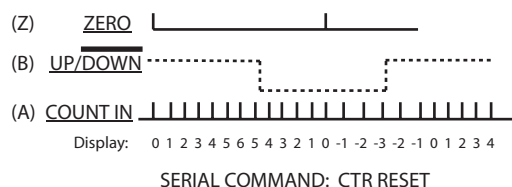
UPM FIG 3: Quad A, Option 3



3.1 Zero Datum: also see “Quadrature” and “Up/Down” Counter.

This single pulse/revolution is produced by rotary encoders to indicate 0° and it is used by the UPM to zero its display and start counting up or down in a degree fashion with degrees, minutes, second, and milliseconds of rotation determined by the resolution of your encoder. For linear measurements, use command “LIN.” For rotational, use the command “ROT.”

UPM FIG 3.1: Quad B, Option 3



Batch (Option 4): Use “Batch” to count or measure specific amount of product in a container. Example: gallons in a barrel, peanuts in a jar, pills in a bottle, etc.

Batch Total: Use “Batch Total” to add the total number of batches of a specific product. Example: barrels in a tanker, jars in a box, boxes in a skid, skids in a truck, etc.

UPM FIG 4: Batch, Option 4

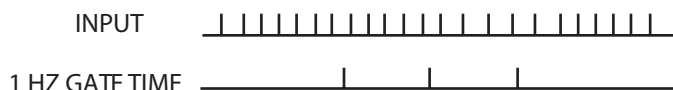


IF YOU DON'T SEE IT
ASK FOR IT!

Frequency (Option 5): Use “Frequency” to totalize the number of pulses over a fixed measure of time. Example: 60Hz = 60 cycles or pulses/second such as a household electrical line, 94.652 MHz might be the transmitting frequency of a radio broadcaster, etc.

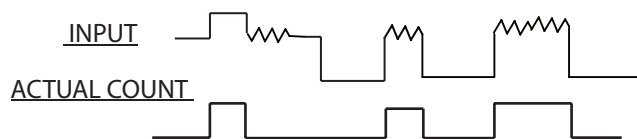
Note: “Frequency” is normally defined as events (pulses) per second (10/s, 1k/s/MHz). “Rate” is defined as events (pulses) per minute, hour, day for slow-occurring events versus a unit of time. See Rate (1/F), such as in oil rigs.

UPM FIG 5: Frequency, Option 5



5.1 De-bouncer/Filter: UPM’s Debouncer (Filter) function is useful when the input signal is from relay contacts that “bounce” or are of an AC nature. Select a “debouncer” time base that covers the worst case condition of the bouncing signal. Relays typically have a bouncing time of 5–20mS, so a time base >25mS will be safe to use. However, if the switching (on-off) speed of the relay is <30mS, you should not use a time base greater than 25mS. The best time base would be approximately >15 and <20mS. This is also useful for AC power lines (>18mS for 60 Hz, >22mS for 50 Hz, or >3mS for 400 Hz power lines).

UPM FIG 5.1: De-Bounce, Option 5



SECTION B: COUNTERS

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5.2 Burst: There are applications where it is desirable to measure the “burst” of a frequency input and ignore the base frequency. In this case, select a gate time > the minimum (maximum normal) burst frequency. Example: Normal: <1kHz, burst >1.5kHz <20kHz. Select a gate of 1.4mS. The UPM will only display the burst’s frequency of approximately 3.2kHz. To count the number of bursts, enable the counter function and the UPM will display the number of bursts since last reset.

UPM FIG 5.2: Burst, Option 5

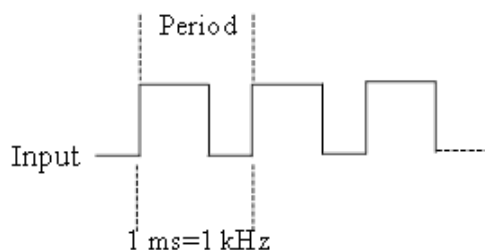


RADs (Option 7): Also known as units of radiation (radiation absorption dose) or “grey” units in SI. Radiation transmitters/sensors produce either analog output (4-20mA) or pulses. If pulses per “grey,” you can accumulate (totalize) the number of pulses over a period of time. If analog, you can integrate logarithmically the total “dose.” See integrator.



Period (Option 6): Period is the inverse of frequency and useful to convert wide frequency range signals to frequency equivalent without using extensive hardware or CPU time by mathematically converting the time a signal takes to switch from “high to low” AKA: “cycle” and converting this time to frequency. IOW: to measure a 1kHz “frequency” signal the CPU will accumulate the number of pulses over 1 second of time. Period is also useful to convert to strokes/minute or events/hour without having to wait hours to accumulate the events, all you need is 1 period. Using the “period” the CPU will take ~1 millisecond of time freeing it to do the other tasks.

UPM FIG 6: Period (Option 6)



REMs (Option 8): AKA Si (Sievert). Radiation detectors/transmitters produce either a pulse per unit of radiation (~0.01 Sievert) or analog signal (usually mV or 4-20mA). In either case, the UPM accepts both signals and if pulsed, it totalizes the number of pulses received. If analog, it uses the integration function, along with the log or anti-log (contracting or expanding) for the reading and gives you the accurate rate (dose) of accumulated radiation in an area.



SECTION B: ANTI-LOG COUNTERS

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Custom (Option 9): Contact OTEK for your custom algorithm/application.

Typical custom design that replaces FF&F obsolete 20mA C.L. (teletype) input 1960's radiation monitor (see pg. 30) with the **UPM-R**.



Up/Down Timer (Option A): Just like the Up/Down Counter (Option 1), but instead of using external pulses to count, the UPM uses its internal programmable time base to increment/subtract its count. Default is one second, range is 1 μ s to 10 seconds.

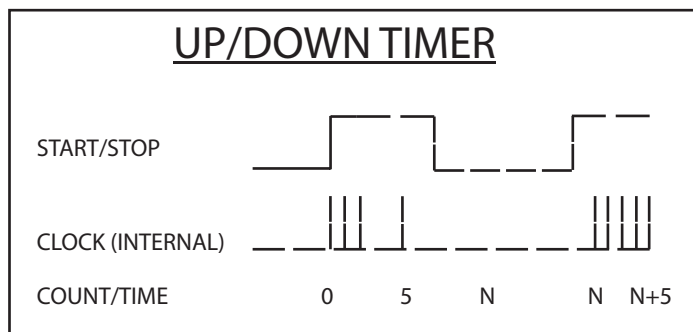


Time: There are three times: **time interval** (Option B), **elapsed time** (Option C) and **range time** (Option D).

Elapsed time means time that has occurred from the starting point and range time means estimated time to end of task (if all conditions remain as they are). Elapsed time requires a time base selection, a “Start” pulse and an “End” pulse, both rising edge (Positive Logic). Range time requires a time base selection (mS to seconds), a reference input signal (events/time base), and a “Total” goal or destination value.

Note: You can enable/disable the up/down function via serial command.

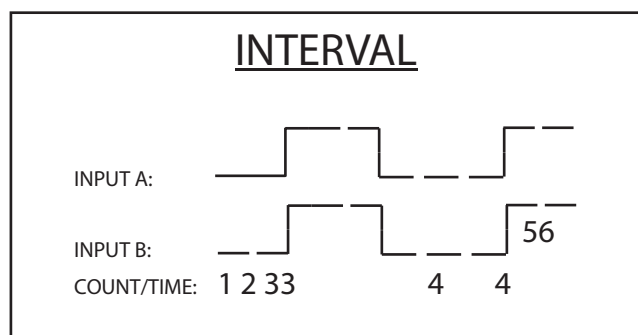
Example: Assume you want to know how long it will take to fill a tanker, whose capacity is 164,000 barrels, at a present rate of 3450 barrels/hr. However, if the rate varies to 2945 or 3649/hr, how long will it take in seconds, minutes, hours, or days? The **UPM** will automatically update its display and serial output as well as its analog output (for PID control) to inform you of the calculated end of process. All math functions are available for you to automatically select multipliers, dividers, or external variables as required. Also, you can use the V-F input option to convert analog inputs (4-20mA, 1-5V, etc.) to events for the range time algorithm. If you have a mileage “Range” indicator in your car, the UPM’s **range** function works the same.



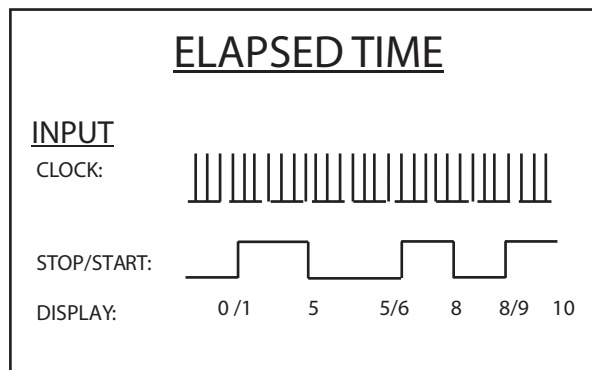
SECTION B: COUNTERS

UPM™
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Time Interval (Option B, cont.): This measures the time interval between two inputs A and B and starts on the rising edge of Input A and stops on the rising edge of Input B. Alternatively, you can select the falling edge or start with Input B and select your time base (μ S to seconds) and any actions to occur (relay, O.C.T, display change, math functions, average, etc.). If you use a "Gate Time" function, you can display/control the average of all the pulse widths that occurred during the gating time.



