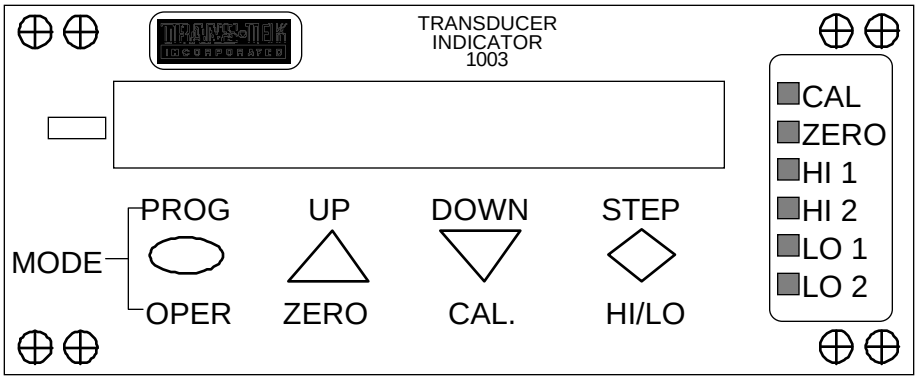
TRANS-TEK
INCORPORATED

MODEL 1003
TRANSDUCER INDICATOR



INSTRUCTION MANUAL

M009-0009 Rev. 6

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TABLES & FIGURES

• INTRODUCTION •

The Model 1003 Indicator provides complete interface for most AC-AC LVDTs, DCDTs and Trans-Tek Angular Displacement Transducers (ADT's). Equipped with the necessary mating connectors and mounting hardware, this fully programmable instrument consists of a *base unit* with several standard features, an integral *personality board* for each type of transducer, and any of several available *options*. A label affixed to the top of the case identifies the personality board and options installed in each indicator.

BASE UNIT

The base unit is a line-powered DC voltmeter with the following features:

operates on 115 VRMS, 50/60 Hz power line
±5 VDC analog output
5 digit, high contrast, LED display
front panel programming
programmable set points (2 high, 2 low) with front panel status lamps
programmable hysteresis values
programmable calibration value with front panel status lamp
push button tare (zero) with front panel status lamp
programmable decimal point position
peak high and low value display
rear panel lockout switch to disable front panel switches
splash resistant front panel with membrane switches
rugged metal case

PERSONALITY BOARDS

Each meter includes one of four personality boards to interface with a specific type of transducer:

AC-AC LVDT (7 kHz) Board - For AC-AC LVDTs which operate at 7 kHz (Phase Angle <10°)
AC-AC LVDT (7 kHz) Board - For AC-AC LVDTs which operate at 7 kHz (Phase Angle >10°)
AC-AC LVDT (3 kHz) Board - For AC-AC LVDTs which operate at 3 kHz
DC-DC LVDT Board - For DC-DC LVDTs and Trans-Tek ADTs which operate at 15, 30 or ±15VDC

OPTIONS

The following options are available with each meter:

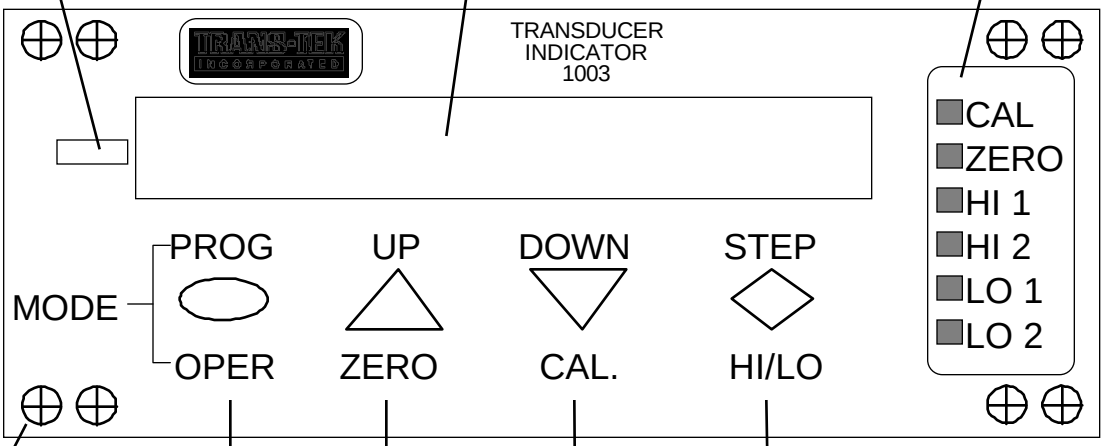
Relay Option - Provides contact closures at the rear panel connector, synchronized with the front panel Set Point Status Lamps.

RS232C Option - Provides RS232C serial communications (transmit only) with handshake, transmitting the display value.

Relay/RS232C Option - Combines the contact closures of the Relay Option and the communications of the RS232C Option above.

Model 1003 Transducer Indicator

Front Panel Features



High Resolution
5 Digit LED Readout

Lighted Bar Indicates
Negative Value

Indicator Lights for
Cal Value, Tare Function
and High & Low Set Points

Pawl Screws
for Mounting
(4 Places)

STEP/HI/LO SWITCH (S4) - While in Program, selects display digit (flashing number). While in Operate, recalls peak High and Low values from last reset.

PROG/OPER SWITCH (S1) - Places meter in Program or Operate Mode.

DOWN/CAL SWITCH (S3) - While in Program, decreases flashing digit or shifts decimal point right. While in Operate, scales display to Cal Value.

UP/ZERO SWITCH (S2) - While in Program, increases flashing digit or shifts decimal point left. While in Operate, acts as tare function.

