

NEW**CYBER SECURITY
EXEMPT**

**100% ANALOG METER REPLACEMENT
FOR SIGNAL POWERED:
Current Loops, AC (V, A, W, Hz) and DC (V, A & W)
NQA1, APP. B & MIL/AEROSPACE GRADES AVAILABLE**

PRELIMINARY

SSAM-N
(Patent
Pending)

FEATURES:

- * Cyber Security Exempt (No Microprocessors)
- * 101 Bars and 4 1/2 Digits
- * Universal Custom Colors with pure white LEDs
- * Custom "Colored" Displays
- * Post Mortem Signal Fail Alarm
- * Brightness Control
- * All Field Configurable
- * Customs Welcome
- * Lifetime Warranty

ANSI 4" SWITCHBOARD



REPLACES DB40 F.F.&F.
Other Models on Request.

SPECIFICATIONS (@25° C)**(Preliminary)**

- * Accuracy: Digits: $\pm 0.1\%$ of F.S., ± 1 LSD
- * Accuracy: Bar: $\pm 1\%$ of Full Scale
- * Conversion Rate: 3/second
- * Display Brightness: Adjustable 50-100%
- * Signal Power Required: 10-100mW
- * Input Signal Range: Current Loops: 3.6-26 or 9-55 mA; VDC: 7-130V; VAC: 30-140V; AAC: 1-4A; WAC: 100-400W; Hertz: 30-450 Hz
- * **Note:** You must use C.T. & P.T. with all A.C. options.
- * **Note:** If your signal can produce $>10\text{mW}$, you can use the **SSAM** or contact Otek.
- * Temperature Coefficient: $\pm 50\text{PPM}/^\circ\text{C}$
- * Operating Temperature: -10 to $+60$; Storage: -20 to $+70^\circ\text{C}$
- * CCMR: $>90\text{dB}@50-60\text{Hz}$
- * Humidity: 5-95% RH non-condensing
- * Front Panel: NEMA 3. NEMA 4X optional
- * Failed Signal Detect: ~ 20 second duration after > 1 minute "On" $@>50\%$ of F.S.
- * Calibration Check: 2 years recommended.

Note 1: Electrical specifications for E and M grades are the same as Industrial, unless otherwise specified and accepted.

HIGHLIGHTS:

- * No Microprocessors or digital assets included \therefore Not **cyber security** vulnerable.
- * 100% Signal Powered (like analog meters) for 4-20 & 10-50mA current loops, AC Volts, Amps, Hertz and Watts and DC V, mA & Watts
- * Our patented Signal Failure Alarm flashes its display for ~ 20 second duration (post-mortem) if the signal fails.
- * 100% Form, Fit & Function (wire-by-wire) plug & play replaces analog meters
- * 101 LED segment bar for 1% resolution with custom colors for alarm zones (bar)
- * 4 1/2 digit (1.9.9.9.9) bright 0.6" LED display.
- * Optional Isolated Alarms & 4-20mA Outputs. USB on request.

How do we do it? We eliminated any and all "digital assets," (microprocessors, etc.) as defined by some nuclear regulations and replaced them with the latest hardware-and added our patented (and patent pending) technology. We married this to the most advanced LED technology (approaching organic LED) to give you super bright bargraph and digital displays. These displays are visible across the room when viewed in a typical Instrument & Control Room (I&C) because we incorporate "pure white" LEDs only, with the option for custom tinted scale plates to meet your needs. Conclusion: The only analog portion of the **SSAM** is the input signal!

Why WHITE LEDs? The Power of the Powerless™! To design an automatic tricolor LED bargraph (as on our **NTM** series) it would require a microprocessor or excessive hardware. Our customer base, nuclear, MIL and aerospace, depends on our reliability for 100% operation 24/7, and access to spare units is not always an option. That's why we have designed the **SSAM** with identical hardware on all models and white LEDs. So if you need a spare for any function, location or input, all you do is change the scale plate (containing your custom color bands such as **red** for alarm, **yellow** for caution and **green** for normal), change the plug-in jumpers and recalibrate (if needed) the Zero & Span. That's all. One (1) model does it all, as long as its housing mechanical is the same! That's why we call it **SSAM**.

Otek specializes in customization and the reverse engineering of obsolete meters. Send us your challenge!

