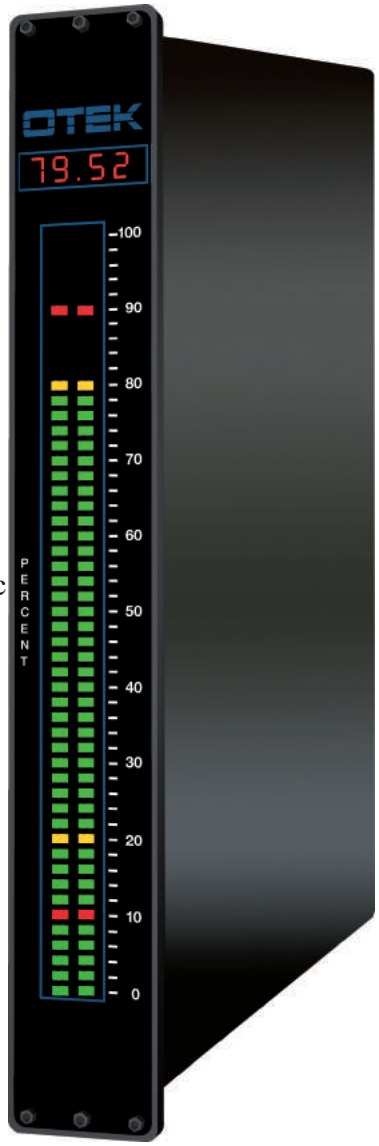
BOILER DRUM LEVEL CONTROLLER
G.E. APPROVED 3 LEVEL ALGORITHM
REPLACES EUROTHERM/CHESSELL "700"

MODEL HI-Q114

11/26/19

Features:

* 8" Automatic Tricolor (RGY) Dual 51 segment bargraph
* Four full digits (.4") .9.9.9.9
* 1, 2, or 3 channel analog inputs
* Standard & custom algorithm to display selected result of mathematical function
* To Mil-Spec: 461,167,901,810 & others
* Nuclear grade to 10CFR50 App. B, IEEE std., 344, 323, 7-4.3.2, EPRI, 102323 rev.4, NUREG 0700 & 0800
* Relays (10A) Alarm Output (6)
* Analog Output (4-20mA/1-5VDC)
* Math functions, polynomials, X-Y tables, etc
* Quick mount, front panel twist lock
* Plug-Unplug connectors
* Free online G.U.I.
* Lifetime warranty - "*Plug & Play*"



Specifications @25°C:

* A/D:16 bits plus sign (50k counts)
* Accuracy or Linearity: ± 0.01% of F.S. ± 1 digit
* Resolution: ± 0.002% F.S.
* Zero: Automatic/Programmable
* Span: 0-100.0%/ Programmable
* Sampling Rate: 16/second
* Input: Single ended/differential
* Input Bias: 50 picoamps
* C.M.V.: ± 2VDC
* C.M.R.R.: >90 db
* Averaging: None to 40 samples
* Input Channels: 1, 2, or 3
* I/O Communications: Isolated USB, RS232, RS485 & RS422, 19.2KB. Ethernet on request.
* Power Consumption: 3 Watts
* Power: 5, 10-32VDC, 90-265VAC

FOR COMMON ELECTRICAL SPECIFICATIONS OF THE HI-Q SERIES PLEASE SEE OTEK'S "COMMON SPECS" PAGES C & D

Features: The HI-Q114 was specifically designed to replace 100% F, F, & F (Plug & Play) the analog version from Chessell (Eurotherm) "700". Additionally, at the request of the General Electric Company Otek implemented its 3 level algorithm specifically for the nuclear (among other fuels) electric power plants to mointor and control the critical operation of boilers and the drum level. Thousands of units have been installed around the world without a single failure (of the HI-Q114) reported in over 25 years of continuous service, 24/7/365. The HI-Q114 is one of 10 models of the award-winning HI-Q series being used in a multitude of nuclear, military, aerospace, and industrial appications to guard against the malfunctioning of a power plant's boiler system. The high reliability of the HI-Q114's hardware and firmware has evolved over the years into the birth of its successor (under final design and approval) the award-winning NTM-4. Yes, Otek is at the forefront of innovation and evolution. The new NTM-4 capitalizes on 25 years younger technology, reducing the hardware count of the HI-Q114 by over 50% and using only "generic" components to meet our goal of over 40 years availability and more than 25 years of CMTBF as required by your military customers. The components that comprise the HI-114 are readily available, but just in case the NTM-4 is being designed. We work hard so all you have to do is *"Plug & Play"*.

