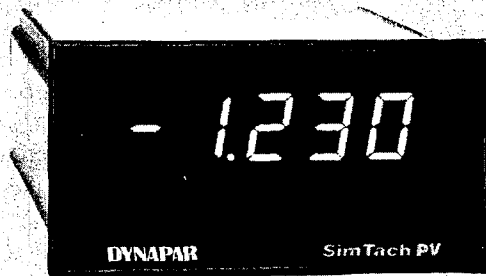


Introduction

The SimTach family of digital process meters offers a full complement of indicating features in a compact and economical package designed for the industrial environment.

The signed, 3-1/2 digit display provides clear indication of process variables with large, bright red LEDs. The "dead front" design offers superior contrast and allows easy readability, even at a distance. A loop sense LED indicates over and underrange signals. A choice of models accommodate process signals in voltage or current modes and offer an optional sensor excitation supply. Setup and calibration is simplified through simple jumper selections, with provisions for offset and scaling to display engineering units. An internal reference is available for "off line" calibration, eliminating the need for signal generators and reference meters. Installation is convenient with pluggable terminal strip connectors.

The SimTach digital process meters combine the latest analog-to-digital conversion circuitry and state-of-the-art construction for the most cost-effective and reliable indicators in industrial applications.



Features

- "Off Line" Calibration Mode for easy Zero and Span adjustments
- Multiple ranges; Operating range selected by jumper
- Shallow, 4" (100mm) depth behind panel
- Pluggable terminal strip connector for easy installation and service
- Large, bright red LED display
- \pm 3-1/2 digit range with 4-1/2 display; indicates to 19990
- Selectable "dummy" zero in least significant digit position
- Fast or slow input filter for improved response
- Zero and Span adjustments to display engineering units
- Built-in over- and under-range indication
- Fits standard 1/8 DIN panel cutout
- Selectable decimal point position in display
- NEMA 4 / IP65 panel seal with panel gasket (provided)
- Heavy-duty Aluminum enclosure and panel mounting straps

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**Technical Manual
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Dynapar^{brand}

