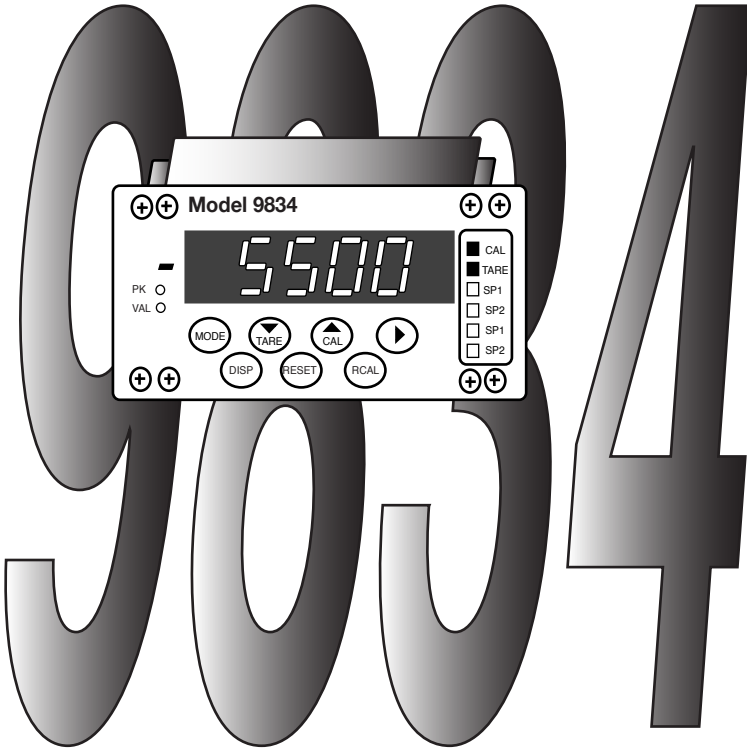


# INSTRUCTION MANUAL

*Model*



High Level Output Indicator with  
Enhanced Performance Features

**interface**

ADVANCED FORCE MEASUREMENT

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3. The remedy set forth herein does not apply to damage to or defects in any product caused by the Buyer's misuse or neglect, nor does it apply to any product which has been repaired or disassembled, which in the sole judgement of Interface affects the performance of the product.
4. Interface makes no warranty concerning components not manufactured by it. However, in the event of the failure of any component or accessory not manufactured by Interface, reasonable assistance will be given to Buyer in obtaining from the respective manufacturer whatever adjustment is reasonable based on the manufacturer's own warranty. Interface expressly disclaims any liability to its customers, dealers, and representatives, and to users of its products, and to any other person for special or consequential damages of any kind and from any cause whatsoever arising out of or in any way connected with the manufacture, sale, handling, repair, maintenance, or replacement arising out of or in anyway connected with the use of said products.
5. Representations and warranties made by any person, including dealers and representatives of Interface, which are inconsistent or in conflict with the terms of this warranty (including but not limited to the limitations of the liability of Interface, as set forth above), shall not be binding upon Interface unless reduced to writing and approved by an officer of Interface, Inc.

THIS EXPRESS WARRANTY SUPERCEDES ANY AND ALL OTHER WARRANTIES, EXPRESSED OR IMPLIED, INCLUDING IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR PARTICULAR PURPOSE.

### **OBTAINING SERVICE UNDER WARRANTY**

Advance authorization is required before any product is returned to Interface. Prior to the return of any product, write or call the Repair Department at Interface advising them of; (1) a part number; (2) a serial number of the defective product; (3) a technical description of the defect including specific test data, written observations on the failure and specific corrective action required; (4) a no-charge purchase order number (so the product can be returned to sender correctly); and (5) ship and bill addresses. Non-verified problems or defects may be subject to an evaluation charge. Please return the original calibration data with the unit.

### **REPAIR WARRANTY**

All repairs of Interface products are warranted for a period of 90 days from date of shipment. This warranty applies only to those items which were found defective and repaired. It does not apply to products in which no defect was found and returned as is or merely recalibrated. Out of warranty products may not be capable of being returned to the exact original specifications.

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## DESCRIPTION

The Model 9834 is an enhanced performance, microprocessor-based digital indicator capable of interfacing to high-level voltage ( $\pm 5$  or  $\pm 10$ VDC) or current (4-20mA) output transducers. A 16-bit analog-to-digital converter accurately digitizes the input signal. A 12VDC@90mA, short circuit protected, transducer excitation supply is also provided. Self-calibrating  $\pm 10$ VDC and 4-20mA analog output signals are standard with this instrument. A programmable digital filter with exponential smoothing and programmable motion window provide optimum response to step inputs. A front panel CAL switch provides a convenient calibration feature. TARE and CALIBRATION are easily performed via front panel pushbuttons.

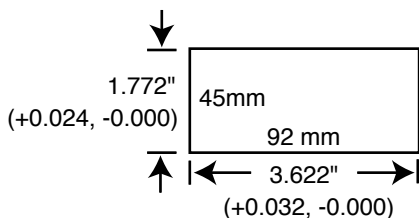
## SPECIFICATIONS

Excitation Voltage:	12VDC $\pm 5\%$
Excitation Current:	90 mA
Input Amp Gain:	1 or 2
Input Impedance:	100K ohm (min)
Input Bias Current:	10nA (max)
Zero Tempco:	1uV/degC (typ)
Gain Tempco:	20ppm/degC (typ)
CMRR:	120dB @ 50-60Hz
Signal Input Range:	$\pm 5$ or $\pm 10$ Vdc (Internal Switch Selectable) 4-20mA (approximately 500mV overhead)
Max Internal Counts:	$\pm 32,768$ over signal input range
Max Display Range:	$\pm 99,999$
Decimal Point:	programmable
Conversion Rate:	120 samples/second
Analog Filter:	2-pole, 1000Hz low pass
Digital Filter:	Exponential smoothing filter with adjustable smoothing constant and filter window
Nonlinearity:	$\pm 0.01\% \pm 1$ internal count
Step Response:	25ms (without digital filtering)
Analog Outputs:	10VDC and 4-20mA (self-calibrating)
Serial Output:	Bi-directional RS232 with internally selectable baud rates
Operating Range:	-10 to 50 degC
Input Power:	115 or 230 Vac (solder pad jumper selectable)
Pkg Dimensions:	3.78W x 1.89H x 5.13D

## INSTALLATION AND WIRING

### INSTALLATION

The Model 9834 enclosure is designated for panel mounting in a 1/8 DIN cutout. The cutout dimensions are shown below.