Elapsed Time (Option C): Depending on the model selected (number of characters/digits), you can display/control events in days, hours, minutes, seconds, mS, and μ S (D:365, H:24, M:60, S:60, μ S:000,000) for a 15 digit model(s) or 5 digits for the smallest package (-L). Use the relays, O.C.T. or analog output to control your process by setting limits/alarms (usually 00:00:00).



Range (Option D): This function is extremely useful in determining how long (range) the asset you have (fuel, beans, water, etc.,) will last you if you maintain the present usage at the present rate. It's no different than a retiree wishing that his money will outlast him, or wondering if you have enough gas to get to the next gas station or calculating whether the rods in a reactor will last until the next "load" arrives. All you need to do is enter the value of "In Stock," and the UPM will use prior (if programmed into the memory) information to determine the range. You can also enter the rate/unit (unit = time, events, etc.) and the UPM will calculate the range.

Contact sales@otekcorp.com with information on your transducer. You'll need to provide data such as:

- 1) Existing fuel intake
- 2) Fuel used (if not full)
- 3) Present consumption/time

The UPM will calculate the range based on actual use of fuel per unit of time or events.



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Julian Clock (Option E): Use Julian Clock (RTC) to indicate time, date, and year to control any loads via the four relays or analog output (4-20mA) of any channel. Four and five digit models alternate the display as follows:

2014 (year) **12 (mo.) **27 (date) 10:15 or
22:15 (hrs and min) 45.07 (sec)

or

2014 (year) *159 (day) **27 (date) 10:15 or
22:15 (hrs and min) 45.07 (sec)

or month, date, year, time or time, data, month, year.

Place any callout in any order and use “*” to indicate dead space. Enable/disable any on-off (Relay/O.C.T.) at any specific time/date/year or analog output to any value.

Example 1: In the year 2015:

K1ON 2015**08**15 07:15

K1OF 2015**09 **01 *9:30

- Turns on Relay K1 on August 15th at 7:15 a.m.

- Turns off Relay K1 on September 1st at 9:30 a.m.

Example 2:

- 2015 (year)*AN1 *4.00 (mA) **10 (month) **19
(date) 23:59 (time)

- 2015 (year)*AN1 *8.50 (mA) **10 (month) **20
(date) 05:30 (time)

- 2015 (year) *AN112.00 (mA) **10 (month) **20
(date) 09:30 (time)

- 2015 (year) *AN116.00 (mA) **10 (month) **20
(date) 12:30 (time)

- 2015 (year)*AN1 20.00 (mA) **10 (month) **21
(date) 0000 (time)

Turns analog out to 4.0mA on October 19th of 2015 at 23:59 (11:59 p.m.), holds it at 4mA, then switches its outputs to 8.50mA on the 20th of October at 5:30 a.m., then to 12.00mA on October 20th at 9:30 a.m., then to 16.00mA on the 20th of October at 12:30 p.m., then to 20.00mA on October 21st of 2015 at 12 midnight (0000 hours).

Rate (Option F): (also see “Frequency”) Rate is used for slow occurring events such as strokes/minutes, GPM, LPM, barrels/day, etc. instead of fast occurring events which are measure in Hertz (usually seconds) such as radio frequencies or power lines.

F.1 Digital Mode Rate: Rate uses the 1/F formula to arrive at the rate per unit of time by counting the number of events that occur within the time base used. If you want to measure/control the process that produces approximately 1/second, use the 1 or 10 second time base. This will give you a reading of approximately 60 EPM (events/minute) or 3600/hr with fractions of an event (3600.3), if required. This is commonly used in oil rigs to measure the barrels/day produced without using a flow meter.

F.2 Analog Mode Rate: If your process produces an analog signal such as 4-20 mA, 1-5 mA, 1-5 V, 0-10V or other, you can use our option 1C, 2C, 3C or 4C (voltage to frequency) to convert/scale the analog to digital form and follow the example noted in Digit Mode Rate C.1. Rate is used to calculate/display the frequency of slow occurring events in a short period of time (seconds) without having to wait minutes, hours, or days to find their frequencies. All you need to do is select the time base (gate) in 0.1, 1, or 10 seconds and multiplier (60 [M], 3600 [H], 86900 [D]) to determine the unit of time.

Contact us at: sales@otekcorp.com.

Date/Time: You can make your own format to suit your country’s needs. Just identify the label and sequence in moving message. You can control any and all four Relays and DAC per channel at will. Default format: U.S. standard: month – date – year – hour – minute – second. Note: Models with 12+ characters (-4) are best suited for calendar-controlled functions.

SECTION B: COUNTERS

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Ratio (Option G): Ratio is the ratio of two signals (A/B) to determine their positive (greater) or negative (smaller) frequency vs. each other. Normally, it is used to synchronize their zero crossings such as in power lines (synchrosopes), other matching frequency applications (radio broadcasts), or conveyor speed synchronization. Using the **UPM** analog output as proportionally controlled by the output of the “Ratio” function can automatically synchronize the objects similar to PID.

Phase Angle (Option H): (needs 2+ inputs) It measures the phase relationship between any two inputs and its value is displayed in degrees (0:00:00 to 360:00:00) formatted DDD:MM:SEC.000 (degrees, minutes, seconds, and milliseconds of rotation). Best with 6 digit models.

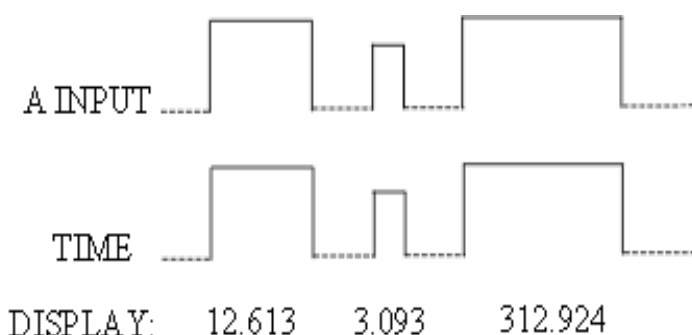
Draw (Option J): Use “Draw” to measure/control two variables that should maintain identical amounts, speed, velocity, etc. Draw = $A/B - 1$ is same as “Ratio,” but 1 unit is subtracted from it to give you a zero display (differential) when their ratio is 1:1. Example: Two conveyors should be travelling at the same speed/tension/level and the **UPM** will display the differential between them.

V-F {Voltage to Frequency Converter} (Option K): The **UPM** series offers an optional high accuracy and resolution V-F (also F-V) Converter capable of converting a 0-1 V signal (or 4-20mA and others on request) to 0-100 kHz giving you a 0.00001V (10μV) resolution ($\pm 0.000001\%$ of full scale). When you use this option, converting pressure to flow and/or volume using the $\sqrt{}$ function becomes a very economical and accurate alternative to old techniques.

Integrations (Option L): Use “Integration” to integrate, accumulate, or totalize events (pulses) over an open period of time (seconds, minutes, hours, days). Also see “Totalizer,” “Event Counter,” “REM Counter,” “Logarithmic,” “Anti-Log,” and “Volume.” Using our V-F (voltage to frequency counter) option, you can convert analog signals to frequency, such as pressure to flow and volume using our “Square Root” extractor function.

L.1 Square Root: This standard feature of the **UPM** allows you to convert the differential pressure from a pressure transmitter to instantaneous flow, and if you enable the integrator mode, to accumulate (per unit of time) the flow into volume.

M. Pulse Width (Option M): To measure/control the duration (width) of a signal remains at “Logic 1”. Its measurement resolution is determined by the gate time selected (10μS to 10sec.). Again, you can use the math functions to meet your algorithm needs such as $CHA + CHB$, $CHA - CHB$, $CHC \times CHD$, $CHC/CHB/\sqrt{}$, etc.



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SECTION B: COUNTERS

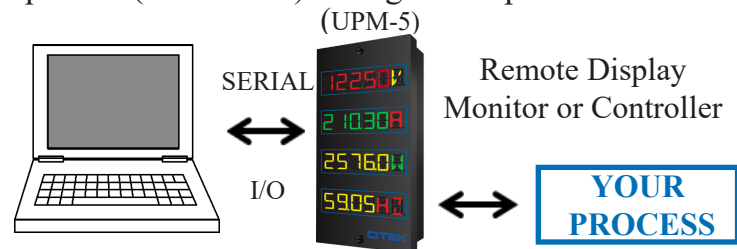
B) UNIVERSAL COUNTER/DPM

As a universal counter/timer/clock, the UPM performs 23 input functions (see ordering info on pg. 24) as simple as up/down counter to integration. For log/anti-log see pg. 30, for radiation monitor UPM-R.

