

NEW

AUTO-TRICOLOR BAR-DIGITAL CONTROLLER FOR NUCLEAR, MIL-SPEC AND INDUSTRIAL

**MODEL
HI-Q2000
& HI-Q2K**

Shown with Existing VMI Housing



Replaces Form, Fit and Function For Versatile (VMI 2000)

SPECIFICATIONS @ 25°C

A/D CONVERTER:

- 16-Bit Plus Sign A/D(50K Counts)*
 - Display Resolution: 0.01% of F.S.
 - Accuracy: $\pm 0.01\%$ of Full Scale
 - Linearity: $\pm 0.01\%$ of Full Scale
 - Drift: $\pm 50\text{PPM}/^\circ\text{C}$
 - Zero: Automatic/Programmable
 - SPAN: Programmable
 - F.S.Input: ± 0.5 to $\pm 50\text{VDC}$
 - Current Range: ± 0.5 to 50mADC
 - Sampling Rate: 16/sec. \div by Channels
 - Input Type: Single Ended/Diff.
 - Input Bias: 50pA
 - C.M.V.: $\pm 2\text{VDC}$
 - CMR: $>90\text{dB}$
 - Averaging (Weighted): None to 255
 - Input Impedance: See Ord. Info.
- * Note: Limited by display of model

FEATURES

- *Single or Dual Bar-Digital
- *Vertical or Horizontal Mount
- *Nuclear Qualified
- *Optional Relays (3)
- *Mathematical Functions
- *X-Y Tables & Polynomials
- *AC or DC Power Input
- *No Rewiring Required
- *Lifetime Warranted
- ***USB**, RS232, 422 & 485
- *Field Selectable Ranges
- *Custom Scales



(No Housing) Option "0"

ON-OFF CONTROL OUTPUTS RELAYS

- Type: S.P.D.T. (1C) 500VAC Isolation
- Max. Switching Current: 10A Res.
- Max. Switching Voltage: 30VDC/240VAC@Rated Current
- Contact Protection: Included to 250VAC

ALARM SET POINTS

- Programmable with P.O.D. and Hysteresis

SERIAL COMMUNICATIONS

- Isolation to 5V or Other Power Inputs: 500VDC
- Baud Rate: to 19.2K Baud
- Protocol: Full ASCII (8N1 Setting)
- Concurrent Use of RS-232C & 422 or RS-232C & RS-485 I/O

POWER INPUTS

- 5VDC $\pm 5\%$ Non-Isolated
- Or 10-32VDC (24VAC) Isolated
- Or 90-265VAC (100-300VDC) Isolated
- Power Consumption: 10 Watts

ENVIRONMENTAL (To Specs)

- Operating Temperature: -10 - 55°C
- Storage Temperature: -20 - 65°C
- Humidity 10-90% RH, N.C.
- MTBF: $> 1000,000$ Hrs. (Calculated)

NOTE: Conformal Coating EMI/RFI Shield On Request



**IF YOU DON'T SEE IT
ASK FOR IT!**

DESCRIPTION:

HFE and HSI compliant display with OTEK's exclusive automatic tricolor bargraph. OTEK's new **HI-Q2K** not only replaces form fit and function the old units but includes the newest technology made popular by the **HI-Q** Series for ultra high reliability. Hence, its "Lifetime Warranty" (Ltd.).

The **HI-Q2K** is available in several configurations (and if not yours, we will make it) designed for "**Drop-In**" replacement of the old units without rewiring the existing connector. In fact, you can leave the existing casing on the panel, slide out the old and slide in the **HI-Q2K**! The **HI-Q2K** was originally designed and fully approved for **10CFR50-B** (Class 1E) for a major Nuclear Power Plant in record time, so if you need to replace them, don't wait until the last minute, do it now!

What Is The Difference? See Note under ordering information for differences between the HI-Q2K and the HI-Q2000.

