1/8 DIN BAR-DIGITAL METER/CONTROLLER

*AUTOMATIC TRICOLOR BAR
*RELAYS/DAC/SERIAL
*NUCLEAR *MIL-SPEC * INDUSTRIAL GRADES

MODEL

BDM

FEATURES:
- Proven Software (SV & V)
- Plastic or Metal Case (EMI/Seismic)
- USB, RS232, RS485, Ethernet
- Power For Your Transmitter (28VDC)
- Math Functions (+, -, x, ÷, √)
- Polynomials (9th), X-Y Tables (25)
- 4 Relays, Isolated 16 bit DAC
- Over 20 Input Signal Conditioners (TC, RTD, S-G, pH, ORP, %RH, HZ)
- High Accuracy Digital Display (+0.01% F.S.)
- Lifetime Warranty

DESCRIPTION
We shrunk the EBD! By popular demand, we took our popular EBD (6x1.7x2") and made it fit in the industry's most popular panel meter size 1/8 DIN (3.6x1.6x2"), and kept all the outstanding features. This is a reduction of almost 50% in size, but not in performance and quality! The new BDM is ready for your DCS, SCADA or stand alone application with its autotricolor bargraph (popularized by OTEK in the nuclear and military industries) for best HMI (just like traffic lights).

GRADES: 3 grades are available: Hi-Rel Industrial (see specs.), Mil-Spec to specific standards, Nuclear to 10CFR50-B and to your requirements. Contact OTEK for availability.

SIGNAL CONDITIONERS: 20+ input signal conditioners are available (more soon). See ordering information and description sections.

ZERO AND SPAN: Either manual or via serial port.

MATH FUNCTIONS: RTD, TC & X-Y linearization plus Tare, Offset, Scale, Peak and more are programmable via simple commands.

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

SPECIFICATIONS @ 25°C 5VDC Power (Industrial Grade)
- Accuracy & Linearity: ±0.01% of F.S. ± 1 Digit
- Bargraph Resolution: 2% (51 Segments)
- Span & Zero Range: ± 3000 Counts
- C.M.V. - Signal to - Power: 2VDC Max.
- Digits: 0.4", 4 (9.9.9.9 to -1.9.9.9) Floating Decimal Point
- Temperature Coefficient: 50 PPM
- Operating/Storage Temp: 0-60/-20 + 80°C
- Power Consumption: 5 Watts @ 5VDC + Options
- Environmental: NEMA 4X, 5-95% RH N.C.
- Case: All Metal Machined or 94VO Plastic
- CMTBF: 100,000+ Hours
- Relays: 1 Amp 120VAC/30VDC (4) SPDT or
- O.C.T.: 30V/30mA
- Analog Out: 16 Bit ± 0.01% (0-1, 4-20mA & 1-5V)
- Serial I/O 300-19.2KB (8N1 Setting)
- Programmable Address
- Ethernet 10 Base T Compatible

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

DISPLAY: The 51 segment automatic tricolor bargraph can be programmed for any direction (up or down), any start (bottom, top, middle), segmented or pointer color change as limits are reached or fixed.

SERIAL I/O" Standard is RS232 with optional RS485 or USB. You can even power the BDM via the USB port (2W Max.).

POWER INPUT: Standard is 5VDC with optional isolated 5-32VDC, 90-265VAC or USB powered.

POWER OUTPUT FOR 4-20mA TRANSMITTER: Non-Isolated (Options A & B) or isolated (Options 4, 7 or 8)

PROGRAMMING: OTEK will configure the BDM at no charge prior to shipment or you can reconfigure it via the serial port using simple commands (See User's Manual at www.otekcorp.com)

Warranty: Lifetime Ltd.

520-748-7900
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E-MAIL:sales@otekcorp.com
http://www.otekcorp.com

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MADE IN USA

TO BE DISCONTINUED 12/2016. FOR REPLACEMENT, CLICK NTM-0 or NTM-B

IF YOU DON'T SEE IT ASK FOR IT!
**THE SIGNAL CONDITIONERS**

**Option 01: 4-20mA Externally Powered:** It only drops 1V @ 20mA (50 Ohms). The "BDM" needs 5VDC @ 100mA to operate.

**Accuracy:** ±0.01% of F.S.

Digits 4, 5 & 6 must be Option "0."

**Accuracy:** ±0.1% of F.S. ±1 digit.

**Option 03: Serial Input Remote Display:** Here you can use the BDM as a remote display with modified (STD.) ASCII to alphanumeric display for DCS SCADA, PLC systems.