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HI-Q114™ MECHANICAL & ORDERING INFORMATION 11-26-19

NOTES: Please READ BEFORE building part number:

1. If digit 9 is option E, then digit 8 must be option E.
2. See notes on bottom of page.

HI-Q114 } - 1 2 3 - 4 5 - 6 7 - 8 9 10 11

BAR-DIGITAL COLOR
- 0 .....Red, Green, Orange
- 9.....Custom (Contact OTEK)

SERIAL I/O - All Isolated
- 1.....RS232C/485
- 2.....RS232C/422
- 4..... USB
- 5..... RS232 Only
- 9.....Custom (Contact OTEK)

POWER INPUT (3)
- 0.....5VDC
- 1.....10-32VDC
- 2.....90-265VAC
- 3.....120-350VDC
- 9.....Custom (Contact OTEK)

CONTROL OUTPUTS
- 0.....None
- 1.....Relays (6)
- 2.....O.C.T. (8)

ANALOG & POWER OUTPUTS (8)
- 0.....None
- 1.....4-20mA, 1 Each
- 2.....0-5VDC, 1 Each
- 3.....4-20mA, 2 Each
- 4.....0-5VDC, 2 Each
- 5.....4-20mA & 0-5VDC, 1 Each
- 6.....4-20mA & 30V Compliance, 1 Each
- 7.....0-5VDC & 30V Compliance, 1 Each
- 8.....30V Compliance, 1 Each
- 9.....Custom (Contact OTEK)

RANGE/CALIBRATION
- 0.....Standard
- 9.....Custom (Contact OTEK)

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

GRADE (1,7)
- I.....Industrial
- M.....To Mil-Spec (Contact OTEK)
- N.....Nuclear (Contact OTEK)
- E .....To EPRI (Contact OTEK)

HOUSING DEPTH (1,6)
- 0.....8" Deep
- E .....To EPRI 102323R2
- 9.....Custom (Contact OTEK)

SIGNAL & DIGITAL INPUTS (4,5,9,10) {2 Inputs}
- 00.....None
- 01.....Multilevel
- 02.....TTL High Speed
- 09.....Custom (Contact OTEK)

ANALOG INPUTS (1 Channel)
- 10.....VDC (1MΩ)
- 11.....mADC
- 12.....4-20mA Current Loop(25Ω)
- 14.....VRMS (1MΩ)
- 15.....mARMS
- 17.....Strain-Gage (>200<400Ω)
- 18.....Strain-Gage (>1K<5KΩ)
- 20.....Resistance (50KΩ)
- 21.....2W Temperature RTD
- 22.....Temperature Thermocouple
- 23.....3W RTD
- 25.....mVDC (1MΩ)
- 29.....Custom (Contact OTEK)

ANALOG INPUTS (2 Channels)
- 30.....VDC(1MΩ)
- 31.....mADC
- 32.....4-20mA Current Loop (25Ω)
- 33.....Watts DC (1M-0.1Ω)
- 34.....VRMS (1MΩ)
- 35.....mARMS
- 36.....Watts RMS (1M-0.1Ω)
- 41.....2W Temperature RTD
- 42.....Temperature TC
- 43.....3W RTD
- 47.....mVDC (1MΩ)
- 49.....Custom (Contact OTEK)

ANALOG INPUTS (3 Channels)
- 50.....VDC (1MΩ)
- 51.....mADC
- 52.....4-20mA Current Loop (25Ω)
- 53.....V RMS (1MΩ)
- 54.....mA RMS
- 55.....2W Temperature RTD
- 56.....Temperature TC
- 69.....Custom (Contact OTEK)

NOTES (Continued):