SECTION C: REMOTE DISPLAYS

C) REMOTE DISPLAYS

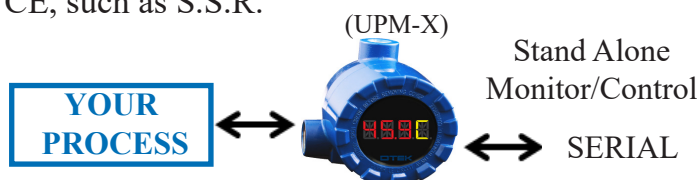
Digits 8 & 9, Options 58, 68, 78, or 88: As a remote (serial input) display/controller, the UPM has no analog or digital inputs enabled or tested, but it can have On-Off Control (Digit 11) and/or Analog Outputs (Digit 12). This will allow you to control your process with your own commands/algorithm and simultaneously display an intelligent message to the operator (HMI/MMI). Imagine the possibilities!



SECTION D: CONTROLLERS

D) CONTROLLER

It can function as a **controller**: it includes an isolated optional analog output (4-20mA) that is internally powered and capable of driving up to 1K Ohm loads. The SPDT relays (4/channel) are capable of driving up to one Amp at 120Vac/30Vdc resistive loads. 300V MOVs are included. The open collector transistors (O.C.T.) are isolated from the signal and power inputs and can drive up to 30mA@30Vdc/VCE, such as S.S.R.



CUSTOMS

Class 1E (Nuclear Safety), Military (to specific MIL-Specs) and industrial grades are available.

SECTION E: OTHER USES ^{UPM™}

11/28/23

E) OTHER USES

E.1 It can function as a **scientific meter**: it performs math functions (+, -, x, ÷, √), X-Y tables, range, polynomials, log-antilog with exponential (ideal for RAD/REM a.k.a. Gy/SV).

E.2 It can function as a **smart message center**: we use ultra-efficient 15 segment automatic tricolor (R/Y/G) LEDs for full alphanumeric display. Number of characters vary with model. Serial I/O includes isolated USB, RS485, or Ethernet.



E3. It can function as a **data logger (paperless recorder)**: some models include an optional removable 32GB µSD memory card for data storage and it is configurable to meet your needs via simple commands. Standard factory configuration is when any limit is reached and include the units I.D. number, name, run time stamp, limit data and message.

E.4 **ABOUT ISOLATION**: all models in the OTEK New Technology series include 100% isolation (>500Vdc) between ALL I/O, including serial I/O, power input, control outputs (relays and O.C.T.), analog outputs, and signal (analog or digital) inputs. The UPM-F is “display only” and has no outputs.

CONCLUSION:

As evidenced, the UPM is truly the **Universal Panel Meter** you have been waiting for. All the listed functions (and more) are included and found in the User's Manual, making the UPM a versatile micro-computer with controlling capabilities superior to a PLC and inferior to it in cost and size.

You can use it to perform most any task. If not, contact us to solve the problem together.

Use Note: Remember the UPM's recording capabilities with its exclusive 32GB memory capacity. That can save you lots of headaches.

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- **NTM Series:** Barmeters: include autotricolor bargraph & digits for analog inputs. Choose from 20 models that can be signal or externally powered and can include control outputs (4-20mA & 4 relays/channel).
- **NTY:** Transmitter (4-20mA) for DIN-Rail or panel mount applications with over 30 input signals, relays (2), and outputs.
- **NTT:** Transmitter (4-20mA) for panel mount applications and include serial or manual (potentiometer) control and include over 30 input signals.

The only differences between the series are:

FEATURES	UPM	NTM	NTT	PNP
FUNCTION	DPM/ COUNTER	METER/ CONTROLLER	4-20mA TRANSMITTER	METER/ CONTROLLER
INPUTS	Analog, Serial & Digital	Analog & Serial	Analog & Serial & Potentiometer	Analog
DISPLAY	Alpha-Numeric Tricolor	Tri-Color Bar-Digital	Tri-Color Bar-Digital	Multicolor Bar Digital
TRICOLOR BAR	None	51 Segments	51 Segment	101 Segments
# OF DIGITS	Up to 18	4	4	4.5
POWER	Signal or External	Signal or External	External	Signal or External
SIGNAL CONDITIONERS	>30 Analog & >20 Digital	>30 Analog Only	>30 Analog Only	>30 Analog Only
USB/485/ETHERNET	Yes	Yes	Yes	USB (On request only)
MEMORY	Yes	Yes	On Request	No
OUTPUTS	4-20mA, Relays or SSR	4-20mA, Relays or SSR	4-20mA, Relays or SSR	2 Each H.V SPDT

4-20mA TRANSMITTERS

NTT-1



NTT MODEL 420



NTT-5



PNP-N



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UPM SERIES ORDERING INFORMATION

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NOTE: Contact sales@otekcorp.com for availability for Digit 15: Universal Counter/Timer/Clock

4 5 6 7 8 9 10 11 12 13 14 15
[U] [P] [M] - [] - [] - [] - [] - [] - [] - [] - [] - []

DIGIT 4

HOUSING (BEZEL DIMENSION & MATERIAL)

0.....1 Ch, 6 Digits (3.8 x 1.9") ½ DIN, Plastic or Metal
3.....1, 2, or 3 Ch, 6 Digits Each (4") ANSI Swbd, Plastic or Metal
4.....1, 2, or 3 Ch, 6 Digits Each (1.4 x 11"), Plastic or Metal
5.....1, 2, 3, or 4 Ch, 6 Digits Each (3 x 6"), Plastic or Metal
A.....1, 2, or 3 Ch, 6 Digits Each (3.8 x 3.8") ¼ DIN, Plastic or Metal
F.....1 Ch, 6 Digits (2 x 3"), Flat Pack Plastic
C.....Custom (Contact OTEK)
H.....1 or 2 Ch, 6 x 1" Horizontal, Plastic Only
L.....1 Ch., 6 Digits (2.9x1.5"), Plastic or Metal
R (see pg. 30).....1 Ch, 8 Digits (1.5 x 5"), Metal Only
X.....1 Ch, 4 Digit (4 x 4") Explosion Proof, Metal

DIGIT 5

SERIAL I/O

0.....USB
1.....RS485
2.....Ethernet
3.....USB & µSD Memory
4.....RS485 & µSD Memory
5.....IRDA (-X Only)
6.....TTY (Remote Display, -R Only)
8.....None (-F Only)
9.....Custom (Contact OTEK)

DIGIT 6

GRADE

0.....Industrial & Plastic
2.....Industrial & Plastic NEMA
3.....Industrial & Metal NEMA
9.....Custom (Contact OTEK)
E.....To EPRI-Nuclear & Metal (Contact OTEK)
I.....Industrial & Metal
M.....To Mil-Spec & Metal (Contact OTEK)

DIGIT 7

OF CHANNELS (3)

1.....One
2.....Two
3.....Three
4.....Four
9.....Custom (Contact OTEK)

INPUT SIGNAL (2, 4, 5, 6, 8)

See pg. 16 and enter option number for Digits 8 & 9

DIGIT 10

POWER INPUT (2)

0.....Powerless™ (No Power)
1.....Non-Isolated USB
2.....Isolated 5Vdc
3.....Isolated 7-32Vdc
4.....Isolated 90-265Vac
5.....Non-Isolated 5VDC (-F Only)
6.....Non-Isolated 7-32VDC (-F Only)
9.....Custom (Contact OTEK)

DIGIT 11

CONTROL OUTPUTS

0.....None
1.....CH. 1.....O.C.T. (4)
2.....CH. 1.....1A.....Relays (4)
3.....CH. 1 & 2.....O.C.T. (8)
4.....CH. 1 & 2.....1A.....Relays (8)
5.....CH. 1, 2 & 3.....O.C.T. (12)
6.....CH. 1, 2 & 3.....1A.....Relays (12)
7.....CH. 1, 2, 3 & 4.....O.C.T. (16)
8.....CH. 1, 2, 3 & 4.....1A.....Relays (16)
9.....Custom (Contact OTEK)
C.....H.V SPDT Reed Relay (4)
D.....H.V SPDT Reed Relay (8)
E.....H.V SPDT Reed Relay (12)
F.....H.V SPDT Reed Relay (16)
G.....H.V SPDT MOSFET (4)
H.....H.V SPDT MOSFET (8)
J.....H.V SPDT MOSFET (12)
K.....H.V SPDT MOSFET (16)

DIGIT 15

COUNTER/FUNCTIONS (7, 8)