Watch 1 minute NTM video: **You Tube™** <http://youtu.be/WXi970VXIzM>

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IN
USA

SSAM-N SPECIFICALLY DESIGNED FOR THE NUCLEAR PROMISE

9-28-17

SSAM-N

ORDERING INFORMATION SSAM-N - -

GRADE & CASE (1, 2)

- 0.....Industrial & Plastic
- 1.....Industrial & Metal
- 2.....Industrial & Plastic NEMA 4X
- 3.....Industrial & Metal NEMA 4X
- M.....To Mil-Spec & Metal (Contact OTEK)
- E.....To EPRI-Nuclear & Metal (Contact OTEK)
- 9.....Custom (Contact OTEK)

RANGE/CALIBRATION

- 0.....Standard (0-F.S. & 0.0-100.0)
- 9.....Custom (Contact OTEK)

SCALE PLATE (3)

- 0.....Standard (Percent & All Green)
- 9.....Custom (Contact OTEK)

BAR/DIGIT COLORS (3)

- 0.....Standard (All Green)NONE
- 9.....Custom (Contact OTEK)E

4-20mA RETRANSMISSION (4)

- 0.....None
- 1.....Included
- 9.....Custom (Contact OTEK)

ALARM (HI-LO) OUTPUT (4)

- 0.....None
- 1.....Included
- 9.....Custom (Contact OTEK)

POWER INPUT

- 0.....Signal Power (Digits 4 & 5, options 00-18 only)
- 1.....Non-Isolated 5VDC Power (Digits 4 & 5, options 01-09 & 20 only)
- 2.....Isolated 5VDC Power (Digits 4 & 5, options 01-09 & 20 only)
- 3.....Isolated 7-32VDC Power (Digits 4 & 5, options 01-09 & 20 only)
- 4.....Isolated 90-265 VAC Power(Digits 4 & 5, options 01-09 & 20 only)
- 9.....Custom (Contact OTEK)

INPUT SIGNAL (ALL SIGNAL POWERED)

- 00.....4-20mA Current Loop (Powerless™)
- 01.....Volts A.C.
- 02.....5 Amps A.C.
- 03.....Watts A.C.
- 04.....Hertz A.C.V.
- 09.....Custom (Contact OTEK)
- 16.....7-140 Volts A.C./D.C., Signal Power
- 17.....10-50mA, Current Loop (Powerless™)
- 18.....10-500mA DC, Signal Power

EXTERNAL POWER INPUT SIGNAL (4)

- 20.....4-20mADC External Power
- 21.....100mV DC F.S.
- 22.....1VDC F.S.
- 23.....10VDC F.S.
- 24.....100VDC F.S.
- 25.....10mADC F.S.
- 26.....100mADC F.S.
- 27.....Watts DC (1Vx1A) F.S.
- 28.....Watts DC (1Vx1V) F.S.
- 29.....Custom (Contact OTEK)
- 30.....0.1V RMS F.S.
- 31.....1V RMS F.S.
- 32.....10V RMS F.S.
- 33.....150V RMS F.S.
- 34.....250 V RMS F.S.
- 35.....0.1A RMS F.S.
- 36.....1A RMS F.S.
- 37.....5A RMS F.S.
- 38.....W RMS (1Vx1VAC) F.S.
- 40.....W RMS (120Vx5A AC) F.S.
- 41.....Hertz (10KHz/5V Logic) F.S.
- 42.....Hertz (120VAC/40-100 Hz) F.S.
- 43.....Hertz (240VAC/30-100 Hz) F.S.
- 44.....Hertz (120VAC/500 Hz) F.S.
- 45.....Strain-Gage (≥300<4K Ohm)
- 47.....RTD (PT100)
- 48.....RTD (PT1000)
- 50.....TC (Type J)
- 51.....TC (Type K)
- 52.....TC (Type T)
- 53.....pH (0-14.00)
- 54.....ORP (0-2000mVDC)
- 55.....% RH (Specify Sensor)
- 56.....Resistance (0-10KΩ)
- 57.....10-50mA F.S.

Notes:

1. Grade 0: Plastic Case; 1. Metal case; M: To agreed-to MIL-Stds (Contact Otek); E: To agreed-to EPRI standards (Contact Otek); 9. Custom (Contact OTEK).
2. Otek will build to certain Nuclear or MIL-Standards but testing and confirmation of compliance, if required, will be quoted as a separate line item.
3. For custom colored translucent scale plates for the bargraph and digit section, use Digit 6, option 9 and Digit 7 option 9 and contact Otek.
4. See Otek model NTM-N for many other input signals offered. The options (20-57) and digits 6 & 7 are only available with external power (Digit 5, options 2, 3 or 4).