*** *Please see back of this page for specifications on Base Unit* ***

BASE UNIT SPECIFICATIONS

Environmental

Operating Temp. Range:	+31°F to +131°F (0°C to +55°C)
Storage Temp. Range:	-40°F to +185°F (-40°C to +85°C)

Splash Proof Front Panel
Anodized Aluminum Case

Mechanical

Case Size:	1.72”H (43.7mm), 3.56”W (90.4mm), 5.0”L (127mm)
Front Panel:	1.91”H (48.5mm), 3.8”W (96.5mm), .1”THK (2.54mm)
Panel Cut Out:	1.77”H (45mm), 3.62”W (91.9mm), up to .25” THK (6.35mm)
Display:	5 Digit, .4”H (10.2mm) LED, polarity sign for Negative only
Rear Panel Connectors:	type Riacon 310091 Series

Front Panel Membrane Switches

Input Power

Input Voltage:	115 Vrms ±10% at 50/60 Hz
Input Current:	approx. .05 ampere

Display

Resolution:	1 Part in 20000
Accuracy:	±.01% Reading ±1 LSD
Conversion Rate:	2 Readings/Second (500 msec/update)
Accuracy Stability:	±.1% Reading ±1 LSD for 120 Days (at +77°F, +25°C)
Zero Stability:	within ±2 Digits for 120 Days (at +77°F, +25°C)

Fixed Functions

Tare (Zero):	automatic push button Zero
Cal (Calibrate):	automatic push button Cal (value programmable by user)
Lock Out Switch:	accessible through rear panel (locks out front panel membrane switches)
Hi/Lo Reading Recall:	push button recall at front panel
Set Points:	two programmable Hi set points with programmable hysteresis
	two programmable Lo set points with programmable hysteresis
	front panel status lamp for each set point

Personality Board

In addition to the specifications given for the Base Unit above, additional specs apply to this meter, depending on the installed Personalty Board. Unless otherwise noted, the total specification is the sum of the specs for the Base Unit plus installed Personalty Board.

• INSTALLATION •

The Model 1003 Indicator is usually mounted in a panel cutout and wired directly to the rear panel connector(s). The recommended panel cutout dimensions are 1.772" (+.024,-.000) by 3.622" (+.032,-.000), with maximum corner radii of .04". The panel may be up to .25" thick. For wiring to the connectors, 22 AWG insulated wires rated for at least 250 Vrms will meet all requirements. Please see Figure 1 below.

Mounting - Rotate the pawl screws counterclockwise retracting them enough to overlap the thickness of the mounting panel. Insert the meter into the panel cutout and tighten the pawl screws.

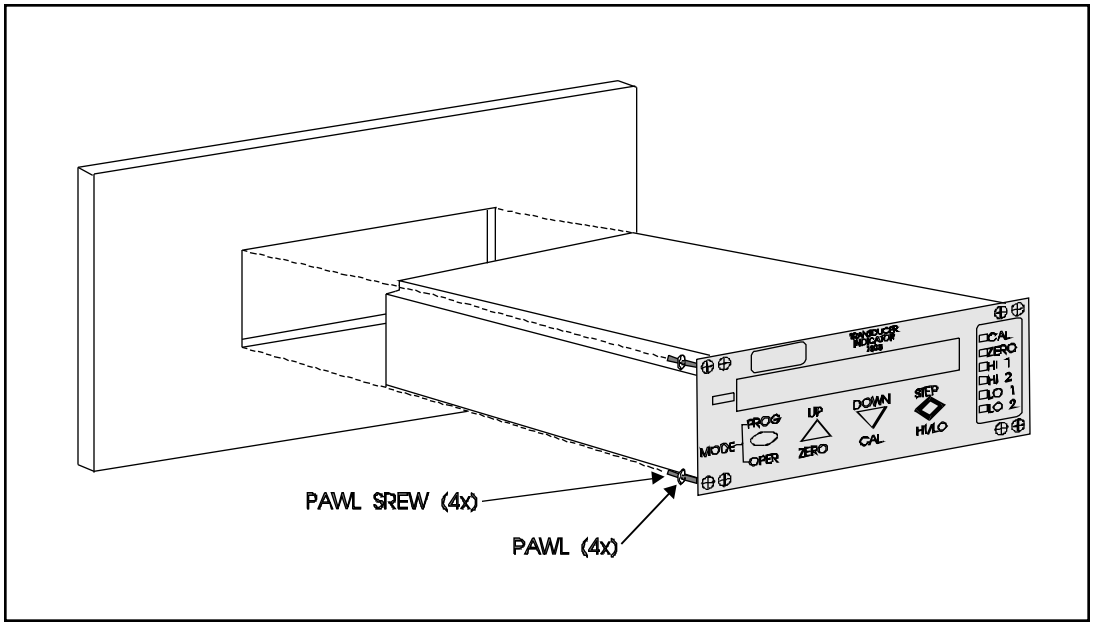
Connectors - The appropriate mating connectors are supplied for each specific meter configuration. J1 provides connections for all standard functions, J2 for the Relay Option, and J3 for the RS232C Option. All connectors are illustrated in the wiring instructions on the following pages. Connector types are shown in Table 1.

Table 1

Meter Configuration	Type of Connector
Base Unit	J1 mates with type Riacon 31009110
Base Unit with Relay Option	J1 mates with type Riacon 31009110
	J2 mates with type Riacon 31009112
Base Unit with RS232C Option	J1 mates with type Riacon 31009110
	J3 mates with type Riacon 31009104
Base Unit with Relay & RS232C Options	J1 mates with type Riacon 31009110
	J2 mates with type Riacon 31009108
	J3 mates with type Riacon 31009104

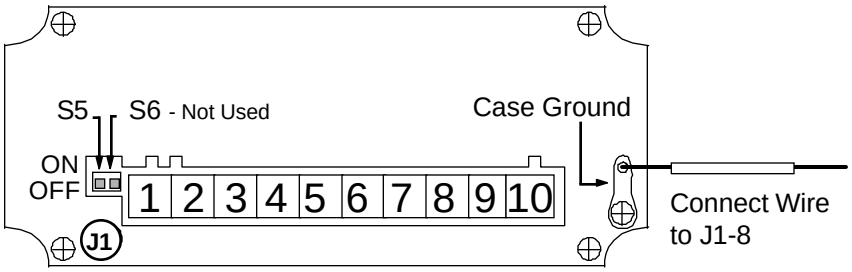
To order replacement mating connectors, please see Table 7 on page 22.