0.....None (Use Digits 8 & 9)
1.....Up/Down Counter
2.....Totalizer
3.....Quadrature
4.....Batch
5.....Frequency
6.....Period
7.....RADS
8.....REM
9.....Custom
A.....Up/Down Timer
B.....Time Interval
C.....Elapsed Time
D.....Range
E.....Julian Clock
F.....Rate
G.....Ratio
H.....Phase Angle
J.....Draw
K.....V-F (Voltage to Frequency)
L.....Integration
M.....Pulse Width

DIGIT 14

RANGE/CALIBRATION

0.....Standard
9.....Custom (Contact OTEK)

DIGIT 13

SCALE PLATE

0.....Standard (0-100%)
9.....Custom (Contact OTEK)

DIGIT 12

ANALOG/POWER OUTPUT

0.....None
1.....CH. 1.....4-20mA Out (1)
2.....CH. 1.....30V Out (1)
3.....CH. 1 & 2.....4-20mA Out (2)
4.....CH. 1 & 2.....30V Out (2)
5.....CH. 1, 2 & 3.....4-20mA Out (3)
6.....CH. 1, 2 & 3.....30V Out (3)
7.....CH. 1, 2, 3 & 4.....4-20mA Out (4)
8.....CH. 1, 2, 3 & 4.....30V Out (4)
9.....Custom (Contact OTEK)

NOTES:

- If you select Option 0 on Digit 15, you cannot have options 1A-1C, 2A-2C, 3A-3C, and 4A-4C as your input signal on Digits 8 & 9.
- See restrictions on UPM-F on pg. 5 (Serial I/O), pg. 6 (Control Outputs), pg. 7 (Analog Outputs), and pg. 8-9 (Input Signal).

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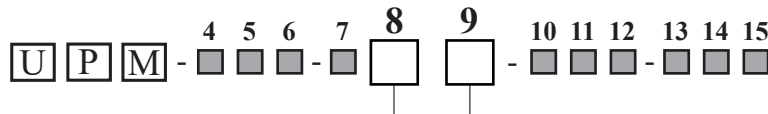
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INPUT SIGNAL



FOR LOOP/SIGNAL POWERED ONLY (4)

00.....	4-20mA, All Channels = Input, Loop Power
01.....	Volts ac, All Channels, Signal Power
02.....(See note 7).....	5 Amps ac, All Channels, Signal Power
03.....(See note 7).....	Watts ac, All Channels, Signal Power
04.....(See note 7).....	Hertz Vac, All Channels, Signal Power
05.....Mixed 2 Channel.....	Ch. 1: Vac; Ch. 2: Aac, Signal Power
06.....Mixed 2 Channel.....	Ch. 1: Vac; Ch. 2: Wac, Signal Power
07.....Mixed 2 Channel.....	Ch. 1: Vac; Ch. 2: Hz, Signal Power
08.....Mixed 2 Channel.....	Ch.1: Aac; Ch. 2: Wac, Signal Power
09.....	Custom (Contact OTEK)
10.....Mixed 3 Channel.....	Ch. 1: V; Ch. 2: A; Ch. 3: W, Signal Power
11.....Mixed 3 Channel.....	Ch. 1:V; Ch. 2: A; Ch. 3: Hz, Signal Power
12.....Mixed 3 Channel.....	Ch. 1: V; Ch. 2: W; Ch. 3: Hz, Signal Power
13.....Mixed 3 Channel.....	Ch. 1: A; Ch. 2: W; Ch. 3: Hz, Signal Power
14.....Mixed 4 Channel.....	Ch. 1: V; Ch. 2: A; Ch. 3: W; Ch. 4: Hz, Signal Power
16.....	7-130 Volts dc, All Channels, Signal Power
17.....	10-50mA, All Channels = Input, Loop Power
18.....	10-500mAac, All Channels = Input, Signal Power

FOR EXTERNAL POWER ONLY (1-4 Ch.) [5-8]

20.....	4-20mA (All Channels Same Input)
21.....	100mVdc F.S.
22.....	1Vdc F.S.
23.....	10Vdc F.S.
24.....	100Vdc F.S.
25.....	10mAac F.S.
26.....	100mAac F.S.
27.....	Watts dc (1V x 1A) F.S.
28.....	Watts dc (1V x 1V) F.S.
29.....	Custom (Contact OTEK)
30.....	0.1V RMS F.S.
31.....	1V RMS F.S.
32.....	10V RMS F.S.
33.....	150V RMS F.S.
34.....	250V RMS F.S.
35.....	0.1A RMS F.S.
36.....	1A RMS F.S.
37.....	5A RMS F.S.
38.....	W RMS (1V x 1Vac) F.S.
40.....	W RMS (120V x 5Aac) F.S.
41.....	Hertz (10KHz/5V Logic) F.S.
42.....	Hertz (120Vac/40-100 Hz) F.S.
43.....	Hertz (240Vac/30-100 Hz) F.S.
44.....	Hertz (120Vac/500 Hz) F.S.
45.....	Strain-Gage ($\geq 300 < 4K$ Ohm)
47.....	RTD (PT100)
48.....	RTD (PT1000)
50.....	TC (Type J)
51.....	TC (Type K)
52.....	TC (Type T)
53.....	pH (0-14.00)
54.....	ORP (0-2000mVdc)
55.....	% RH (Specify Sensor)
56.....	Resistance (0-10K Ω)
57.....	10-50mA F.S.
58.....	None (Serial Input Remote Meter)
1A.....	Any Digit 15, TTL Input Level
1B.....	Any Digit 15, H.V. Input Level
1C.....	Any Digit 15, V-F (Option K) Input Level

MIXED INPUT SIGNALS (2 CHANNELS)

60.....	Ch.1: 1V; Ch.2: 1A (.2 Ω) RMS
61.....	Ch.1: 10V; Ch.2: 1A (.2 Ω) RMS
62.....	Ch.1: 100V; Ch.2: 1A (.2 Ω) RMS
63.....	Ch.1: 100V; Ch.2: 5A (.04 Ω) RMS
64.....	Ch.1: 150V; Ch.2: 5A (.04 Ω) RMS
65.....	Ch.1: 250V; Ch.2: 5A (.04 Ω) RMS
66.....	Ch.1: 150V; Ch.2: 100Hz (120 V Line) RMS
67.....	Ch.1: 250V; Ch.2: 100 Hz (240V Line) RMS
68.....	None, Serial Input Only
69.....	Custom (Contact OTEK)
2A.....	Any Digit 15 TTL Input Level
2B.....	Any Digit 15 H.V. Input Level
2C.....	Any Digit 15 V-F (Option K) Input Level

MIXED INPUT SIGNALS (3 CHANNELS)

70.....	Ch.1: 1V; Ch.2: 1A (.2 Ω); Ch.3: W RMS
71.....	Ch.1: 10V; Ch.2: 1A (.2 Ω); Ch.3: W RMS
72.....	Ch.1: 100V; Ch.2: 1A (.2 Ω); Ch.3: W RMS
73.....	Ch.1: 100V; Ch.2: 5A (.04 Ω); Ch.3: W RMS
74.....	Ch.1: 150V; Ch.2: 5A (.04 Ω); Ch.3: W RMS
75.....	Ch.1: 250V; Ch.2: 5A (.04 Ω); Ch.3: W RMS
76.....	Ch.1: 150V; Ch. 2: 5A (.04 Ω); Ch.3: 100Hz RMS
77.....	Ch.1: 250V; Ch. 2: 5A (.04 Ω); Ch.3: 100 Hz RMS
78.....	None, Serial Input Only
79.....	Custom (Contact OTEK)
3A.....	Any Digit 15 TTL Input Level
3B.....	Any Digit 15 H.V. Input Level
3C.....	Any Digit 15 V-F (Option K) Input Level

MIXED INPUT SIGNALS (4 CHANNELS)

80.....	Ch.1: 150V; Ch.2: 5A (.04 Ω); Ch.3: W; Ch.4: 100Hz RMS
81.....	Ch.1: 250V; Ch. 2: 5A (.04 Ω); Ch.3: W; Ch.4: 100 Hz RMS
82.....	Ch.1: 120V; Ch. 2: 5A (.04 Ω); Ch.3: W; Ch.4: 500 Hz RMS
83.....	Ch.1: 250V; Ch. 2: 5A (.04 Ω); Ch.3: W; Ch.4: 500 Hz RMS
88.....	None, Serial Input Only
89.....	Custom (Contact OTEK)
4A.....	Any Digit 15 TTL Input Level
4B.....	Any Digit 15 H.V. Input Level
4C.....	Any Digit 15 V-F (Option K) Input Level