SimTach

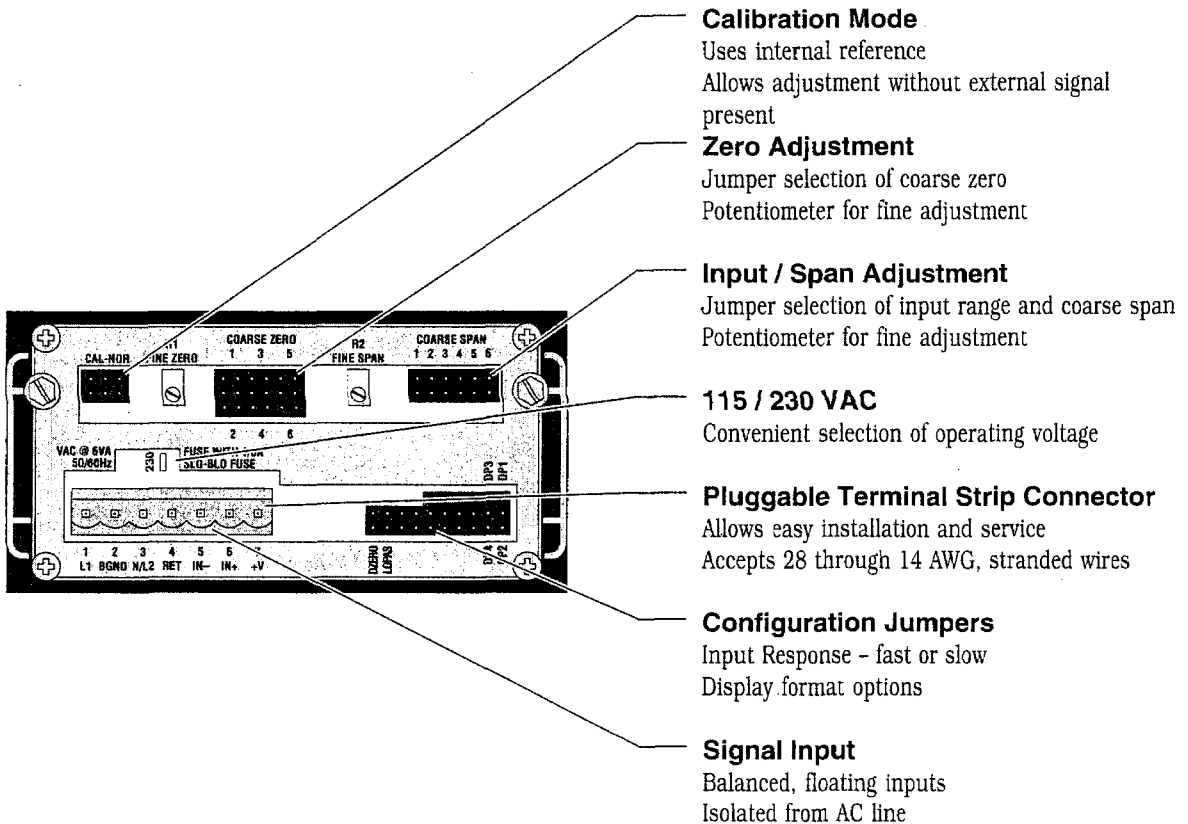
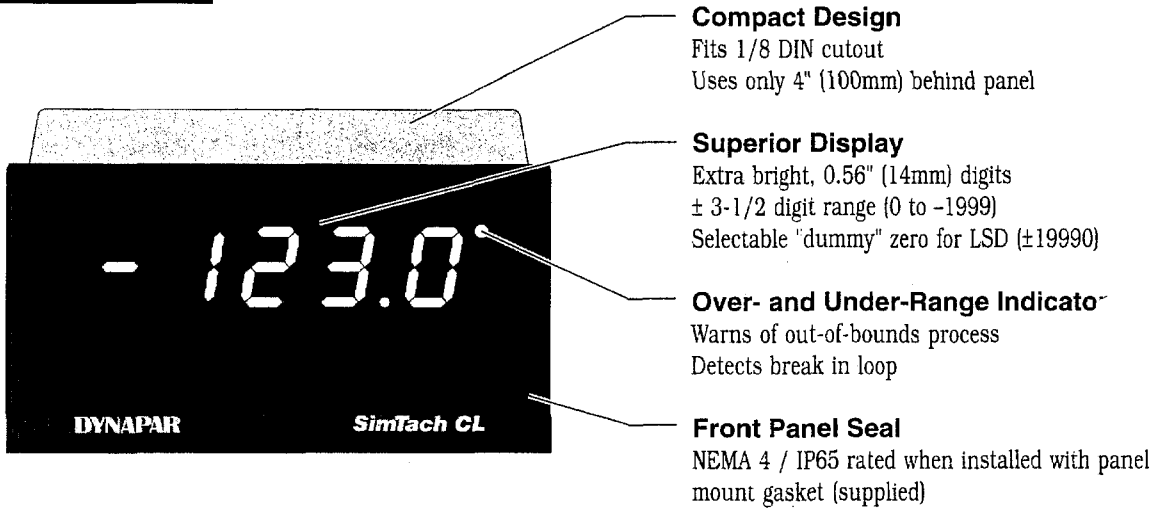
Process

Volts/Current

Meters

O V E R V I E W

CONSTRUCTION





SPECIFICATIONS

Input Power

AC: Terminals 1 (L1) and 3 (N/L2)
95 to 130 VAC (or 190 to 260 VAC,
selectable), 50/60 Hz, 6 VA

Display

Type: 7-segment red LED plus indicator
Number: 4-1/2 digits plus minus sign
Height: 0.56" (14mm)
Decimal Point: none, .X, .XX, .XXX or .XXXX
jumper selectable

Inputs

Signal Terminals 5 (IN-) and 6 (IN+)
Ranges: 4 to 20, or 10 to 50 mA jumper
selectable (current loop); 0 to 5, 10, or 20
volts jumper selectable (process volts)
Response Times (for 90% change): Fast, 0.5 sec;
Slow 2.0 sec (jumper selectable)
Impedance: 20 Ω max. (current loop); 1 M Ω min.
(process volts)
Accuracy: 0.1% of full scale, ± 1 digit
Stability: ± 100 ppm/ $^{\circ}$ C
Common Mode Rejection: 80 db at 50-60 Hz

Excitation Power

(models ST L S 1 and ST P S 1 only)
Terminals 4 (RET) and 7 (+V)
Voltage: 24 VDC, unregulated (40 VDC max. at
max. line, no load; typically 22 to 32 VDC
with 50mA load over min. to max. line)
Current: up to 50 mA maximum

Adjustments

Zero: approx. ± 1000 count offset in increments
of 350 counts; jumper selectable, with
continuous adjustment between settings.
Span: approx. 0 to 2000 count attenuation in
increments of 125 counts; jumper selectable,
with continuous adjustment between
settings.

