

Experiment No.: 01

Current to Pressure Converter

Academic Year : 2023-24 **Sem** : I

Class : TY BTech Instrumentation & Control

Course Name : Process Instrumentation

Course Code : IC3231

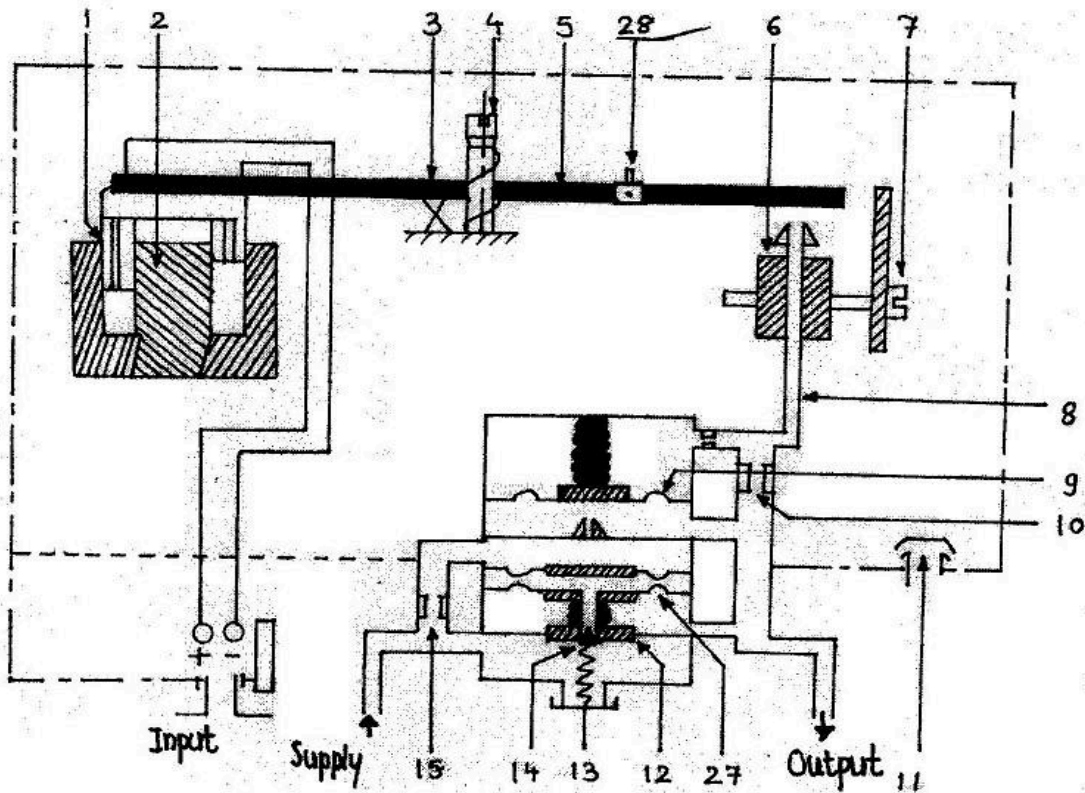
Name : Sahil Rajendrakumar Nimse.

Division : IC-A

Roll No. : 73

G.R. No. : 12320211

E TO P CONVERTER



1 → VOICE COIL

2 → PERMANENT MAGNET

3 → FULCRUM

4 → ZERO ADJUSTING SCREW

5 → BEAM (BAFFLE)

6 → NOZZLE

7 → SPAN ADJUSTING SCREW

8 → CONNECTING PIPE

9 → DIAPHRAGM

10 → RESTRICTOR

11 → EXHAUST BAFFLES

12 → VALVE SEAT

13 → SCREW CAP

14 → VALVE NEEDLE

15 → CAPILLARY TUBE

27 → DOUBLE MEMBRANE

28 → BALANCE

Experiment No.: 01

Current to Pressure converter

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

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

Theory : Current to Pressure converter is a device that converts standard current input signal (4-20 mA) into standard pneumatic output (3-15 psi). The relation between input current and output pressures is linear.

An integral bracket is used for surface mounting of the converter. Pneumatic connection are $\frac{1}{4}$ " NTP internal threaded. Electrical connections, gland span and zero adjustments are made by means of screw adjusters.