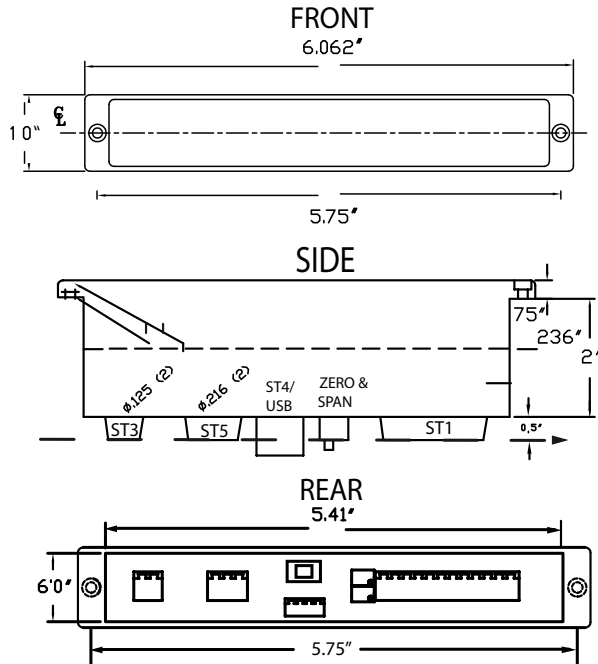
NOTES:

3. # of input channels is governed by Digit 7.
4. Option 00-14 only for loop/signal powered (Digit 10, Option 0).
5. Options 20 thru 58 available for all models; Options 60 thru 69 only for models with 2+ channels (Digit 7, Options 2-4); Options 70-79 only for models with 3+ channels (Digit 7, Options 3 or 4); Options 80-89 only for Digit 7, Option 4.
6. Options 20-89 only for externally powered models (Digit 10, Options 1-9).
7. Options A accept 5V TTL/CMOS inputs or dry contacts (10K Ω pull ups). Options B accept dry contacts to 150Vdc/ac pulses. See "Debouncer/Filter" definitions. Options C accept 0-1Vdc & 4-20mA. See "V-F" definition. Conditions: if Digit 15 = "0" then Digits 8 & 9 must be Options 00-89 and vice-versa. If Digit 15 = "1" thru "L" then Digits 8 & 9 must be 1A-4C and Digit 10 (power) must be Option 1-9. Option H (Phase angle) requires 2 inputs.
8. In multi-channel models, all channels have the same input function. For mixed inputs, use options 69, 79 or 89 and specify. Consult OTEK for availability.

UPM MECHANICAL & MOUNTING INFORMATION BY CASE STYLE (Digit 4 & Option #)

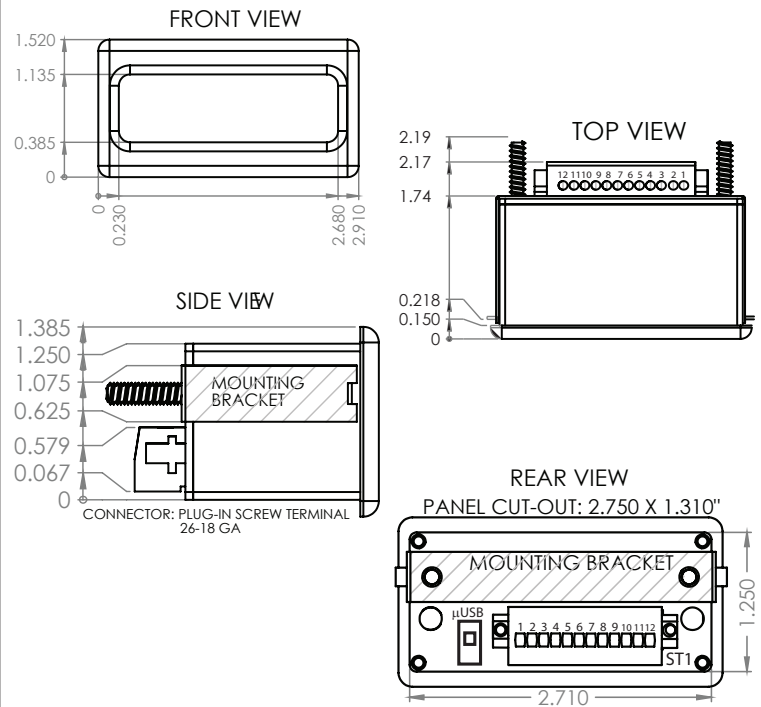
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OPTION-H: 6 x 1" Bezel Mechanical



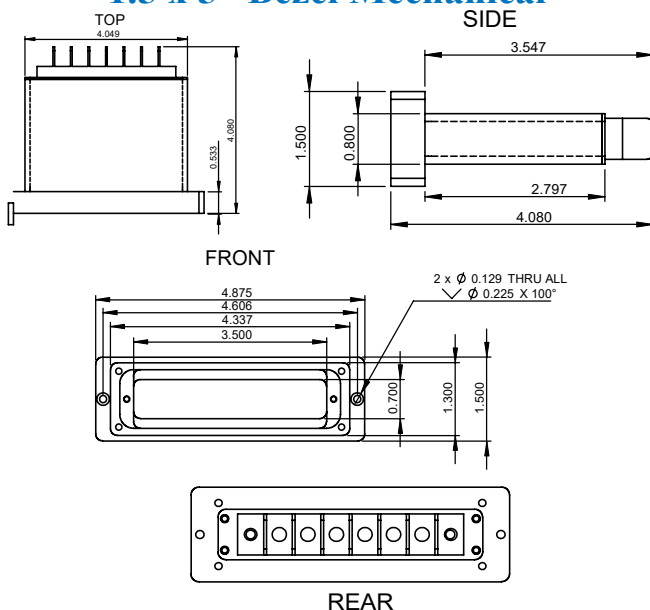
NOTE: ZERO & SPAN POTS. ON REQUEST ONLY.
PANEL CUTOUT: 0.95" x 5.45"

OPTION-L: 2.9 x 1.5" Bezel Mechanical



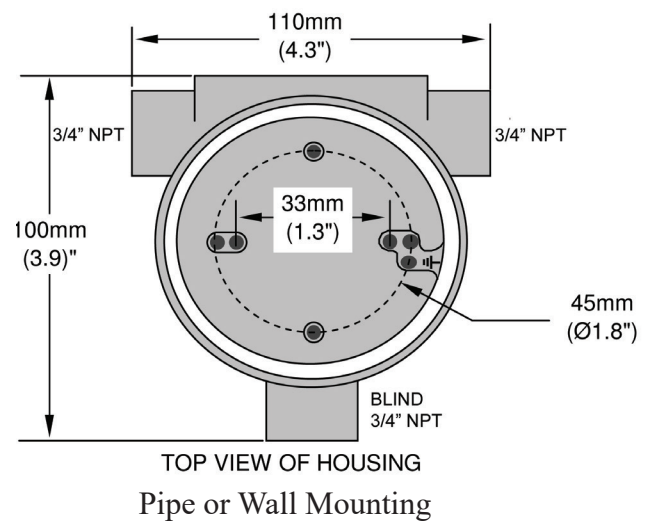
PANEL CUTOUT: 1.31 x 2.75"

OPTION-R: 1.5 x 5" Bezel Mechanical



NOTE: ZERO & SPAN POTS. ON REQUEST ONLY.
PANEL CUTOUT: 1.35" x 4.40"

OPTION-X: 4x4" Explosion Proof Mechanical Class 1, Div. 1, Groups B-G; EX & IECex: IM2, Exd1



Contact OTEK for wall mount bracket.

YOUR NOTES:

UPM™
11/28/23

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E-MAIL: sales@otekcorp.com
<https://www.otekcorp.com>

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TUCSON, AZ 85714 U.S.A.
MADE
IN
USA 

NEW

LOG/ANTI-LOG (RADIATION) PANEL METER

SEE **UPM** MASTER CATALOG FOR OTHER MODELS, SPECIFICATIONS, AND DESCRIPTION. THE **UPM-R** IS ONE OF >10 MODELS OFFERED.