Modes

Calibration: Internal reference: 4.3VDC (process
volts); 15mA (4-20mA range); 48mA (10-50mA
range); connected in place of external signal
allows "off line" adjustment of Zero and Span
Normal: External signal connected to input

Mechanical

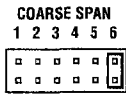
Enclosure Dimensions: 3.5"x1.7" (91x44 mm)
Bezel Dimensions: 3.78"x1.98" (96x50 mm)
Panel Cutout Size: 1/8 DIN, 3.62"x1.77" (92x45
mm)
Panel Thickness: 1/16" (2 mm) to 1/2" (13 mm)
Depth Behind Panel: 4" (100 mm)

Environmental

Operating Temp.: 4 to 140 $^{\circ}$ F. (-20 to 60 $^{\circ}$ C.)
Storage Temp.: -40 to 185 $^{\circ}$ F. (-40 to 85 $^{\circ}$ C.)
Ambient Humidity: 0 to 85% noncondensing
Front Panel Seal: NEMA 4 / IP65 when installed
with panel gasket (supplied)

CONFIGURATION

EXAMPLE:
The jumper on the pin pair, shown below, configures the input for a 0-5V range.



Input Range Selection

For process volts inputs (ST P S x), place a jumper on a pair of pins labelled 6 for 0-5V or 1-5V signals, next to the pair of pins labelled 5 for 0-10V signals; remove any jumpers on the pin pairs labelled 5 and 6 for 0-20V signals. Choose the range that is higher than the maximum expected signal level.

For current loop inputs (ST L S x), place jumpers on both pairs of pins labelled 5 and 6 for 10-50 mA signals; remove any jumpers on the pin pairs labelled 5 and 6 for 4-20mA signals.

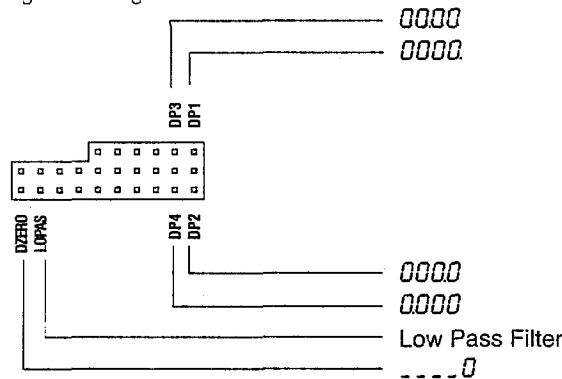
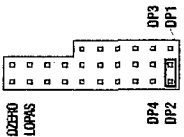
Display Options

Place a jumper on a pair of pins next to one of the four DPx decimal point options to add a decimal point to the display.

A jumper may be added on the LOPAS pair of pins to filter the input and "slow down" the response to a rapidly changing input.

Jumper the pair of pins next to DZERO position to set the least significant digit to 0.

EXAMPLE:
The jumper on the pin pair, shown below, configures the display to show two decimal places.



Calibration Mode

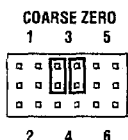
An internal reference of 4.3 volts, 15 or 48 mA can be used to adjust Zero and Span displays. Move both jumpers under CAL-NOR from the NOR position (on the right when looking at the jumpers) to the CAL position (on the left). Note that these jumpers are oriented horizontally.



Normal Operation (external signal used)
Calibration Mode (internal reference used)

ZERO & SPAN ADJUST

EXAMPLE:
The jumpers on the pin pairs, shown below, selects a coarse offset of 0 to 350 counts.



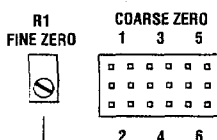
Zero (Offset) Setting

The Zero display may be set to indicate values in the range of -1000 to 1000 when the minimum signal input is present.