Figure 1



DC-DC Transducer Configuration

Equipped with DC-DC Personality Board
Designated by Model Number 1003-S-010x



Switch **S5** locks out front panel switches S1 through S4 when turned "ON".

Caution
Failure to properly ground the case may result in meter failure.

Connector J1 Terminal Designations
DC-DC Personality Board

J1-1	- 15 VDC Supply
J1-2	RESET →
J1-3	Common
J1-4	Analog Output
J1-5	Transducer Output HI
J1-6	Not Used
J1-7	+ 15 VDC Supply
J1-8	**AC Line Power Earth Ground**
J1-9	**AC Line Power Low**
J1-10	**AC Line Power High**

NOTE: Reset automatically occurs on power up and can be manually reset by shorting J1-2 to J1-3.

The Trans-Tek Series 240 DC-DC LVDT, Series 350 Gaging, or Series 600 Angular Displacement Transducers can be connected as illustrated in Figure DC-1. In this configuration, the transducer is powered by +15 VDC. For higher sensitivity in the Series 240 LVDTs, the input terminal J1-1 can be substituted for J1-3, increasing the excitation voltage to +30 VDC. Modification to the jumper position on the DC Board may be required. Please see next page for jumper position instructions.

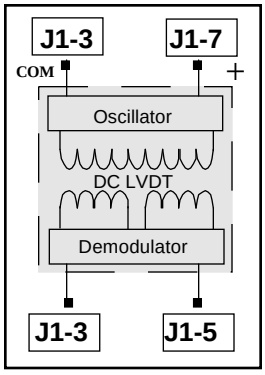


Figure DC-1

Other DC powered transducers, such as a Trans-Tek Model 0605 Angular Displacement Transducer, require a dual bipolar power supply. For transducers requiring this excitation, use the configuration shown in Figure DC-2.

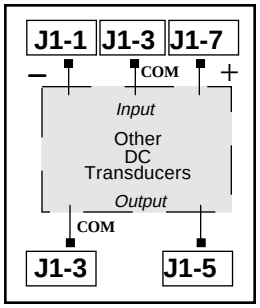


Figure DC-2

DC-DC TRANSDUCER BOARD SET-UP

These instructions are given to optimize the DC-DC Transducer Board for the transducer output. This is done by placing a jumper in one of five possible locations on this board. ***{Warning: failure to properly locate the jumper could restrict the usable electrical stroke of the transducer.}*** Unless otherwise requested at time of order, the jumper will be factory installed in Position #1, allowing for the most transducer stroke. Please see Figure 2 below.

When powered by the available 15 VDC or ±15 VDC excitation, determine the maximum output voltage from the transducer over its nominal working range (regardless of polarity).

Remove the four screws that secure the front panel to the case and slide the circuit board(s) out of the case. Based on the maximum output voltage, determine the proper jumper position using Table 2.

After making the appropriate changes, reassemble board(s) and front panel into case.

Table 2

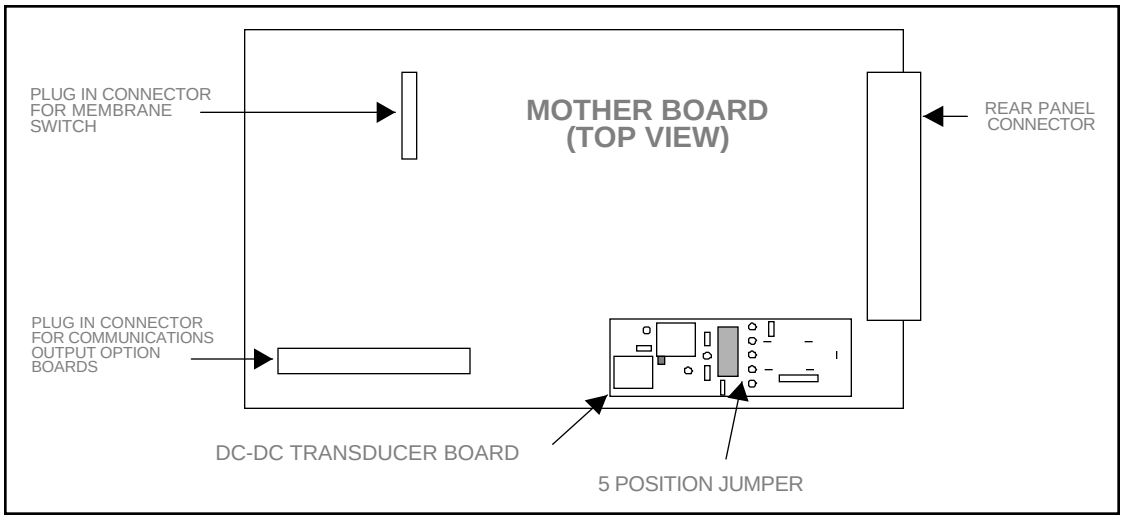
Max. Output (VDC)	Jumper Position
9.3 to 13.2	#1
7.4 TO 9.3	#2
5.0 TO 7.4	#3
4.0 TO 5.0	#4
less than 4.0	#5

DC-DC TRANSDUCER BOARD SPECIFICATIONS

This board provides excitation voltage to the transducer and coarse scaling of the transducer output. Input voltage choices include 15 VDC or ±15 VDC.