520-748-7900

FAX: 520-790-2808

E-MAIL:sales@otekcorp.com

http://www.otekcorp.com

OTEK™
CORP.
SINCE 1974

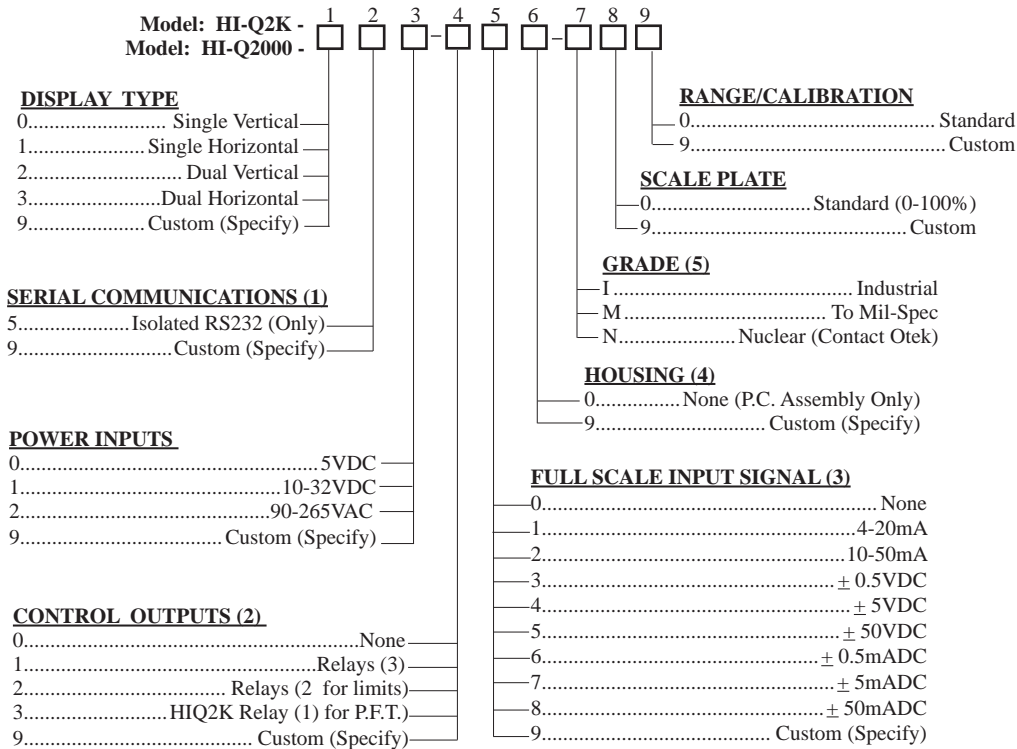
4016 E. TENNESSEE ST.
TUCSON, AZ. 85714 U.S.A.

MADE
IN
USA



HI-Q2K/HI-Q2000 ORDERING INFORMATION

10/4/11



NOTE: The **HI-Q2000** & **HI-Q2K** use existing **VM2000** case and connector without wiring change. For New Installations, see models HI-Q120 & HI-Q121 to replace older units.

NOTES:

1. Only RS232C available on the front behind the filter. For other Serial I/O, see models HI-Q120 & HI-Q121.
2. 3rd Relay internally connected for power fail test.
3. Option "0" (none) only as serial input remote display. RTD, RMS, TC, S-G inputs on request.
4. Option "0" for installing on existing VMI case. For other options contact OTEK, or see models HI-Q120 and HI-Q121.
5. Otek will build to certain MIL-standards but testing and confirmation of compliance, if required, will need to be done by a third party and at customer's expense.

HI-Q2K Vs. HI-Q2000

1. The HI-Q2K has internal circuitry (TTL) to simulate µC, A/D & power failure for simulator room. The HI-Q2000 does not.
2. The HI-Q2K is an upgrade of the HI-Q2000.
3. The HIQ2K has either 2 limit relays or 1 power fail test relay but not both.

MECHANICAL (ALL VERSIONS)

Note: NAKED Module Fits In Existing VMI2000 Housing and Connector Mates With Back Plate

BENEFITS

OF
THE

HI-Q™

(High I.Q.)

DESCRIPTION: The HI-Q Controllers consist of several products with sub-products. All the products share similar hardware and software with the main difference being their package and display. Once you have familiarized yourself with one, you will know them all! By using common software and hardware, we realize R&D and production savings that we pass on to you.

BENEFITS

* **SY & V:** The HI-Q Series software has been verified & validated as trouble/glitch free per IEEE Std. The Hardware has passed several Mil-Std's, such as 461, 462, 617, EPR1 102323 & others. If we don't have it, we'll make it!

* **Low Cost-High Performance:** When you buy the HI-Q, you buy a "Computing Controller," not just an instrument. Its performance to price ratio is unsurpassed in the industry. Only the specific functions that you will need are selected and included, no need for unnecessary extras.

