TO BE DISCONTINUED 12/2016. FOR REPLACEMENT, CLICK NTM-M or NTM-N

NEW

AUTOMATIC TRICOLOR SWITCHBOARD BARGRAPH FOR MIL-SPEC, NUCLEAR & HI-REL INDUSTRIAL USES WITH > 20 INPUT SIGNAL CONDITIONERS

MODEL SEB

FEATURES:

- New: VDC/A.C. Signal Powered (No power supply required)
- 51 Automatic Tricolor Bars (RGY)
- 4 Digits (9.9.9.9 -1.9.9.9)
- RS232/485/USB Serial I/O
- Fits Industry's Std. 4" ANSI or 1/4 DIN Panel Cut-Out, But Only 1" Deep
- Use As Indicator/Controller/Remote Display on DCS/SCADA
- Optional 10-32VDC or 90-265VAC Power Input
- Power For Transmitter (28VDC@20mA)
- NEMA 4X Front Panel
- Replaces Many Old Bargraphs
- Lifetime Warranty

SPECIFICATIONS @ 25ºC 5VDC Power (Industrial Grade)

- Accuracy & Linearity: See description section.
- Bargraph Resolution: 2% (51 Segments)
- Span & Zero Range: ± 3000 Counts
- C.M.V. - Signal to - Power: 2VDC Max.
- Digits: 0.6", 4(9.9.9.9) 0.01% Resolution
- Temperature Coefficient: 50 PPM
- Operating/Storage Temp: 0-60/-20 + 80ºC
- Power Consumption: 150mW @ 5VDC + Options
- Environmental: NEMA 4X , 5-95% RH N.C.
- Serial I/O 300-19.2KB (8N1 Setting)
- All ASCII I/O, Address: 255
- CMTBF: 100,000+ Hours

Note: See description section for individual specifications.

DESCRIPTION

Now you can replace that **Old** analog or digital "Switchboard" meters with **OTEK's** latest **Nano** & **Sigma Delta A/D** Technology worthy of its Lifetime Warranted products. The New **SEB** (**S**witchboard L**E**D **B**argraph) complements the new breed of Programmable Intelligent Controllers, with features only found in other **OTEK's** Mil-Spec, Nuclear and Outerspace versions. The new nanotechnology used with proven firmware (SV & V) and **Sigma Delta A/D** reduces the number of components and cost without compromising in quality.

You can use the **SEB** as stand alone or part of a **DCS**, **SCADA**, or **PLC** system via its Serial and/or Analog I/O. Only order what you need!

GRADES: 4 grades are available: Hi-Rel Industrial (see specs.), Mil-Spec to specific standards, Nuclear to 10CFR50-B to your specific list and custom to your requirements. Contact **OTEK** for available "Off The Shelf" specs. **NOTE: M** & **N** grades are supplied in a metal housing, **I** grade in plastic or metal.

ANALOG INPUTS: Over 40 input signals are accepted. If we don't have it, we'll make it.

ANALOG OUTPUT: Optional 0-1mA, 0-20mA or 0-5VDC all isolated and reversed scale are available on request.

POWERLESS™: Another **OTEK** innovation (Pat. #4,908,569 & 7,626,378) allows the SEB to be signal powered (no power supply). See ordering information.

EXTERNALLY POWERED: Here you have access to ALL the **SEB's** features such as relays, analog out, USB, RS232, RS485, math functions, X-Y tables, polynomials, floating point and more.

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.

A. C. SIGNAL POWERED: No power supply is required! The **SEB** draws its parasitic power (~50mA)from the signal it measures. Warning! No isolation. Use P.T. and C.T. (No control outputs).

POWER OUTPUT FOR 4-20mA TRANSMITTER: Either isolated 30VDC @ 20mA (Options 4, 7 or 8).

GRADES: Nuclear: For Class 1E; Mil: To specific Mil-Stds; Industrial: Per these specifications.

Other Bargraphs: LSB, LBD, LPB, HI-Q Series.

Warranty: Lifetime Ltd.

IF YOU DON'T SEE IT ASK FOR IT!

520-748-7900
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http://www.otekcorp.com

OTEK™ CORP.
SINCE 1974

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

SEB Series continued
HOW IT WORKS:

CURRENT LOOP POWERED:
We use a Zener to clamp the voltage to 5V max. and monitor the Loop's current (we invented it in 1974). (Digit 2, Option 0).

VDC SIGNAL POWERED: We monitor the voltage with high impedance and clamp it to a safe level to power the **SEB**. (Digit 2, Option 2).