Move two jumpers under Coarse Zero to one of the six positions to set the approximate display value to those shown in the table, at right.

Adjust the Fine Zero potentiometer to set the precise display.

Position	Offset Range
1	700 to 1050
2	350 to 700
3	0 to 350
4	-350 to 0
5	-700 to -350
6	-1050 to -700



Jumper two pin pairs for coarse Zero display
Adjust to set fine Zero display

EXAMPLE:
The jumpers on the pin pair, shown below, selects an attenuation of 1000 counts.



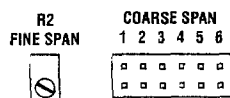
Span (Full Scale) Setting

The Span, or full scale, display (when the maximum signal input is present) may be set to use the full display range of 1999, or a lesser value by attenuating (reducing) the input signal.

Add jumpers to the pin pairs under Coarse Span to provide attenuation according to the table, at right. Any combination of the four jumpers may be used.

Adjust the Fine Span potentiometer to set the precise display.

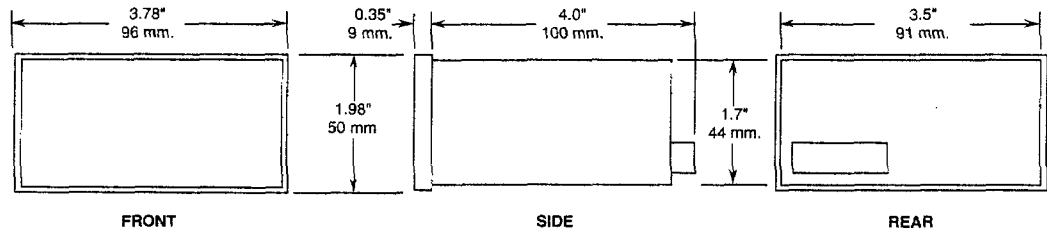
Jumper Positions				Attenuation	Max. Display
4	3	2	1		
			x	125	1875
		x		250	1750
		x	x	375	1625
	x			500	1500
	x		x	625	1375
	x	x		750	1250
	x	x	x	875	1125
x				1000	1000
x			x	1125	875
x		x		1250	750
x		x	x	1375	625
x	x			1500	500
x	x		x	1625	375
x	x	x		1750	250
x	x	x	x	1875	125



Jumper pin pairs for coarse Span display
Adjust to set fine Span display

INSTALLATION

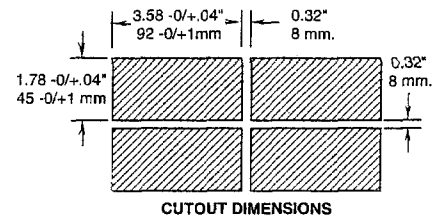
PANEL MOUNTING



Panel Mounting

Make a panel cutout as shown in the diagram at right. Observe proper clearances when installing multiple units. If the installation requires a front panel seal, apply the adhesive gasket (included with the unit) to the outside of the panel.

Next, slide the unit through the cutout. Insert the panel mounting straps into the slotted guides in the enclosure. Tighten the 5/8" long hex washer head screws securely with a 3/16" hex driver. **DO NOT** over-tighten!



WIRING

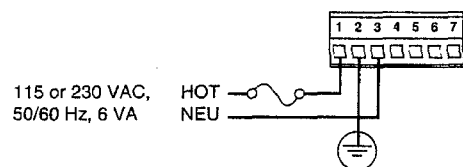
WARNING!
In installation and use of this product, comply with the national electrical code; federal, state and local codes, and any other applicable safety codes. In addition, turn off power and take other necessary precautions during installation, service and repair to prevent personal injury, property loss and equipment damage.

AC Power Input

Select 115 or 230 VAC operation with a flat blade screwdriver through the panel cutout (unit is shipped set for 230 VAC).

Connect AC power to terminal 1 (L1) through a 1/8 A., "slow blow" type fuse and to terminal 3 (N/L2), as shown in the diagram on the right. Connect terminal 2 (BGND) to Building (Earth) Ground.

AC power should be from a separate branch circuit that is noise-free and does not feed heavy loads.



EXAMPLE:

The jumper on the pin pair, shown below, configures the input for a 0-5V range.