SYSTEM:

* **Use the Isolated RS Translator** to interface with other industry standard USB, RS-232C/RS-422 or RS-485 devices with open or proprietary protocols. If they are "RS" and "ASCII" compatible, the HI-Q can communicate with them.

* **Stand Alone: as Single or Multi Loop Controller** Whether under the protection of a factory environment or in the open field, the HI-Q will meet and exceed your expectations.

CONFIGURATION: Just Upload OTEK's **FREE Windows Navigator™ (GUI)** and configure or re-configure your HI-Q without an Instruction Manual, in minutes!



COMMON FEATURES

* **Ready to Use:** Just apply power, select the commands, set your limits and start controlling.

* **Automatic Tricolor:** Changes colors (Red, Blue, Purple, Green, Amber) upon reaching a limit. **Flashing & dimming** of the displays are under your control.

* **Password Security:** You can enable or disable the front panel keypad (Optional Keypad).

* **Emergency Shut Down:** Any three keys held down simultaneously will shut down the controller sending all outputs to a "Fail Safe" (Off) state.

* **Power on Test (POT):** Will test every major section of its hardware, software and firmware and flag any malfunctions.

* **C.O.P. (Computer Operating Properly):** Checks the operation of its internal algorithms. You can disable it.

* **Mathematical Functions:** Insert the math function. Transmit and/or control with the result.

* **Polynomials and Look Up Tables:** Make your own or use the preprogrammed polynomials to 9th order.

* **Self Diagnostics:** The HI-Q will detect major software/hardware failure & warn you via its display/serial port.

* **Modular Design For Long Life Expectancy**

* **Lifetime Warranted**

* **Obsolescence Proof:** All critical components have 2nd source and/or are in modules, so they can be replaced/redesigned efficiently and economically.

* **Customs:** Very economical and efficient thanks to its modular design.

INTERFACE

OPERATOR:

* **Bargraphs** are used for quick trend indication. The operator can, at a glance, tell where the process is.

* **Digital Display(s)** are used to give accurate process indication and set point control or calculate values in engineering units. They are also used to display the menu driven prompts.

PROCESS:

All HI-Q intelligent controllers offer five methods of controlling your process:

- a) Current: 4-20mA, 1-5mA, 0-20mA (including PID), directly or inversely proportional.
- b) Voltage: 0-5VDC & 1-5VDC (or 5-0 & 5-1VDC) or any other ranges in between.
- c) Four (4) or six (6) SPDT 10Amp relays.
- d) Open collector Bi MOS outputs.
- e) The serial port (USB, RS232, 422 & 485)

Applications: See Technical Brief on Page 27

Some Commands You Can Enter Via the Optional Keypad (More Via the Serial Port) or GUI

- Security Code-Restricted Access
- Zero Offset-Tare
- Full Scale-Range
- Colors (LED or LCD backlight) (Any available mix)
- Intensity-None to Max.
- Blinking On/Off
- Filtering (averaging)
- Danger Alarms (Warning-Stop)
- Relays (4 or 6), Bi Mos (8) On-Off
- Current Loops 4-20mA(0-5V out)

- 1 → 3 Assign any Channel to any
- 4 → 2 Display & Relays to Channels or External Commands
- A/M * Auto/Manual Process Control
- K Assign any Constant to any Channel
- Δt Assign any Delay to any Output
- P Proportional
- I Integral
- D Derivative
- Your Own Custom Commands
- oops! Reset to Default Parameters
- Poly Ours or Your Polynomials/Tables
- ...!! * Process Predictability (Signal(s) vs Time (Contact Otek)

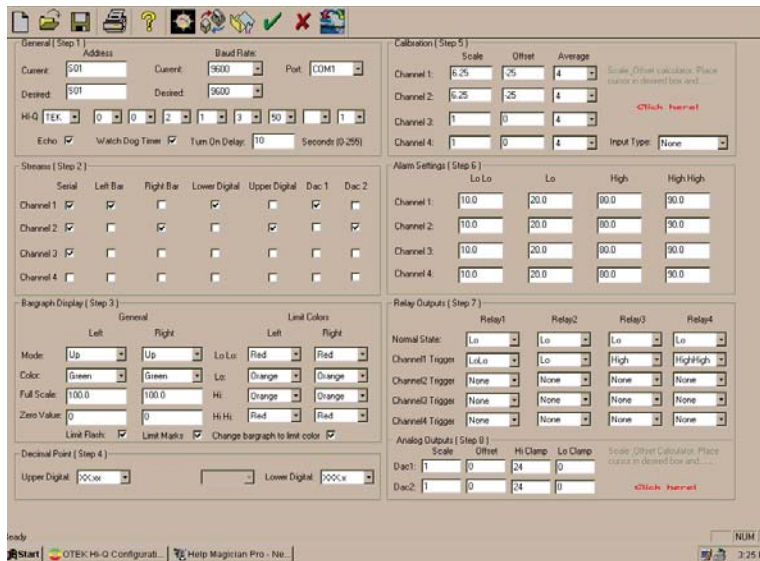
- +,-,x,÷,√,Σ Fixed or Variables
- Δ t Alarm w/or w/out Delay
- Watchdog Timer
- COP-Computer Operating Properly
- Store any Fix Value or Command in Memory
- Any Address Alphanu-meric or Either
- Any speed 1.2 to 19.2 KBPs
- Any Resolution (1 to 50,000)

