LAKEWOOD SYSTEMS LTD.
Remote Data Recording Products

IP-BA100
Rain-tight Input Plug
(Bridge Amplifier with Excitation and Input Range of 0 - 25 mV)

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1 Introduction

The IP-BA100 is a unique input plug with screw terminals to allow easy hookup of Bridge type millivolt sensors. The other end has a connector that will connect to an R-XP External Plug Assembly. This allows easy connection to many Lakewood Systems products such as the R-X Data Storage Unit, Auto Chart, Chart Pac, DR-X Depth Recorder, to name a few. The screw terminals are also protected from the environment by use of a Rubber Boot Cover. With the use of advanced electronics the IP-BA100 amplifies a 0-25 millivolt input into a 0 to 2.5 volt output. The powering of the bridge is provided with on-board excitation. The IP-BA100 features a quick response time, low power consumption, wide operating temperature range and sensor excitation if needed. This makes the IP-BA100 perfect for interfacing to Load Cells, non-amplified Pressure Probes and other full bridge or differential sensors.

1.1 Terminal Assignments

The four screw terminals are used to connect the sensor. If the sensor does not need excitation power only two of the terminals are used. The first screw terminal (1) is Excitation Minus which is connected to common ground. The second screw terminal (2) is an analog input that is connected to the negative output of the bridge sensor. It has a high input impedance to eliminate sensor loading. The next screw terminals (3) is connected to the positive output of the bridge sensor. It also has a high input impedance to eliminate sensor loading. The last screw terminal offers excitation plus (5V) for the sensor. This output has minimal drive capability (25 milliamperes maximum). The power is pulsed on for a short duration then turned off. The length of the on-time power pulse can be set when programming the datalogger's header. Fig. 1 shows the position of the screw terminals.

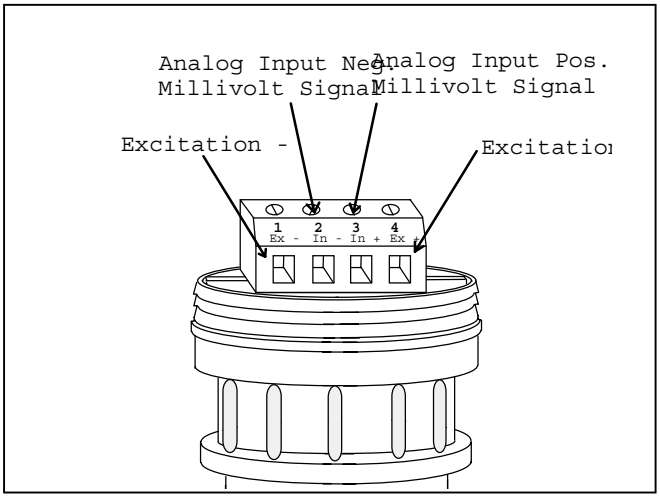

Fig. 1 IP-BA100 Terminal assignment.

Make sure the screw terminal is fully open before inserting the wire. A small tug on the wire after tightening can assure the wire is secure.

1.2 Using The Rubber Boot Cover

The rubber boot cover can be used to keep the screw terminals protected from the environment. To use the cover, turn it inside out as shown in Fig. 2 and make a small hole to let the wire through. By using a tywrap you can then clamp the wire at the position you desire.

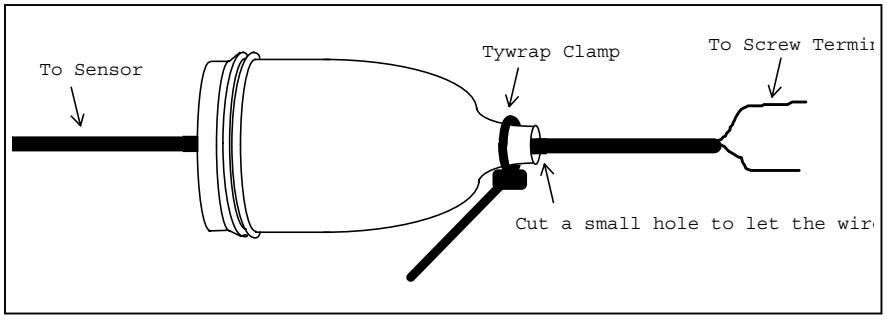

Fig. 2 Preparing the Rubber Boot Cover.

Once you have screwed the wires down and returned the rubber boot cover from the inside out position you can slip it over the screw terminals shown in Fig. 3 below.

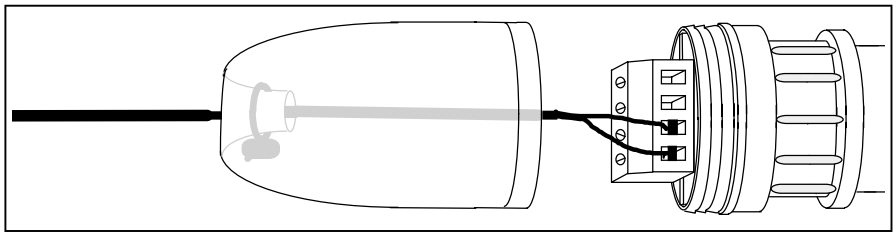

Fig. 3 Final Mounting of the Rubber Boot Cover.

1.3 Software Requirements

The IP-BA100 has two settings in the datalogger's programming header that must be correct. The first is warm-up time and the second is a 0 to 2.5 volt range setting. The example shown in Fig. 4 would be used if the IP-BA100 was connected to analog channel one and if the probe connected to the IP-BA100 did not require a longer excitation warm-up time than the 410 milliseconds. The IP-BA100 requires a minimum warm-up time of 410 milliseconds. If the excitation warm-up time is too short, the probe's output will differ between AUX PULSED readings and AUX CONTINUOUS readings. AUX PULSED readings are monitor screen values taken when AUX power is being pulsed. AUX CONTINUOUS readings are monitor screen values taken when AUX power is turned on continuously. Keep increasing the warm-up time until the AUX PULSED readings and the AUX CONTINUOUS readings match.

