BENEFITS OF THE HI-Q™ (High I.Q.)

DESCRIPTION:

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 and we are happy to pass them on to you.

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

BENEFITS

* **SV & 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 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.

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

Symbol	Description
⊖	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
⚠ STOP	Danger Alarms (Warning/Stop)
Ⅰ	Relays (4 or 6), Bi Mos (8) On-Off
	Current Loops 4-20mA (0-5V out)

|	
1 → 3 4 → 2	Assign any Channel to any 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)

$+,-,x,\div, \sqrt{}, \Sigma$ Selectable

Δ t	Alarm w/or w/out Delay
	Watchdog Timer
	COP & Self-Diagnostics
	Store any Non-Volatile Command in Memory
4016 E.ST. Tucson, AZ	Any Address Alphanumeric
	Any speed 1.2 to 19.2 KBPs
	Any Resolution (down to 1÷50,000)

A

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 a standalone unit 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 for 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 and click on Windows Navigator ™.
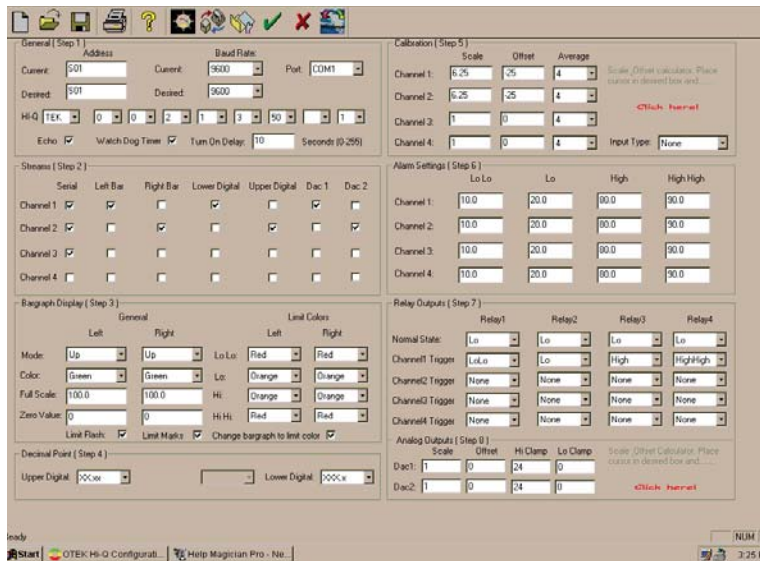
OTEK's **"HI-Q"** line of **Programmable Intelligent Controllers** with their built-in and isolated signal conditioners will connect directly to your sensor and/ or transducer and even power it. All you have to do is to connect & power up. We will even preprogram the **"HI-Q"** for you if so desired 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 (25 Point)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 a standalone unit 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 IF, ASK FOR IT!
Our customers THINK of the products; we just design them!

B

COMMON ELECTRICAL SPECIFICATIONS FOR:

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

(All at 25℃) 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.
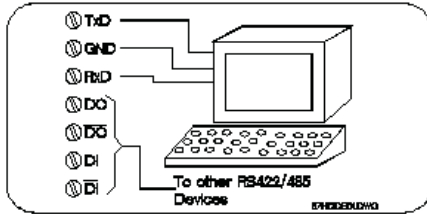

POWER INPUTS
(DIGIT 3)

• 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

4ea. 10A Relays SPDT
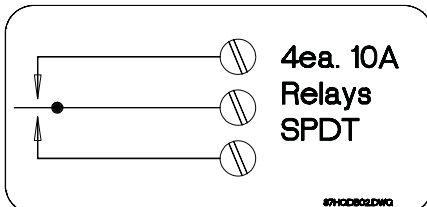
BiMOS OPEN COLLECTOR

• 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
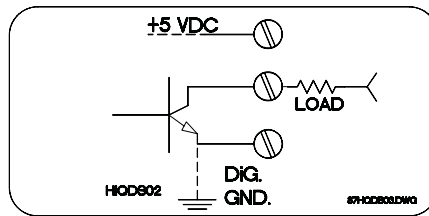
+5 VDC
LOAD
DiG. GND.

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
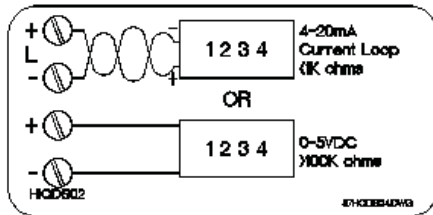
MEASURING INPUTS
(DIGIT 6 & 7)
DIGITAL DISCRETE INPUTS
Functions Selectable:
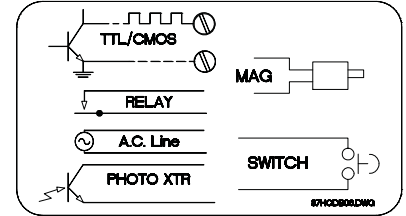
Event, Timer, Period, Frequency,
RPM and SPH

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/⁰C
• 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 •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%/°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
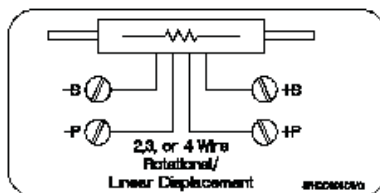 (3) Tare, Range, Zero Span Are User-Programmable

F#67HQDB07
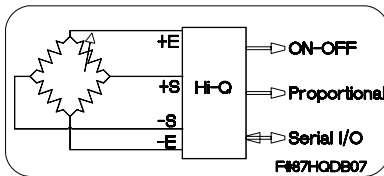
VDC *(Options 25 & 47)*

• 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

2,3, or 4 Wire
Rotational/
Linear Displacement

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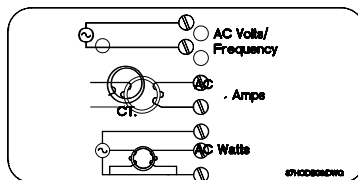
RTD *(Options: All RTD)*
NOTE: Due to limited signal input connections (6) we can accept 2-wire/3 channel; 3-wire/2 channel or 4-wire/1 channel. Contact Otek for others.

• 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:+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, °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-Q214:	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-Q219:	10W
HI-Q2000:	15W
HI-Q2K:	15W