AC SIGNAL POWERED: For VAC & Hz we use a capacitor limiting rectifier to power the **SEB** and monitor the VAC with an RMS-DC converter. For Hz we use an F-V for accurate conversion. For A.A.C. we invented (Patented) a C-V converter to extract the current from your C.T. for power and monitor the signal with RMS-DC. (Digit 2, Options Q-T). ~250mW.

EXTERNALLY POWERED:
Non-Isolated 5VDC or isolated 5-36VDC or 90-265VAC 50/60Hz is optional (Digit 3, Options 1-8). Power: ~500mW plus options.

DISPLAY (Digit 4): 0-100% & 0-1,000 counts or use #9 and specify (configurable).

SERIAL I/O: When ordered, (Digit 5), the **CPU** controls the Baud Rate (300-9600 Baud), the relays, analog output, math functions, linearization polynomial (9th) & X-Y tables.

CONTROL AND POWER OUT (Digit 6): Not for powerless models. You can order 4-20mA as standard, or 0-5V, 0-20mA or 0-24mA on request, or you can order the isolated 30VDC (30mA) or non-isolated 28VDC out for your transmitter. See ordering information for power consumption of each option.

RELAYS/O.C.T.(Only for powered models): Either four (4) relays (SPDT) rated contacts at 10A@120 VAC resistive, with ~500ms response; with built in varistors or 4 open collector transistors rated at 30 VDC/30mADC common emitter, with < 1uS response.

THE SIGNAL CONDITIONERS: (2ND DIGIT)

OPTION 1: 4-30VDC SIGNAL POWERED
Another **OTEK** innovation. The voltage signal powers an **LDO** to protect the **SEB** and a divider network is used to measure and display the signal. If the input resistance of this Option is too low (~ 500 Ohms), use powered models. Power Input must be Option 0 (Powerless).
Accuracy: ±0.1% of F.S. **Power consumption**: ~250mW.

CONNECTIONS:
FIG. SEB-0, LOOP POWERED

TS2
1 N.C.
2 N.C.
3 - LOOP
4 + LOOP

OPTION 2: 4-20mA EXTERNALLY POWERED: It only drops 1V @ 20mA (50 Ohms) but the "**SEB**" needs 5VDC @ 150mA to operate. Power Input must be Options 1-9.
Accuracy: ±0.05% of F.S.

CONNECTIONS:
FIG. SEB-1, 4-30V IN

TS2
1 N.C.
2 N.C.
3 - SIG.
4 + SIG.

OPTIONS 3-6: VDC & mADC EXTERNALLY POWERED:
Input impedance is 1 Mega Ohms on all VDC ranges and 100 Ohm on 2mA & 1 Ohm on 200 mA range.

Accuracy: ±0.05% of F.S.

CONNECTIONS:
FIG. SEB-2-B, G, H, L-N

TS2
1 + SIG. HI
2 - SIG. LO
3 N.C.
4 N.C.

OPTIONS 7, 8 & A:
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 SCRs fired to ± 1%. Input impedances vs. range are the same as for VDC & mADC ranges.
Warning: No Isolation!

Accuracy: ±0.1% of F.S.

CONNECTIONS:
FIG. SEB-2-B, G, H, L-N

TS2
1 + SIG. HI
2 - SIG. LO
3 N.C.
4 N.C.

OPTION 9: CUSTOM Use this option to describe any custom input, scale or modification to the **SEB** and contact us for feasibility and cost.

CONNECTIONS:
FIG. SEB-2-B, G, H, L-N

TS2
1 + SIG. HI
2 - SIG. LO
3 N.C.
4 N.C.

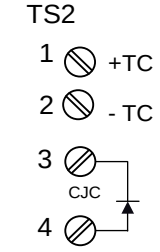
SEB Series continued

OPTION J: THERMOCOUPLE (TYPE J): This **TC** has a range of -210 to + 760^{0}C (-350 + 1390^{0}F). Its color is white (+) and Red (-), cold junction (CJ) is at the connector base. Make sure the connections from the **SEB** and your **TC** are as close to the **SEB's** terminal as possible to avoid errors. If you short out the **SEB's** +**TC** & -**TC** together, the **SEB** will read the ambient temperature due to its built-in C.J.C. (Cold Junction Compensation).

NOTE: You can change from °C to °F and TC type via simple commands on serial port.

Accuracy: ± 2^0 F/C of signal input.