Operation : Refer the Figure (1),

The pick up system consist of (1) situated in the air gap of permanent magnet (2). The converter consists of nozzle (6) restrictor (10) and the baffle plate on beam (5), which is mounted on beam pivot (3). The converter serves to convert the force on the coil (produced by 4-20 mA current signal) into movement of baffle plate, which closes nozzle (6) and so increases the pressure in connecting pipe (8). The pneumatic relay consists of diaphragm (9). Valve seat and needle (12), (14) and capillary tube (15). The increased pressure in connecting tube (8) causes diaphragm to move down closing the part below it. This result in pressure built up on the top surface of double membrane, which is connected to a valve needle (14). The valve is opened till the pressure equilibrium on the both sides of double membrane is restored. When the valve opens to restore equilibrium, the supply air flows directly to the outlet with a pressure proportional to valve opening.

Specifications of Current to Pressure converter :

Input Signal	4-20 mA dc
Input resistance	$90 \Omega \pm 5$
Pressure	3-15 psi / 0.2 - 1 kg/cm ²
Characteristics	Linear with input current
Linearity	0.5 %

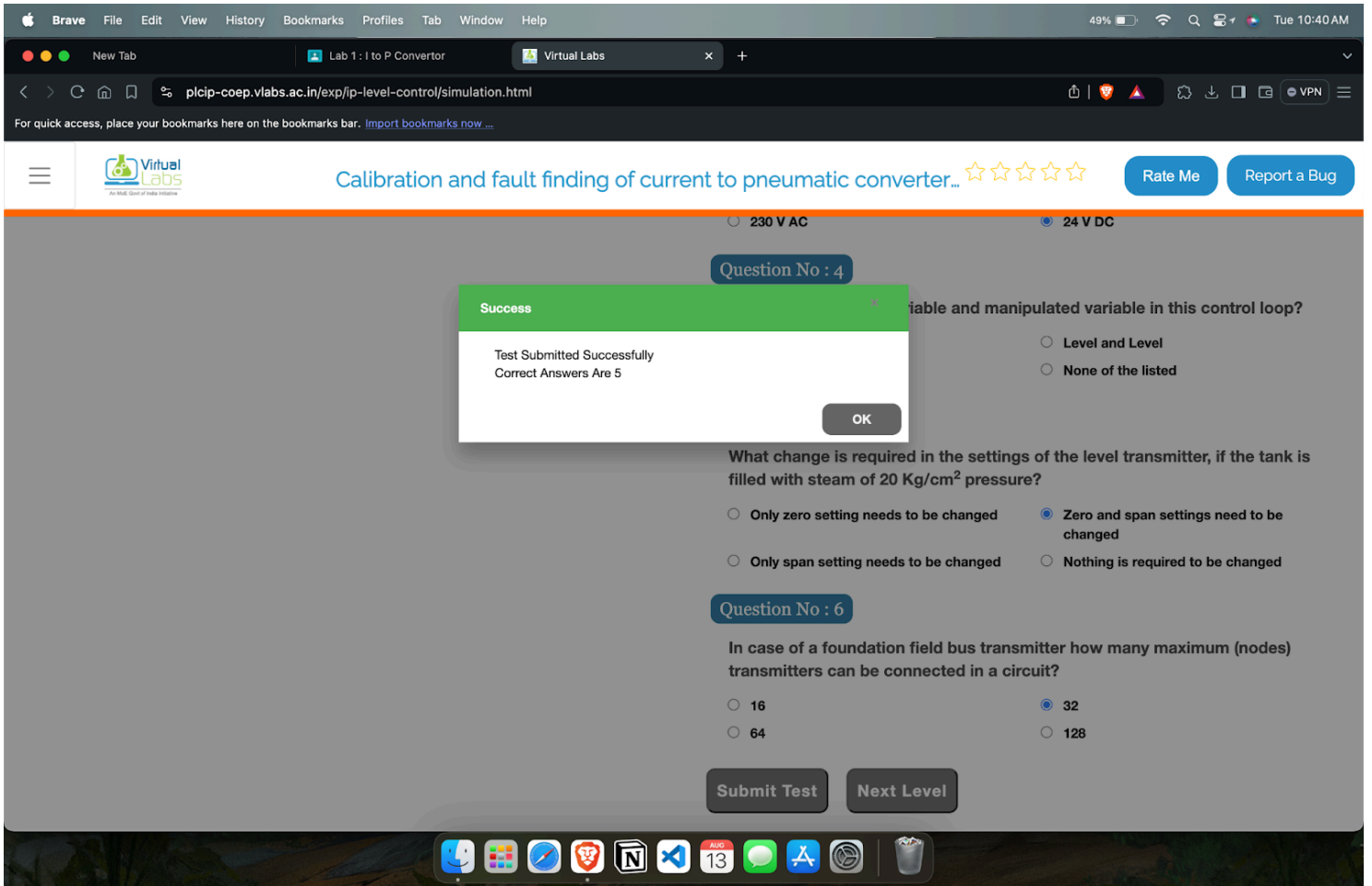
Sensitivity	0.1 %
Air supply	20 psi / 1.4 kg / cm ² ± 10 %
Power supply	240 V AC ± 10 % 50 Hz
Consumption	30 L/H typically