Supply Voltage to Transducer:	±15 VDC ±5% at 30 mA maximum
Transducer Output Voltage Range:	-13.2 to +13.2 VDC
Temperature Coefficient of Sensitivity:	±.006%/°F typical (±.01%/°C)
Temperature Coefficient of Zero:	±2% LSD maximum, over rated operating temperature range
Analog Output Voltage:	adjustable to 5.0 VDC when the transducer output is between 2.9 and 13.2 VDC; polarity is the same as that of transducer.
Analog Output Impedance:	2 ohms maximum; output is short circuit protected and can operate into loads of at least 1000 ohms without distortion.
Analog Output Noise and Ripple:	2 mVrms maximum
Analog Output Frequency Response:	375 Hz (-3db point) nominal
Analog Output Stability:	.002% Full Stroke after 30 minute warm-up

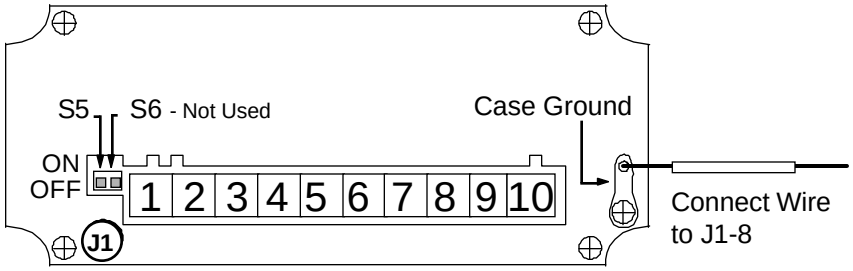
Figure 2



AC-AC Transducer Configuration

Equipped with AC-AC Personality Board

Designated by Model Number 1003-S-020x, -030x or -040x



Switch **S5** locks out front panel switches S1 through S4 when turned "ON".

Caution
Failure to properly ground the case may result in meter failure.

Connector J1 Terminal Designations

AC-AC Personality Board

J1-1	Transducer Output
J1-2	RESET
J1-3	Common
J1-4	Analog Output
J1-5	Transducer Output
J1-6	Not Used
J1-7	Transducer Excitation
J1-8	**AC Line Power Earth Ground**
J1-9	**AC Line Power Low**
J1-10	**AC Line Power High**

NOTE: Reset automatically occurs on power up and can be manually reset by shorting J1-2 to J1-3.

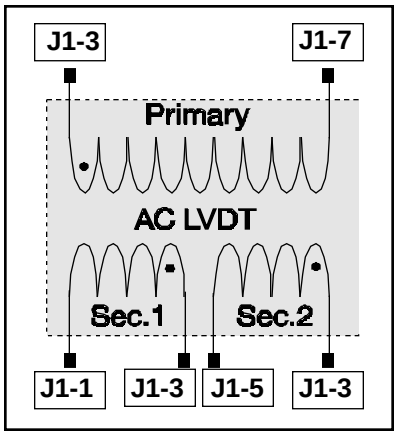


Figure AC-1

The Trans-Tek Series 210-220, 230, 310-320 Gaging, and 330 Gaging AC-AC LVDT are connected as shown in Figure AC-1. In this configuration, an AC excitation of either 3 kHz or 7 kHz and 1.7 VRMS is provided. The particular version, indicated by the meter's "S" number (-020x, -030x, -040x), is determined by knowing which specific transducer will be used with the indicator.

AC-AC 7 kHz BOARD SPECIFICATIONS

This item provides the oscillator and demodulator circuitry to operate with AC-AC LVDTs at 7 kHz.

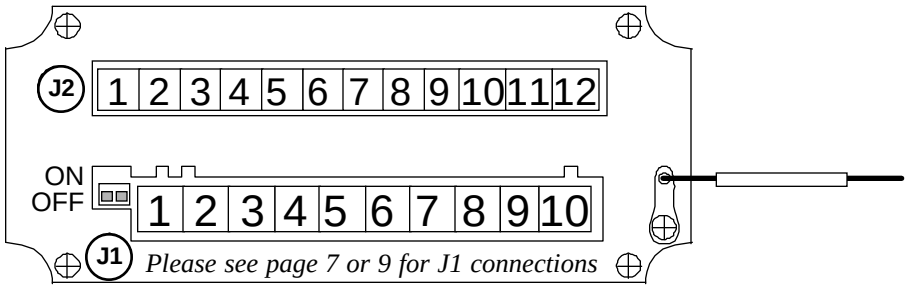
Oscillator Frequency:	7 kHz ±10% (factory set, range 1 to 20 kHz)
Oscillator Output Voltage:	1.7 Vrms ±4%
Oscillator Load:	100 ohms minimum
Demodulator Input:	.973 Vrms maximum, to avoid distortion
Demodulator Non-linearity:	±.05% maximum
Temperature Coefficient of Sensitivity:	±.006%/°F typical (±.01%/°C)
Temperature Coefficient of Zero:	±2 LSD maximum, over rated operating temperature range
Analog Output Voltage:	adjustable to 5.0 VDC when the LVDT output is .840 Vrms (±9%)
Analog Output Impedance:	2 ohms maximum; output is short circuit protected and can operate into loads of at least 1000 ohms without distortion
Analog Output Noise and Ripple:	2 mVrms maximum
Analog Output Frequency Response:	300 Hz (-3db point) nominal
Analog Output Stability:	.002% Full Stroke after 30 minute warm-up

AC-AC 3 kHz BOARD SPECIFICATIONS

This item has the same specifications as the AC-AC 7 kHz Board described above, except the oscillator frequency is 3 kHz instead of 7 kHz.

Relay Option Connections

Designated by Model Number 1003-S-0x01



Connector J2 Terminal Designations

Relay Option

J2-1	Common (SPH1)
J2-2	N.O. (SPH1)
J2-3	N.C. (SPH1)
J2-4	Common (SPH2)
J2-5	N.O. (SPH2)
J2-6	N.C. (SPH2)
J2-7	Common (SPL1)
J2-8	N.O. (SPL1)
J2-9	N.C. (SPL1)
J2-10	Common (SPL2)
J2-11	N.O. (SPL2)
J2-12	N.C. (SPL2)

Relay Option provides contact closures at rear panel connector J2, synchronized with front panel Set Point Lamps: HI 1, HI 2, LO 1, LO 2. When the front lamp is lit, the respective relay coil is powered. Each relay has one normally open (N.O.), one normally closed (N.C.) and one common contact.