CONNECTIONS:
FIG. SEB-J/K (TC)

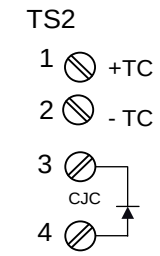


CJC INCLUDED

OPTION K: TC (TYPE K): This is yellow (+) and red (-) and has a range of -270 + 1370^{0}C (-440 + 2500^{0}F). The same notes as Option G.
Accuracy: ± 2^0 F/C of signal input

For Other TC use #9 and Specify.

CONNECTIONS:
FIG. SEB-J/K (TC)

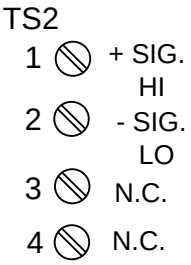


CJC INCLUDED

OPTION L: %RH: This conditioner is designed to interface to a typical (capacitance type) 2-3pF/% of **RH** made by several manufacturers. Use Option 9 and contact **OTEK** to specify your sensor's specifications.

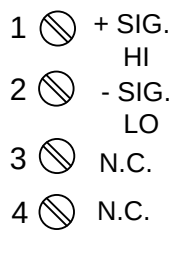
Accuracy: ± 2% RH of signal input.

CONNECTIONS:
FIG. SEB-2-B, G, H, L-N



OPTION M: PH (ACIDITY): We use a FET input (10^{15}) amplifier and calibrate the **SEB** for 0-14.00 pH using the Industry's standard ± 413 mV = ± 7pH coefficient.
Bargraph display is 0-100% or use #9 and specify.
Note: Not temperature compensated.
Accuracy: ±0.05% of F.S.

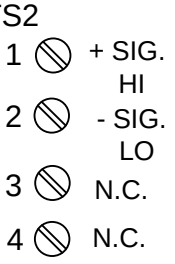
CONNECTIONS:
FIG. SEB-2-B, G, H, L-N



OPTION N: ORP (OXYGEN REDUCTION POTENTIAL): Our FET amplifier (10^9) accepts the industry standard 2000mV F.S. of the probe and the **SEB** displays it in % (0-100.00%).

Accuracy: ±0.05% of F.S.

CONNECTIONS:
FIG. SEB-2-B, G, H, L-N



OPTION P: HI SPEED PEAK & HOLD (P&H): Now you can capture fast transients greater than 5 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: 2VDC/mADC F.S. (Specify Range). Contact OTEK for V/mA o RMS.

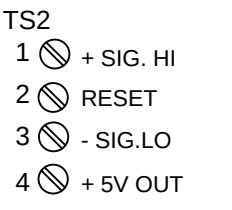
Accuracy: +/- 0.1% of F.S. +/- 1 Digit

Linearity & Resolution: +/- 0.1% of F.S.

Response time: >200KHz (<5us)

Retention: >10 years (with power on)

CONNECTIONS:
FIG. SEB-P (P & H)



RUN: JUMP 3 & 2
RESET: PULSE 3 & 1 or OPEN 3 & 2
PIN 3 HAS 10K PULL UP TO +5V

SEB Series continued

OPTION 2: OPEN COLLECTOR TRANSISTORS (O.C.T):

Four O.C.T are included and all are common emitter (sinking) to digital ground. The 5 VDC internal power is available. 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 300ms.

OPTION 3: ISOLATED 4-20 MA (RETRANSMISSION): (Only for Powered Models)

This option is offset & scaled via the serial port (digit 5) 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. Accuracy & linearity is +/-.1% of setting and can drive up to 1K ohms load. Also see Option B. Power consumption: 200mA@5VDC.

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. Power consumption: 200mA@5VDC.

DISPLAY (4TH DIGIT): Standard display is 0-F.S. input=0-100% and 0-100.0 counts. Any other, use #9 and specify. Also, see digit #9 for scale plate printing.

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

Don't forget to add all power requirements of each option desired. Worst case is 2 watts.

OTHER SPECIFICATIONS

- Bars: 51 & 4 Digits (9.9.9.9)
- Power For Transmitter: 28VDC@20mA (requires 1 Watt Power Input)
- Input Type: Differential & Single Ended. 1M Ohms For VDC
- All Configurations via Serial Port For Added Security
- 5VDC Powered: 40mA @ 5V
- Zero & Span Adjustments: On Rear (See Note 5) or Via Serial Port
- Z in For V: 1 MEG Ohms
- Z in For mA: See Ordering Information on Digit 2.

GRADES: 4 grades are available, all with the same high reliability and tested and approved for: **I** Industrial, **M** to specific Mil-Specs, **N** Nuclear to 10CFR50B and **S** Intrinsically Safe for Class I Div. 1.(See Note 1) Contact **OTEK** for more details.

HOUSINGS: Either plastic, metal, explosion proof or sanitary to 250°F Steam cleaning.

