

Experiment No.: 02

Pressure to Current Converter

Academic Year : 2024-25 **Sem** : I

Class : TY BTech Instrumentation & Control

Course Name : Process Instrumentation

Course Code : IC3231

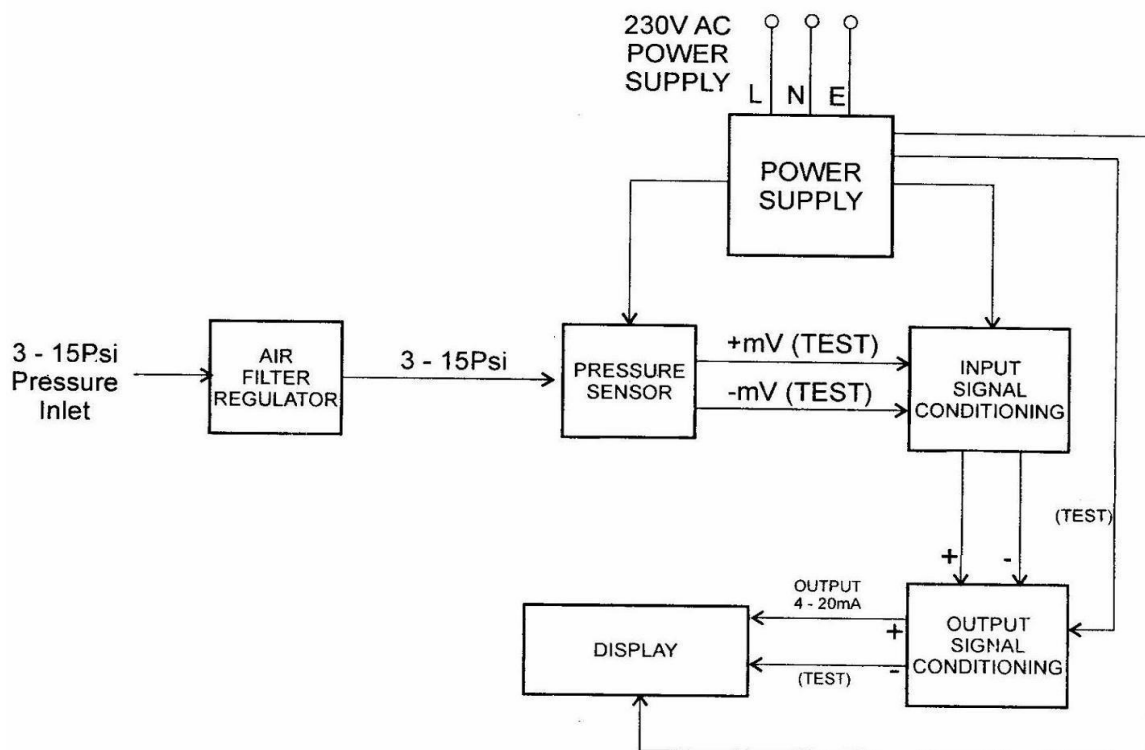
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BLOCK DIAGRAM OF PRESSURE TO CURRENT CONVERTER



Experiment No.: 02
Pressure to Current converter

Aim : To study and plot the calibration curve of Pressure to Current converter.

Apparatus : Pressure to Current converter, Compressor, Digital multimeter, Pressure gauge, piping, connecting wires etc.

Theory :

Principle of operation:

A precision voltage reference circuit supplies a static and highly regulated voltage to all other portions of the circuit. An excitation circuit drives the solid state, piezo-resistive transducer which has configuration of a Wheatstone's bridge upon the application of pressure to the transducer, a force and resultant strain, cause the bridge to become unbalanced in direct proportion to the applied pressure. The voltage thus obtained is amplified, scaled and summed with another reference voltage to produce the output current source signal.