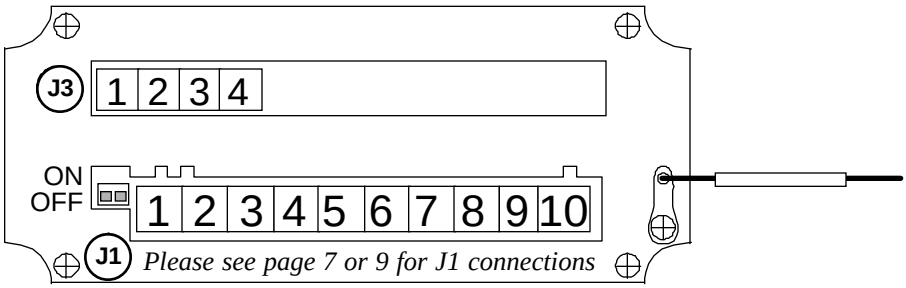
NOTE: On meters with RS232C and Relay Options, the normally closed (N.C.) contacts are not included.

Relay Option Specifications

Contact Ratings:	250 Vrms maximum, up to 4 amperes maximum 30 VDC maximum, up to 3 amperes maximum
Response Time:	On = 8 mseconds nominal Off = 5 mseconds nominal

RS232C Option Connections

Designated by Model Number 1003-S-0x02



Connector J3 Terminal Designations
RS232C Option

J3-1	RS232C Data Terminal Ready (DTR)
J3-2	RS232C Ground (GND)
J3-3	RS232C Data Set Ready (DSR)
J3-4	RS232C Transmit Data (TXD)

RS232C Option provides RS232C serial communication (transmit only) with handshake, transmitting display information.

*** Please see pages 13 & 14 for specifications on RS232C Board ***

RS232C Option Specifications

Mode: Half Duplex, Transmit Only

Handshake: DSR (data set ready), DTR (data terminal ready) and TXD (transmit data signal)

Rate: Factory supplied at 1200 baud unless otherwise ordered. Rate can be field set to 600,1200, 2400, 4800, 9600 and 19200 baud via the DIP switch assembly on the top circuit board inside the meter (please see Figure 3 next page). To reach the DIP assembly, remove the four screws that secure the front panel to the case and slide the circuit boards out of the case.

Data Format: No parity bit, 1 stop bit, 8 data bits

Data Transmission: Data is transmitted in ASCII characters in the following sequence

Sign:	plus or minus (1'st word)
Magnitude:	MSD first (2'nd through 6'th word)
Decimal Point:	Exponent (7'th word)
EOL:	Control Z (8'th word)

Decimal position is transmitted as power of 10 exponent

X.XXXX	4 (ASCII)
XX.XXX	3 (ASCII)
XXX.XX	2 (ASCII)
XXXX.X	1 (ASCII)

Data Update: Data is transmitted once per conversion cycle, if the Data Set Ready (DSR) line is True. Once transmission is started, all 8 words are transmitted independently of DSR (i.e., the state of DSR is ignored until all words are transmitted).

Data Terminal Ready (DTR): DTR is set True when the meter is active.

Program to Read RS232C: A recommended program in Basic to continuously read the meter's display onto the screen of a computer via the computer's serial port #1 is as follows:

```
CLS
T = 1
DO
    OPEN "COM1: 1200,N,8,1,RS,CD,DS" FOR RANDOM AS #1
    DO
        DATA$ = INPUT$ (8, #1)
        D$ = RIGHT$ (DATA$, 1)
        IF D$ = CHR$ (26) THEN
            V = VAL(LEFT$(DATA$, 6))
            W = VAL(MID$((LEFT$(DATA$, 7)), 7, 1))
            D1 = V / (10 ^ W)
            PRINT T, D1
            T = T + 1
        ELSE
            CLOSE
            EXIT DO
        END IF
    LOOP
LOOP
```