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MADE
 IN
 USA



GRADE (DIGIT 2):

Options 0 & 2 are 94VO black plastic. Options 1 & 3 are 6061 aluminum nickel plated and black powder coated bezel only, which allows you to make electrical contact with your grounded panel via its case. Option **M** is to customer specified MIL-Stds and uses the metal case of option 1. Option **E** is to **EPRI 102323 (Rev C)**, plus your specified and accepted nuclear standards. See note #1 of the ordering information on page 2.

Class 1E; 10CFR50, Appendix B: Otek expects to be fully qualified and approved by a major nuclear power plant by the end of 2017. Please contact us for more information.

EXTERNAL POWERED (SIGNAL INPUT) OPTIONS**INPUT SIGNAL SPECIFICATIONS (DIGITS 3 & 4)**

Note: All ± 1 LSD and % full scale range unless noted.

Option 00 & 17 For Loop Power Only:

Option 00, 4-20mA Loop Powered: Burden: $>3V@4mA, \leq 5V@20mA$; Range: 3-26mA; Accuracy & Linearity: $\pm 0.5\%$ of F.S.

Option 17: 10-50mA Loop Powered: Burden: $>3V@10mA, \leq 5V@50mA$; Range: 3-50mA; Accuracy & Linearity: $\pm 0.5\%$ of F.S.

Options 01 Through 04 & 16, A. C. Signal Powered Only:

FUSE IT! Use external 1/2 ASB for Volts and 5 ASB for Amps. SSAM has **1 Amp internal** and 4 Amps external.

Important Notes:

1) **C.T.** are sensitive and limited to the secondary (output) impedance. OTEK A.C. signal powered products present and input impedance of ~ 0.2 Ohms ($\sim 1V@5A$). Make sure your C.T. can drive a >0.3 Ohm load without saturating or losing linearity. Contact Otek for assistance. Best C.T. to use: $>100:5$ ratio.

2) All inputs for 50-60 Hz lines. Contact Otek for 400 Hz lines.

Option 01, VAC (P.T.): Burden: $<100mW$; Range: 30-140V/40-70Hz; Accuracy & Linearity: $\pm 0.5\%$ of F.S. Best operating range: 90-140VAC to specifications.

Option 02, 5 AMP A.C. (C.T.): Burden: $<100mW$; Range: 0.5-4A Full Scale; Accuracy & Linearity: $\pm 0.5\%$ of F.S. Best range: 2-4 Amps. Maximum input: 5 Amps AC, 10 seconds.

Options 01 Through 04 & 16, A. C. Signal Powered Only: (Continued)

Option 03, Watts A.C. (C.T. & P.T.): Range: $>100<600W/50-60Hz$; Accuracy & Linearity: $\pm 0.5\%$ of F.S. at 90-140VAC & 1-4AAC. Best operating range: 100-500 Watts. For 400 Hz lines, use option 09 and specify (i.e. Option 03=400 Hz line) after the complete part number.

Option 04, Hertz VAC: Range: $>30V<140V$ & $>30<70Hz$; Accuracy & Linearity: $\pm 0.5\%$ of F.S. For 400 Hz lines, use option 09 and specify (i.e. option 04=400 Hz line) after the complete part number.

VAC/DC Signal Power Only:

Option 16, 7-140VAC/DC: Now you can monitor and control your AC line, UPS, battery bank or power supply from 7-140VDC/VAC, with only power from the signal. The SSAM requires $>10<80mW$ ($\sim 3mA-20mA$). Imagine the possibilities! Almost like analog (only signal wires), but with 21st century digital technology ready for your PAC/DCS/SCADA system.

Scaling: 7-140VDC in = 7.0-140.0 Digital Display & 5-100% bargraph. See Digits 9 & 10 for custom calibration and scale.

Accuracy & Linearity: $\pm 0.5\%$ of full scale.

Option 17: 10-50mA Loop Power: See option 00. Same as option 00, but for 10-50mA current loops

Option 18: 10-500mADC Signal Power: Calibration: 10-500mADC=10-500 & 5-100%. For other calibrations, use digit 10 and specify.

NOTE: Digits 3 & 4, Options 20-57 are available on the SSAM, but must be externally powered (at present). Select input option (20-57), then power input Digit 5, options 1, 2, 3 or 4.

Options 20 through 58, For Externally Powered Only:

Option 20, 4-20mA: Burden: <10 Ohm (0.2V); Range: 3-26mA; Accuracy & Linearity: $\pm 0.5\%$ of F.S. ± 1 Digit.