Specifications of Pressure to Current converter :

Input	:	Instrument air 3-15 psig.
Output	:	4-20 mA DC
Power supply	:	230VAC, 50Hz
Power Consumption	:	Less than 10 VA
Max. Pressure	:	1.5 times max pressure range.
Burst Pressure	:	2 times max pressure range.
Accuracy	:	± 0.25 % of span
Hysteresis	:	± 0.1 %
Repeatability	:	± 0.1 % span
Resolution	:	± 0.1 %
Response time	:	50 mS to 99% of step change
Relative Humidity	:	5-95 % at 25°C.
Operating Temperature	:	0 to 55°C
Display	:	8 * 1 Alphanumeric LCD

Procedure :

- 1) Switch on the compressor and let the pressure build up to 20 psi.
- 2) Make the connections as per the circuit diagram.
- 3) Vary the pressure gradually by using AFR and note down the corresponding current reading on DMM. Take 5 readings up to 15 psi.
- 4) Now gradually close the valve and again note down the current reading for same value of pressure.
- 5) Plot the graph for increasing as well as decreasing readings.
- 6) Calculate the % error and sensitivity.

Observations :

Sr. No.	Input Pressure on regulator (psi)	Output current Expected (mA)	Display Reading (psi)	% Error	Output current measured (mA)	% Error
1.	3	4	3	0	4.8	5
2.	6	8	5.31	-5.75	7.6	-2.5
3.	9	12	11.7	22.5	13.9	11.87
4.	12	16	14.3	19.16	16.4	2.5
5.	15	20	15	0	21	6.25

Sample calculation: -

$$\% \text{ Error} = [(\text{Required} - \text{Actual}) / \text{Span}] * 100$$

Conclusion:

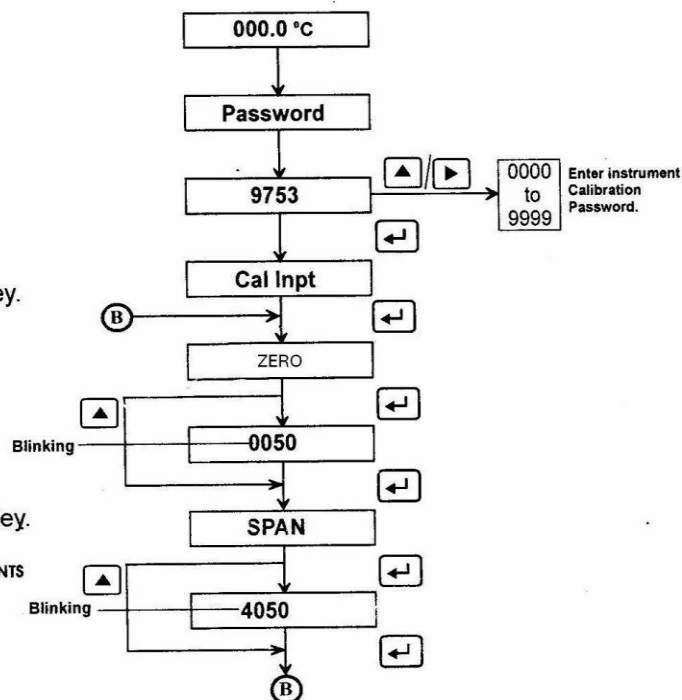
In this experiment we configured and calibrated the P/I converter for level control system successfully.

CALIBRATION PROCEDURE

E.g. : Range - 3 to 15 Psi

FLOW CHART FOR CALIBRATION

- 1) Do the connections as per the termination details given on page 3 of the manual.
- 2) Power ON the instrument.
- 3) Go to calibration mode refer flow chart .
- 4) Display will show **CAL INPUT**
- 5) Press **↵** key. Display will show **ZERO**
- 6) Apply 3 Psi Pressure at input & Press **↵** Key.
- 7) Display will show **0050** Approx. ADC COUNTS
- 8) Press **↵** key to save zero calibration.
- 9) Display will show **SPAN**
- 10) Apply 15 Psi Pressure input & Press **↵** Key.
- 11) Display will show **4050** Approx. ADC COUNTS
- 12) Press **↵** key to save span calibration.
- 13) Calibration end.
- 14) Press **M** key to switch to run mode.



