

**NEW!**  
**PRELIMINARY**

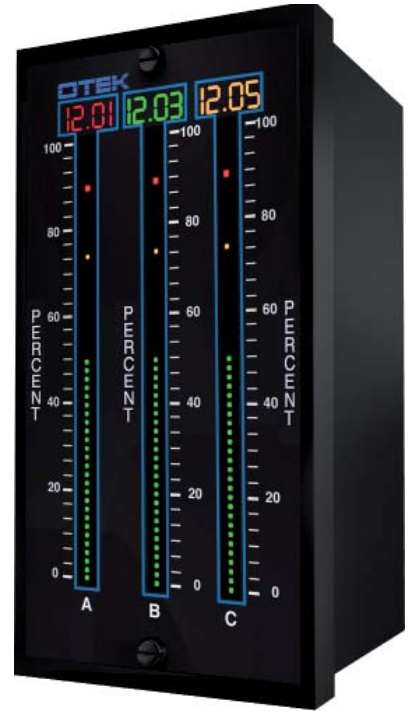
**AUTOMATIC TRI-COLOR ISOLATED TRIPLE BAR-DIGITAL CONTROLLER WITH USB/232/485/ETHERNET I/O & MICRO CARD FOR NUCLEAR, MIL-STD & INDUSTRIAL USE**

**MODEL TBD**

**FEATURES:**

- \*3 Ea. isolated 14 bit A/D with 51 segment auto tricolor bargraph & 4 digits
- \*Metal case for EMI/RFI compliance (Mil-Std 461) Shock (901C), FUNGI (810-F)
- \*Shock & Vibration (Mil-Std 167) Ready
- \*>30 Input Signals & >5 Power Inputs
- \*SDHC For Data Logging up to 8 GB
- \*USB, 232, 485, ETHERNET I/O
- \*High Speed (>20Khz) Peak & Hold (Opt'l)
- \*Isol. 28VDC Power for XMTR (Opt'l)
- \*Up/Down or Center Zero Bargraph
- \*12 Relays or Open Coll. Transistors (4 per Channel)
- \*Isolated Analog Out (4-20mA/0-5 VDC)
- \*Remote Display For SCADA/DCS
- \*Front Panel or Serial Zero & Span
- \*NEMA 3 Case Only 3" Deep
- \*Math Function, Polynomial & X-Y Tables
- \*Lifetime Warranty.

(Actual size is 3"x 6")