3. Custom Blue/Red Display Requires Options 1 or 2 Power Input
4. Volt & Amps ranges are internal jumper range selectable: .5, 5, 10 & 50V; 1, 5 & 20mA. Shipped with .5V or 1mA unless specified.
5. Mixed or additional inputs (V&A, Temp & 4-20mA, Etc.) are available as customizations. Choose the custom number (09, 29, 49 or 69) and specify custom requirements.
6. 14.5" deep housing with specific connector termination on request.
7. OTEK will build to certain nuclear or MIL-Standards but testing and confirmation of compliance, if required, will need to be done by a third party and at customer's expense.
8. 30V compliance is for external transmitters/transducers.
9. Multi-channel input options are factory assigned to specific displays but are field configurable.
10. Digits 6 & 7, Option 00 is for a remote display/controller only.
11. For **Boiler Drum Level Controller** use option 69 (digits 6 & 7) and contact sales@otekcorp.com for information. Please include the specifications that need to be met.

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

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COMMON ELECTRICAL SPECIFICATIONS FOR: HI-Q114

For HI-Q: •DIN-BAR •TEK •TBS •114 •214 •116 •117 •118 •119 •120 •121 •123 •124 •126 •127 •219 •2K and 2000

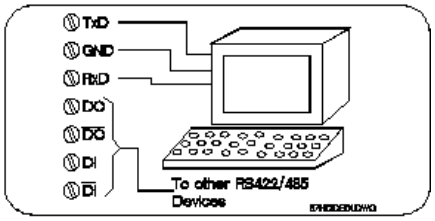
11-26-19

(All at 25°C) Also See Individual Specifications

SERIAL COMMUNICATIONS (DIGIT 2)

- Isolation to 5V or Other Power Inputs: 500VDC
- Baud Rate: to 19.2K Baud
- Protocol: Full ASCII
- Concurrent Use (Translator) of USB or RS-232C & 422 or RS-232C & RS-485 I/O & USB

NOTE: As a translator, you can use the com. port to translate from one protocol to another, so long as you only "talk" on one and listen on the others, ie., talk on USB, listen on 485, or 422, talk on 232, listen on 485. Can NOT have 232&USB.



POWER INPUTS (DIGIT 3)

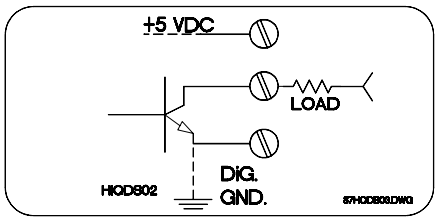
- 5VDC±5% Non-Isolated
- Or 10-32VDC (24VAC) Isolated
- Or 90-265VAC or (100-300VDC on request) Isolated
- Power consumption varies from model to model and number of options selected. See Specific Models.

ON-OFF CONTROL OUTPUTS RELAYS (DIGIT 4)

- Type: S.P.D.T. (1C)
- Max. Switching Current: 10A Res.
- Max. Switching Voltage: 30VDC/240VAC@Rated Current
- Contact Protection: Included
- Contact Isolation: 1000VRMS
- Initial Contact Resistance: 0.1Ω
- Life Expectancy: 10,000,000 Cycles

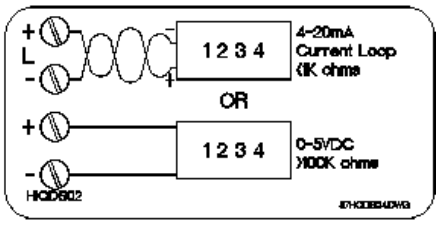
BiMOS OPEN COLLECTOR

- Type: Sink Driver (Transistor)
- Isolation to 5V Power: None
- Max. Current Sink: 250mA
- Vsat @250mA: .8V
- Standard VC: 5VDC
- External VC: <35VDC
- Switching Speed: 1µS



ANALOG CONTROL OUTPUTS (DIGIT 5)

- Accuracy & Linearity: ± 0.01% F.S.
- Resolution: 16 Bits
- Outputs: 0-5VDC(>100KΩ), 4-20mA (<1KΩ)
- Custom Output: 0-20mADC
- Compliance Output: 30VDC
- Isolation: 500VDC