THE BENEFITS OF THE "HI-Q" (Continued)

Now you can monitor and control your process from the comfort of your control room or at the site with an inexpensive PC & OTEK's complete line of **Programmable Intelligent Controllers**. Use them either as Stand-Alone or as part of your DCS or SCADA system.

CONFIGURATION with OTEK's New **Windows Navigator™** (PC G.U.I.) is so fast & easy that no instruction manual (other than connections) is required! Just Plug in your PC Terminal, upload our **FREE** Program and start selecting your configuration. Within minutes you will be done and you can even email it to remote locations!

For a **FREE** copy of the Windows Navigator™ visit our website at www.otekcorp.com then click on Windows Navigator™.



OTEK's "HI-Q" line of **Programmable Intelligent Controllers** with their built-in and isolated signal conditioners will connect directly to your sensor and/or transducer and it will even power it. All you have to do is to connect & power up. We will even preprogram the "HI-Q" for you if so desired for **"Plug-N-Play"**.

Common Features of the "HI-Q™" Series:

- Math Functions: +, -, x, ÷, √ and More
- Isolated 18-bit A/D w/Signal Conditioners
- Isolated Analog Outputs (4-20mA & 0-5VDC)
- (4 or 6 each) 10A SPDT Relays for On-Off Control
- O.C.T. (250mADC) for Fast On-Off Control
- Isolated 5 & 10-32VDC (24VAC Also) Power Input
- Isolated 90-265VAC or (100-350VDC on Request) Power Input
- 5 VDC Power for Low Voltage Applications
- Look Up Tables for Thermocouples/RTDs
- Polynomials to the 9th Order
- Customer's X-Y (25X25)Tables
- ZERO • TARE • SPAN • AVERAGE
- All ASCII Characters for Open Protocol
- Programmable Baud Rate & Address
- Isolated RS-232C/422/485 Translator & USB (Ethernet on Request)
- Automatic Tricolor LED Displays with Dimming, Blinking & Pointers
- P.I.D. or Just Plain Proportional Control
- SV & V, Mil-Stds with Self-Diagnostic Capabilities
- Modular Design for Long Life Expectancy
- Lifetime Warranted

What Can the "HI-Q" Series Do for You?

It can accurately and reliably monitor and/or control your process as stand alone or as part of a DCS/SCADA for complete factory automation.

From the most basic form as a serial input **remote display** to the most complex as stand alone **Programmable Intelligent Controller**, the "HI-Q" Series will perform to specifications in the oceans, on earth or in outer space, in the Alaskan tundras or in the Tucson deserts.

MILITARY, NUCLEAR, SEISMIC & EPRI TR-102323R3 Models Are (Or Being) Approved. Contact OTEK™

Where Are the "HI-Qs" Being Used?

Only OTEK's HI-Q Series are in Outer space (**Mir & I.S.S.**), Military Aircraft (**Night Vision**), Naval Warships (**Mil-Spec**), Nuclear Power Plants, Offshore Exploration/Drilling, Mass Transit (**Metro**), Biomedical (Non-Life Support), Pharmaceutical, Agricultural, Waste & Water Treatment, etc.

IS YOUR APPLICATION MORE CRITICAL?

IF YOU DON'T SEE IT, ASK FOR IT!
Our customers **THINK** of the products, we just design them!