Process Volts Input

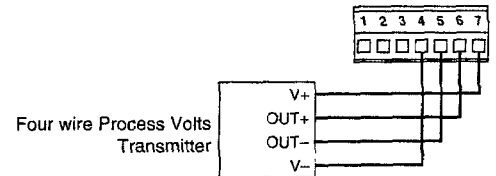
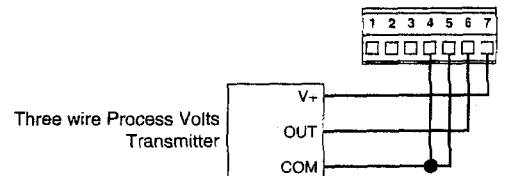
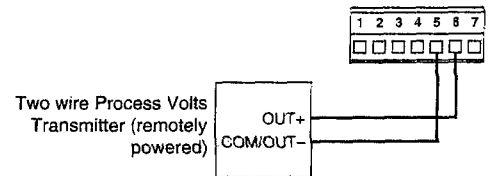
Place a jumper on pin pair 6 under Coarse Span for input ranges of 0-1V, 0-5V or 1-5V.

Place a jumper on pin pair 5 under Coarse Span for input ranges of 0-10V.

Remove any jumpers from pin pairs 5 and 6 under Coarse Span for input ranges of 0-20V.

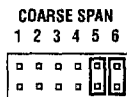
Connect the excitation power and output signal wires as shown at right. Note that model ST P S 1 is required to supply power to the three and four wire transmitters.

If a negative value is displayed, reverse the terminal 6 (IN+) and terminal 5 (IN-) connections.



EXAMPLE:

The jumper on the pin pair, shown below, configures the input for a 10-50 mA range.



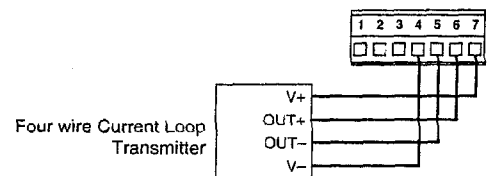
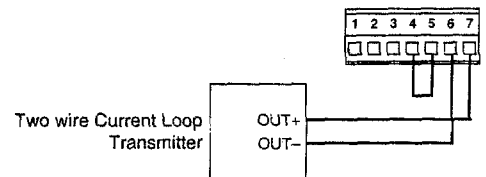
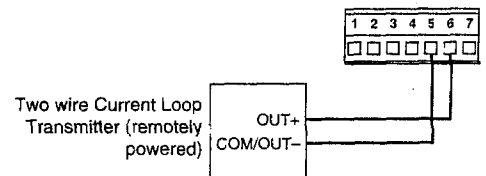
Current Loop Input

Place a jumper on pin pairs 5 and 6 under Coarse Span for 10-50mA signal inputs.

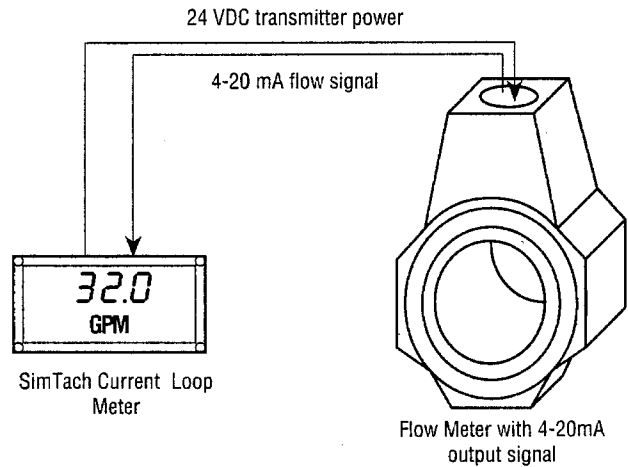
Remove any jumpers from pin pairs 5 and 6 under Coarse Span for 4-20mA signal inputs.

Connect the excitation power and output signal wires as shown at right. Note that model ST L S 1 is required to supply power to the transmitters, if they are not remotely powered.

If the over- and under-range indicator is constantly displayed, reverse the transmitter OUT+ and OUT- connections.



FLOW RATE MONITOR



OBJECTIVE

Use a SimTach Current Loop meter (model number ST L S 1) to monitor the rate of flow through a flow meter.

