

**NOW  
USB**

# Programmable Intelligent Controllers WITH BARGRAPH-DIGITAL LED OR LCD DISPLAY

**HI-QTBS  
HI-Q123  
HI-Q124**



### HI-QTBS (SHOWN 1/2 SIZE)

- 101 Auto-Tricolor Bars (1% resolution)
- Intensity Control: Off, Dim, Bright, Brightest
- Six(6) 0.6" Alpha-Num. Digits
- Programmable Blinking & Dimming

**New !**



### New USB V2.0 Compatible:

The USB-232 converter plugs into the **DB9** connector and extends 1.25" on the rear. Has standard "Client" connector.

### FEATURES:

- ◆ NEW SANITARY CASE
- ◆ Isolated 18-bit A/D(50K Counts)
- ◆ 5V, 10-32VDC; 24 or 100-240VAC Power (10W For LED, 3W For LCD)
- ◆ Isolated 16 Bit 4-20mA or 0-5VDC I/O
- ◆ Four 10A Relays or 8-1/4A O.C.T.
- ◆ Isolated USB RS-232C/422/485
- ◆ Isolated Compliance/Excitation to Power Your Sensors/Transducers
- ◆ 1, 2 or 3 Channel Input
- ◆ Menu Driven Keypad (Optional)
- ◆ NEMA4X Front Panel
- ◆ Math Functions: +, -, x, ÷, √ & More
- ◆ Polynomials
- ◆ Look Up Tables



### HI-Q123 (SHOWN 1/2 SIZE)

- 101 Bars (1% resolution)
- Six(6) 0.6" Alpha-Num. Digits
- Four(4) Alarm Annunciators
- Optional Backlight
- High Contrast LCD
- Programmable Blinking & Pointers



### HI-Q124 Needle

**JUST LIKE  
ANALOG  
METERS**

### HI-Q124 "FAN"



### SANITARY CASE

- 101 Needles (1% resolution)
- Four(4) Digits with Decimal Points
- Mimics Analog Meters
- Optional Backlight
- Ideal As Synchroscope



### EXPLOSION PROOF

### NEW TRICOLOR BACKLIGHT:

AUTOMATIC TRICOLOR (R/G/A) BACKLIGHT (FOR LCD MODELS) ALLOWS YOU TO CHANGE BACKGROUND COLORS AT WILL VIA SERIAL COMMANDS OR SET POINTS INCLUDING BLINKING OF THE DISPLAY. INTENSITY IS EXTERNALLY CONTROLLED.

SPECIFICATIONS: See Pages A-D

### NEW SANITARY CASE!

- Only 6 X 6 X 3" Aluminum
- Double Gasketed and 3/4" NPT
- High Temperature/Impact Window
- Wall/Panel/Pipe Mounting
- Up to 250°F Steam Cleaning
- Water Tight/Submersible