To panel mount the 9834, perform the following steps.

1. Rotate the four pawl screws (outside screws in each corner) several turns counter-clockwise to retract the pawls. Make sure the pawls retract enough to clear the back of the mounting panel. The pawls may be retracted to accommodate panel thicknesses up to 0.25 inches (6.35mm).
2. Insert the instrument into the panel cutout.
3. Position the pawls so that their elongated dimension overlaps the panel cutout, then tighten the screws. Do not over-tighten.
4. Installation complete.

### WIRING

Reference Figures 3 and 4 for TRANSDUCER and I/O wiring information. Power is applied with a 3-prong AC power cord. The instrument is protected by a 250V, 250mA fast acting 5mm fuse. The fuse holder is an integral part of the input power connector. A spare fuse is provided in the fuse holder. Internal solder jumpers are provided to allow 115Vac or 230Vac operation (Reference Figure 6 on page 5).

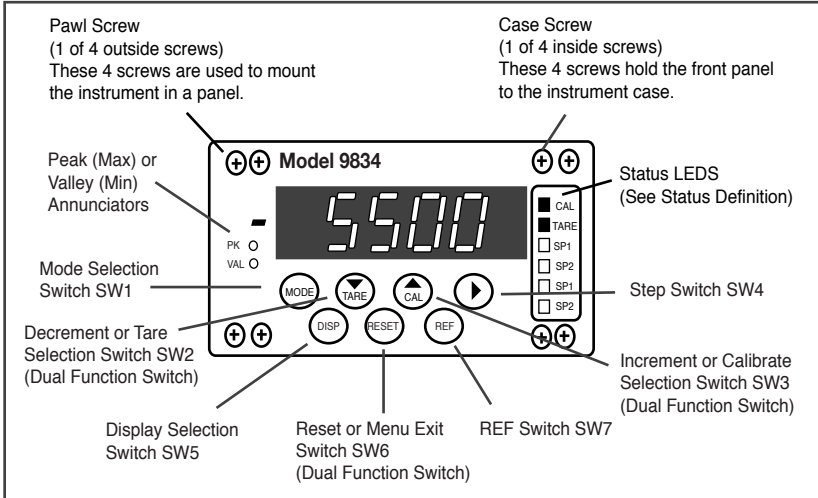


Figure 1. Model 9834 Front Panel View

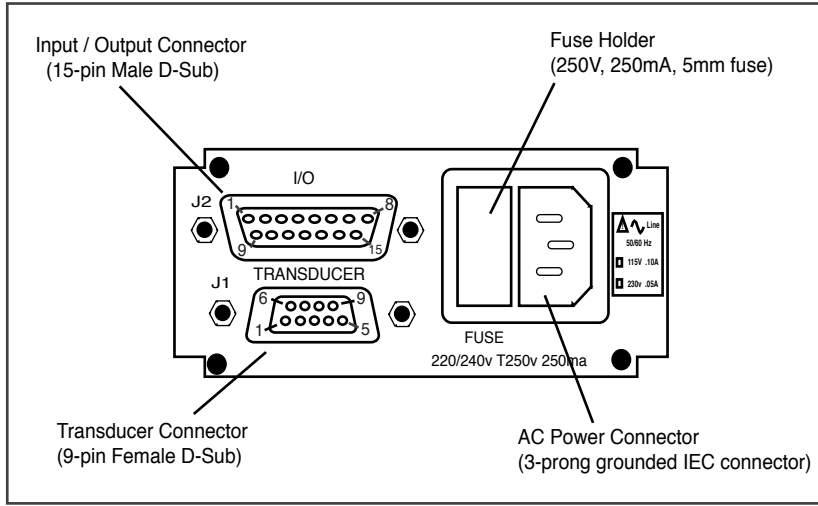


Figure 2. Model 9834 Rear Panel View

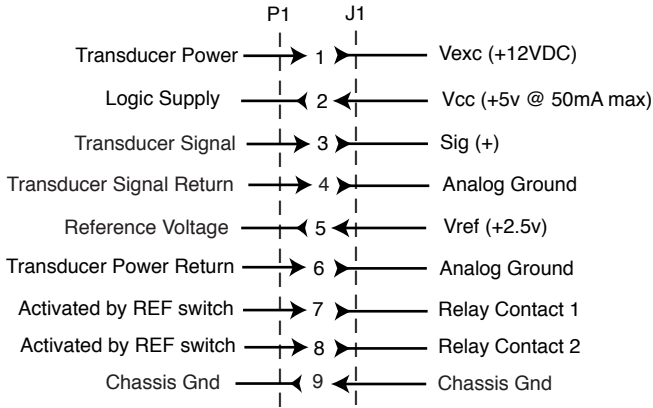


Figure 3. Transducer Wiring

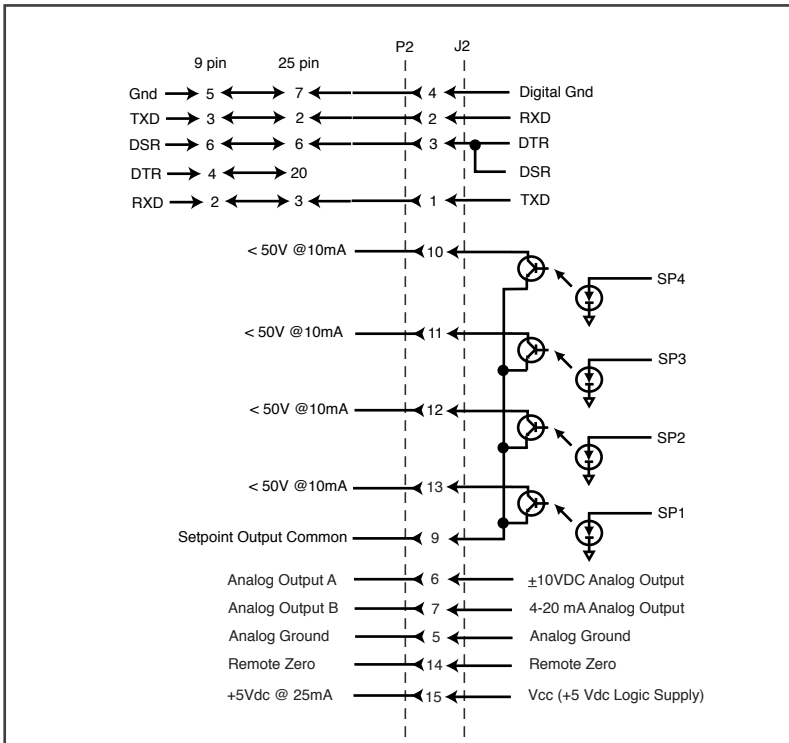


Figure 4. I/O Wiring

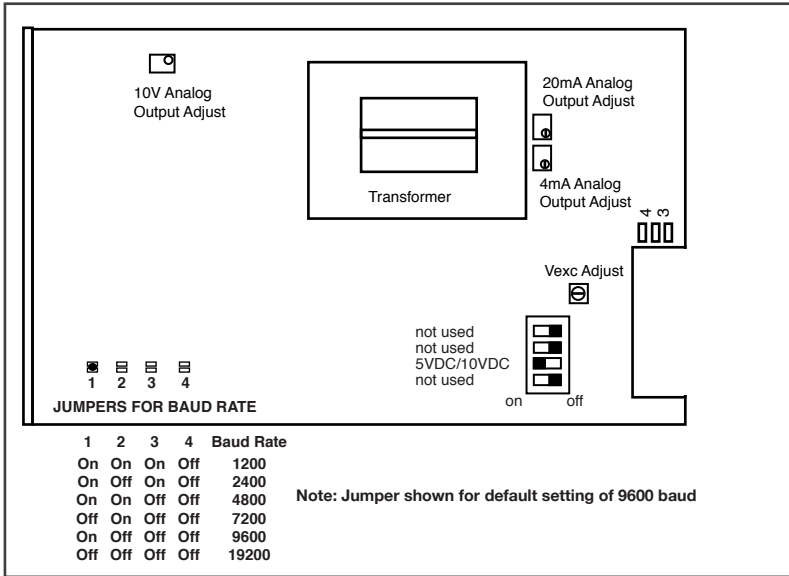


Figure 5. Location of Switches, Jumpers and Potentiometers (Top View)

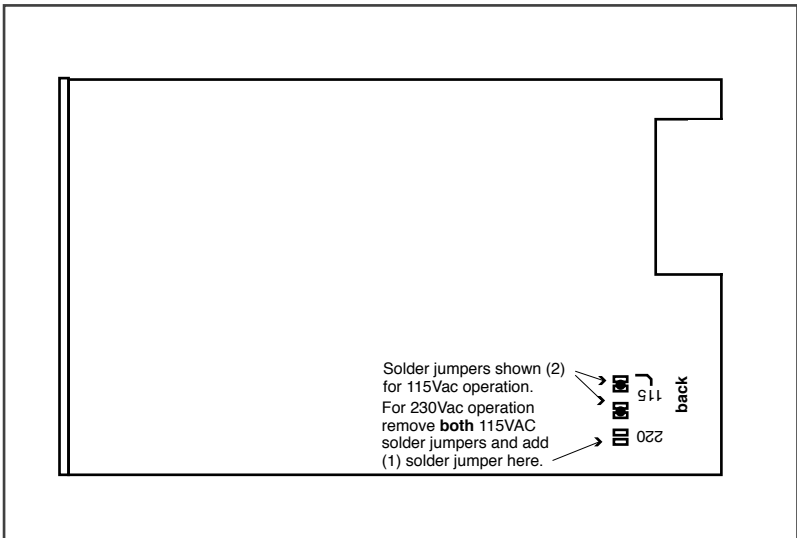
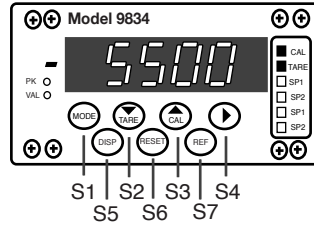


Figure 6. Location of Jumpers for AC Line Voltage Selection (Bottom View)



## SWITCH AND FUNCTION DEFINITIONS

### SWITCH DEFINITIONS



### Mode Selection Switch (S1)

S1 is used to cycle through the various programmable functions of the 9834. The sequence is as follows. The designators, in ( ), identify text that will be displayed. The settable values are shown in { }