Procedure:

- 1) Switch on the compressor and let the pressure build up to 20 psi.
- 2) Vary the current in terms of percentage on the calibrated scale such as 0, 25, 50, 75 etc. notes down the corresponding pressure reading. Take five readings up to 100 on the calibrated scale.
- 3) Now gradually decrease the current from 100 % to 0% and again note down the pressure reading.
- 4) Plot the graph Pressure Vs Current for increasing as well as decreasing readings.
- 5) Calculate the % error and sensitivity.

Observations:

Sr. No.	Input Current mA	Expected Pressure Psi	Actual Pressure (Increasing) psi	Actual Pressure (Decreasing) psi	% Accuracy in terms of span
1.	4	3	0.402	0.2	-2.88
2.	8	6	0.209	0.4	-2.86
3.	12	9	0.81	0.6	-3.04
4.	16	12	1.008	0.8	2.52
5.	20	15	0.824	1	2.36



BraveFileEditViewHistoryBookmarksProfilesTabWindowHelp49% 10:40 AM

New TabLab 1: I to P ConvertorVirtual Labs

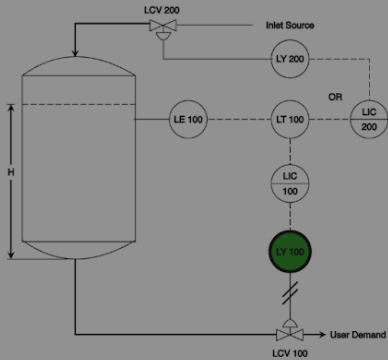
plcip-coep.vlabs.ac.in/exp/ip-level-control/simulation.html

For quick access, place your bookmarks here on the bookmarks bar. Import bookmarks now ...

Virtual Labs

Calibration and fault finding of current to pneumatic converter...☆☆☆☆☆

Rate MeReport a Bug



Level Control System

LY Configuration

In this level configure the LY 100

Success

Configuration is successful.
Please click next level to proceed for wiring of LY 100

OK

Direct Acting

20 mA

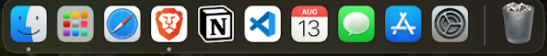
g/cm²

2 to 1 kg/cm²

Supply Voltage : 24 VDC

Loop Impedance : 165 Ohm

Check ConfigurationNext Level





In this level configure the LY 100

Check Configuration

Apple BraveFile Edit View History Bookmarks Profiles Tab Window Help48% 10:44 AM

New TabLab 1: I to P ConverterVirtual Labs


plcip-coep.vlabs.ac.in/exp/ip-level-control/simulation.html

For quick access, place your bookmarks here on the bookmarks bar. Import bookmarks now ...