Options 21 through 24, VDC: Input impedance 1M Ω ; Range: Per Option; Accuracy & Linearity: $\pm 0.5\%$ of F.S. ± 1 Digit.

Options 25 & 26, mADC: Input impedance Option 25: 50 Ω ; Option 26: 5 Ω ; Accuracy & Linearity: $\pm 0.5\%$ of F.S. ± 1 Digit.

Option 27, Watts DC (1Vx1A DC): V_{Zin} : 1M Ω / A_{Zin} : 1.0 Ω , 5W; Range: 1W; Accuracy & Linearity: $\pm 0.5\%$ of F.S. ± 1 Digit.



NOTES AND DESCRIPTIONS (Continued)

INPUT SIGNAL SPECIFICATIONS (DIGITS 3 & 4)

Options 20 through 58, For Externally Powered Only: (Continued)

Option 28, Watts DC (1Vx1V): VZin: 1M for both inputs; Range: 0-1V; Accuracy & Linearity: $\pm 0.5\%$ of F.S. ± 1 Digit.

NOTE: Always use P.T. or C.T. with H.V. Lines.

Options 30 through 34: VRMS: Zin: 1M Ω ; Range; per options; Accuracy & Linearity: $\pm 0.5\%$ of F.S. ± 1 Digit.

Options 35-37, Amps RMS: Zin: Option 35 (0.1A): 2 Ω ; Option 36 (1 A): 0.2 Ω ; Option 37 (5A): 0.02 Ω ; Range: Per option; Accuracy & Linearity: $\pm 0.5\%$ of F.S. ± 1 Digit.

Option 38: Watts RMS (1Vx1V AC/DC): Zin: 1M Ω for both inputs; Range: 1V RMS; Accuracy & Linearity: $\pm 0.5\%$ of F.S. ± 1 Digit.

Note: Always use P.T. & C.T. for options 33, 34, 40, 42, 43 & 44.

Option 40, Watts RMS (120VAC P.T. x 5AAC C.T.): Zin: 1M for V & 0.02 Ω for I; Range: 0-600W; Accuracy & Linearity: $\pm 0.5\%$ of F.S. ± 1 Digit Note: Shunt resistor (0.02 Ω) supplied.

Option 41, Hertz (10KHz/5V Logic): Zin: 1M; Range: 30-10KHz; Accuracy & Linearity: $\pm 0.5\%$ of F.S. ± 1 Digit

Option 42, Hertz (120V, 40-100Hz): Zin: 1M; Range: 50-150V/30-100Hz; Accuracy & Linearity: $\pm 0.5\%$ of F.S. ± 1 Digit

Option 43, Hertz (240V, 30-100Hz): Zin 1 M; Range: 100-260V/30-100Hz; Accuracy & Linearity: $\pm 0.5\%$ of F.S. ± 1 Digit. Use P.T.

Option 44, Hertz (120V, 500 Hz): Zin: 1 M; Range: 50-150V/300-500Hz; Accuracy & Linearity: $\pm 0.5\%$ of F.S. ± 1 Digit. Use P.T.

Note on Strain Gage: Specify S-G, sensitivity, range (cal. resistor value) and calibration. Example: 350 Ohms, 2mV/V, 20mV=0-100%.

Options 45, Strain Gage ($\geq 300K < 4K$ Ohm) : Excitation: 4.096V, 50 PPM/ $^{\circ}$ C Range: ± 300 -4K Ω ; Accuracy & Linearity: $\pm 0.5\%$ of F.S. ± 1 Digit

Options 20 through 58: For Externally Powered Only: (Continued):

Option 47 & 48, RTD: 47: 100 Ω (PT100); 48: 1K Ω (PT1000); Range: same as RTD; Accuracy & Linearity: $\pm 0.5\%$ of F.S. ± 1 Digit; 2, 3 or 4 wire RTD. For 3 wire, connect -E to -S. For 2 wire, also connect +E to +S. Warning: Max distance to sensor: \sim 300 Feet (100M) or use our NTY or NTT transmitters.

Note for Options 47-52: Specify $^{\circ}$ F or $^{\circ}$ C calibration after part number. Default: $^{\circ}$ F (not field selectable).

Option 50, Type "J" TC: Range: -210 to 760 $^{\circ}$ C; Colors: red and white; CJC: Included; Accuracy & Linearity: $\pm 2^{\circ}$ C of F.S.