	<b>Factory Default Settings</b>
Full Scale CAL Switch Disabled (CAL Off) or Enabled (CAL On)	(CAL Off)
Filter Window Value (bAnd) {001 to 999}	{010}
Filter Value (FILTEr) {00 to 99}	{95}
Decimal Point (dP) {x.xxxx, xx.xxx, xxx.xx, xxxx.x, xxxxx}	{xxxxx}
Calibration Number (CAL) {00001 to ±99999}	{10000}
Full Scale Number (FS) {00001 to ±99999}	{10000}
Setpoint 1 to Monitor (SP -) {Instantaneous, Peak, Valley, Peak-Valley}	{Instantaneous}
Setpoint 1 to be (SP HI) {High Setpoint} or (SP LO) {Low Setpoint}	{High Setpoint}
Set Setpoint 1 Value (Set SP) {00000 to ±99999}	{99999}
Setpoint 2 to Monitor (SP -) {Instantaneous, Peak, Valley, Peak-Valley}	{Instantaneous}
Setpoint 2 to be (SP HI) {High Setpoint} or (SP LO) {Low Setpoint}	{High Setpoint}
Set Setpoint 2 Value (Set SP) {00000 to ±99999}	{99999}
Setpoint 3 to Monitor (SP -) {Instantaneous, Peak, Valley, Peak-Valley}	{Instantaneous}
Setpoint 3 to be (SP HI) {High Setpoint} or (SP LO) {Low Setpoint}	{High Setpoint}
Set Setpoint 3 Value (Set SP) {00000 to ±99999}	{99999}
Setpoint 4 to Monitor (SP -) {Instantaneous, Peak, Valley, Peak-Valley}	{Instantaneous}
Setpoint 4 to be (SP HI) {High Setpoint} or (SP LO) {Low Setpoint}	{High Setpoint}
Set Setpoint 4 Value (Set SP) {00000 to ±99999}	{99999}
Hysteresis for Low Setpoints (HL) {000 to 200}	{000}
Hysteresis for High Setpoints (HH) {000 to 200}	{000}
Depress Mode Again to Exit (AgAln)	

While in the Mode Selection sequence, the indicator is no longer monitoring the input signal. To exit, depress S1, once, after the Decimal Point selection is completed.

### Decrement or Tare Switch (S2)

This switch serves two functions, depending on the present status of S1. If the meter is in the Mode Selection sequence, this switch decrements the flashing digit.

If the meter is in its normal operating mode, S2 becomes the TARE switch. Depressing S2 will automatically zero the readout, illuminate the TARE LED and zero the analog output. Depressing and holding S2 depressed for approximately 3 seconds will UNTARE the readout and extinguish the TARE LED. TARING is accomplished by storing the reading prior to TARING and subtracting this value from all subsequent readings.

## SWITCH DEFINITIONS (CONT)

### Increment or Cal Switch (S3)

This switch serves two functions, depending on the present status of S1. If the instrument is in the Mode Selection sequence, this switch will increment the flashing digit.

If the instrument is in its operating mode, S3 becomes an AUTO CAL switch.

**CAUTION:** If CAL function has been activated, depressing this switch will cause the instrument to recalibrate its full scale reading. Be sure to read the CALIBRATION INSTRUCTIONS before using this switch.

### Step Switch (S4)

When the instrument is in the Mode Selection sequence, this switch allows the user to cycle through the digits. Used in conjunction with S2 and S3, it allows rapid updating of the Set Point, Hysteresis and Cal values.

### Display Switch (S5)

This switch cycles the readout to display:

	Annunciator(s) Illuminated
Peak-Valley	Peak and Valley
Peak	Peak
Valley	Valley
Instantaneous Value	None

While in the Peak-Valley, Peak or Valley readout mode, the RESET switch (S6) resets the readout to the instantaneous value

### Reset or Exit Switch (S6)

This switch also serves two functions, depending on the present status of S1. If the instrument is in the Mode Selection sequence, this switch is used to Exit this sequence and return to the normal display mode. Any selections made during the Mode Selection sequence, prior to that selected just before exiting, will be saved and remembered in non-volatile memory.

If the instrument is in the normal display mode this switch will reset the Peak, Valley and Peak-Valley readings to the instantaneous value.

### REF Switch (S7)

This switch activates a reed relay, which shorts Relay Contact 1 and Relay contact 2 together (Reference Figure 3).

## FUNCTION DEFINITIONS

### Filter Value (FILtEr) {00 to 99}

The 9830 uses a filter based on exponential smoothing, a digital averaging technique where the recent conversions are given more weight than the older conversions. The weighting factor is the value of (FILtEr). The formula for the exponential filter is:

$$S_t = (1-F)C_{t-1} + FS_{t-1}$$

where  $S_t$  = the new smoothed value  
 $S_{t-1}$  = the previous smoothed value  
 $C_{t-1}$  = actual value of most recent conversion  
 $F = (\text{FILtEr})/100$

Higher (FILtEr) values produce stronger filtering. 99 = maximum filtering. 00 = no filtering. **The factory default value is 95**, a compromise between display stability and response time appropriate for general purpose work.

### Filter Band (bAnd) {001 to 999}

To permit a heavy filter and still have fast response to a step input change, the filter operates only inside a stable band. If two consecutive conversions have a difference greater than the **bAnd B**, the filter automatically sets  $F=0$ , permitting maximum response. When the difference is again within the **bAnd B**, the filter returns to the selected  $F = (\text{FILtEr})/100$  value.

Where B is referred to the input signal in volts,  
band value  $B = (\text{bAnd})/100$  on the 10 volt range  
band value  $B = (\text{bAnd})/200$  on the 5 volt range

#### Examples:

1.  $B = 0.5$  volts with  $\text{bAnd} = 500$ , 10 volt input range
2.  $B = 0.25$  volts with  $\text{bAnd} = 500$ , 5 volt input range

**The factory default is (bAnd) = 10.**

### Decimal Point (dP) {x.xxxx, xx.xxx, xxx.xx, xxxx.x, xxxxx}

dP allows selection of decimal point locations for display. The locations selectable are shown in { } above. The Increment and Decrement switches are used to shift decimal places.

### Calibration Number (CAL) {00001 to ±99,999}

(CAL) is equal to the desired reading corresponding to the calibration load, whether the load is actual, simulated, or from REF. The number is entered prior to performing the calibration.

#### Examples:

1. A 75.34 lb weight is being used to calibrate a 100 lb load cell. (CAL) may be set to 75.340, 75.34 or 75.3 depending on the resolution desired.
2. A 10,000 lbf load cell is known to have a rated output of 4.980 volts. A voltage calibrator is used to generate 4.980 volts. (CAL) = 10000.