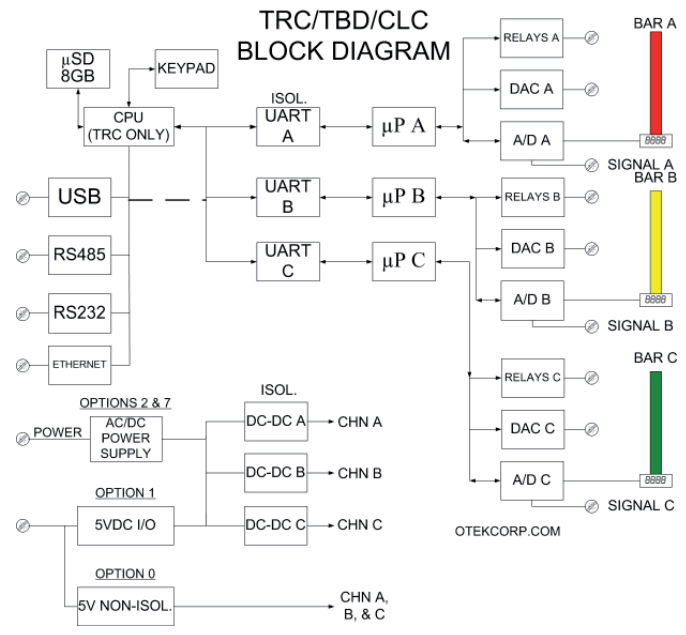
**SPECIFICATIONS (@ 25°C)**

- NOTE: All 3 channels isolated from each other and power input.  
(See options description)
- Accuracy & Linearity:  $\pm 0.01\%$  of F.S.
  - Bargraph Resolution: 2%
  - Span & Zero Range:  $\pm 3000$  Counts
  - C.M.V. - Signal to - Power: 2VDC Max.
  - Digits: 0.2", 4 (9.9.9.9) Floating D.P.
  - Temperature Coefficient: 50 PPM
  - Op. /Storage Temp: 0-60/-20 + 80°C
  - Power Consumption: 2 Watts @ 5VDC + Options
  - Environmental: NEMA 3 , 5-95% RH
  - Case: All Metal Machined or 94VO
  - CMTBF:** 100,000+ Hours
  - Relays: 1 Amp 120VAC/30VDC (4) SPDT or O.C.T.: 30V/30mA
  - Analog Out: 16 Bit  $\pm 0.01\%$
  - Serial I/O 300-19.2KB (8N1 Setting)
  - All ASCII I/O; Address:  $10^{34}$  (> $10^{34}$ )

**DESCRIPTION:**

A nuclear customer liked our model "EBD" and gave us the challenge to put 3 isolated channels in one case, make it to military standards 461,901,810 & 167 (Epritr-102323R3), Class 1E, and keep the case < 4 inches deep! Now you can benefit from their need, OTEK's ingenuity and over 35 years experience in high quality instrumentation and its unique lifetime warranty.

**LIFETIME WARRANTED!**



**\*POWER OUTPUT (28 VDC) FOR 4-20mA XMTR**

If You Don't See It, Ask For It!

**Think of the possibilities!**

- \*Triple Redundant Controller
- \*Any 3 input process: V/A/Hz/W; C°/#/G; pH/C°/rH; etc.

Tel: 520-748-7900 Fax: 520-790-2808  
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**OTTEK**™ CORP.  
Since 1974

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

## TBD SERIES

Some features include:

\***ANALOG INPUTS:** >30 Signal conditioners. (See ordering information on P.6)

\***MATH FUNCTIONS:** Polynomial (9th), RTD, TC & X-Y linearization plus Tare, Offset, Scale, Peak, Hold and more are programmable via simple command.

\***CONTROL OUTPUTS:** 4 each relays or 4 open collector transistors for High, High-High, Low and Low-Low Control of each channel.

\***ANALOG OUTPUT:** Optional isolated 4-20mA, 0-1mA, 0-20mA or 0-5VDC with 16 Bit resolution.

\***SERIAL I/O:** RS232, RS485, USB or Ethernet.

\***ISOLATED POWER INPUT:** Standard is 3 isolated 5VDC or common isolated 10-32VDC, 100-240VAC or USB powered.

\***DISPLAY:** The 51 segment automatic tricolor bargraph can be programmed for any direction (up or down), any start (bottom, top, middle), colors change as limits are reached or exceed.

\***DATA LOGGING:** Removable SDHC memory card up to 8 gigabytes.

We use our series "SC" signal conditioners (~1" x 1") so we can mix and match any offered combination, but only 3 maximum/instrument. (See note 1 in ordering information).

## THE SIGNAL CONDITIONERS:

### (2nd & 3rd Digits)

#### Option 01: 4-20mA Input:

A 50 Ohm 1% resistor is used as a shunt. Don't connect/disconnect the signal without limiting the current (max 50mA<1 second).

Accuracy: +/- 0.05% of full scale.

### (2nd & 3rd Digits): Options 04-08:

Input impedance is 1 Mega Ohms on all VDC ranges.

Accuracy: ±0.05% of F.S.

### (2nd & 3rd Digits):

Option 09: Custom: Use this option to describe any custom input, scale or modification to the **TBD** and contact us for feasibility and cost.

Accuracy: To Be Determined

### (2nd & 3rd Digits):

#### Options 10-13: 200µA - 200mADC:

Since the **TBD** is 200mV full scale (2,000 Counts) the "Shunt" resistors used are 1K, 100, 10 or 1 Ohm.