Fig. 4 Example Header Settings

1.4 Entering the IP-BA100 into the Library

The IP-BA100 amplifies the sensor's output by 100. This makes the entries for the Library 100 times what the sensor calibration sheets show. For example, a Bridge Load Cell sensor at full scale of 500 lbs. outputs:

Calibration Factor(mV/V) x Excitation = Output(mV)

Where ‘Calibration Factor’ is a constant for the specific probe. After looking at the calibration sheet we see a Calibration Factor. If the Calibration Factor was 1.5913 mV/V then,

1.5913 mV/V X 5.00 V = 7.9565 mV @ 500 lbs.

So when the sensor is exposed to 500 lbs of load it will output 7.9565mV if it's calibration constant on the Certificate of Calibration is 1.5913mV/V per 500 lbs. Since the IP-BA100 amplifies the sensor's signal by 100 times the voltage going into the datalogger will be:

7.9565mv X 100 = .79565 Volts

Our library entries would then be as shown in Fig. 5.

Fig. 5 Example Library Curve Fitting for a Load Cell.

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 -LEAST SQUARES CURVE FITTING -

ENTER A DATA PAIR IN RESPONSE TO EACH QUESTION MARK.
EACH PAIR IS A DATALOGGER VALUE AND AN ENGINEERING UNIT
VALUE SEPARATED BY A COMMA. THIS WILL ALLOW YOU TO
ENTER THE EXPECTED OUTPUTS AT DIFFERENT VOLTAGES.

WHEN YOU HAVE ENTERED ENOUGH POINTS TYPE  999 , 999 TO END.
MAXIMUM OF 30 DATA PAIRS WILL BE ACCEPTED.

Voltage,Units? 0,0
Voltage,Units? .79565,500
Voltage,Units? 999,999

 2 DATA PAIRS ENTERED

DEGREE OF POLYNOMIAL TO BE FITTED ? 1

X POWER          COEFFICIENT
   0           0
   1           628.4170175

Accuracy of Curve Fit = 100

CONTINUATION OPTIONS
  1 - DETERMINE SPECIFIC POINTS
  2 - FIT ANOTHER DEGREE TO THE SAME DATA
  3 - SAVE COEFFICIENTS TO DISK FOR LOTUS
  4 - SAVE DATA PAIRS TO DISK FOR LOTUS
  5 - LIST TABLE OF CALC. Y POINTS
  6 - EXIT AND USE THE COEFFICIENTS FOR THE PROBE BEING EDITED
  7 - EXIT AND DISCARD THE FITTED COEFFICIENTS
WHAT NEXT? 6
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1.5 Using a R-XP External Plug with the IP-BA100

The IP-BA100 can be wired to an *Ultra-Logger* directly through the UL16-TB Terminal Board by using an R-XP External Plug Assembly. The wiring and mounting information is shown in Fig. 6.

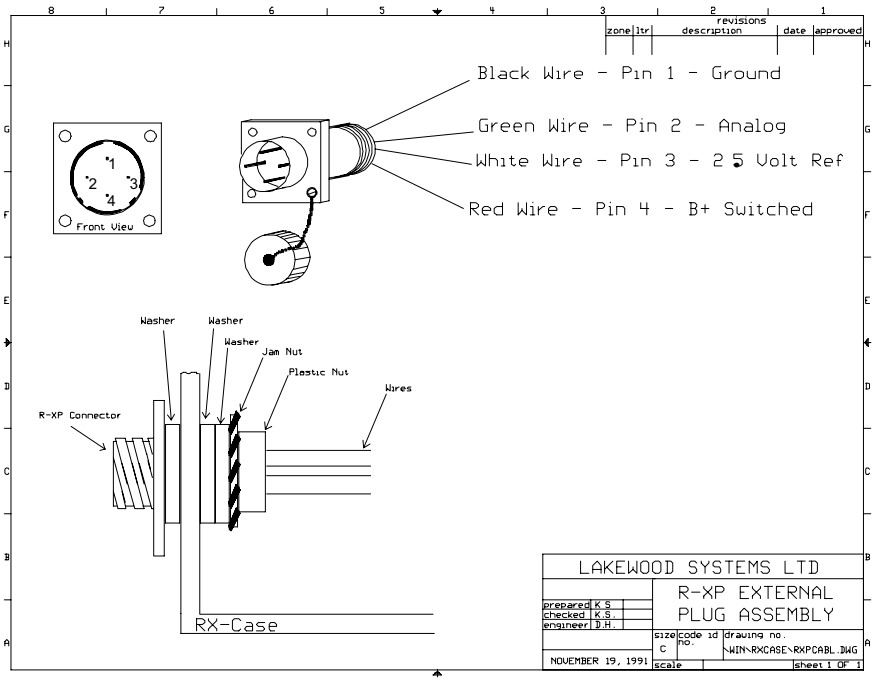

Fig. 6 R-XP Wiring and Mounting Information

1.6 Specifications

Parameter	Min	Typical	Max	Units
Operating Voltage Pin 4	5.5	12	16	Volts
Maximum Output Voltage		5.000		Volts
Differential Input Range	0.0		25.0	mV
Current Consumption (no probe)		TBD		µA
Operating Temperature Range	-40	25	65	°C
Voltage Gain of Output/Input	99.8	100.0	100.2	Av
Turn On Delay	210	410	∞	ms

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