## FUNCTION DEFINITIONS (CONT)

### Full Scale Number (FS) {00001 to ±99999}

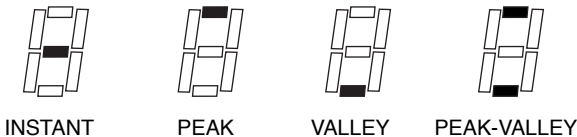
(FS) is for scaling the analog outputs of the indicator. Both the ±10V output and the 4-20 mA outputs are automatically scaled by (FS). (FS) = the display value that corresponds to the full scale spans of the outputs, either 10V or 16 mA. Changing the (FS) has no effect until a calibration is performed. The scaling is accomplished along with the calibration procedure. The TARE function operates on the analog output the same as it does on the digital display. The analog output is a continuously amplified analog signal even though the gain is digitally controlled. Therefore the polarity of the analog output is always the same as the signal input. The 4-20 mA output is unipolar and therefore must always be used with a positive input signal.

#### Examples:

1. A 9834 is to read 10000 on the display and produce 5.000 V output with a 10,000 lbf load cell loaded to capacity. (FS) =  $10000 \times 10V/5V = 20000$ .
2. A 9834 is to read 2000.0 on the display and produce a 10 mA span output with a 2000 lbf load cell loaded to capacity. (FS) =  $2000.0 \times 16mA/10mA = 3200.0$ . The output will then be 4 mA at zero load and 14 mA at capacity.

### Setpoint 1 to Monitor (SP1 -) {SP1 — , SP1 <sup>-</sup> , SP1 <sub>-</sub> , SP1 □ }

This function allows Setpoint 1 to monitor the instantaneous, peak, valley or peak minus valley displays. The Increment or Decrement switches are used to cycle through the various displays. To signify which display is being monitored, the least significant 7-segment display will be illuminated as shown below.



### Setpoint 1 to be (SP1 HI) {SP1 HI, SP1 LO}

This allows Setpoint 1 to be a High or Low Setpoint. The Increment or Decrement switches are used to cycle through the HI or LO selection.

A High Setpoint is disabled when the compared value is less than the Setpoint value. The High Setpoint is enabled when the compared value is equal to or greater than the Setpoint value.

A Low Setpoint is disabled when the compared value is greater than the Setpoint value. The Low Setpoint turns on when the compared value is equal to or less than the Setpoint value.

### Set Setpoint 1 Value (SEt SP) {00000 to ±99,999}

Setpoint 1 can be set for any value from 00000 to ±99,999. This value along with the previous selection of SP HI or SP LO determines when the optically isolated open-collector output transistors are activated and the SP1 annunciator illuminated.

**For Setpoints 2, 3 and 4, refer to Setpoint 1 setup, shown above.**

### Hysteresis Low (HL) {000 to 200}

HL is the hysteresis value for all Setpoints set to SP LO. HL determines the value the displayed reading must exceed the Setpoint value by before deactivating their respective opto isolated open-collector output(s).

### Hysteresis High (HH) {000 to 200}

HH is the hysteresis value for all Setpoints set to SP HI. HH determines the value the displayed reading must get below the Setpoint value by before deactivating their respective opto isolated open-collector output(s).

## OPERATING INSTRUCTIONS

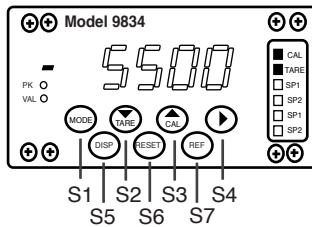
### TURN-ON INSTRUCTIONS

Reference Figures 3 and 4 for proper input and output signal wiring.

1. Apply power to the instrument.
2. Verify the instrument readout blanks momentarily, then displays the value of the input signal.

### PROGRAM INSTRUCTIONS

Four front panel switches (S1, S2, S3 and S4) allow the user to program Filter Window (bAnd), Filter 1- (FILTEr), Decimal Point (dP), Calibration Number (CAL), Full Scale Number (FS), Setpoint to Monitor (SP -), Setpoint to be (SP HI), Setpoint Value (Set SP), Hysteresis Low (HL) and Hysteresis High (HH) values.



1. Depress MODE (S1) once.

The text **CoDE** will be displayed. Depress the switches in the sequence shown.

S3 - S2 - S3

The text **CAL OFF** will be displayed. This disables the CAL function of the INCREMENT/CAL switch. To enable the CAL function depress the INCREMENT or DECREMENT switch. The text **CAL ON** will be displayed. Depressing the MODE switch will enable the CAL function. To exit the MODE sequence without enabling the INCREMENT/CAL switch, depress the RESET switch.

2. Depress MODE (S1) switch once.

The text **bAnd** followed by the current value of the Filter Window will be displayed. Use S2, S3 and/or S4 to change the current value.

To store the selected value in non-volatile memory, depress the MODE switch. To exit the MODE sequence, without storing the new value in non-volatile memory depress the RESET switch. Reference Filter Window in the Function Definitions section for more information.

3. Depress MODE (S1) switch once.

The text **FILTEr** followed by the current setting of the Filter value will be displayed. Use S2, S3 and/or S4 to change the value.

To store the selected value in non-volatile memory, depress the MODE switch. To exit the MODE sequence, without storing the new value in non-volatile memory, depress the RESET switch. Reference Filter Value in the Function Definitions section for more information.

## PROGRAM INSTRUCTIONS (CONT)

4. Depress MODE (S1) switch once.

The text **dP** followed by the decimal point location will be displayed. Use S2 or S3 to locate the decimal point. To store the selected value in non-volatile memory, depress the MODE switch. To exit the MODE sequence, without storing the new value in non-volatile memory depress the RESET switch. Reference Decimal Point in the Function Definitions section for more information.

5. Depress MODE (S1) switch once.

The text **CAL** followed by the current value of the Calibration Number will be displayed. Use S2, S3 and/or S4 to change the current value. To store the selected value in non-volatile memory, depress the MODE switch. To exit the MODE sequence, without storing the new value in non-volatile memory depress the RESET switch. Reference Calibration Number in the Function Definitions section for more information.