Accuracy: ±0.05% of F.S.

### (2nd & 3rd Digits):Options 14-22:

V & mA RMS: Here we use a **True RMS-DC** Converter for accurate (± 0.05%) measurement of sine waves up to 10KHz (± 0.1% for 10-20KHz) and SCR fired to ± 2%. Input impedances vs. range are the same as for VDC & mADC ranges. **Warning: No Isolation!**

Accuracy: ±0.05% of F.S.

### (2nd & 3rd Digits): Option 23:

#### 5Amps AC:

Specifically for current transformers (**C.T.**) this option requires an externally mounted (supplied) 0.05 Ohm, 0.1% 5 Watt resistor. You can mount the "Shunt" at your **C.T.** or next to the **TBD** but make sure the connections are "Perfect" to electrical codes. The C.T. might have "**Lethal**" **High Voltage** without a "Shunt" (Open) and the **TBD** will "Smoke". See OTEK's New **ACS & CTT** models for **C.T.** powered instruments (Patent #7,626,378).

**Warning: No Isolation!**

Accuracy: ±0.05% of F.S.

#### Option 24: Strain-Gage (<1000

**Ohm Type):** Here we use high accuracy and stability constant current (~1mA) source, and a differential amplifier to convert the 2 or 3mV/V (typical) sensitivity of your "Load-cell". *Specify* your Strain-Gage sensitivity and full scale and the **TBD's** display at Zero and Full Scale Please!

Accuracy: ±0.05% of F.S.

#### Option 25: Strain-Gage (≥1K < 4K

**Ohm):** These are typically "Monolithic" **S-G** that require constant voltage (preferably) excitation. We use 4.096V for high stability and accuracy. *Specify* your S-G impedance and sensitivity and the **TBD's** display at Zero and Full Scale.

Accuracy: ±0.1% of F.S.

Note on S-G: Some S-G offer +/- 1VDC or 4-20mA condition output. Use Option 9 and specify.

## **TBD SERIES**

### **(2nd & 3rd Digits): Option 26:**

**RTD (PT100):** We excite your 2, 3 or 4 wire RTD with 200 $\mu$ A to avoid the "self heating" effect. The range of the **TBD** is the same as your **RTD** typically -200°C to +800°C (-328 + 1562°F). You can place the decimal point at will (typically -200.0 to 800.0 (-328.0 to 1562.0)). The **PT100** has a temperature coefficient of 0.00385 Ohms/Ohm/°C. (For legacy 0.00392 TC {known as ANSI 392} or 10 Ohm copper, contact **OTEK** and use Option "09".)

**Accuracy:**  $\pm 0.5\%$  of F/C plus sensor's error.

Note: For 2 wire, jump -S to -E and +S to +E. For 3 wire only jump -S to -E.

Note: You can change °C to °F via serial port.

### **(2nd & 3rd Digits): Option 27:**

**RTD (PT1000):** Same as PT100 except it is 1000 Ohms at 0°C instead of 100 Ohms @ 0°C. The same technique is used for copper **RTD** (10 Ohm), contact **OTEK**. Same connection as Option 26 apply.

Note: You can change °C to °F via serial port.

**Accuracy:**  $\pm 0.05\%$  of F/C plus sensor's error.

Note: For long distances use a 4-20mA transmitter such as our **900** or **LPX** series.

### **(2nd & 3rd Digits): Option 28:**

**Thermocouple (Type J):** This **TC** has a range of -210 to +760°C (-350 + 1390°F). Its color is white (+) and Red (-), cold junction (CJ) is inside the **TBD** at the connector base. Make sure the connections from the **TBD** and your **TC** are as close to the **TBD's** entrance as possible to avoid errors. If you short out the **TBD's** +**TC** & -**TC** together, the **TBD** will read the ambient temperature due to its built-in C.J.C.

Note: You can change °C to °F or TC type via serial port.