BACKGROUND

The flow meter is installed in-line with the delivery system. It is equipped with a transmitter that outputs a signal, from 4 to 20 mA, proportional to the rate of flow over the range of 0 to 32 gallons/minute. The transmitter requires a 24 VDC power source.

SETUP

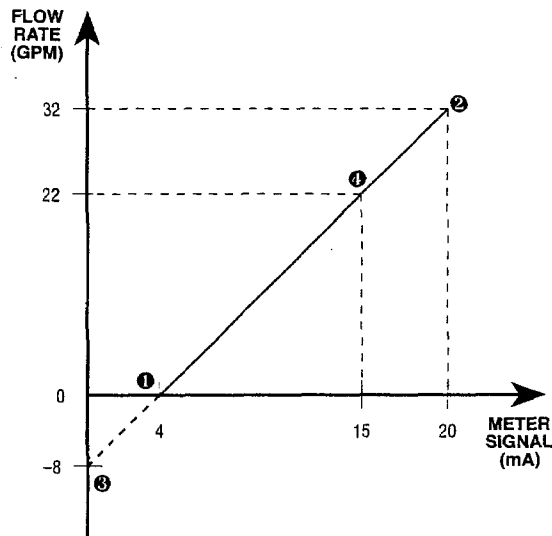
Connect the +V, RET, IN+ and IN- terminals as suggested by the flow meter instructions. For a 4-20mA input, remove jumpers from positions 5 and 6 under COARSE SPAN.

To display the maximum rate in units of gallons/minute, add a jumper to the DP2 position (XX.X). Do not add a jumper to the DZERO position. If the flow rate changes slowly and a smoother display is desired, add a jumper to the LOPAS position.

CALIBRATION

The flow meter transmitter outputs a 4-20mA current signal proportional to the rate of flow between 0 and 32 gallons/minute. To display flow rate in gallons/minute, the Zero and Span adjustments are used. Three methods of calibrating the meter to this application are presented below.

1. Bench Top
Connect a signal generator that outputs DC current (or a DC power supply and potentiometer) in series with the panel meter and a calibrated hand-held meter. Set the current to 4 mA. Change the Coarse Zero jumper positions until the display reads close to 0. Then, adjust the Fine Zero potentiometer to display 00.0. Next, set the current to 20 mA. Observe the display, and add jumpers to the Coarse Span positions to attenuate, or reduce, the display to approximately 32. Adjust the Fine Span potentiometer until 32.0 is displayed. Repeat the Zero and Span adjustments for better



accuracy.

2. On-Line

Install the flow meter and transmitter in a system whose flow rate can be manually controlled. While no flow is present, change the Coarse Zero jumper positions until the display reads close to 0. Then, adjust the Fine Zero potentiometer to display 00.0. Next, adjust the rate of flow to its maximum of 32 gallons/minute. Observe the display, and add jumpers to the Coarse Span position to attenuate, or reduce, the display to approximately 32.0. Adjust the Fine Span potentiometer until 32.0 is displayed. Repeat the Zero and Span adjustments for better accuracy.

3. Off-Line

Use the information about the rates of flow and the transmitter, shown in the graph above, and

the CALibration mode of the panel meter to adjust the Zero and Span prior to installation.

Since the transmitter outputs a minimum of 4 mA at 0 gal/min and a maximum of 20 mA at 32 gal/min, the slope of the graph is:

$$(32 - 0 \text{ gal/min}) \div (20 - 4 \text{ mA}) = 2 \text{ gpm/mA}$$

Since the display at 4 mA should be 0, no Zero Offset adjustment is required. Add jumpers to position 3 under Coarse Zero. The display when no current is present at 0 mA, or 4 mA less than the minimum, is calculated as:

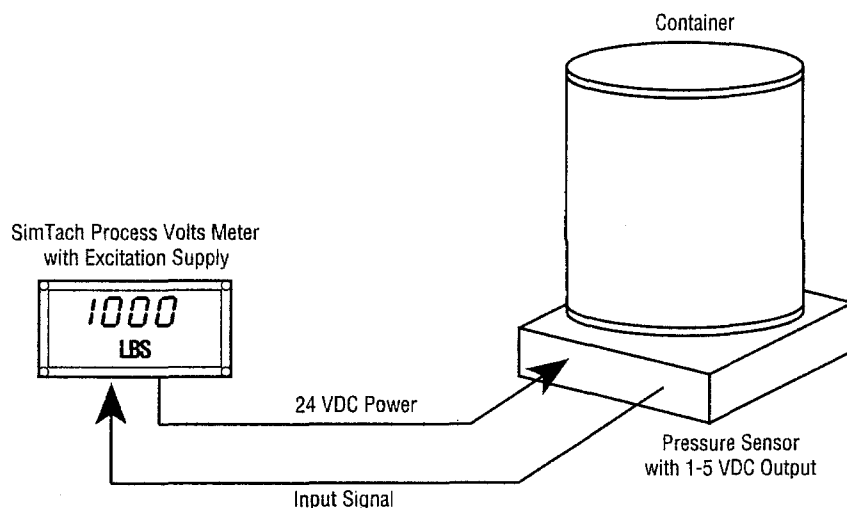
$$-4\text{mA} \times 2\text{gpm/mA} = -8 \text{ gpm}$$

Disconnect or zero the input signal and adjust the Fine Zero pot until the display reaches -8.0. To display 32.0 at the maximum input of 20 mA, add jumpers to positions 1, 3 and 4 under Coarse Span. The display at the CAL mode current of 15 mA is calculated as:

$$11\text{mA} \times 2 \text{ gpm/mA} = 22 \text{ gpm}$$

Move the horizontally positioned jumper pair from the NORMAL to the CALibration position. Adjust the Fine Span pot to obtain a display of 22.0 gpm. Repeat the Zero and Span adjustments for better accuracy.

CONTAINER FILLING



OBJECTIVE

Use a SimTach Process Volts meter (model number ST P S 1) to monitor the weight of chemicals being filled into 55 gallon drums.

BACKGROUND

The weighing platform is fitted with a pressure transducer that produces a linear voltage output in proportion to the weight. The transducer outputs 1VDC at a 0 and 5VDC at a maximum capacity of 1,000 pounds. The pressure transducer requires a 24 VDC power source.

SETUP

Connect the +V, RET, IN+ and IN- terminals according to the pressure transducer instructions. To configure the SimTach for a 1-5V input, install a jumper in position 6 under COARSE SPAN.

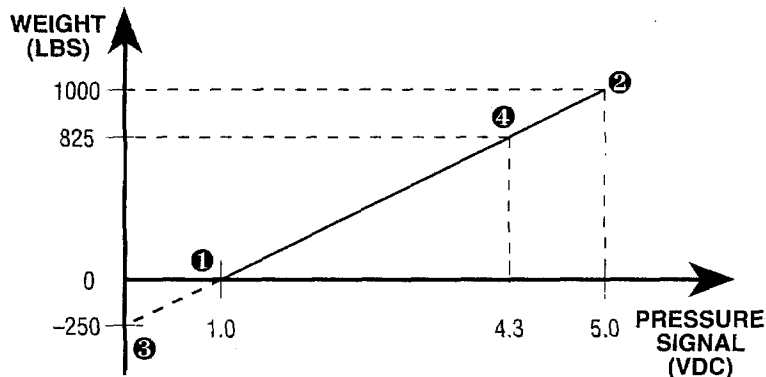
To display a maximum of 1000 lbs., do not install jumpers in the decimal point (DPx) or dummy zero (DZERO) positions to format the display as XXXX. To more accurately track the weight as the container is filled, do not install a jumper in the low pass filter (LOPAS) position.

CALIBRATION

The pressure transducer outputs a 1 to 5 volt signal proportional to the container weight between 0 and 1,000 pounds. To tailor the display to indicate weight in pounds, the Zero and Span adjustments are used. Three methods of calibrating the meter to this application are presented below.

1. Bench Top

Connect a signal generator that outputs DC voltage to the panel meter inputs. Set the voltage source to 1 VDC. Change the Coarse Zero jumper positions until the display reads close to 0. Then, adjust the Fine Zero potentiometer to display 000. Next, set the voltage source to 5 VDC. Observe the display, and add jumpers to the Coarse Span position to attenuate, or reduce, the display to approximately 1000. Adjust the Fine Span potentiometer until 1000 is displayed. Repeat



the Zero and Span adjustments for better accuracy.