6. Depress MODE (S1) switch once.

The text **FS** followed by the current value of the Full Scale Number will be displayed. Use S2, S3 and/or S4 to change the current value. To store the selected value in non-volatile memory, depress the MODE switch. To exit the MODE sequence, without storing the new value in non-volatile memory depress the RESET switch. Reference Full Scale Number in the Function Definitions section for more information.

7. Depress MODE (S1) switch once.

The text **SP1** - will be displayed. Use S2 and S3 to change the parameter SP1 is to monitor. To store the selected parameter in non-volatile memory, depress the MODE switch. To exit the MODE sequence, without storing the new parameter in non-volatile memory depress the RESET switch. Reference SP1 to Monitor in the Function Definitions section for more information.

8. Depress MODE (S1) switch once.

The text **SP1 HI** or **SP1 LO** will be displayed. Depressing S2 or S3 alternates SP1 HI and SP1 LO. To store the selected parameter in non-volatile memory, depress the MODE switch. To exit the MODE sequence, without storing the new parameter in non-volatile memory depress the RESET switch. Reference SP1 HI in the Function Definitions section for more information.

## PROGRAM INSTRUCTIONS (CONT)

9. Depress MODE (S1) switch once.

The text **SEt SP** will be displayed momentarily, followed by the current value of Setpoint 1. Use S2, S3 and/or S4 to set a new value. To store the selected parameter in non-volatile memory, depress the MODE switch. To exit the MODE sequence, without storing the new parameter in non-volatile memory depress the RESET switch. Reference Set SP in the Function Definitions section for more information.

10. Depress MODE (S1) switch once.

The text **SP2** - will be displayed. Reference SP1 - setup instructions on Page 11 to set SP2 -.

11. Depress MODE (S1) switch once.

The text **SP2 HI or SP2 LO** will be displayed. Reference SP1 HI setup instructions on Page 11 to set SP2 HI or SP2 LO.

12. Depress MODE (S1) switch once.

The text **SEt SP** will be displayed momentarily, followed by the current value of Setpoint 2. Reference SEt SP setup instructions above to set a new value for Setpoint 2.

13. Depress MODE (S1) switch once.

The text **SP3** - will be displayed. Reference SP1 - setup instructions on Page 11 to set SP3 -.

14. Depress MODE (S1) switch once.

The text **SP3 HI or SP3 LO** will be displayed. Reference SP1 HI setup instructions on Page 11 to set SP3 HI or SP3 LO.

15. Depress MODE (S1) switch once.

The text **SEt SP** will be displayed momentarily, followed by the current value of Setpoint 3. Reference SEt SP setup instructions above to set a new value for Setpoint 3.

16. Depress MODE (S1) switch once.

The text **SP4** - will be displayed. Reference SP1 - setup instructions on Page 11 to set SP4 -.

## PROGRAM INSTRUCTIONS (CONT)

17. Depress MODE (S1) switch once.

The text **SP4 HI or SP4 LO** will be displayed. Reference SP1 HI setup instructions on Page 11 to set SP4 HI or SP4 LO.

18. Depress MODE (S1) switch once.

The text **SEt SP** will be displayed momentarily, followed by the current value of Setpoint 4. Reference SEt SP setup instructions above to set a new value for Setpoint 4.

19. Depress MODE (S1) switch once.

The text **HL** will be displayed momentarily, followed by the current value of Hysteresis Low. Use S2, S3 and/or S4 to set a new value for HL. To store the new value of HL in non-volatile memory, depress the MODE switch. To exit the MODE sequence, without storing the new value, depress the RESET switch.

20. Depress MODE (S1) switch once.

The text **HH** will be displayed momentarily, followed by the current value of Hysteresis High. Use S2, S3 and/or S4 to set a new value for HH. To store the new value of HH in non-volatile memory, depress the MODE switch. To exit the MODE sequence, without storing the new value, depress the RESET switch.

21. Depress MODE (S1) switch once.

The text **AgAln** will be displayed. Depress MODE switch one more time to exit the MODE sequence.



## CALIBRATION INSTRUCTIONS

The Interface Model 9834 can be calibrated using (2) different methods.

1. The first method uses actual or simulated ZERO and FULL SCALE (FS) inputs. Actual inputs may come from a transducer loaded with calibrated weights. Simulated inputs may come from a voltage calibrator.
2. The second method utilizes an REF switch.

### ACTUAL OR SIMULATED LOAD METHOD

1. Connect the transducer to the instrument using Figure 3 as a reference. Do not apply any load to the transducer.
2. Apply power to the instrument.

**NOTE:** If the instrument was previously calibrated and no new calibration is required, do not proceed any further. All previous calibration information is stored in non-volatile EEPROM and is ready for use when power to the instrument is reapplied.

3. Calculate the CAL NUMBER (CAL) by verifying the load that will be used to calibrate the Model 9834.

Example: If a 500 pound load is used to calibrate and the desired readout is 500.0, the CAL NUMBER will be 5000. The decimal point can be selected later. If the desired readout is 500 then the CAL NUMBER will be 500.

4. Calculate the FS NUMBER (FS). This is the value used, by the microprocessor, to set the full scale analog output.

Example: If the CAL NUMBER is 5000, but the +10VDC analog output is desired at 7500, set the FS NUMBER to 7500. If +10VDC is desired at 5000, set the FS NUMBER to 5000.

5. Program in the CAL NUMBER. Reference **PROGRAM INSTRUCTIONS**, Step 5 on Page 11 to set the CAL NUMBER.
6. Program in the FS NUMBER. Reference **PROGRAM INSTRUCTIONS**, Step 6 on Page 11 to set the FS NUMBER.
7. The TARE and CAL LED's on the front panel should be illuminated.
8. Depress and hold the TARE (S2) switch. The TARE LED will extinguish and the instrument will display the UNTARED reading.

## CALIBRATION INSTRUCTIONS (CONT)

9. Enable the CAL switch. Reference **PROGRAM INSTRUCTIONS** Step 1 on Page 10 to enable the CAL switch.

**Note:** Enabling the CAL switch allows only one attempt at calibrating the instrument. If calibration is not successful, repeat the whole calibration procedure.