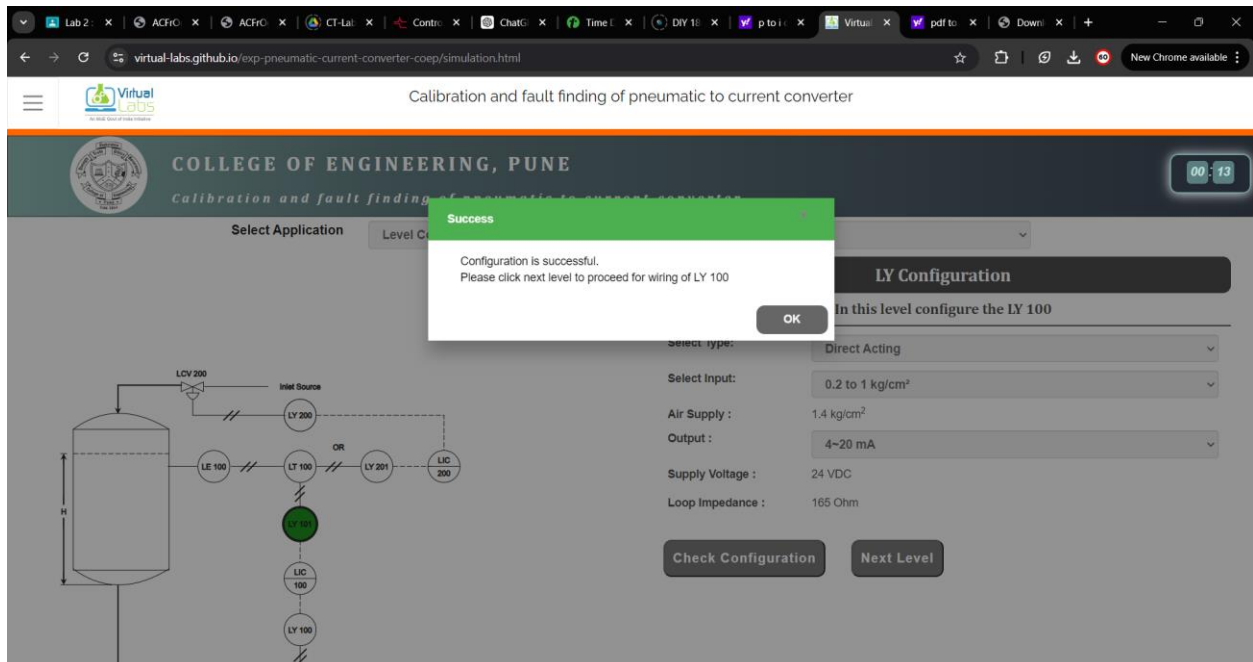
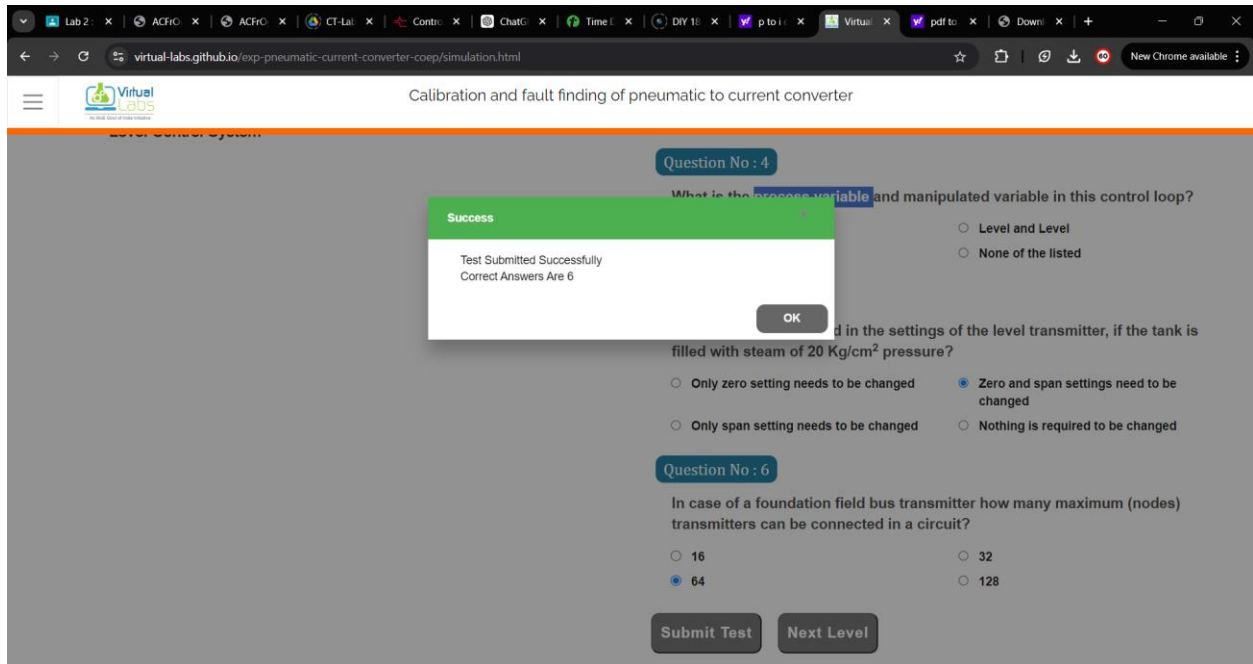
CALIBRATION CHART