Figure 3: RS232C Option - Switch Settings and Pin Designations

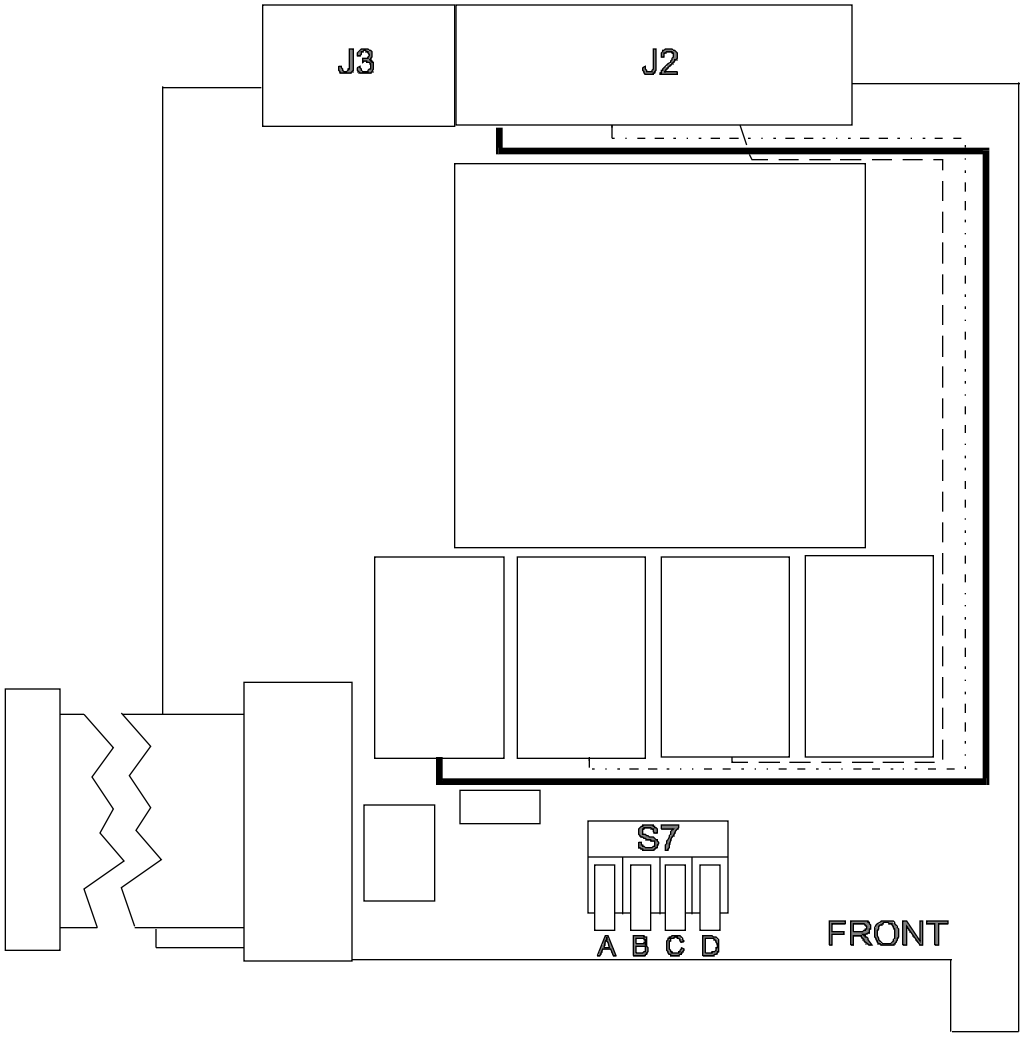


Table 3

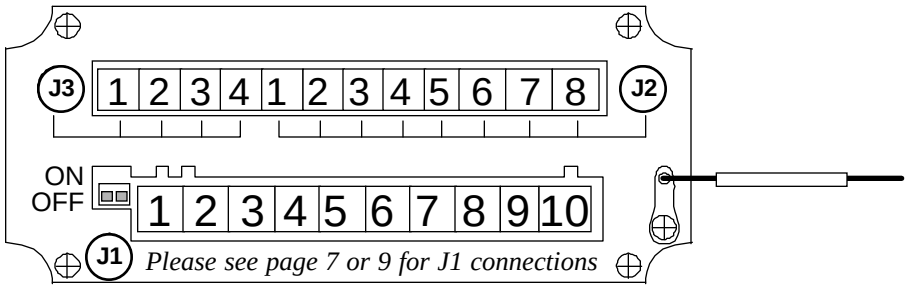
RS232C CONNECTOR WIRING		
TRANSDUCER INDICATOR	**25 PIN**	**9 PIN**
TXD J3-4	3 RXD	2 RXD
DSR J3-3	20 DTR	4 DTR
GND J3-2	7 GND	5 GND
DTR J3-1	6 DSR	6 DSR

Table 4

S7: BAUD RATE SWITCH SETTINGS				
A	**B**	**C**	**D**	**RATE**
0	**1**	**1**	**1**	600
1	**0**	**0**	**0**	1200
1	**0**	**1**	**0**	2400
1	**1**	**0**	**0**	4800
1	**1**	**1**	**0**	9600
1	**1**	**1**	**1**	19200
UP = 1, DOWN = 0				
FACTORY SET AT 1200 BAUD RATE				

Relay/RS232C Option Connections

Designated by Model Number 1003-S-0x03



Connectors J2 & J3 Terminal Designations

Relay/RS232C Option

J3	J3-1	RS232C Data Terminal Ready (DTR)
	J3-2	RS232C Ground (GND)
	J3-3	RS232C Data Set Ready (DSR)
	J3-4	RS232C Transmit Data (TXD)
J2	J2-1	Common (SPH1)
	J2-2	N.O. (SPH1)
	J2-3	Common (SPH2)
	J2-4	N.O. (SPH2)
	J2-5	Common (SPL1)
	J2-6	N.O. (SPL1)
	J2-7	Common (SPL2)
	J2-8	N.O. (SPL2)

These combined options provide contact closures and serial communication. For this version, *Normally Closed* (N.C.) contacts are not included. Please see full specs for both options on Pages 13-15.

QUICK  START

This overview provides quick start-up steps for operating your Model 1003 Indicator.
Full details are described on the following pages.

Make all necessary wiring connections as described on the proceeding pages

Program desired values for High/Low Set Points, Hysteresis Points,
Calibration Value and Decimal Point

Turn “CAL” and “ZERO” lights OFF to activate voltmeter function

Locate NULL (or zero) position of transducer - display will read nearly all “0”s
(This is center of transducer’s working range)

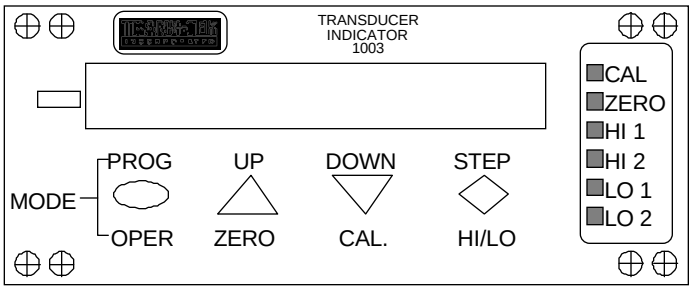
Displace transducer to point in stroke where ZERO is desired
(If you choose the NULL position, you’re already there!)

Hit the “ZERO” button on front panel

Displace transducer to point in stroke where programmed CAL value is desired
(Be sure to stay within working range of transducer)

Hit the “CAL” button on front panel

CALIBRATION IS NOW COMPLETE!



• SWITCH DEFINITIONS •

Front Panel View

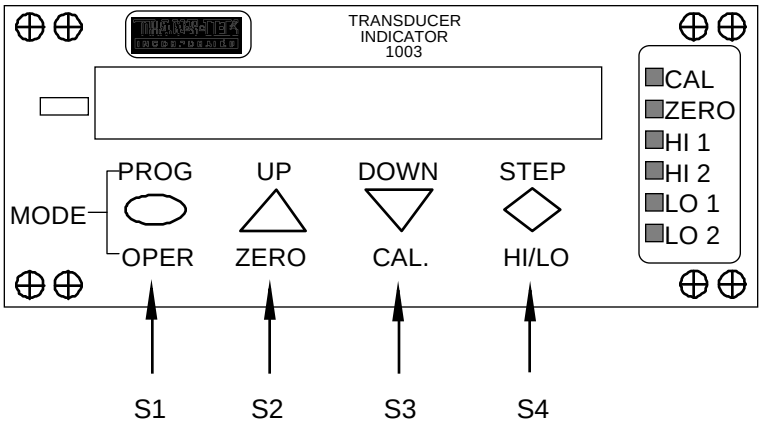


Table 5: Summary of Switch Definitions		
FRONT PANEL SWITCH	**WHILE IN "PROGRAM"**	**WHILE IN "OPERATE"**
Prog/Oper (S1)	advances to next program step	displays current input value
Up/Zero (S2)	increases flashing digit or shifts Decimal Point left	lights Zero Lamp - subtracts display value from readings extinguishes Zero Lamp - cancels subtraction
Down/Cal (S3)	decreases flashing digit or shifts Decimal Point right	lights Cal Lamp - scales display to read Cal Value extinguishes Cal Lamp - displays base unit input voltage
Step/Hi/Low (S4)	selects the display digit	displays HI and LO readings for one second
Please see next page for more detailed definitions		