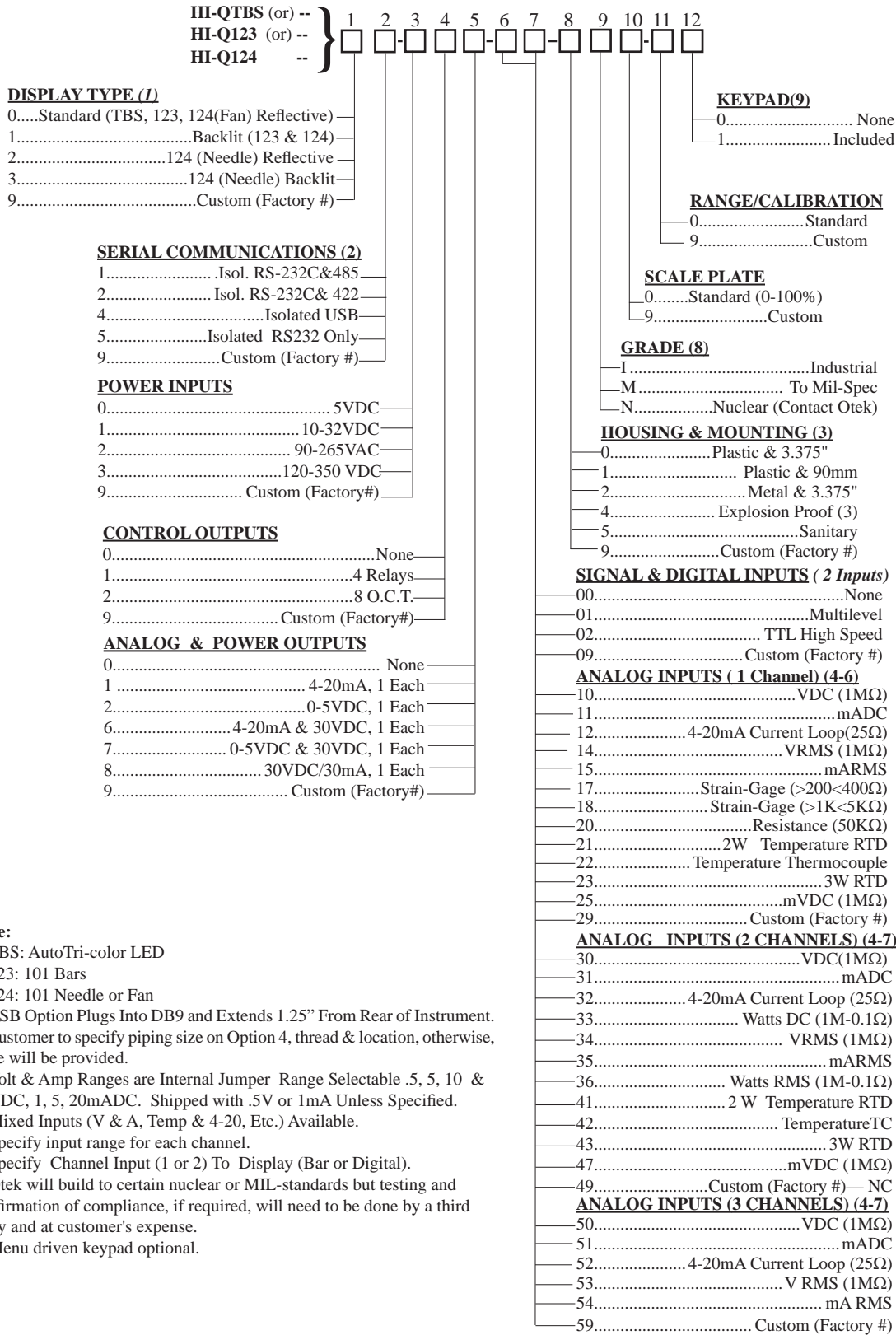
### WHAT IS IT

- ◆ It is a Programmable Logic Controller (P.L.C.)
- ◆ It is a Computing Controller
- ◆ It is a DCS to Process Interface
- ◆ It is a Process to SCADA Interface
- ◆ It is a Single Loop Process Controller
- ◆ Or Just a *Plain METER*

### EXPLOSION PROOF:

- Approved for:
  - Class I Div 1 & 2 Groups B, C & D;
  - Class II Div 1 & 2 Groups E, F & G;
  - Class III Nema 3, 4, 7 & 9, FM, CSA, Baseefa & Cenelec Certified
- Tempered Glass Window
- Aluminum Casted Housing

## ORDERING INFORMATION 10-4-11



**Note:**

1. TBS: AutoTri-color LED  
123: 101 Bars  
124: 101 Needle or Fan
2. USB Option Plugs Into DB9 and Extends 1.25" From Rear of Instrument.
3. Customer to specify piping size on Option 4, thread & location, otherwise, none will be provided.
4. Volt & Amp Ranges are Internal Jumper Range Selectable .5, 5, 10 & 50VDC, 1, 5, 20mADC. Shipped with .5V or 1mA Unless Specified.
5. Mixed Inputs (V & A, Temp & 4-20, Etc.) Available.
6. Specify input range for each channel.
7. Specify Channel Input (1 or 2) To Display (Bar or Digital).
8. 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.
9. Menu driven keypad optional.

