Digi-Star★

SIMULATOR MANUAL

OPERATORS INSTRUCTIONS

Simulator P/N 400253

GENERAL INFORMATION

The DIGI-STAR Simulator is a device used to simulate full bridge load cells or transducers. This precision instrument is a versatile and easy to operate diagnostic tool. We realize that load cell simulators must occasionally visit a hostile "real world" thus the compact waterproof packaging makes this simulator rugged enough to carry in your tool box.

DESCRIPTION

Components of the DIGI-STAR Simulator include a 3-position toggle switch for selecting the desired mV/V output and Variable knob for different outputs, also a cord for connecting the unit to the instrument or device under test. Precision resistors are carefully matched so they absolutely track each other. This product is fully internally encapsulated to prevent contamination of the switches and resistors.

PROPERLY USING THE UNIT

To get the most from your simulator, please remember the following:

1. Although the simulator is essentially waterproof, dampness, water, or fertilizer on the face of the unit could cause some problems. This could show up as a faulty selector switch. Keep the face clean and dry when using the unit.

2. If the simulator has been in a truck for an extended period of time in the winter months, allow it some reasonable time to "warm up" under load. In northern climates, temperatures of -40F can occur in an unheated space. The simulator may exhibit a small zero shift as the resistors heat. Typically this is less than 3 counts and will stabilize in several minutes.

OPERATION

The basic function of the Simulator is to simulate the output of full bridge transducers allowing the instrument portion of the system to be separated from its transducers for purposes of calibration or troubleshooting.

Hook up the simulator to the indicator by the connector on the end of the cable. Once the simulator is hooked up to the indicator, it will be necessary to determine the level of input signal (mV/V) required to perform the calibration or test. This information may be found imprinted on a label attached to the indicator or by contacting DIGI-STAR's Scale Service Department. In cases where the original setting is not available or the system is being recalibrated for a new value, the required input signal level can be determined based on the rating of the transducers, the weight of the vessel, scale or hopper if any, and the maximum weight of the product to be weighed.

Once the simulator setting has been determined, and the simulator has been hooked up to the indicator for approximately 10 to 15 minutes to allow the system time to stabilize, the user should then follow the described procedure for checking and or calibrating the instrument as found in the manual supplied with the indicator.

PRE OR RECALIBRATION WITH A SIMULATOR

Another use of the simulator is in calibration of instrumentation. This is commonly used in very large capacity systems where it may be difficult to do a recalibration should an indicator fail. The simulator must be applied properly in this application. Accurate recalibrations of better than +/- .1% are achievable.

Whenever a large tank, hopper, truck, or track scale is initially calibrated, disconnect the field wiring and replace it with the simulator. In many cases the large dead load may have to be tarred out to return the indicator to zero. With the scale on zero, turn on the simulator to 0.4 mV/V and take a reading. Write this number on the back of the indicator and also in the customers file. Should the indicator ever need to be repaired, or if the calibration accuracy is in question, this data can be invaluable. If a "loaner" or replacement unit is required, it can be calibrated to the scale understructure with the simulator. With proper care, excellent results can be obtained particularly when a recalibration cannot be done immediately.

PRE OR RECALIBRATION WITH A SIMULATOR CONTINUED

The practice outlined above can also be used to precalibrate an indicator to a known system of load cells. The cells are provided with known calibration data. By studying this data, an indicator can be calibrated to a known set of cells before the system is ever installed. Calibration at the site is faster and more cost effective. This process uses your brain instead of your back. It also forces technicians to test the equipment before taking it to the customer's plant. This is an excellent procedure to use with your equipment.

NOTE: Indicated weights at specific simulator settings and scale system configurations are average values. Weights for standard products are known to be quite accurate, however non standard configurations such as 8 load cell, etc. are estimates based upon prior experience. Also please recall that the use of a J-BOX Extension Kit or Duplex Kit warrants field calibration as pointed out on decals shipped with those products.

The following will affect the calibration number:

Type of indicator.

Does the system have lightning protection or not.

What length of cable is installed on the Junction Box.

Are the cells temperature compensated or not.

When in doubt, always field calibrate with known weights. Do not
trust a single commercial scale, get a second opinion.

TROUBLESHOOTING

If properly used, the load cell simulator is a powerful tool. The DIGI-STAR simulator provides simple and convenient means for troubleshooting both the instrumentation and transducer sections of a weighing system. Many problems in measurement systems involve drift or other situations, which are not repeatable. In these cases, knowing where to look for the problem may be half the solution. A simulator gives a fixed point from which all other system components can be judged to be properly working.

When a field problem occurs, there must be a detailed procedure to follow to eliminate different components as a problem source. The following are steps which should help in isolating the problem;

1. Attach the simulator to the indicator and see if the indicator is operational. If the indicator is not functional or is drifting, it must be repaired or replaced before proceeding further.

2. Attach the simulator to the indicator. If multiple junction boxes are used, connect at the first box. Disconnect any field wiring or lightning protection which may be installed. This will check the wiring for moisture, leakage, rodent damage, or other error sources. If errors are found, replace or repair before proceeding.

3. If lightning protection installed in the junction box is under investigation, connect the simulator to it and check for leakage or drift. Lightning protectors are designed to fail in the closed condition after a large transient. Check the excitation for excessive voltage. Repair or replace the unit if defective before continuing. Reconnect the normal wiring and close the box.

4. Go to the next junction box and repeat step 3. Make sure to disconnect any system wiring which has not been previously tested. This procedure is essential if the root of the problem is to be found. Make the indicator prove to you that the system is functioning properly.

5. Once all the system wiring is checked out, check the load cells themselves for opened or shifted bridge resistances. If any are found, check any trimming boxes through which the cell is routed for possible electrical damage. Make sure that the trimmers are functional. Make doubly sure that all trimming boards are clean and uncontaminated. Use alcohol or other suitable solvents. Make sure that all moisture has dried before re-installing the boards.
   With proper use of the simulator, troubleshooting can be made easier and more efficient.

WHAT CAN I EXPECT FROM MY SIMULATOR

The simulator provides one known stable ratiometric mV/V output. The variable knob output is 0.0 mV/V to approximately 0.6mV/V. As with a strain gage load cell, the output the cell provides is directly proportional to the excitation voltage, which is provided to the cell. The 0.0mV/V signal provides a convenient means of setting or checking the initial analog offsets of the amplifiers. The background noise of the simulator is typically less than 500 nanovolts. This figure assumes a very stable excitation power supply. Remember, the output of the simulator can only be as stable as the input excitation voltage divided by about 1,000.

SPECIFICATIONS

FIXED RANGES:	0.0mV/V *, 0.4mV/V
VARIABLE RANGES:	0.0mV/V to 0.6+mV/V
IMPEDANCE:	348 ohm +/- .1%
INPUT VOLTAGE LEVELS:	5 to 15 VDC Maximum
DIMENSIONS:	3" X 2" X 1.5"

* The 0.0mV/V is nulled typically to less than 5 microvolts.