• SWITCH DEFINITIONS •

Prog/Oper Switch (S1) - S1 places the indicator in PROGRAM or OPERATE mode. When in the PROGRAM mode, pressing S1 advances the readout to the next program step. While at each step, a display prompt (identifying the parameter) is shown in parentheses for approximately one second. This prompt is then immediately followed by the actual value for that parameter. Starting from OPERATE, the sequence of steps is as follows:

PROGRAM STEP	DISPLAY PROMPT
Set Point 1 High	(SPH1)
Set Point 1 Low	(SPL1)
Set Point 2 High	(SPH2)
Set Point 2 Low	(SPL2)
Hysteresis High	(HH)
Hysteresis Low	(HL)
Calibration Value	(CAL)
Decimal Point	(dP)
Exit to OPERATE Mode	

Pressing S1 once more after DECIMAL POINT step returns the instrument to OPERATE mode, displaying the current value of the input.

Up/Zero Switch (S2) - S2 serves two functions, depending on the status of S1 (PROGRAM or OPERATE). While in PROGRAM mode, S2 increments the flashing digit or shifts the DECIMAL POINT left. While in OPERATE mode, S2 becomes the ZERO SWITCH: pressing S2 when the ZERO LAMP is *not* lit will light the lamp and subtract that display value from all subsequent readings. Pressing S2 when the ZERO LAMP is lit will extinguish the lamp and cancel the subtraction.

Down/Cal Switch (S3) - S3 serves two functions, depending on the status of S1 (PROGRAM or OPERATE). While in PROGRAM mode, S3 decrements the flashing digit or shifts the DECIMAL POINT right. While in OPERATE mode, S3 becomes the CAL SWITCH: pressing S3 when the CAL LAMP is *unlit* will light the CAL LAMP and scale the display to read the CALIBRATION VALUE. Pressing S3 when the CAL LAMP is lit will extinguish the CAL LAMP and return the indicator to displaying the base unit input voltage directly in volts. (NOTE: disregarding display decimal point position, the base unit nominally displays 10000 when its input is 1 VDC.)

Step/Hi/Low Switch (S4) - S4 serves two functions, depending on the status of S1 (PROGRAM or OPERATE). While in PROGRAM Mode, S4 selects the display digit. The selected digit will flash and will respond to increasing by S2 or decreasing by S3. While in OPERATE mode, pressing S4 displays the prompt “HI” for one second followed by the High reading for one second. It will automatically continue with the prompt “LO” for one second and the Low reading for one second, before finally returning to the standard display.

Lockout Switch (S5) - Placing the rear panel toggle switch S5 in the up position *disables* switches S1 through S4.

• FUNCTION DEFINITIONS •

(Descriptions given for OPERATE mode)

Set Point 1 High (SPH1) - SPH1 is a value from -99999 to 99999, entered in PROGRAM mode. When the display value is more positive than the SPH1, the HI 1 LAMP is lit. This condition persists until the display value decreases to less than SPH1, minus the HYSTERESIS HIGH (HH) value.

Set Point 1 Low (SPL1) - SPL1 is a value from -99999 to 99999, entered in PROGRAM mode. When the display value is more negative than the SPL1, the LO 1 LAMP is lit. This condition persists until the display value increases to more than SPL1, plus the HYSTERESIS LOW (HH) value.

Set Point 2 High (SPH2) - SPH2 is a value from -99999 to 99999, entered in PROGRAM mode. When the display value is more positive than the SPH2, the HI 2 LAMP is lit. This condition persists until the display value decreases to less than SPH2, minus the HYSTERESIS HIGH (HH) value.

Set Point 2 Low (SPL2) - SPL2 is a value from -99999 to 99999, entered in PROGRAM mode. When the display value is more negative than the SPL2, the LO 2 LAMP is lit. This condition persists until the display value increases to more than SPL2, plus the HYSTERESIS LOW (HH) value.

Hysteresis High (HH) - HH is a value from 00 to 99, entered in PROGRAM mode, that applies to both high set points (reference SPH1 and SPH2).

Hysteresis Low (HL) - HL is a value from 00 to 99, entered in PROGRAM mode, that applies to both low set points (reference SPL1 and SPL2).

Calibration Value (CAL) - CAL is a user value from 0 to 99999, entered in the PROGRAM mode. ***{Warning: values above 20000 may compromise stability.}*** When the CAL SWITCH is pressed (lighting the CAL LAMP), the instrument scales the display value to equal the CALIBRATION VALUE. This also sets the scale factor between the input signal voltage and the display until the CAL SWITCH is pressed again.

Decimal Point (dP) - In PROGRAM mode, dP positions the display decimal point between any of the five digits or completely removes the decimal point from the display.

Hi/Low - The HI and LO values are the maximum and minimum values of the displayed readings (in operate mode) from the last reset. Reset occurs when the meter is powered up, or by shorting pin J1-2 to J1-3. (Please see wiring instructions on pages 7 or 9)

NOTE: all functions above are stored in nonvolatile memory

• OPERATING INSTRUCTIONS •

PROGRAMMING VALUES

After applying line power to the Model 1003 Indicator, you may begin programming the High/Low Set Points, Hysteresis Points, Cal Value and Decimal Point using the controls on the front panel.