**Accuracy:**  $\pm 2^0$  F/C of signal input.

### **(2nd & 3rd Digits): Option 30:**

**TC (Type K):** This is yellow (+) and red (-) and has a range of -270 + 1370°C (-440 + 2500°F). The same notes as Option 28.

**Accuracy:**  $\pm 2^0$  F/C of signal input

Note: You can change °C to °F or TC type via serial port.

### **(2nd & 3rd Digits): Option 31:**

**TC (Type T):** This blue (+) and red (-) **TC** wire has the range of -270<sup>0</sup> + 400°C (-440 + 750°F). Same notes as Option 28.

**Accuracy:**  $\pm 2^0$  F/C of signal input.

### **(2nd & 3rd Digits): Options 32-33:**

#### **Frequency Input:**

We use an **F-V** to accept frequencies from 40 - 20KHz and amplitudes from 1-400V peak or dry contact or open collector transistor (O.C.T.). For 50 to 440 Hz power line frequency measurement. Use Option # "33" or see our **ACS** Powerless™ Series.

**Accuracy:**  $\pm 0.05\%$  of F.S.

### **(2nd & 3rd Digits): Option 34:**

**%RH:** This conditioner is designed to interface to a typical (capacitance type) 2-3pF/% of **RH** made by several manufacturers. Use Option "09" and contact **OTEK** to specify your sensor's specifications.

**Accuracy:**  $\pm 2\%$  RH of signal input.

### **(2nd & 3rd Digits): Option 35:**

**pH (Acidity):** We use a FET input (10<sup>15</sup>) amplifier and calibrate the **TBD** for 0-14.00 pH using the Industry's standard  $\pm 413$  mV =  $\pm 7$  pH coefficient.

Note: Not temperature compensated.

**Accuracy:**  $\pm 0.05\%$  of F.S.

### **(2nd & 3rd Digits) Option 36:**

**ORP (Oxygen Reduction Potential):** Our FET amplifier (10<sup>9</sup>) accepts the industry standard 2000mV F.S. of the probe and the **TBD** displays it in % (0-100.00%).

**Accuracy:**  $\pm 0.05\%$  of F.S.

### **(2nd & 3rd Digits): Option 37:**

**Hi Speed Peak & Hold (P&H):** Now you can capture fast transients greater than 50 microseconds (even faster soon) with accuracy and resolution greater than 0.1% of F.S. and retention of greater than 10 years (Due to **OTEK's** new and patent-pending **P&H Option**).

### **Serial I/O: (4th Digit)**

**Note: All set for 9600 Baud (Programmed)**

Option "0": No Serial I/O: Only options 0, 5 or 6 on digit 6 are available when option "0" is selected.

**Option 1:** RS2323: 1200-19.2kb, all ASCII (8N1) open protocol "DB9" connector

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**Option 2:** RS485: 1200-19.2kb, all ASCII (8N1) open protocol screw “conn.”

**Option 3:** USB: 1200-19.2kb, all ASCII (8N1) open protocol “USB Type B.” Driver included at [www.otekcorp.com/support-downloads.htm](http://www.otekcorp.com/support-downloads.htm)

Any terminal program (Hyperterminal, Procomm, Kermit) will work with OTEK’s serial com. ports.

**Option 4 (Ethernet):** Fully compliant 10 baseT, RJ45 connector. Free Drive

**Option 5 (Micro SD Memory Card):** Automatic log of all data as configured via the serial port. The TBD can store up to 8 gigabytes of data. The µSD is pluggable on the rear.

**POWER INPUT:( 5th Digit):**

Option “0”: Non-Isolated 5 VDC (2W/channel); all I/O of all 3 channels (except relay contacts and analog out) are non-isolated.

Option “1”: 5VDC input (2W/Channel); all I/O are 100% isolated from each channel and each other.

Option “2”: 90-265VAC (same option as 1, but single VAC power supply)

Option “7”: 10-32VDC: Same as option 2 but single VDC power supply

Option “9”: Specify your own (i.e. independent and isolated 10-32VDC (or VAC) power input). Contact Otek (might have to delete some outputs).