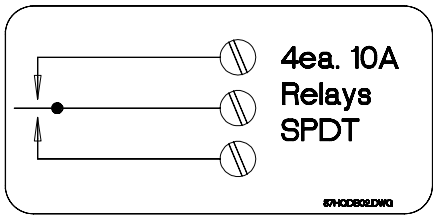


MEASURING INPUTS (DIGIT 6 & 7)

DIGITAL DISCRETE INPUTS

Functions Selectable:

Event, Timer, Period, Frequency, RPM and SPH

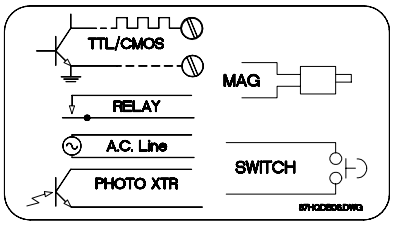


Multilevel (Option 01): (Low Speed)

- Dry Contact to 24VDC
- Isolation to 5V Power: None
- Response: DC to 100Hz
- Input Impedance: 1MΩ/27pF

TTL Level (Option 02):(High Speed)

- 0<.8V; 1=>2.4V
- Response: DC-50KHz
- Isolation to 5V Power: None



ANALOG INPUT SIGNALS

(All Isolated to 500VDC & After 30min, Warm Up)

Note: *Worst case accuracy & linearity are the sum of A/D and selected signal conditioner errors.*

A/D CONVERTER

- 16-Bit Plus Sign A/D(50K Counts)*
- Display Resolution:±0.002% of F.S.*
- Accuracy: ±0.01% of Full Scale
- Linearity: ±0.01% of Full Scale
- Drift: ±50PPM/°C
- Zero: Automatic/Programmable
- SPAN: Programmable
- F.S.Input Voltage Range: ±0.5VDC
- Max.Current Range: ±1/2 AmpDC
- Sampling Rate:16/sec. ÷ by Channels
- Input Type: Single Ended/Diff.
- Input Bias: 50pA
- C.M.V.: ±2VDC
- CMR: >90dB
- Averaging (Weighted): None to 40
- Input Impedance: See Ord. Info.

* Note: Limited by display of model selected (# of digits)

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COMMON ELECTRICAL SPECIFICATIONS FOR: (Cont'd) HI-Q114

For HI-Q: •DINBAR •TEK •TBS •114 •214 •116 •117 •118 •119 •120 •121 •123 •124 •126 •127 •219 •2K and 2000

NOTE: All V/mA Input Models (Options 10, 11, 14, 15, 30, 31, 33, 34, 35, 36, 50, 51, 53 & 54) Have Internal Jumper Selected Input Ranges of .5, 5, 50 & 500V and .5, 5, 50, 500mA.

OPTIONS: (*See Ord. Information*)_
10, 11,12, 30, 31, 32, 50, 51 & 52
**** Same Specifications As A/D***

ANALOG SIGNAL CONDITIONERS

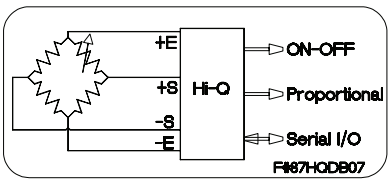
(All outputs set for ±500mVDC F.S.)

STRAIN-GAGE:

(Options 17, 18, 37 & 38)

- Accuracy and Lin.: ±0.1% of F.S.
- V Excitation(1): ±2.5VDC ±0.5%
- I Excitation(2): 1mADC ±0.5%
- Stability of Excitation: ±0.05%/ºC
- Maximum Current of VE: 30mA
- Maximum Voltage of IE: 5VDC

(1) Typical for S-G of 200-400Ω
(2) Typical for Monolithic S-G to 5KΩ
(3) Tare, Range, Zero Span Are User-Programmable

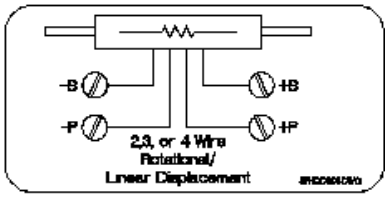


VDC *(Options 25 & 47)*

- Accuracy & Lin.: ±0.1% of F.S.
- Full Scale Input:±10mVDC
- Typical Gain: 50(see A/D Sec.)
- Common Mode Voltage: ±2VDC