ENVIRONMENTAL:

- Op/Storage Temp.: -10 + 70°/-20 + 80°C
- Humidity: 5-95RH Non-Condensing
- MTBF: >100,000 Hours

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OTEK™ CORP.
SINCE 1974

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MADE IN USA

NOTE: Please READ BEFORE building part number:

1. If digit 2 is option 1, then digit 3 must be option 0, digit 5 must be option 1 and digit 6 must be option 0.
2. If digit 2 is option Q-T, digits 3, 5 & 6 must be option 0.
3. If digit 3 is option 7, then digit 5 must be option 4.
4. See notes below.

Model: SEB - 1 2 3 4 5 6 7 8 9

GRADE (5)
- I.....Industrial
- M.....Mil-Spec
- N.....Nuclear (Contact OTEK)
- 9.....Custom (Contact OTEK)

SCALE PLATE
- 0.....Standard 0-100%
- 9.....Custom (Contact OTEK)

RANGE/CALIBRATION (10)
- 0..... Standard
- 9.....Custom (Contact OTEK)

F.S. INPUT SIGNAL/Z in (1,2,6,9)
- 1.....4-30VDC Signal Powered
- 2.....4-20mA External Powered
- 3.....200mVDC/1M Ohms
- 4.....500 VDC/1M Ohms
- 5.....2mADC/100 Ohms
- 6.....200mADC/1 Ohms
- 7.....200mVRMS/1M Ohms
- 8.....500VRMS/1M Ohms
- 9.....Custom (Contact OTEK)
- A.....2mARMS/100 Ohms
- B.....5ARMS/0.05 Ohms
- C .....Strain Gage<1000 Ohms
- D.....Strain Gage>1000 Ohms
- E.....RTD PT100 (100 Ohms)
- F.....RTD PT1000 (1K Ohms)
- G.....Frequency 40-20 KHz
- H.....Frequency 50-60HZ Line
- J.....TC Type J
- K.....TC Type K
- L.....%RH (Specify Sensor)
- M.....pH (0-14.00)
- N.....ORP (0-2000 mV)
- P.....High Speed Peak & Hold, 2 V
- Q.....VAC Signal Powered (P.T.)
- R.....AAC Signal Powered (5A C.T.)
- S.....40-70 Hertz Signal Powered (P.T.)
- T.....Watts AC Signal Powered (P.T. & C.T.)
- U.....None (Remote Display/Control)

HOUSING & MOUNTING
- 0..... Plastic & 3.375"
- 1.....Plastic & 90mm
- 2..... Metal & 3.375"
- 4..... Explosion Proof
- 5..... Sanitary
- 9.....Custom (Contact OTEK)

CONTROL OUTPUTS (1,2)
- 0.....None
- 1.....Relays (4 ea.)
- 2.....Non-Isol. Open Collector Xtrs. (4 ea.)
- 3.....Isolated Retransmission (4-20mA)
- 4..... Isolated 30VDC for Transmitter
- 5.....Isolated Relays & 4-20mA Out
- 6..... Isolated O.C.T. & 4-20mA
- 7.....Isolated Relays & 30VDC Out
- 8.....Isolated O.C.T. & 30VDC Out
- 9.....Custom (Contact OTEK)

SERIAL I/O (1,2,3,6,11)
- 0.....None
- 2.....RS232
- 3.....RS485
- 4.....USB
- 9.....Custom (Contact OTEK)

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

POWER INPUT (1,2,3,8,11)
- 0.....Signal/Loop Powered
- 1.....Non-Isolated 5VDC
- 6.....Isolated 90-265VAC
- 7.....Non-Isolated USB Powered
- 8.....Isolated 10-32VDC
- 9.....Custom (Contact OTEK)

DISPLAY CONFIGURATION (7)
- 0.....Standard
- 9.....Custom (Contact OTEK)

NOTES (Continued):

5. Contact **OTEK** for other grades and for M & N grades and available specs. 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.
6. Warning: AC signal power (digit 2, options Q-T) is not isolated from Serial I/O. Use an isolated P.T. or a serial isolator.
7. Standard configuration is: 0-100% and 0-1,000 counts for F.S. range. Colors are 0-50% = green, 50-75% =orange, 75-100% = red. Field configurable. Specify yours at time of ordering.
8. Maximum power consumption (all options): 2 Watts
9. Specify sensor manufacturer and type for pH and % RH.
10. Zero and Span adjustments are behind the unit.
11. USB powered is limited to 0.5A @ 5V (USB V 2.0). Contact OTEK for maximum loading.

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