**520-748-7900**  
 FAX: 520-790-2808  
 E-MAIL:sales@otekcorp.com  
 http://www.otekcorp.com



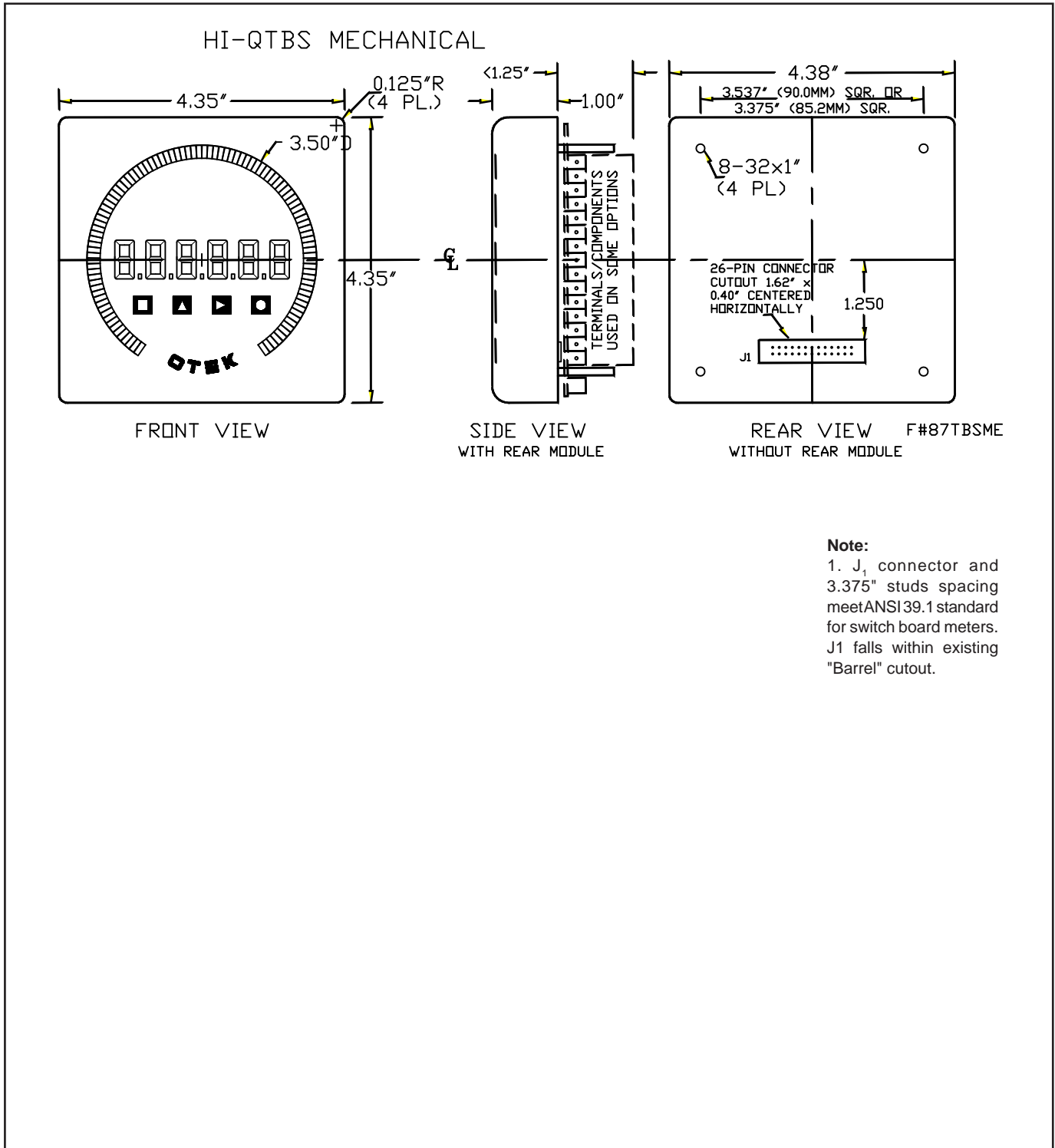
4016 E. TENNESSEE ST.  
 TUCSON, AZ. 85714 U.S.A.

MADE  
 IN  
 USA



# HI-QTBS, 123 AND 124 MECHANICAL INFORMATION

## MECHANICAL FOR ALL OTEK'S "SWITCHBOARD" STYLE METERS



**Note:**

1. J<sub>1</sub> connector and 3.375" studs spacing meet ANSI 39.1 standard for switch board meters. J<sub>1</sub> falls within existing "Barrel" cutout.

# 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, EPRI 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.

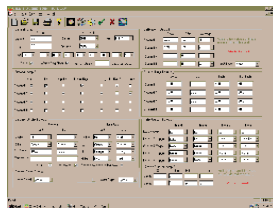
### SYSTEM:

\* **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 9<sup>th</sup> 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)