2. On-Line

Connect the meter to the pressure transducer. With no weight applied, change the Coarse Zero jumper positions until the display reads close to 0. Then, adjust the Fine Zero potentiometer to display 000. Next, add a known weight, as close to the maximum as possible for better accuracy. Observe the display, and add jumpers to the Coarse Span position to attenuate, or reduce, the display until it indicates the correct weight. Adjust the Fine Span potentiometer until the exact weight is displayed. Repeat the Zero and Span adjustments for better accuracy.

3. Off-Line

Use the information about the pressure transducer, shown in the graph above, and the

CALibration mode of the panel meter to adjust the Zero and Span prior to or during installation.

Since the transmitter outputs a minimum of 1 VDC at 0 lbs. and a maximum of 5 VDC at 1000 lbs., the slope of the graph is:

$$(1000 - 0 \text{ lbs}) \div (5 - 1 \text{ v}), = 250 \text{ lbs/v}$$

The display when no signal is present is at 0 VDC, or 1 volt less than the minimum — is calculated as:

$$-1\text{v} \times 250 \text{ lbs/v} = -250 \text{ gpm}$$

Disconnect or zero the input signal and jumper the pair of pins at position 4 under the Coarse Zero (-350 to 0 Offset). Then, adjust the Fine Zero pot until the display reaches -250. To attenuate, or reduce, the full scale display from 1999 to 1000 lbs., add a jumper to position 4 under Coarse Span (1000 count attenuation). The display at the CAL mode voltage of 4.3 VDC is calculated as:

$$(4.3 - 1 \text{ v}) \times 250 \text{ lbs/v} = 825 \text{ lbs}$$

Move the horizontally positioned jumper pair from the NORMAL to the CALibration position. Adjust the Fine Span pot to obtain a display of 825 lbs. Repeat the Zero and Span adjustments for better accuracy. Remember to reposition the jumper pair from the CALibration mode back to NORMAL operation.

ORDERING INFORMATION

Model	Description
ST B S 0	SimTach DC Volts/Amps Meter
ST C S 0	SimTach AC Volts/Amps Meter

Model	Description
ST L S 0	SimTach Current Loop Meter
ST L S 1	SimTach Current Loop Meter with excitation supply
ST P S 0	SimTach Process Volts Meter
ST P S 1	SimTach Process Volts Meter with excitation supply

WARRANTY

Standard products manufactured by the Company are warranted to be free from defects in workmanship and material for a period of one year from the date of shipment, and products which are defective in workmanship or material will be repaired or replaced, at the option of the Company, at no charge to the Buyer. Final determination as to whether a product is actually defective rests with the Company. The obligation of the Company hereunder shall be limited solely to repair and replacement of products that fall within the foregoing limitations, and shall be conditioned upon receipt by the Company of written notice of any alleged defects or deficiency promptly after discovery within the warranty period, and in the case of components or units purchased by the Company, the obligation of the Company shall not exceed the settlement that the Company is able to obtain from the supplier thereof. No products shall be returned to the Company without its prior consent. Products which the Company consents to have returned shall be

shipped F.O.B. the Company's factory. The Company cannot assume responsibility or accept invoices for unauthorized repairs to its components, even though defective. The life of the products of the Company depends, to a large extent, upon the type of usage thereof, and THE COMPANY MAKES NO WARRANTY AS TO FITNESS OF ITS PRODUCTS FOR SPECIFIC APPLICATIONS BY THE BUYER NOR AS TO PERIOD OF SERVICE UNLESS THE COMPANY SPECIFICALLY AGREES OTHERWISE IN WRITING AFTER THE PROPOSED USAGE HAS BEEN MADE KNOWN TO IT.

THE FOREGOING WARRANTY IS EXCLUSIVE AND IN LIEU OF ALL OTHER WARRANTIES EXPRESSED OR IMPLIED, INCLUDING, BUT NOT LIMITED TO ANY WARRANTY OF MERCHANTABILITY OR OF FITNESS FOR A PARTICULAR PURPOSE.

SERVICE

If this product requires service, call the number below for an Return Material Authorization (RMA) number, pack it in a sturdy carton with the RMA number clearly marked on the outside, and ship prepaid to: Service Department at the address below.

Please Include:

1. A description of problem
2. The name of responsible person
3. Your purchase order number
4. Your return shipping instructions