**Control & Power Out (6th Digit):**

**Option 1: Relays (4):** Standard outputs are SPDT of all 4 relays(for Hi, Hi Hi, Lo & LoLo). Contacts are rated at 1 amp at 120 VAC/30 VDC resistive load. Also applies to option 5 & 7 (Relays). Power required by each relay is 200 mW (40mA@5VDC) x 4=800 mW. (Contact OTEK for 10 A contacts).

**(6th Digit): Option 2: Open Collector Transistors (O.C.T):**

Four O.C.T are included and all are common emitter (sinking) to digital ground (terminal TS1-2). The 5 VDC internal powers is available at terminal TS1-1. Maximum current allowed per O.C.T. (From the internal 5 VDC) is 20mA/O.C.T. if external VCC is used, the maximum VCE is 30 VDC and 100 mA per O.C.T. Switching time is under one (1) uSecond.

**(6th Digit): Option 3: Isolated 4-20 mA:** (Must include serial I/O options 1-3 Digit 4)

This option is offset & scaled via the serial port (digit 4) and can be configured for 4-20, 0-20 or 0-24 mA or 0-5 VDC via internal jumpers (standard is 4-20 mA).

This option requires under 200 mA@5VDC internal power due to step up from 5-30 VDC compliance. Accuracy & linearity is +/- .1% of setting and can drive up to 1K ohms load. Also see Option B.

**(6th Digit): Option 4: Isolated 30 VDC**

You can use it to excite your transmitter at up to 25mA. It consumes under one (1) watt at full load. Also see Option A.

**(6th Digit): Option 3, 5-8:**

Combinations of Options 1-4. Don’t forget to add all power requirements of each option desired.

**( 6th Digit): Option A: Non-Isolated 28VDC For Transmitters.**

**Note: Does Not Require Serial I/O**

It converts the internal 5 VDC to 28 VDC and requires under 0.8 watts@5 VDC with max current output of 25mADC.

**TBD SERIES continued**

**(6th Digit): Option B: Non-Isolated 4-20 mA Out.**

**Note: Does Not Require Serial I/O**

This option converts the **TBD** to a low-cost transmitting DPM. The output is referenced to the **TBD's** Signal input after it has been conditioned by the signal conditioner (such as strain-gage, Hz, PH, etc.), and it has its own zero and span potentiometers for your customized range. Standard connections are for sourcing with burden under 700 ohms @ 20 mA. For external compliance and sinking, select option #9 and specify "external compliance" (you supply the VDC power for the 4-20mA transmitter). Minimum voltage is 10 VDC plus your load. Max is 30 VDC plus your load. Accuracy and linearity is +/- 0.05% of full scale. Power requirement is 800mW@5VDC internal compliance or 50mW with external (yours) compliance.

**( 7th Digit): Option 0: Plastic 94 VO Black (Not for Mil-Spec. or Nuclear)**

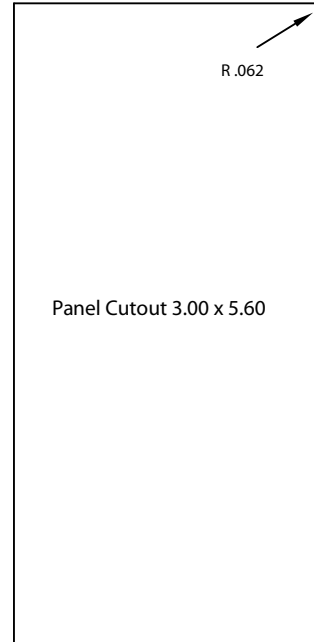
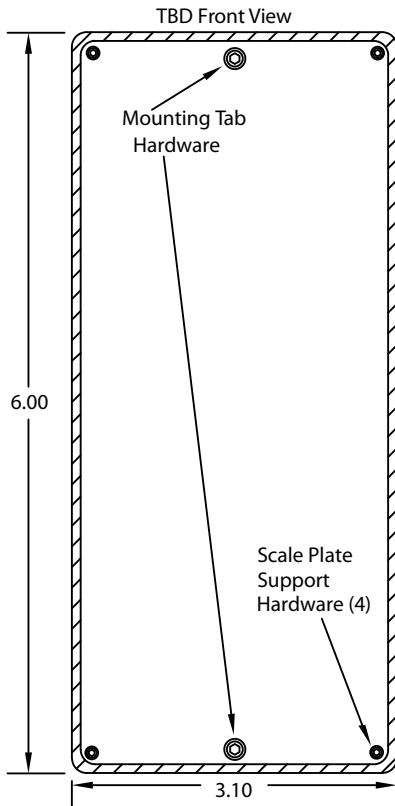
**Option 1:** Aluminum machined, nickel plated ready for Mil-Std. 461 (EPRI TR-102323R3)

