Using the GPX 220 Simulation Function

The GPX 220 contains on-board input simulation circuitry. This simulation capability serves two functions:

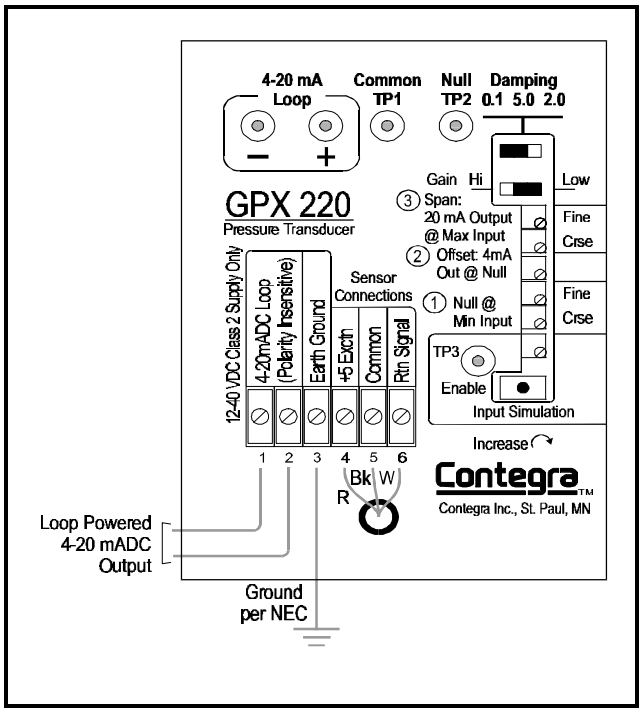
1) Manual Level Simulation: manual manipulation of the 4-20 mA loop for control system testing.
2) Calibration of the GPX 220 prior to installation.

Use of the simulation function is not recommended in applications where a narrow range of the sensor is being used (such as elevated tanks or closed pumping systems). This functionality is intended for use when the GPX 220 is at a standpipe or other similar application where a higher percent of the scale is being used.

Reference document 10011-0001-01 for standard installation and calibration information.

Tools required:

- DVM – Digital Volt Meter[1]
- Trim tool for potentiometer adjustment



Input Simulation - manual level simulation

When the input simulation pushbutton is depressed, its associated potentiometer controls the output of the 4-20 mA loop.

Caution: when the pushbutton is depressed, the output of the GPX 220 changes to the level dictated by the potentiometer. Do not use level simulation until all of the pumps or other equipment have been turned off.

1. Monitor the 4-20 mADC loop current by placing the DVM's probes in the T420's test points - located in the upper left corner.
2. Make note of the mA reading.
3. While pressing the level simulation pushbutton, adjust the input simulation potentiometer until the GPX 220 is outputting the mA reading measured in step 2.
4. The next time the pushbutton is pressed, the GPX's output will change to the level set in step 3. You are then able to adjust the level within the 4-20 mA range for system start-up / testing by adjusting the potentiometer.

Recommendation: In a pump-up application, it is a 'best practice' to leave the potentiometer adjusted to a 20 mA output (or nearly 20 mA) so as not to inadvertently turn on pumps if the input simulation pushbutton is accidentally depressed.

Footnotes:

1) When using the T420's 4-20 mADC test points, best accuracy is achieved by using DVM's with a burden voltage less than 5.0 mV/ mA (i.e 5 ohm sense resistance). If using a DVM with a higher sense resistance the installing technician should calibrate by inter-

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'Simulated' Calibration - with offset

1. Place the sensor in a vertical orientation.
2. Measure and record the transducer's output voltage by placing the test leads on terminals 5 (common) and 6 (signal return). The voltage should be approximately 0.5 VDC. This number is "V@ZeroPSI" and is used in Equations 1 and 2.
3. Determine the PSI at which 4 mA will be transmitted. This is 'OffsetPSI' in Equation 2. Then calculate the Input Simulation required for setting the span. This is 'V@Offset' in Equation 2.
4. Connect a voltmeter to TP1 (common) and TP3 (Input Simulation Level).
5. While pressing the Input Simulation pushbutton, adjust the Input Simulation potentiometer until the calculated offset simulation voltage (V@OffsetPSI) is measured. Release the pushbutton.
6. Measure the voltage from TP1 (common) to TP2 (Null). While pressing the Input Simulation pushbutton, adjust the potentiometers labeled "**Null @ Min Input**" (course and fine) until zero volts is measured. Release the pushbutton.
7. Monitor the 4-20 mADC loop current by placing the DVM's probes in the T420's test points - located in the upper left corner.
8. While pressing the Input Simulation pushbutton adjust the potentiometer labeled "**Offset: 4 mA Output @ Null**" until 4 mA is measured.
9. Determine the PSI at which 20 mA will be transmitted. This is '**MaxPSI**'. Then calculate the Simulation Voltage to impose to simulate this level. This Simulation Voltage is '**V@FS**' in Equation 1.
10. Connect a voltmeter to TP1 (common) and TP3 (Input Simulation Level).
11. While pressing the Input Simulation pushbutton, adjust the Input Simulation potentiometer until the calculated full-scale simulation voltage (**V@FS**) is measured. Release the pushbutton.
12. Monitor the 4-20 mADC loop current by placing the DVM's probes in the T420's test points - located in the upper left corner.
13. While pressing the Input Simulation pushbutton (thus applying the simulated full-scale signal), adjust the potentiometers labeled "Span: 20 mA Output @ Max Input" (Course & Fine) until the DVM measures 20 mA.
14. Finally, choose the desired Damping time constant. Three time constants are available: 0.1 (jumper @ left), 2.0 (jumper @ right) and 5.0 (jumper removed) seconds.

Notes for Equation 1 (offset):

V@ZeroPSI Signal VDC at Zero PSI = _____

OffsetPSI PSI at offset level = _____

V@Offset Signal VDC at offset level - per Eq. 1

Notes for Equation 2 (span):

MaxPSI Maximum PSI measured = _____

V@MS Signal VDC at MinPSI - per Eq. 1

Equation 1 (offset):

$$V@ZeroPSI + \left(4 * \frac{OffsetPSI}{GPX\,220\_Pressure\_Element}\right) = V@Offset$$

Equation 2 (span):

$$V@ZeroPSI + \left(4 * \frac{MaxPS}{GPX\,220\_Pressure\_Element}\right) = V@FS$$

Example (with offset)

A GPX 220 with a 30 PSI sensor will be measuring a tank with a 5 PSI offset (OffsetPSI) and a maximum PSI of 25 (MaxPSI) (5 PSI offset plus 20 PSI span). Notes: (1) Any measurements in feet will have to be converted to PSI. (2) If there is no offset, leave the sensor unpressurized to "**Null @ Min Input**" (step 6) and "**Offset: 4 mA Output @ Null**" (step 8), then perform the span calibration beginning at step 9.

Assume that **V@ZeroPSI** has been measured at .503 V. Equation 1 solves for the Simulation Voltage at the offset PSI (**V@Offset)** as follows:

$$.503 + \left(4 * \frac{5}{30}\right) = V@Offset = 1.170V$$

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tion 2 solves for the Simulation Voltage at the full scale PSI (**V@FS**) as follows:

$$.503 + \left(4 * \frac{25}{30}\right) = 3.836V$$