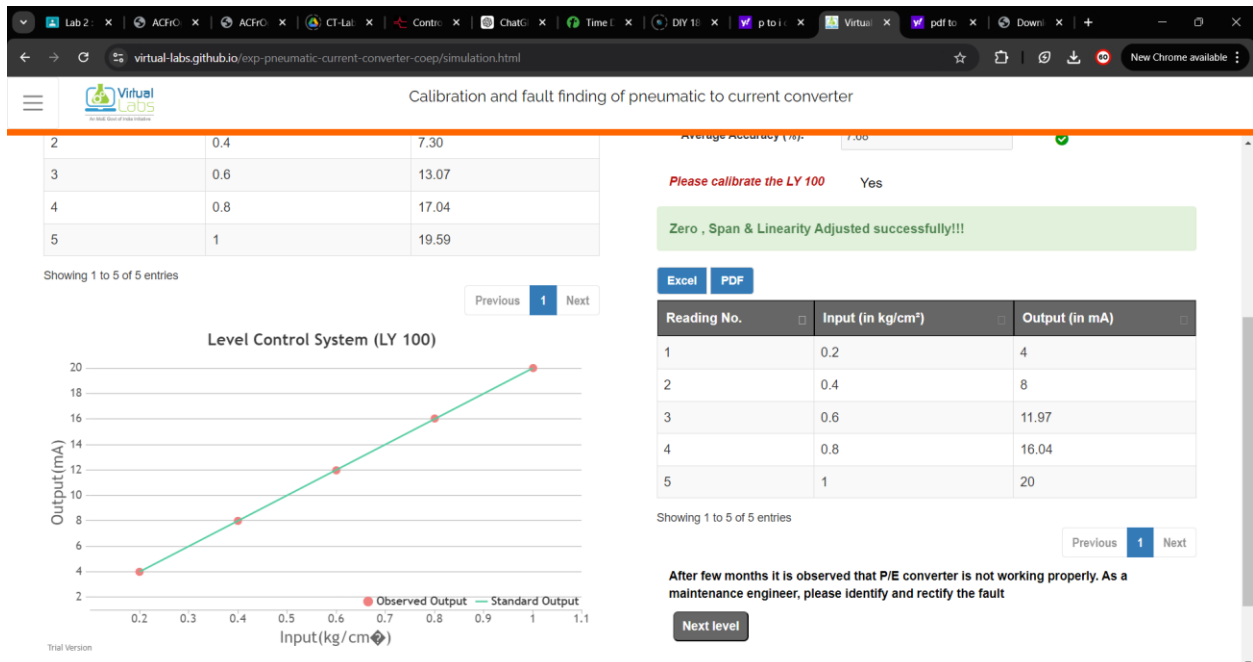
E.g. Range - 3 - 15 Psi

Input Pressure (Psi)	DISPLAY READING	Output (mA)
03.00	03.00	4.000
06.00	06.00	8.000
09.00	09.00	12.000
12.00	12.00	16.000
15.00	15.00	20.000

Screenshots of the Tasks completed on the Virtual Lab:

(Introduction, Configuration, Connections, Characterization, Calculations, Calibration, Final observation Table, Fault Finding, etc.)





virtual-labs.github.io/exp-pneumatic-current-converter-coep/simulation.html

Calibration and fault finding of pneumatic to current converter

In this level detect the fault in LY 100

The Output of P/E Converter shown in the table Identify the Fault

Reading No.	Input (in kg/cm ²)	Output (in mA)
1	0.2	0
2	0.4	0
3	0.6	0
4	0.8	0
5	1	0

Detect Fault:

Detect Fault

Identify Fault

Success

Fault detection successful! Please detect another new fault

OK