UPM-R**PATENT**

#9,054,725 B1

8/25/23

Interfaces with TTY G.A. RAD Transmitters Model RD-2A and Replaces obsolete RM-2300 for Nuclear & Mil applications



Typical 8 Digit, 15 Segment Display

SECTIONS:

Ordering Info: pg. 31
DPM: pg. 3-6
COUNTER: pg. 7-12
REM Meter: pg. 12
Remote Display: pg. 12

**CLASS 1E
10CFR50 APP. B
MIL-SPEC &
INDUSTRIAL
GRADES**

FEATURES:

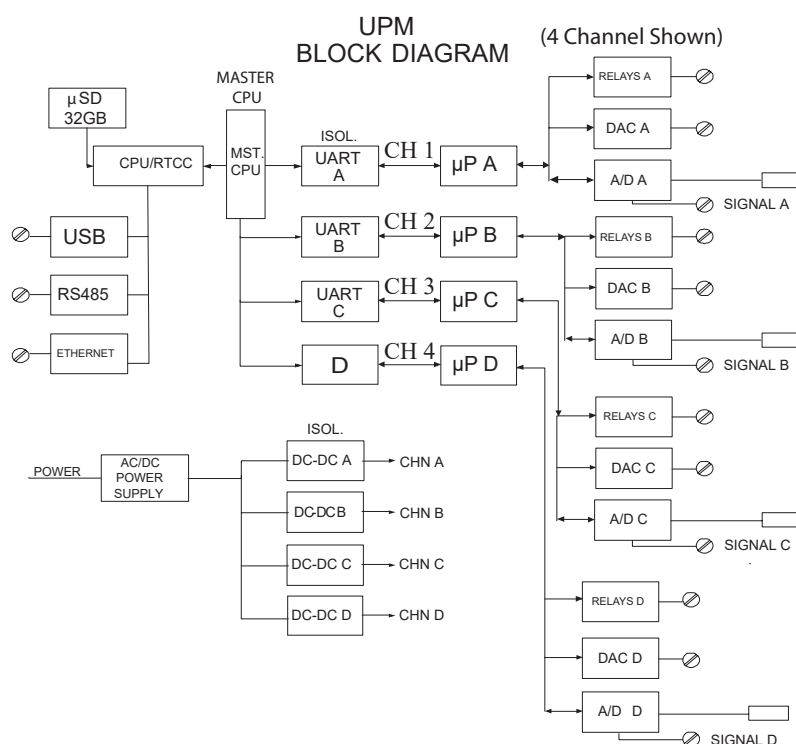
- *Math functions (+, -, x, $\sqrt{\quad}$, \div , X-Y tables, polynomials/ Log & Anti-Log Functions)
- *8 Character Alpha-Numeric Display (Counter/Remote Display) or -1.9.9.9 (DPM): 0.4" High, Red
- *INPT FAIL Alarm with Run Time Stamp
- *Self Diagnostics
- *Isolated Serial I/O: USB/RS485
- *Only 100mW @ 5Vdc or Powerless™
- *Intensity Control Via Serial Port
- *Averaging: None to 255
- *Alpha Characters Selectable
- *Power Input Options: 5, 7-32Vdc & 90-265Vac
- *>30 Isolated Input Signals
- *4-20mA/30V Output
- *Lifetime Warranty

DESCRIPTION: The **Universal Panel Meter (UPM)** series combines over 40 years of experience with the latest ASIC uC and ultra-efficient multicolor LED technology to bring you into the 21st century. The **UPM** external power series features over 30 signal conditioners to replace form, fit and function any analog or digital input panel meter. If not, we'll make it!

Our patented hardware and firmware gives you the highest reliability (we have a lifetime warranty) at the lowest cost, with features such as: automatic (programmable) tricolor display (like a traffic light); automatic signal fail detect (open or short); indication and serial transmission with run time stamp and units ID, isolated retransmission (4-20mA), and universal power inputs (5-32Vdc or 90-265Vac). The **UPM** Series offers several math functions such as X-Y tables, polynomials and log-anti-log functions.

The **UPM** signal and external power series also feature isolated USB, RS485. You can tell us your custom needs and we'll make it (or might already have it)!

The **UPM-R** is available in either a loop or an external power version and includes >30 signal conditioners and isolated input power options. Standard factory set color changes are: red: <10, >90%, yellow: <20, >80%, green: >20, <80% of F.S. Use Digit 14, Option 9 for custom configuration (you can change it with simple commands).

**520-748-7900**

CAGE CODE

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57861

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MADE
IN
USA



UPM-R ORDERING INFORMATION

UPM™
11/28/23

SEE NOTES BELOW

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
U P M - R 1 - 0 0 -

UPM-R

HOUSING (Bezel Dimension & Material)

R.....1 Ch, 8 Digits (1.5 x 5")

SERIAL I/O

0.....USB
1.....RS485
6.....20mA C.L. (TTY)
9.....Custom (Contact OTEK)

GRADE & CASE*

1.....Industrial & Metal
3.....Industrial & Metal NEMA 4X
M.....To Mil-Spec & Metal (Contact OTEK)
E.....To Epri-Nuclear & Metal (Contact OTEK)
9.....Custom (Contact OTEK)

*Grades E, M & 9 may
require an N.R.E. fee.

OF CHANNELS

1.....One
9.....Custom (Contact OTEK)

INPUT SIGNAL: LOOP POWER ONLY (1)

00.....4-20mA, Loop Power

INPUT SIGNAL: EXTERNAL POWER ONLY (2-5)

20.....4-20mA (All Channels Same Input)
21.....100mVdc F.S.
22.....1Vdc F.S.
23.....10Vdc F.S.
24.....100Vdc F.S.
25.....10mAdc F.S.
26.....100mAdc F.S.
29.....Custom (Contact OTEK)
30.....0.1V RMS F.S.
31.....1V RMS F.S.
32.....10V RMS F.S.
33.....150V RMS F.S.
34.....250V RMS F.S.
35.....0.1A RMS F.S.
36.....1A RMS F.S.
37.....5A RMS F.S.
41.....Hertz (10KHz/5V Logic) F.S.
42.....Hertz (120Vac/40-100 Hz) F.S.
43.....Hertz (240Vac/30-100 Hz) F.S.
44.....Hertz (120Vac/500 Hz) F.S.
45.....Strain-Gage ($\geq 300 < 4K$ Ohm)
47.....RTD (PT100)
48.....RTD (PT1000)
50.....TC (Type J)
51.....TC (Type K)
52.....TC (Type T)
53.....pH (0-14.00)
54.....ORP (0-2000mVdc)
55.....% RH (Specify Sensor)
56.....Resistance (0-10K Ω)
57.....10-50mA F.S.
58.....None (Serial or TTY Input Remote Meter)
1A.....Any Digit 15 TTL Input Level
1B.....Any Digit 15 H.V. Input Level
1C.....Any Digit 15 V-F (Option K) Input Level

COUNTER/FUNCTIONS

0.....None (Use Digits 8 & 9)
1.....Up/Down Counter
2.....Totalizer
3.....Quadrature
4.....Batch
5.....Frequency
6.....Period
7.....RADS
8.....REM
9.....Custom
A.....Up/Down Timer
B.....Time Interval
C.....Elapsed Time
D.....Range
E.....Julian Clock
F.....Rate
G.....Ratio
H.....Phase Angle
J.....Draw
K.....V-F (Voltage to Frequency)
L.....Integration

RANGE/CALIBRATION

0.....Standard (0-100.0)
9.....Custom (Contact OTEK)

SCALE PLATE

0.....Standard (No Markings)
9.....Custom (Contact OTEK)

ANALOG/POWER OUTPUT

0.....None
9.....Custom (Contact OTEK)

CONTROL OUTPUTS

0.....None
9.....Custom (Contact OTEK)

POWER INPUT

0.....Powerless™ (No Power)
1.....Non-Isolated USB
2.....Isolated 5Vdc
3.....Isolated 7-32Vdc
4.....Isolated 90-265Vac
9.....Custom (Contact OTEK)

NOTES:

- Number of input channels is governed by Digit 7.
- Options 20 through 1C only for externally powered models (Digit 10, Options 1-9).
- Options 20 through 1C only for externally powered models (Digit 10, Options 1-9).
- Option 1A accepts 5V TTL/CMOS inputs or dry contacts (10K Ω pull ups). Option 1B accepts dry contacts to 150Vdc/ac pulses. See "Debouncer/Filter" definitions. Option 1C accepts 0-1Vdc & 4-20mA. See "V-F" definition. Conditions: if Digit 15 = "0", then Digits 8 & 9 must be Options 00-58 and vice-versa. If Digit 15 = "1" through "L", then Digits 8 & 9 must be 1A-1C and Digit 10 (power) must be Option 1-9. Option H (Phase angle) requires 2 inputs.
- Digit 5, Option 6 (Teletype Input) only available with Option 58 on Digits 8 & 9. Only for TTY Remote Display.

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CAGE #57861

FEATURES:

- 4-20mA Loop or External Powered
- STD. 1" Diameter Barrel, 2" long
- Night Vision Compliant (NVG3)
- Replaces HI-LO Needle Type
- (4) 0.25" Full LED Digits (9.9.9.9)
- Color Options: Green, Red or Blue
- To Published Mil-Spec
- Industrial or Mil-Spec Grades
- Automatic Lost Signal Detection
- Replaces FF&F P/N 8DJ103LA H1 & EAK-4A/A3J-2 RTCA-160F Qualified
- **Internal/External Intensity Control**
- **Night vision NVG3 available**
- Customs: welcome



MODEL APM



DESCRIPTION

OTEK's Model **APM** is a four digit green, red, or blue LED indicator that accepts standard avionics power of 5-32Vdc (Green, Red, or Blue digits) and intensity control voltage of 1.5-5V 50-440Hz (or dc/Resistance). OTEK's exclusive powerless technique allows the **APM** to be loop powered causing a maximum of 4Vdc burden to the loop. The Powerless™ **APM** only requires 2 wires & <50mW to operate.