RESISTANCE *(Options 20 & 40)*

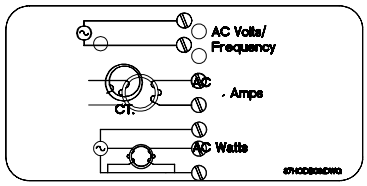
- Accuracy & Lin.: ±0.1% of F.S.
- Full Scale Input: 50KΩ
- Excitation Current: 0.01mA
- Stability of Excitation: ±0.05%/ºC



TRUE RMS VOLTS, AMPS & WATTS

(Options 14, 15, 34, 35, 36, 53, 54 55 60 & 61)

- Accy. & Lin.: ±1.0% of F.S. DC-50KHz Sine Wave
- Accy. & Lin.: ±0.5% of F.S. DC-10KHz Sine Wave
- Accy. & Lin.: ±2.0% of F.S.10KHz- 50KHz Sine Wave
- Resolution: ±0.01% of F.S.
- Common Mode Voltage: 2Vrms
- Overvoltage Protection: 500VAC
- Overcurrent Protection: 200%
- Input Impedance: See Ord.Info.
- Drift vs Temperature: ±50 PPM/°C
- Input Bias Current: 10pA



RTD *(Options: All RTD)*

NOTE: Due to limited signal input connections (6) we can accept 2-wire/3 channel; 3-wire/2 channel or 4-wire/1 channel. Contact Otek for others.

- Din (α=0.00385):-200° to+800°C
- ANSI (α=0.003923):-200 to+600°C
- Accuracy: ±0.1°C of signal
- Resolution: ±0.1°C of signal
- Scale: User Selectable °F, ºC or °K
- Linearization: Polynomial to 9th
- Open Sensor:+Overange/Flash
- Connections: 2,3 Wire (4 Wire On Request)
- Excitation: 0.1mA or 1mA (Cu)
- Open RTD: Burn-up
- PT200, 1K & 2K on request

THERMOCOUPLE *(Opt. 22,42 & 56)*

- Thermocouple Type: User-Select-able but Specify When Ordering (J, K, T, R, S, B, C, E)
- Accuracy of **HI-Q**: ±0.1% of F.S.
- Resolution: 0.1°
- Full Scale: Same as Thermocouple
- Open TC:(Burn Up)
- Input Impedance: >100MΩ
- Scale: User Selectable °F, ºC or °K
- Lead Resistance Effect:<0.001°/100Ω
- Linearization: Polynomial to 9th

Notes:
1. No isolation exists between channels.
2. **Do not use** grounded thermocouple.

OTHER INPUT SIGNALS: 3 & 4 wire RTD, pH, ORP, % RH, Speed, RPM, Volume, Flow, High Speed Peak & Hold, etc.

ENVIRONMENTAL *(To Specs)* INDUSTRIAL & NUCLEAR:

- Operating Temperature:-10-55°C
- Storage Temperature: -20-65°C
- Humidity: 10-90%RH, N.C.
- MTBF: >200,000HRS (Calculated)
- NEMA4X(IP65)

MILITARY: TO SPECIFIC MIL-STD (I.E. 461, 462, 901, 810 F, 167, ETC.) Nuclear: Class 1E, EPRI, TR-102323, NUREG 0700 & 0800

CUSTOMS: OTEK CUSTOMIZES ANY OF ITS PRODUCTS TO YOUR EXACT SPECIFICATIONS.