B

HI-Q SERIES COMMON ELECTRICAL SPECIFICATIONS FOR:

**For HI-Q: •DIN-BAR •TEK •TBS •114 •115 •116 •117
•118 •119 •120 •121 •123 •124 •126 •127 •128 •2K and 2000**

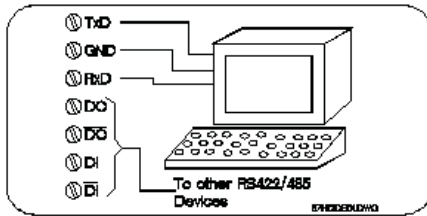
(All at 25°C) Also See Individual Specifications

SERIAL COMMUNICATIONS

(DIGIT 2)

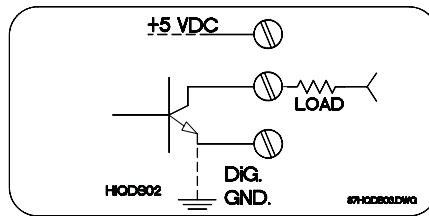
- Isolation to 5V or Other Power Inputs: 500VDC
- Baud Rate: to 19.2K Baud
- Protocol: Full ASCII
- Concurrent Use (Translator) of USB or RS-232C & 422 or RS-232C & RS-485 I/O & USB

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.



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

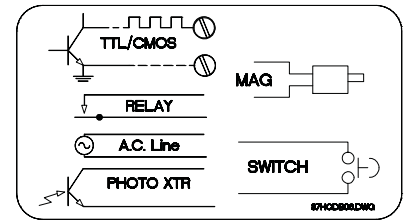


Multilevel (Option 01): (Low Speed)

- 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



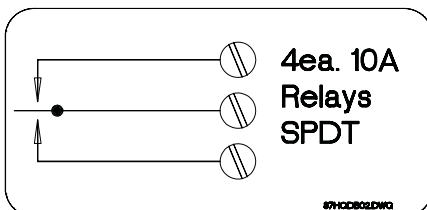
POWER INPUTS

(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.

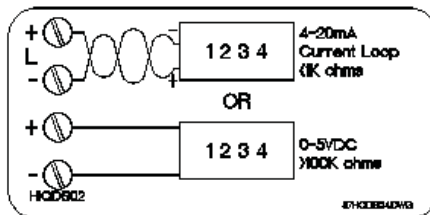
ON-OFF CONTROL OUTPUTS RELAYS (DIGIT 4)

- 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



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



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)

MEASURING INPUTS (DIGIT 6 & 7) DIGITAL DISCRETE INPUTS Functions Selectable:

Event, Timer, Period, Frequency, RPM and SPH

COMMON ELECTRICAL SPECIFICATIONS FOR: (Continued)

**For HI-Q: •DINBAR •TEK •TBS •114 •115 •116 •117
•118 •119 •120 •121 •123 •124 •126 •127 •128 •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

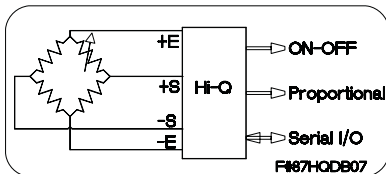
ANALOG SIGNAL CONDITIONERS

(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%/°C
- 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

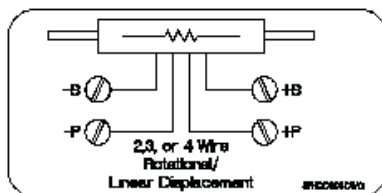


VDC (Options 25 & 47)

- 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)

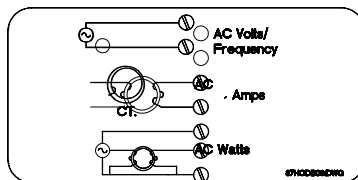
- Accuracy & Lin.: ±0.1% of F.S.
- Full Scale Input: 50KΩ
- Excitation Current: 0.01mA
- Stability of Excitation: ±0.05%/°C



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, °C or °K
- Linearization: Polynomial to 9th
- Open Sensor: +Overrange/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 Selectable 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, °C 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.

POWER CONSUMPTION (WORST CASE)

DIN-BAR	5W
HI-QTBS:	10W
HI-QTEK:	15W
HI-Q114:	10W
HI-Q115:	10W
HI-Q116:	10W
HI-Q117:	15W
HI-Q118:	15W
HI-Q119:	15W
HI-Q120:	15W
HI-Q121:	15W
HI-Q123:	5W
HI-Q124:	5W
HI-Q126:	10W
HI-Q127:	5W
HI-Q128:	10W
HI-Q2000:	15W
HI-Q2K:	15W