The heart of the **APM** is our patented (#10,222,405) Powerless™ that accepts Vdc or mAdc and can be scaled (internally) to any value. The unit mounts in a standard avionics 1" diameter hole with four mounting screws and connects to Power and signal via a "Twist Lock" circular connector (DBC53H-10-6P, Mating Cable End: MS347640 (L or M) -6S).

The **APM** is fully sealed and it is not affected by differential pressure, liquid spray (NEMA4X), or humidity (see specs).

APPLICABLE MIL-SPECS:

MIL-STD-461D, 462D, 704F, 130K, 810F, 889B2 & 1472F; MIL-HDBK-217F & 454A, RTCA-160F, & NVG3.

SPECIFICATIONS @ 25°C & 5Vdc +10%

Powered Models

- Loop Powered: 4-20mA, <4V burden (50mW)
- Power Input Voltage: 5-32Vdc, 200mW
- Power Consumption: 0.5W max
- Intensity Control Input: 1.5-5Vdc/ac or resistance
- Input Signal: V/mAdc (Specify)
- Display: 4 each ¼" (6.5mm) LED Green, Red, or Blue
- Night Vision Display: green digits only (NVG3 on request)
- Accuracy & Linearity: ±0.05% of reading
- Sampling Rate: 3/second
- Input Impedance: 1M Ohms (V)/50 Ohms (mA)
- Operating Temperature: -20 to +60°C
- Storage Temperature: -30 to +70°C
- Altitude Operating: 50,000 feet max
- Altitude Storage: 60,000 feet max
- Weight: 1.5oz. (42g)
- Finish: Electroless Nickel Plating or Black Powder Coat

Loop Powered Models Powerless™

- Burden: 50mW (4V max)
- Min-Max Signal: 3.6-36mA
- Specify Input Signal F.S. vs. Display F.S. & Decimal Point

		APM - <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5 <input type="checkbox"/> 6						CAGE # 57861	
INPUT SIGNAL (1)								HOUSING	
0.....	4-20mA Loop Powered							0.....	Electroless Nickel Plated
1.....	1 Vdc F.S.							1.....	Black Powder Coat over E. Nickel Plated
2.....	10Vdc F.S.							9.....	Custom (Contact OTEK)
3.....	100Vdc F.S.							CALIBRATION (6)	
4.....	1mAdc F.S.							0.....	4-20mA = 0-100.0%
5.....	10mAdc F.S.							1.....	0-F.S. = 0-100.0%
6.....	100mAdc F.S.							9.....	Custom (Contact OTEK)
7.....	100mV (Shunt)							DISPLAY TYPE (3)(7)	
8.....	Powered 4-20mA							0.....	Red Digits
9.....	Custom (Contact OTEK)							1.....	(NVG3) Green Digits
POWER INPUT (1, 4)								2.....	Blue Digits
0.....	Loop Powered							9.....	Custom (Contact OTEK)
1.....	5Vdc Non-Isolated							GRADE (5)	
2.....	5Vdc Isolated							I.....	Industrial
3.....	7-32Vdc Non-Isolated							M.....	Mil-Spec (Contact OTEK)
4.....	7-32Vdc Isolated							9.....	Custom (Contact OTEK)
9.....	Custom (Contact OTEK)								

Note: NVG3 (custom) on request

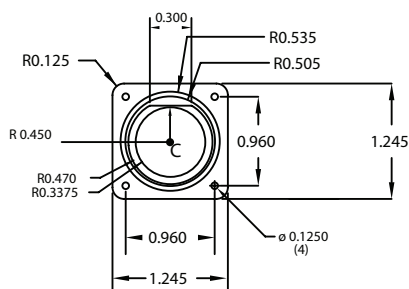
DOWNLOADS:
For manuals, user-
software or drivers:
www.otekcorp.com

NOTES: Please READ BEFORE building part number

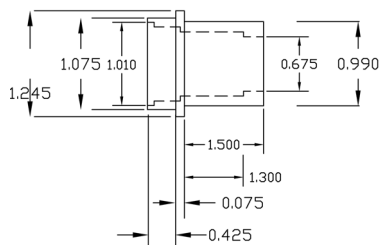
1. If Digit 1 is Option 0, then Digit 2 must be Option 0 (and conversely).
2. The APM has 4 full digits and negative sign. Maximum display is -9999 to 9999.
3. Loop powered display intensity is minimum 4mA and maximum 20mA.
4. OTEK will build to certain nuclear or MIL-Standards but testing and confirmation of compliance, if required, will need to be done by third party and at customer's expense.
5. Calibration and decimal point position are set before unit is sealed. Customizations must be specified & accepted before ordering.
6. For NVG-3 (Night Vision) compliant use Option 9 on Digit 4 & specify: Green Digits & NVG-3 compliant & use intensity control terminals.

APM MECHANICALS

FRONT VIEW



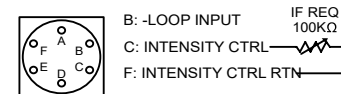
SIDE VIEW



TYPICAL CONNECTIONS

FIG. LOOP POWERED

APM-0

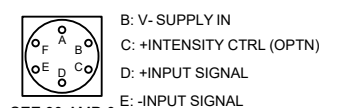


P/N DBC53H-10-6PN

MATTING: MS3476L10-6S OR EQUIV.(NOT SUPPLIED)
SHELL CHASSIS IS GND

FIG. VDC POWERED

APM-1



SEE 90-AMP-0

NOTE: INTENSITY CTRL IS CUSTOM SET FOR (VAC/VDC) OR RESISTANCE.

FOR VAC/VDC CONFIGURATION THERE IS NO INTERNAL ISOLATION.

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Bar-Digital Replacement Guide. Cage # 57861

Existing Meter (OTEK Meter - Direct or Closest Replacement or Custom)