Option 51, Type "K" TC: Range: -270 to 1370 $^{\circ}$ C; Colors: Yellow and red; CJC: Included; Accuracy & Linearity: $\pm 2^{\circ}$ C of F.S.

Option 52, Type "T" TC: Range: -270 to 400 $^{\circ}$ C; Colors: blue and red; CJC: Included; Accuracy & Linearity: $\pm 2^{\circ}$ C of F.S.

Note for Thermocouples (TC): Shorting out the +/-TC terminals will display the ambient temperature of the C.J.C. at the terminals.

Option 53, pH: Range: 0-14.00; Zin: $>10^{15}\Omega$; Temperature compensation: None; Accuracy & Linearity: $\pm 0.5\%$ of F.S. ± 1 Digit.

Option 54, ORP: Range: 0-2000mV; Zin: $>10^9 \Omega$; Accuracy & Linearity: $\pm 0.5\%$ of F.S. ± 1 Digit

Option 55, % RH: Range: Per sensor; Input Type: 2-3 pF/% Capacitors; Accuracy & Linearity: $\pm 0.5\%$ of F.S. ± 1 Digit. State sensor's specifications.

Option 56, Resistance Range: 0-10K Ω =0-100%=0-100.0; Accuracy & Linearity: $\pm 0.5\%$ of F.S. ± 1 Digit. Ideal for linear transducers.

Option 57, 10-50mA Range: 10 Ohms input resistance Accuracy & Linearity: $\pm 0.5\%$ of F.S. ± 1 Digit.



POWER SUPPLY (DIGIT 5):

Option 0 only for Powerless™ signal input options 00-18. **Option 1** for non-isolated 5VDC power; **Option 2** for isolated 5 VDC power; **Option 3** for isolated 7-32 VDC power; **Option 4** for isolation 90-265VAC, 50-60 Hertz. All options are $\pm 10\%$ input range.

Note: When ordering input options 20-57, power input options 1-4 or 9 must be selected (max power required is 200mW).

ALARM OUTPUT (DIGIT 6):

Digit 6, Option 1: Alarm Outputs (Signal Power): Open collector transistors (2) optional. See the ordering information on page 2, Digit 6, option 1. For relays, contact Otek (custom).

Alarms are opto-isolated NPN open collector transistors. One for **LOW** limit (QL) and one for **HIGH** limit (QH). They **sink** the load (max 30mA/30VDC) and are factory set for:

QL: $\leq 20\%$ of full scale (F.S.) and QH: $\geq 80\%$ of F.S., unless otherwise specified with order. If a custom setting is required, use option 9 and specify. **Example:** QL: $\leq 50\%$; QH: $\geq 90\%$. **Note:** Custom alarm settings are **NOT** field programmable.

RETRANSMISSION (DIGIT 7):

The SSAM can convert its input signal to isolated 4-20mA current loop output (patent #7,684,768) and it is factory set for :

Input Signal Option 00: 4mA out at 4mA input & 20mA out at 20mA input.

Input Signal Options 01-04: 4mA out at 20% of input signal and 20mA out at 100% of input signal.

Input Signal Options 16-18: It follows the input signal range (4-20mA out=7-140VDC, 10-50mA or 10-500mA input).

For Powered Input Signal Options 20-57: 4-20mA output = 0-Full scale input signal, as published (see ordering information digits 3 & 4). For custom outputs, use options 9 on Digit 7 and specify.

IMPORTANT NOTE FOR ISOLATED RETRANSMISSION:

When used with Powerless™ (Digits 3 & 4, Options 00-18): 4-20mA input burden is increased to $< 10V$ and 4-20mA output must be externally powered by 6-24VDC@25mA.

BARGRAPH COLORS (DIGIT 8):

Otek's exclusive **Color-X™** technique allows you to choose specific color bands for any portions of the bargraph and digits. We use super-high efficiency **white** LEDs and we color the filter with any transparent colored sections to meet your needs. See page 6 for selections. The **standard** bar and digit color is green. See the SSAM photo on page 1 for typical customized colors. Specify your custom bar and digit colors by using option 9 on Digit 8. Digits are always green unless specified otherwise.

**SCALE PLATE (DIGIT 9):**

Standard scale plate printing is 0-100% (see picture on page 1). For custom scale printing, use option 9 on Digit 9 and specify.

RANGE & CALIBRATION (DIGIT 10):

Standard range and calibration is 0-100% of full scale per input signal selected on Digits 3 & 4. For custom calibration, use option 9 on Digit 10 and specify.