10. Apply no load to the transducer.
11. Depress the TARE (S2) switch once. The TARE LED should illuminate and the readout should be ZERO  $\pm 1$  digit.
12. Apply the FULL SCALE load to the transducer. If a voltage generator is used, set it to the the desired voltage setting. The instrument should display a value greater than **01000**. For optimum performance the readout should be closer to **32000**. Ignore the decimal point.
13. Depress the CAL (S3) switch once. The CAL LED should turn on and the readout will display the CAL NUMBER  $\pm 1$  digit.
14. The CALIBRATION sequence is now complete.

**NOTE:** Calibration information (tare and slope values) are maintained in non-volatile memory and are updated each time the CAL switch is depressed. TARING the display stores the new tare value, but does not change the scale factor (slope value).

## CALIBRATION INSTRUCTIONS (CONT)

### CALIBRATION USING THE REF SWITCH

1. Attach a calibration adaptor to J1.
2. Apply power to the instrument.
3. The TARE and CAL LED's on the front panel should be illuminated
4. Depress the TARE (S2) switch once. The TARE LED should extinguish. The instrument should now display the UNTARED reading.
5. Depress the MODE (S1) switch once. Enable the CAL switch by selecting CAL ON. Depress the MODE switch once more, then exit the MODE sequence by depressing RST (S6)
6. Depress the CAL(S3) switch once. The CAL LED should extinguish. The instrument should now display the UNCALIBRATED reading.
7. With no load on the transducer, verify the readout is approximately zero.
8. Depress the TARE(S2) switch once. The TARE LED should illuminate and the readout should be ZERO  $\pm 1$  digit.
9. Depress and hold the REF switch. The display should read a value greater than **01000**. For optimum performance the readout should be closer to **19000**. Ignore decimal point.

While holding down the REF switch, depress the CAL (S3) switch once. The CAL LED should turn on and the readout should display the CAL NUMBER  $\pm 1$  digit.

10. The REF CALIBRATION sequence is now complete.

**NOTE:** Calibration information (tare and slope values) are maintained in non-volatile memory and are updated every time CALIBRATION Steps 8 and 9 are performed. TARING the display does not change the scale factor (slope value) calculated when Step 9 is completed.

## SERIAL RS232 COMMUNICATIONS

### General Information

See Figure 4 on page 4 for RS232 connections and wiring information.

See Figure 5 on page 5 for setting baud rate. The unit is pre-wired for 9600 baud.

The data is transmitted in the following format:

- One Start Bit;
- Eight Data Bits;
- No Parity Bit;
- One Stop Bit

Transmissions from the Model 9834 are controlled by sending XOFF (ASCII code decimal 19, DC3) to suspend character transmission and XON (ASCII code decimal 17, DC1) to start transmission. All transmissions to the Model 9830, including XON and XOFF, must terminate with a CR (hex OD) and only a CR. *Note: do not send a line feed.*

The RS232 port is active only in the data display mode and will not respond in while in the MODE sequence.

### RS232 Programming Data

The RS232 data is transmitted in 8 sequential bytes, in binary or bit significant format, depending on the parameter. The data has the following significance.

Byte	Description																				
1	Status Byte: Setpoint Status The status is contained in one byte and is bit significant A logical 1 indicates setpoint value exceeded.																				
	<table border="0"><thead><tr><th>Bit</th><th>Status of</th><th>Bit</th><th>Status of</th></tr></thead><tbody><tr><td>0</td><td>SP1</td><td>4</td><td>Not Used</td></tr><tr><td>1</td><td>SP2</td><td>5</td><td>Not Used</td></tr><tr><td>2</td><td>SP3</td><td>6</td><td>Not Used</td></tr><tr><td>3</td><td>SP4</td><td>7</td><td>Not Used</td></tr></tbody></table>	Bit	Status of	Bit	Status of	0	SP1	4	Not Used	1	SP2	5	Not Used	2	SP3	6	Not Used	3	SP4	7	Not Used
Bit	Status of	Bit	Status of																		
0	SP1	4	Not Used																		
1	SP2	5	Not Used																		
2	SP3	6	Not Used																		
3	SP4	7	Not Used																		
2	Function Byte: ID of transmitted function																				
	<table border="0"><thead><tr><th>Value</th><th>Function</th></tr></thead><tbody><tr><td>1</td><td>Instantaneous</td></tr><tr><td>8</td><td>Peak minus Valley</td></tr><tr><td>65</td><td>Peak</td></tr><tr><td>66</td><td>Valley</td></tr></tbody></table>	Value	Function	1	Instantaneous	8	Peak minus Valley	65	Peak	66	Valley										
Value	Function																				
1	Instantaneous																				
8	Peak minus Valley																				
65	Peak																				
66	Valley																				
3-6	Data Byte: Binary representation of data. The data value is represented in 2's complement where bytes 3 is the most significant byte and byte 6 is the least significant byte.																				
7	Decimal Point Byte: The decimal is represented as an exponent  The value for x.xxxx is 1 The value for xx.xxx is 2 The value for xxx.xx is 3 The value for xxxx.x is 4 The value for xxxxx is 5																				
8	EOT Byte: This byte indicates end of transmission - transmitted as hex OA.																				

SERIAL RS232 COMMUNICATIONS (CONT)

Examples of Transmitted Data

	Byte	1	2	3	4	5	6	7	8	
Value in Hex		00	01	FF	FF	FB	EB	03	0A	
Value in Decimal		0	1	255	255	251	235	3	10	
No SP Exceeded	_____									
Instantaneous Display	_____									EOT
Displayed Number = -10.45	_____									
Decimal = xxx.xx										

	Byte	1	2	3	4	5	6	7	8	
Value in Hex		02	42	FF	FE	76	CE	03	0A	
Value in Decimal		2	66	255	254	123	206	3	10	
SP 2 Exceeded	_____									
Valley Display	_____									EOT
Displayed Number = -993.78	_____									
Decimal = xxx.xx										

**Commands**

The XON and XOFF commands only affect the transmission of data from the selected displayed function. The unit responds to all other commands independent of the XON/ XOFF. All commands are ASCII strings and must terminate with a CR (hex OD) and only a CR. The RS232 port is active only when in the data display mode and will not respond to commands if the unit is in the MODE sequence

**(S)elect Commands**

To select or change the function being displayed and being transmitted by the RS232 port, send the Model 9830 an ASCII string (S\$) consisting of two characters, SX, where X is a hex number.