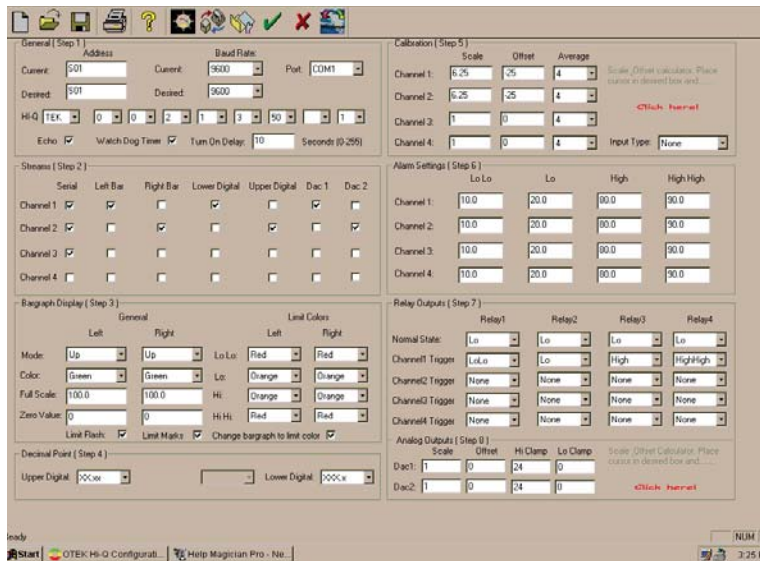
- +,-,x,÷,√,Σ Fixed or Variables
- Δ t Alarm w/or w/out Delay
- Watchdog Timer
- COP-Computer Operating Properly
- Store any Fix Value or Command in Memory
- Any Address Alphanu-meric or Either
- Any speed 1.2 to 19.2 KBPs
- Any Resolution (1 to 50,000)

# 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](http://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:

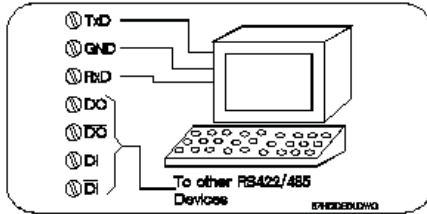
**For HI-Q: •DIN-BAR •TEK •TBS •114 •115 •116 •117  
•118 •119 •120 •121 •123 •124 •126 •127 •128 •2K and 2000**

(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.*

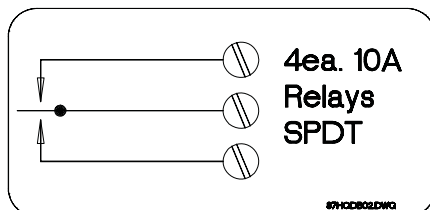


## POWER INPUTS (DIGIT 3)

- 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.

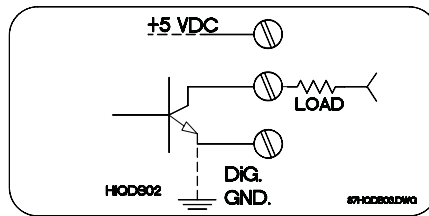
## ON-OFF CONTROL OUTPUTS RELAYS (DIGIT 4)

- 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



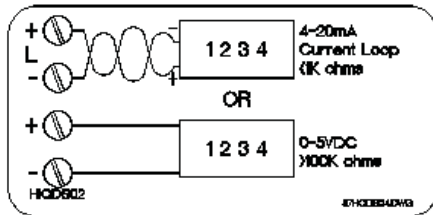
## BiMOS OPEN COLLECTOR

- 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

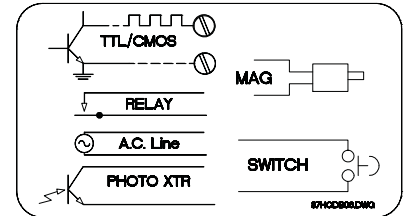
**C**

## 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)

# 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

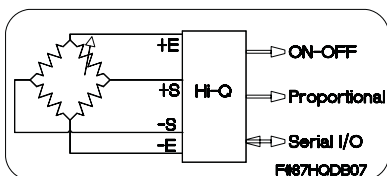
**ANALOG SIGNAL  
CONDITIONERS**

(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

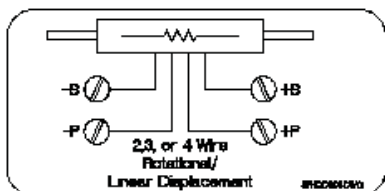


**VDC** (Options 25 & 47)

- 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)

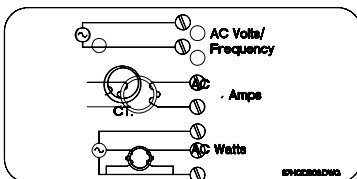
- Accuracy & Lin.: ±0.1% of F.S.
- Full Scale Input: 50KΩ
- Excitation Current: 0.01mA
- Stability of Excitation: ±0.05%/°C



**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 21 & 41)

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

**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:**

Otek has developed over 30 signal conditioners that can be incorporated in the HI-Q series economically, such as for: 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