**Options 04-08: VDC Externally Powered:** Input impedance is 1 Mega Ohms on all VDC ranges.

**Accuracy:** ±0.05% of F.S.

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

**Options 10-13: 200μA - 200mADC:**

Since the BDM is 2V full scale (10,000 Counts) the "Shunt" resistors used are 1K, 100, 100 or 10 Ohm. Don't forget that maximum display is 9999 or -1999.

**Accuracy:** ±0.01% of F.S. ±1 digit.

**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,s fired to ±1%. Input impedances vs. range are the same as for VDC & mADC ranges. **Warning: No Isolation!**

**Relays/O.C.T.:** Standard is normally open (N.O. SPST). On request we can give you normally closed (N.C.). All are 1A @ 120VAC rated. The O.C.T. are normally off, com. emitter 30VDC/100mA max.
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 BDM but make sure the connections are "Perfect" to electrical codes. The C.T. might have "Lethal" High Voltage without a "Shunt" (Open) and the BDM 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 highly accurate and stable constant current (~1mA) source, and a differential amplifier to convert the 2 or 3mV/V (typical) sensitivity of your "Loadcell". Specify your Strain-Gage sensitivity and full scale and the BDM'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 BDM'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.

Option 26: RTD (PT100): We excite your 2, 3 or 4 wire RTD with 200μA to avoid the "self heating" effect. The range of the BDM 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) contact OTEK and use Option "09").
Note: You can change °C to °F via serial port.
Accuracy: ±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.
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.

Accuracy: ±0.05% of F/C plus sensor's error.
Note: For long distances use a 4-20mA transmitter such as our 900 or LPT series.

Option 28: Thermocouple (Type J): This TC has a range of -210 to +760°C (-350 to 1390°F). Its color is white (+) and red (-), cold junction (CJ) is inside the BDM at the connector base. Make sure the connections from the BDM and your TC are as close to the BDM's connector as possible to avoid errors. If you short out the BDM's + TC & -TC together, the BDM will read the ambient temperature due to its built-in C.J.C at TS3.

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

Accuracy: ±2° F/C of signal input.

Option 30: TC (Type K): This is yellow (+) and red (-) and has a range of -270°C + 1370°C (-440°F + 2500°F). The same notes as Option 28 apply.

Accuracy: ±2° F/C of signal input.

Option 31: TC (Type T): This blue (+) and red (-) TC wire has the range of -270°C + 400°C (-440°F + 750°F). Same notes as Option 28 apply.

Accuracy: ±2° F/C of signal input.

Option 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: ±0.05% of F.S.

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: ±2% RH of signal input.

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**FIG. BDM-26**

**FIG. SPM-28**

**FIG. SPM-32**

**FIG. SPM-34**
**BDM SERIES continued**

**Option 35: pH (Acidity):** We use a FET input (10^15) amplifier and calibrate the **BDM** for 0-14.00 pH using the Industry's standard ±413 mV = ±7pH co-efficient.

Note: Not temperature compensated.

**Accuracy:** ±0.05% of F.S.

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**Option 36: ORP (Oxygen Reduction Potential):** Our FET amplifier (10^9) accepts the industry standard 2000mV F.S. of the probe and the **BDM** displays it in % (0-100.0%).

**Accuracy:** ±0.05% of F.S.

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**Option 37: Hi Speed Peak & Hold (P&H):** Now you can capture fast transients greater than 50 microseconds (even faster soon) with 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).

Input: V or mADC (Specify Range). Contact OTEK for V/ma RMS or Loop Powered).

**Accuracy:** +/- 0.1% of F.S. +/- 1 Digit

**Linearity & Resolution:** +/- 0.5% of F.S.

**Response time:** >20KHz (<50us)

**Retention:** >10 years (with power on).

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**Serial I/O (DIGIT 4): Option 1:** RS232: 1200-19.2kb, all ASCII (8N1) open protocol screw connector terminals.

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

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**Option 3:** USB: 1200-19.2kb, all ASCII (8N1) open protocol "USB Type B."

Any terminal program (Hyperterminal, Procomm, Kermit) will work with OTEK's serial com. ports. For USB download our Driver at www.otekcorp.com/Support/Downloads/PC-USB Driver.

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**Option 1 or 7:** Non-Isolated 5 or 7-32 VDC Power: See Specific Option # & Connections.

All listed I/O options are available. Power requirements vary with options included. The **BDM** with No Control and Power Out (Digit 6, Option 0) requires under 500 mW (100 mA@5VDC) for LED.

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**Options 2-6: Isolated Power**

These options offer minimum isolation of 500 VAC or DC and their efficiency is about 80%. Again, add all the options: power x1.2 to arrive at total power required. Options 3, 4, 5 & 7 have wide input range, all others +/- 5%.