<b>S\$</b>	<b>Function</b>
S0	Instantaneous
S8	Peak minus Valley
SA	Peak
SB	Valley
SE	Reset

Examples written in Basic. These examples assumed that the RS232 port was opened with buffer #2. The following code changes the displayed and transmitted function.

Example 1  
Print #2, "S0"                      Changes the function to Instantaneous

Example 2  
X\$="SA"  
Print #2, X\$                      Changes the function to Peak

SERIAL RS232 COMMUNICATIONS (CONT)

**(M)ODE COMMANDS**

To change a MODE item, send an 8 character ASCII string to the Model 9834. The 1st character is always M. The 2nd character identifies the item being changed. The other characters are the item's new value.

String Transmitted	Menu Item Changed
MA00nnn	Sets Filter Window (bAnd) to nnn where 001 < nnn < 999
MW000nn	Sets Filter 1-alpha (FILtEr) to nn where 00 < nn < 99
MC ±nnnnn	Sets Calibration value (CAL) to ±nnnnn
ME ±nnnnn	Sets Full Scale value (FS) to ±nnnnn
MG+0000n	Sets decimal pt (dP) to n where 1 < n < 5
MI+000nn	Sets SP1 to monitor function (See Table below)
MJ+0000x	Sets SP1 to HI or LO where x is H or L
MK ±nnnnn	Sets the value of SP1 to ±nnnnn
ML+000nn	Sets SP2 to monitor function (See Table below)
MM+0000x	Sets SP2 to HI or LO where x is H or L
MN ±nnnnn	Sets the value of SP2 to ±nnnnn
MO+000nn	Sets SP3 to monitor function (See Table below)
MP+0000x	Sets SP3 to HI or LO where x is H or L
MQ ±nnnnn	Sets the value of SP3 to ±nnnnn
MR+000nn	Sets SP4 to monitor function (See Table below)
MS+0000x	Sets SP4 to HI or LO where x is H or L
MT ±nnnnn	Sets the value of SP4 to ±nnnnn
MU+00nnn	Sets Hysteresis High (HH) to nnn where 000 < nnn < 200
MV+00nnn	Sets Hysteresis Low (HL) to nnn where 000 < nnn < 200

nn Function for SP

- 00 Instantaneous
- 01 Peak-Valley
- 02 Peak
- 03 Valley

Examples written in BASIC. These examples assumed that the RS232 port was opened with buffer #2.

The following code changes the indicated menu item.

```

Example 1
X$ = "ME+12000"
PRINT #2, X$           'changes FS value to +12000

Example 2
PRINT #2, "MI+00003" 'changes SP1 to monitor valley
    
```

**(T)are and (P)reset Commands**

String Transmitted	Menu Item Changed
TT	Tare or Zero
TU	Untare or Unzero
TA ±nnnnn	Sets the tare value to ±nnnnn

Examples written in BASIC. These examples assumed that the RS232 port was opened with buffer #2.

```

Example 1
PRINT #2, "TT"           'initiates an autozero or autotare

Example 2
X$ = "TA-00108"
Print #2, X$             'Set the tare value to -108
    
```

SERIAL RS232 COMMUNICATIONS (CONT)

**(C)alibrate Commands**

String Transmitted	Menu Item Changed
CC	Calibrate
CU	Uncalibrate
CA x.xxxxxE ±yy	Sets the Scale Factor to x.xxxxx * 10 <sup>yy</sup>

Examples written in BASIC. These examples assumed that the RS232 port was opened with buffer # 2.

**Example 1**

Print #2, "CU" 'uncalibrates the unit

**Example 2**

X\$="CA+6.612882E-01 'sets the scale factor to +.6612882  
PRINT #2, X\$

**(V)iew Command**

To get a dump of all present MENU selections, send an ASCII string consisting of the letter V.

It is recommended that XOFF be transmitted prior to sending the "V" command to eliminate the possibility of extraneous data being received.

For any parameter, the most significant byte is the first byte received.

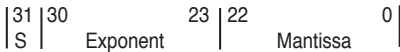
The scale factor is stored as IEEE 32 bit single precision numbers:

$$(-1)^S 2^{(exponent-127)} * 1.MANTISSA$$

where S denotes the sign bit

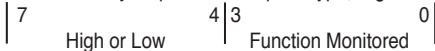
S=1 if the number is negative

A given 32 bit value is stored in memory as:



Zero is represented by 4 bytes containing only zeroes

Function monitored by setpoint and setpoint type, High or Low stored as



where High = 0001 and Low = 0000

and Function nn (See MODE commands shown on Page 19)

**(V)iew Command**

The entire stored parameters are dumped in 43 bytes of binary data. A 44th byte of hex 0A is sent to indicate end of transmission.

The order of parameter dump and byte sizes are:

Order	Bytes	String Position	Order	Bytes	String Position
1	4	01-04 Scalefactor	10	1	28 SP1 Function & HI or LO
2	4	5-8 Cal Number	11	4	29-32 SP2 Value
3	4	9-12 Tare	12	1	33 SP2 Function & HI or LO
4	4	13-16 Filter Band	13	4	34-37 SP3 Value
5	1	17 HL	14	1	38 SP3 Function & HI or LO
6	1	18 HH	15	4	39-42 SP4 Value
7	1	19 Decimal Pt	16	1	43 SP4 Function & HI or LO
8	4	20-23 Full Scale	17	1	44 End of Transmission
9	4	24-27 SP1 Value			

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**interface**

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