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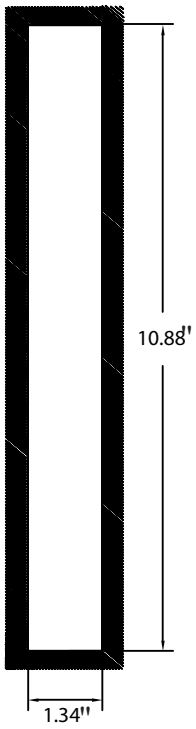
HI-Q114™ MECHANICAL DRAWINGS

DRUM LEVEL CONTROLLER

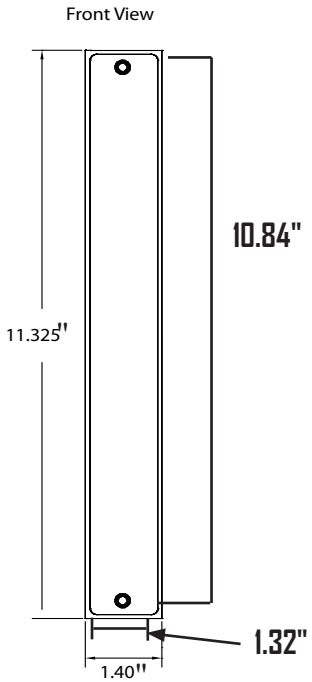
PANEL CUT OUT

Panel cut out



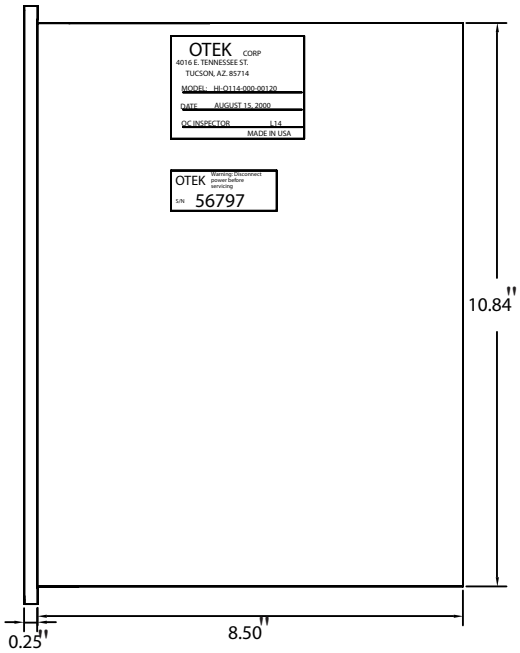
FRONT VIEW

Front View



HI-Q114 SIDE VIEW

TWIST LOCK FRONT PANEL MOUNT (2)



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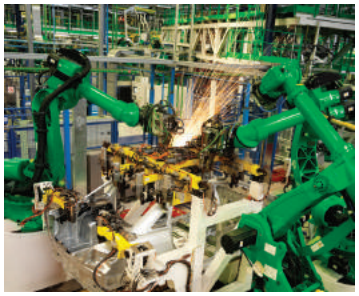
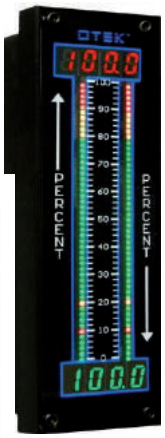
OTHER AWARD WINNING PRODUCTS:



NEW TECHNOLOGY METERS/CONTROLLERS, CYBER SECURITY COMPLIANT TO NEI08-09

The **NTM** Series includes various features such as: several math functions such as X-Y tables, polynomials and log-anti-log functions, 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"



NTM -9

UNIVERSAL PANEL METERS/CONTROLLERS (ANALOG & DIGITAL OUTPUTS)

The **UPM** Series includes various new features such as: isolated serial USB, RS485 or Ethernet µSD memory card to 32GB, several math functions such as X-Y tables, polynomials and log-anti-log functions. automatic signal fail detect (open or short), alarm and serial transmission with run time stamp and unit's ID, isolated retransmission (4-20mA), and universal power input (5-32VDC and 90-265VAC). It's a DPM, Up/Down Counter, Timer, Julian Clock, X-Y-Z/ Quadrature, LOG-Antilog, Frequency, Interval, Elapsed, Rate, Ratio, Draw, Range. Cyber security compliant to NEI08-09. Signal or External Power.

UPM -5

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

The **SSAM** series replaces any and all "digital assets," (microprocessors, etc,.) with old fashioned CMOS Logic (as defined by NEI 08-09). 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.

SSAM-N

INSTANT PRICING: Our state-of-the-art **Configurator** **(currently only available for the NTM series)** allows you to build your specific part number, receive a price and create a customized user's manual. 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.

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