ISOLATED USB SERIAL OUTPUT (CUSTOM):

Contact Otek for serial output only via **USB** from the SSAM.

Want to know more about New Technology and increase your profits?



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OTEK'S HOME PAGE**



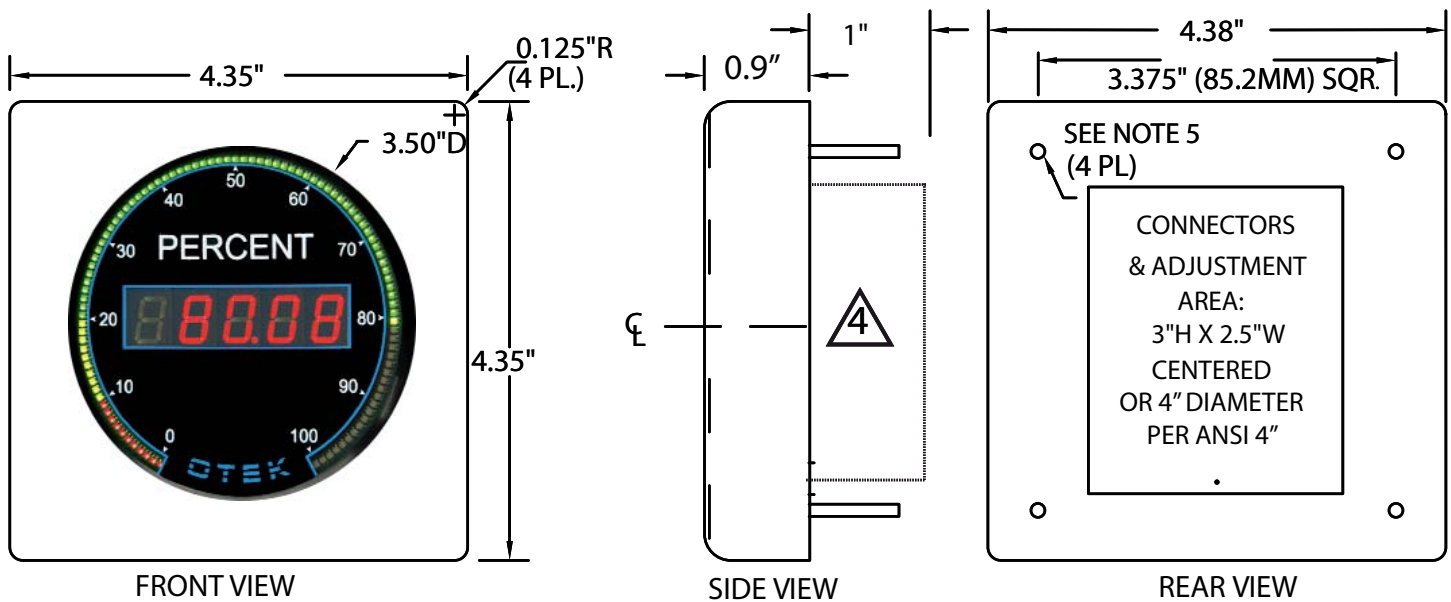
AVAILABLE COLORS USING OTEK'S COLOR-X™ OVERLAY (Select Digit 5, Option 9 and provide the range and color number(s)).

BROWN RED ORANGE YELLOW GREEN BLUE VIOLET GREY WHITE



Note: If required, specify the specific colors for the bar and the digits. Example (Digit 5, Option 9): Bar: 0-10 red, 11-20: yellow; 21-80: green; 81-90: yellow; 91-100: red. Digits: All blue.

SSAM-N MECHANICAL DRAWING



NOTES:

1. STANDARD PANEL MOUNTING PER ANSI 4" (3.375") CASE CAN ALSO BE MOUNTED IN 1/4 DIN PANEL CUTOUT (92x92mm).
2. CONNECTORS AND 3.375" STUDS SPACING MEET ANSI39.1 STANDARD FOR SWITCHBOARD METERS. CONNECTORS FALL WITHIN EXISTING "BARREL" (IF ANY) CUTOUT (4"Ø).
3. WIRE: 26-16GA
4. SHIELDED VERSIONS WILL EXTEND ~1" BEHIND THE PANEL.
5. METAL VERSION HAS #8-32X 3/4" MOUNTING STUDS; PLASTIC HAS #4-40X1/2" MOUNTING STUDS.