Option 7 is non-isolated 7-32 VDC/input range.
Option 1: Relays (4):
Standard outputs are SPST, N.O. of all 4 relays. For N.C. of all 4 relays or SPDT of only 2 relays or other contact combination select option 9 and specify. 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).

Option 2: Open Collector Transistors (O.C.T):
Factory Default Settings:
HI-HI LIMIT: K1 on at >90% of full scale (F.S.).
HI LIMIT: K2 on at >80% of F.S.
LO LIMIT: K3 on at <20% of F.S.
LO-LO LIMIT: K4 on at <10% of F.S.

Example: Reading is 40% of F.S.: None
Reading is 81% of F.S.: K2 or Q2 on.
Reading is at 91% of F.S.: K1 & K2 or Q1 & Q2 on.
Reading is at 19% of F.S.: K3 or Q3 on.
Reading is at 9% of F.S.: K3 & K4 or Q3 & Q4 on.

Option 2: Open Collector Transistors (O.C.T) {Continued}:
Four O.C.T are included and all are common emitter (sinking) to digital ground (terminal TS2-2). The 5 VDC internal powers is available at terminal TS2-1. 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 30 mA per O.C.T. Switching time is under one (1) uSecond.

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.

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.

Option 5-8: Combinations of Option 1-4.

Don't forget to add all power requirements of each option desired.

See Options 1-4 & Connections.

Option A: Non-Isolated 28VDC For Transmitters.
It converts the internal 5 VDC to 28 VDC and requires under 0.8 watts@5 VDC with max current output of 25mADC.
Option B: Non-Isolated 4-20 mA Out.

This option converts the BDM to a low-cost transmitting DPM. The output is referenced to the BDM'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 5 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. Also see Option 3.

**CASE TYPE (DIGIT 7):**

- **Option 0, Plastic:** ABS 94VO black is standard. All options have 2 piece plug-in screw terminal connectors and seismic tested mounting slides (2).
- **Option 1, Metal:** Aluminum machined, nickel plated (ready for EMI/RFI compliance), black powder coated.
- **Option 2 & 3, Nema 4X:** We add a neoprene or monel gasket for full front panel water proof. (No Span or Zero front panel adjustments).
- **Option 9, Custom:** Use this to specify your needs. M&N options, digit 1 automatically get metal housings (Option 3).

**MOUNTING (DIGIT 8):**

- **Option 0:** Horizontal
- **Option 1:** Vertical

**Zero & Span Adjustments:** (Zero on right, span on left). Always adjust zero before span. NOTE: Nema 4X, MIL-STD and nuclear have no front panel adjustments. Unit must be removed from housing for calibration (Normally not required).

**Connectors:** All connectors are 2 piece plug-in on 3.5 mm centers. Min-Max Gauge accepted is 26-16.

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**BDM MOUNTING INSTRUCTIONS**

**MOUNTING INSTRUCTIONS:**

1. Remove mounting bracket and hardware.
2. Slide meter into panel cutout from front of panel.
3. Reattach mounting bracket and hardware
4. Tighten screws on rear of meter to secure in panel.
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MADE IN USA

OTEK CORP.
SINCE 1974
### Model: BDM

#### GRADE (1)
- **I**: Industrial
- **M**: Mil-Spec (Contact OTEK)
- **N**: Nuclear (Contact OTEK)
- **9**: Custom (Contact OTEK)

#### SCALE PLATE
- **0**: Standard (0-100%)
- **9**: Custom (Contact OTEK)

#### MOUNTING
- **0**: Horizontal
- **1**: Vertical
- **9**: Custom (Contact OTEK)

#### CASE (3)
- **0**: Plastic
- **1**: Metal
- **2**: Plastic/Nema 4X
- **3**: Metal/Nema 4X
- **9**: Custom (Contact OTEK)

#### CONTROL & POWER OUT
- **0**: None
- **1**: Relays (4)
- **2**: O.C.T. (4)
- **3**: Isol. 4-20mA (For XMTR)
- **4**: Relays & Isol. 4-20mA
- **5**: O.C.T. & Isol. 4-20mA
- **7**: Relays & Isol. 30VDC For XMTR
- **8**: O.C.T. & Isol. 30VDC For XMTR
- **9**: Custom (Contact OTEK)

#### POWER INPUT
- **0**: Non-Isolated 5VDC
- **1**: Isolated 5VDC
- **3**: Isolated 7-32VDC
- **4**: Isolated 9-36VDC
- **5**: Isolated 48VDC
- **7**: Non-Isolated 7-32VDC
- **9**: Custom (Contact OTEK)

#### SERIAL I/O (3)
- **1**: RS232
- **2**: RS485
- **3**: USB
- **9**: Custom (Contact OTEK)

### NOTES:
1. 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.
3. Nema 4X for front panel only.

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