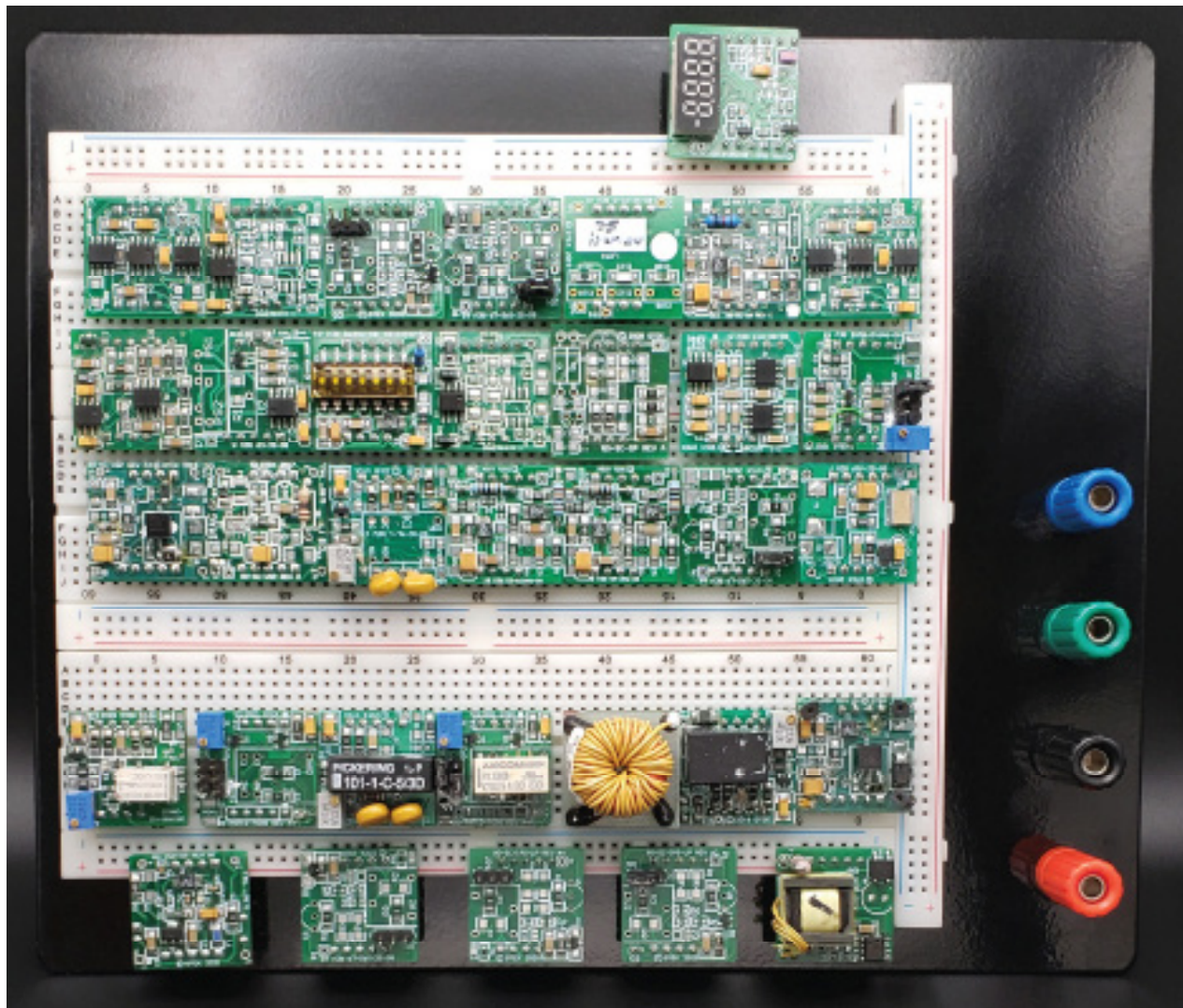
NSN 8DJ103LA H1 (AVIATION PANEL METER APM)
A&M/Weston 49 Series (HI-Q119 , NTM-9 , HiQ-TEK , PNP-9)
Bowmar 6" (HI-Q119 , NTM-9 , HiQ-TEK , PNP-9)
Chessel 700 Series (HI-Q114 , NTM-4)
Crompton 077/078 (HI-QTBS , NTM-3 , NTM-M , NTM-N , PNP-N)
Crompton 128 (HI-Q119 , NTM-9 , PNP-9 , HiQ-TEK)
Dixon BB1101/202PV (HI-Q119 , NTM-9 , HiQ-TEK , PNP-9)
Dixon BD, BJ, BS and BL (HI-Q121 , NTM-1)
Dixon BE 051/BE101 (HI-Q101 , NTM-P)
Dixon BEW51,BW051/P (HI-QTBS , NTM-3 , NTM-M , NTM-N , PNP-N)
Dixon BG101/BG202P (HI-Q116 , NTM-6)
Dixon BJ101 (DIN-BAR , NTM-0 , NTM-B , PNP-B)
Foxboro 257 Series (HI-Q118 , NTM-8)
GE 180 (HI-Q119 , NTM-9 , PNP-9) See pg. 30 for mech. Many mfrs. use equal mech.
GE AB/DB30 or DB40 (HI-QTBS , NTM-3 , NTM-M , NTM-N , PNP-N)
International Instruments 9262/9263 (DIN-BAR , NTM-0 , NTM-B , PNP-B)
Modutec 4SB (HI-QTBS , NTM-3 , NTM-M , NTM-N , PNP-N)
NES 6" (HI-Q119 , NTM-9 , PNP-9)
Sigma 1151/1251 (HI-Q119 , NTM-9 , PNP-9)
Sigma 9200/9220 (NTM-V)
Sigma 9262/9263 (NTM-0 , NTM-B , NTM-V)
Sigma 9264 (HI-Q121 , NTM-1)
Sigma 9270 (HI-Q120 , NTM-2 , PNP-2)
T.A. Bailey "RY" Series (HI-Q116 , NTM-6)
T. A. Bailey 775 Series (HI-Q117 , NTM-7 , PNP-7)
Takemoto 6" (HI-Q119 ; NTM-9 , PNP-9)
Triplett 6" (HI-Q119 , NTM-9 , PNP-9)
Versatile VMI 2000 (HI-Q120 , NTM-2 , PNP-2)
Weschler PC and PH (HI-Q121 , NTM-1)
Weschler/Westinghouse K231/241 (HI-QTBS , NTM-3 , NTM-M , NTM-N , PNP-N)
Weschler/Westinghouse VX252/251 (HI-Q119 , NTM-9 , PNP-9)
Yokogawa Series (HI-Q121 , NTM-1)
Yokogawa 180 (HI-Q119 , NTM-9)
Yokogawa AB/DB30 or 40 (HI-QTBS , NTM-3 , NTM-M , NTM-N , PNP-N)

UNIVERSAL PANEL METER PLUG & PLAY MODULES

©
UPM™
11/28/23

HOW DO WE DO IT? JUST PLUG AND PLAY!

- Over 50 plug in 1" SQR modules for signal power, control out & serial I/O
- Transmitters, we use any **NTM** or **PNP** model and just plug in our 4-20mA C.L. module! See **NTM** Digit 12 or **PNP** Digit 10.
- Compliant to Mil-Specs, Nuclear, ANSI, NEMA, RTCA, IEEE, and EPRI
- 3 Product lines; **NTM**: 22+ models, **UPM**: 8 models, **PNP**: 16 models + customs
- Over 12 patents (and pending) including the **Powerless™** loop powered meter (1974)
- Used by aerospace, military, nuclear, offshore, and industrial
- CMTBF: > 40 years, obsolescence hardened > 40 years, lifetime warranted.



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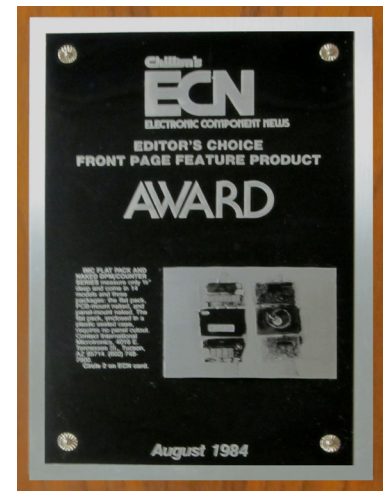
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OTЕК™
The "DIGITIZERS" SINCE 1974
CORP.

A CLASS
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COMPANY

4016 E. TENNESSEE ST.
TUCSON, AZ 85714 U.S.A.
MADE
IN
USA 



OTHER AWARD WINNING PRODUCTS:

4-20mA TRANSMITTERS / PID CONTROLLERS



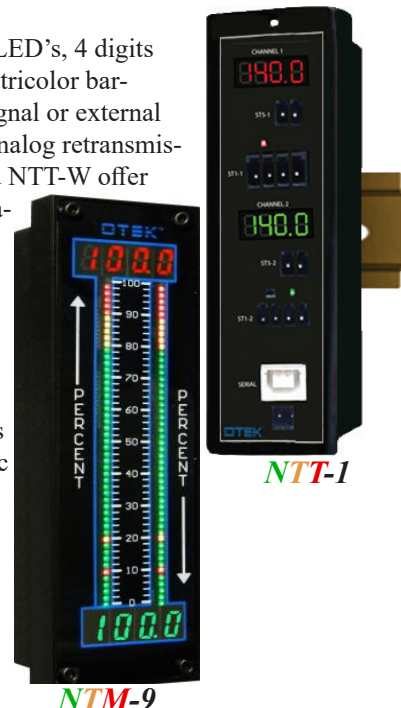
The **NTT** series offers 4 digit, low-power, hi-intensity LED's, 4 digits per display, over 30 input signal conditioners standard, tricolor bargraph with programmable set points, and options for signal or external power. Control functions include: serial I/O, isolated analog retransmission, OCT or relay control outputs. Models NTT-S and NTT-W offer front panel manual control of the output for PID calibration. Cyber security compliant to NEI08-09.



NEW TECHNOLOGY METERS / CONTROLLERS, CYBER SECURITY COMPLIANT



The **NTM** Series includes various features such as: several math functions such as X-Y tables, polynomials and log-anti-log functions. It also features an automatic (programmable) tricolor bargraph, automatic signal fail detect (open or short), indication and serial transmission with run time stamp and unit's ID, isolated retransmission (4-20mA), and universal power input (5-32Vdc and 90-265Vac). "Plug & Play" 100% Signal or Externally Powered.



CYBER SECURITY SAFE, NO C.D.A., ALL HARDWARE LOGIC 100% SIGNAL POWERED



The **PNP** series replaces any and all "digital assets," (microprocessors, etc.) with old fashioned CMOS Logic (as defined by NEI08-09). We married this to the most advanced LED technology to give you super bright bargraph and numerical displays. All models use the same patented technology, along with our patented hardware to give you the highest reliability (lifetime warranty) at the lowest cost. Customized for "Plug & Play" replacement for analog meters.



INSTANT PRICING: Our state-of-the-art **Configurator** allows you to build your specific part number, receive a price and create a customized user's manual. This Configurator is available for the **UPM**, **NTM**, and **PNP** series! If you already have a complete part number, you can simply enter it to get instant pricing or create the custom user's manual. There is no waiting, no hassle and no RFQ.

Watch our New Technology
Video on OTEK Website:



Visit our Configurator
on OTEK Website:



ABOUT OTEK:

OTEK Corporation was founded in 1974 by Dr. Otto Fest, whose enduring goal has been to provide the very best in process measurement and control instrumentation, coupled with unparalleled service. Otek designs, develops and manufactures their products right here in the U.S., deploying state-of-the-art technology and using only the highest quality materials and components. Key products include digital panel meters, bargraphs, controllers, batch counters, and process data loggers. The high quality of our products allows us to offer an unprecedented lifetime warranty.

OTEK also offers a 15 day evaluation program at no charge.

520-748-7900 CAGE CODE
FAX: 520-790-2808 57861
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