→ **press the Prog/Oper Switch to advance through each program step (listed below)**
At each step, the display prompt is shown for about 1 second, followed by the actual value in memory

→ **you will be prompted to enter values for each program step:**
(All values are held in nonvolatile memory)

Which Keys to Use
Up Switch increases flashing digit
Down Switch decreases flashing digit
Step Switch selects the next flashing digit

While at Decimal Point
Up Switch moves DP left
Down Switch moves DP right

Hint: Displaying the Negative Sign
The negative sign appears while decrementing the digits from 9-0-1 in the first LED space to the left.

SPH1
SPL1
SPH2
SPL2
— **Setpoints**
Enter value between -99999 and 99999

HH
HL
— **Hysteresis Points**
Enter value between 00 and 99

Cal — **Calibration Value**
Enter value between 00000 and 99999
Note: a number less than 20000 is recommended

DP — *The Decimal Point may be located between any of the digits or eliminated altogether*

CALIBRATION

Calibration should be performed when the meter is first put into service or when the transducer is changed in any way. It should also be calibrated when the instrument has been repaired or modified. Periodic calibration is recommended to account for unexpected system changes.

Proper calibration is conducted as a system, with the transducer connected to the meter and after the system has been powered for at least 30 minutes.

Scaling the Cal Value Over the Transducer Stroke

The Model 1003 Indicator allows the user to display nearly any reading over the working range of the transducer. This is accomplished by first establishing a Calibration Value as described in the "PROGRAMMING VALUES" section above. The following steps show how to display this Cal Value for the desired measurement range of the transducer.

→ **after confirming the unit is in Operate Mode, press the Zero and Cal Switches to extinguish the Cal and Zero Lamps**
This initializes the base unit, creating a voltmeter. In this mode, display values outside the range -20000 to +20000 may cause all digits to blink simultaneously. This condition clears when returned within range. For more information, please see Overrange Note on next page.

Scaling for ± output

→ **position the transducer so that the display reads 0000 (or as close as possible)**
This is the transducer's null position (the decimal point will appear as programmed).

→ **press the Zero Switch**
The Zero Lamp will light and the display will read 0000, making this point the center of the msmt. range.

→ **using a measuring device, displace the transducer to the desired point in the stroke**
In most cases, this point is at one end or the other of the transducer's working range.
This will be the end of the measurement range.

→ **press the Cal Switch**
The Cal Lamp will light and the meter is scaled to display ± the Cal Value
from one end of the measurement range to the other.

CALIBRATION IS NOW COMPLETE!
If the Cal Value was entered as a positive number, the output will begin as positive at this point.
If the Cal Value was entered as a negative number, the output will begin as negative at this point.

Scaling for a single-ended output

→ **position the transducer so that the display reads 0000 (or as close as possible)**
This is the transducer's null position (the decimal point will appear as programmed).

→ **using a measuring device, displace the transducer to the desired point in the stroke**
In most cases, this point is at one end or the other of the transducer's working range.
This will be the beginning of the measurement range for this setup.

→ **press the Zero Switch**
The Zero Lamp will light and the display will read 0000.

→ **displace the transducer to a second desired point in the stroke**
In most cases, this second point is at the opposite end of the transducer's working range.
This will be the end of the measurement range.

→ **press the Cal Switch**
The Cal Lamp will light and the meter is scaled to display between 0 and the Cal Value
from one end of the measurement range to the other.

CALIBRATION IS NOW COMPLETE!
If the Cal Value was entered as a positive number, the scaled output will be all positive.
If the Cal Value was entered as a negative number, the scaled output will be all negative.

OVERRANGE NOTE: Similar overrange conditions may occur in Operate Mode, regardless of the display reading. This happens whenever the display operates outside the equivalent initialized range of -20000 to +20000. If an overrange condition is reached during calibration, it MUST be removed before proceeding, to avoid inaccurate readings.

Table 6: Troubleshooting Guide

Symptom or Problem Experienced	Possible Cause and Solution
Display digits flashing	Meter overranged - check jumper position on DC board (pg 8)
No display	Check wiring to rear panel connector(s) (pgs 7, 9) Check AC power connection (pgs 7, 9)
Display on, but no change with transducer core movement	Check wiring to rear panel connector(s) (pgs 7, 9) Verify operation of transducer
Unable to find zero or null position of transducer	Check wiring to rear panel connector(s) (pgs 7, 9) Verify ZERO LAMP is off (see "Up/Zero Switch" pg 18)
Readings are unstable	Verify CAL VALUE is less than 20000 (see "Cal Value" pg 19)
Meter is losing programmed parameters	Check pin J1-2 for possible connection to pin J1-3 (pgs 7, 9)
Static electricity shorting display	Inadequate case ground (see "J1-8 Connection" pgs 7, 9)

Table 7: Replacement Mating Connector P/Ns

Meter Configuration	Type of Connector	Trans-Tek Connector P/Ns
Base Unit	J1 mates with type Riacon 31009110	C003-0053 Connector Assembly
Base Unit with Relay Option	J1 mates with type Riacon 31009110	C003-0053 Connector Assembly
	J2 mates with type Riacon 31009112	C003-0054 Connector Assembly
Base Unit with RS232C Option	J1 mates with type Riacon 31009110	C003-0053 Connector Assembly
	J3 mates with type Riacon 31009104	C003-0055 Connector Assembly
Base Unit with Relay & RS232C Options	J1 mates with type Riacon 31009110	C003-0053 Connector Assembly
	J2 mates with type Riacon 31009108	C003-0056 Connector Assembly
	J3 mates with type Riacon 31009104	C003-0055 Connector Assembly

• WARRANTY TERMS •

All TRANS-TEK products are warranted against defective material and workmanship for one year.

• TECHNICAL ASSISTANCE •

For technical support on the Model 1003 Indicator or any TRANS-TEK product, please contact our Sales Engineering Dept.

TOLL FREE
1-800-828-3964

(Fax: 860-872-4211)

Visit Our Web Site!
http://transtekinc.com

TRANS-TEK
INCORPORATED
Route 83, P.O. Box 338
Ellington, CT 06029