**Mounting Instructions:**

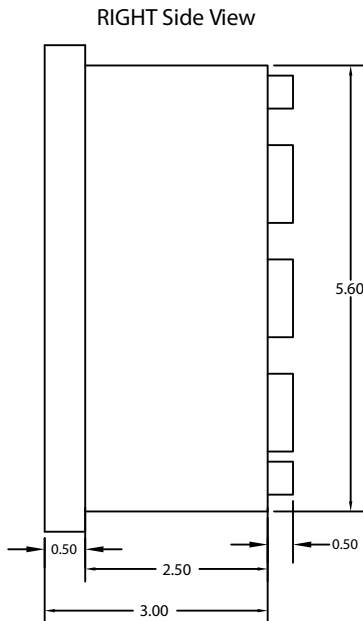
1. Remove filter.
2. Slide TBD in panel and twist lock the tabs until secured.
3. Replace filter.



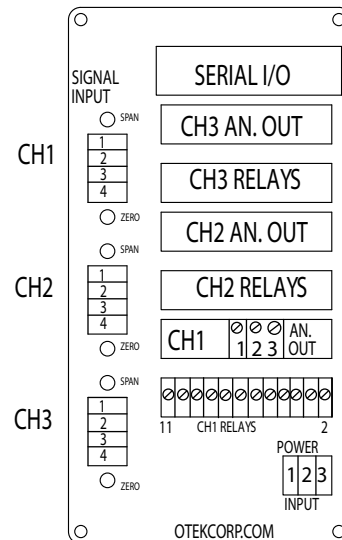
# TBD MECHANICAL INFORMATION



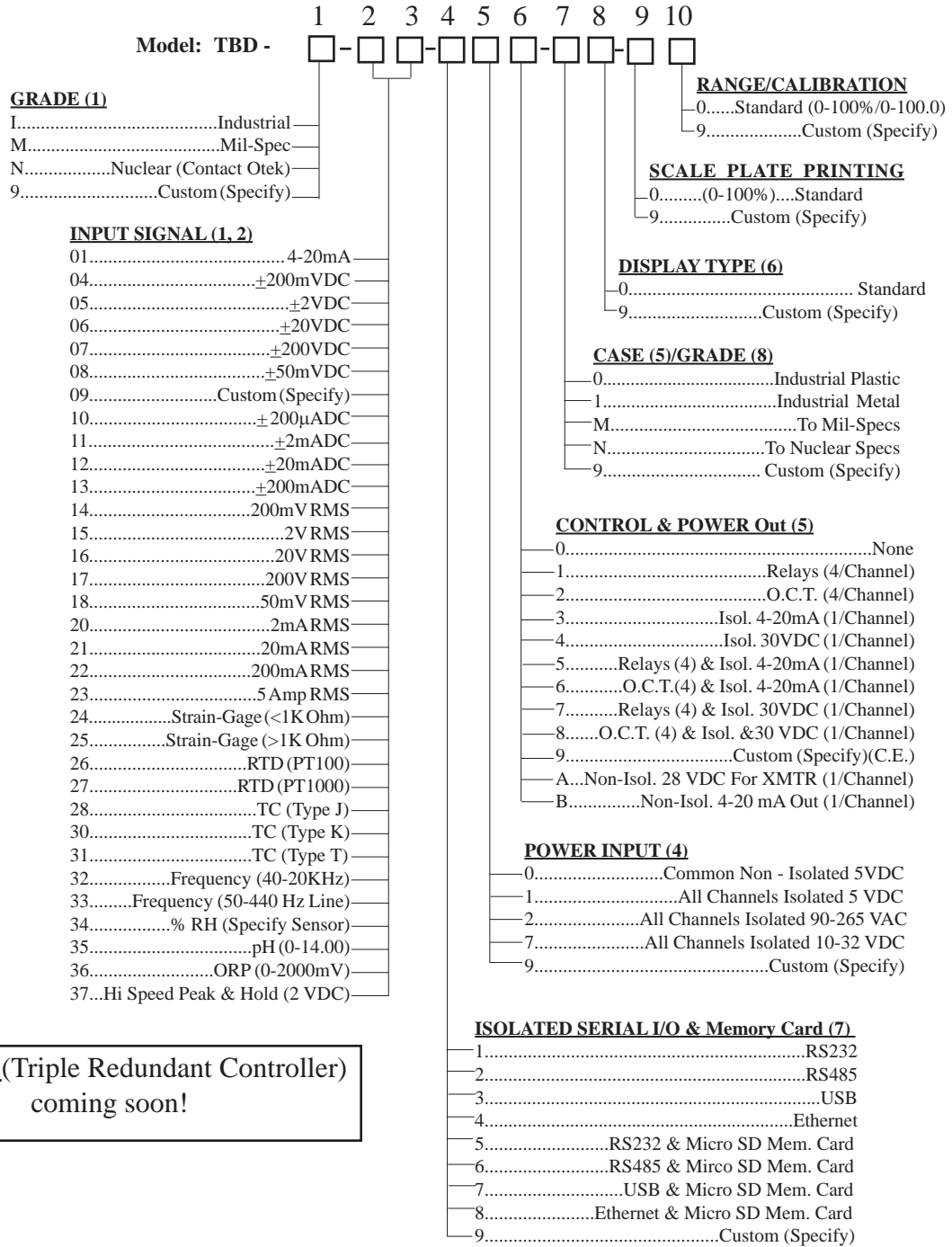
- Mounting: 1. REMOVE FILTER  
 2. TWIST MOUNTING TABS (2) CLOCKWISE  
 3. REPLACE FILTER



## TBD TYPICAL CONNECTIONS



# TBD SERIES ORDERING INFORMATION 10-26-11



New **TRC** (Triple Redundant Controller) coming soon!

**NOTES:**

1. All 3 channels get same signal input. For mixed signals, use Option "09" and specify input option # vs. channel #. Channel 1 is left, #2 is center & #3 is right. Option 23 (5Arms) includes 3 each 0.05 Ohm 1%5W shunt resistor.
2. See "EBD" or HI-Q119 series for single channel & dual channel.
3. Serial I/O is isolated from signal. Must have serial I/O to implement processor's functions (if req'd).
4. Non-isolated 5 VDC (Option 1) eliminates isolation between channels & all I/O except relays & analog out. Max power Req'd.: 5 watts.
5. Control Outputs (Digit 6, Option 1-8) must order any serial I/O (Digit 4). As on Note 1, Digit 6, Options 1-6 get same outputs for each channel (i.e. 3 each 4-20mA out). For mixed outputs (i.e. Ch. 1, Relays, Ch.2, O.C.T. & Ch.3, 4-20mA) use Option 9 and specify. (subject to acceptance by OTEK). Options A&B are NOT isolated from input signals or internal 5V supply (Option 0 on Digit 5)
6. Std. display is 3 bars, 3 digitals per photo on front. For other configurations or # of bars/digitals or digital colors, use Option 9 and specify (subject to acceptance by OTEK).
7. Ethernet connector extends 1/2" beyond back cover
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.