Virtual Labs
An MIT, Govt of India Initiative

Calibration and fault finding of current to pneumatic converter...☆☆☆☆☆

Rate MeReport a Bug



COLLEGE OF ENGINEERING, PUNE

Calibration and fault finding of current to pneumatic converter

03:53

Library

Common Symbols

Power Supply

Configurator

Analog IN

250 Ohm

Analog OUT

FFT Card

Transmitter Symbols

2-Wire Transmitter

HART Transmitter

3-Wire Transmitter

4-Wire Transmitter

2-Wire Transmitter

HART Transmitter

3-Wire Transmitter

4-Wire Transmitter

HART Transmitter

Check Connection

Success

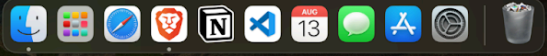
Correct Connection. Please click next level

OK

I/P Converter

LY 100

Analog OUT



Library

Common Symbols

- Power Supply
- Analog IN
- Analog OUT
- Configurator
- 250 Ohm
- FFT Card

Transmitter Symbols

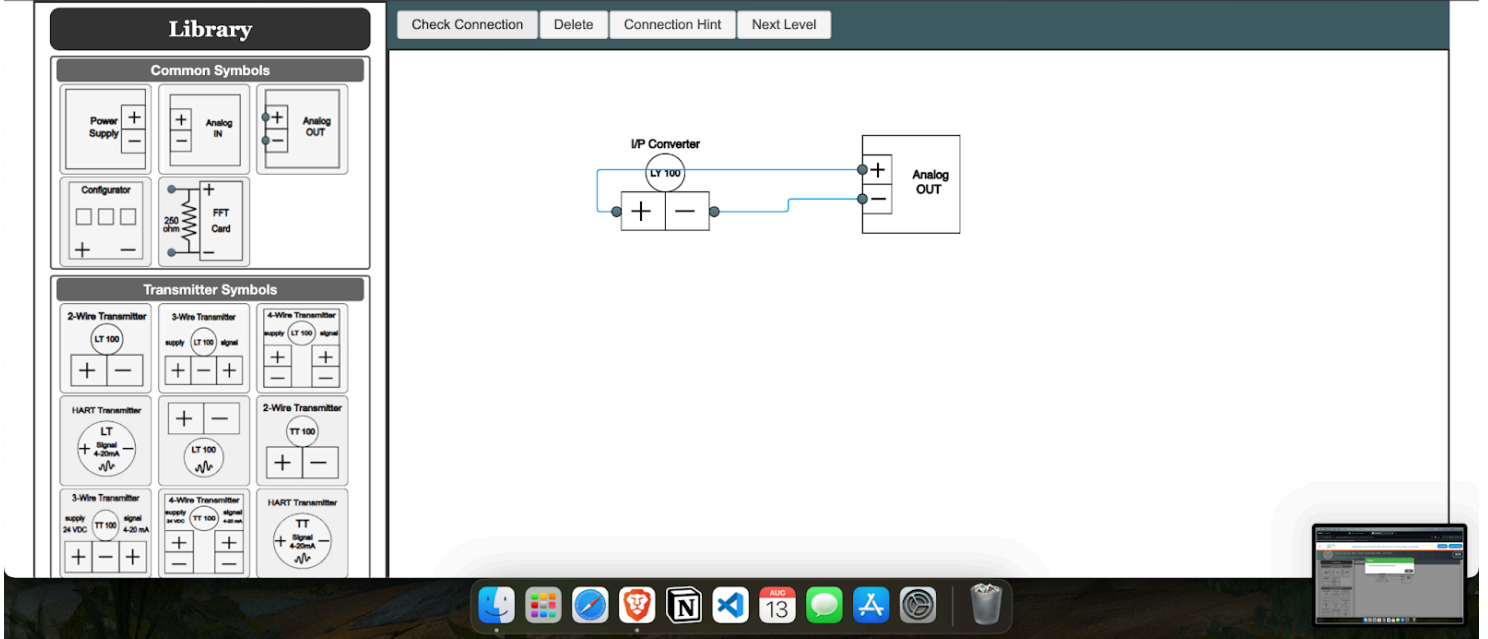
- 2-Wire Transmitter (LT 100)
- 3-Wire Transmitter (LT 100)
- 4-Wire Transmitter (LT 100)
- HART Transmitter (LT 100)
- 3-Wire Transmitter (TT 100)
- 4-Wire Transmitter (TT 100)
- HART Transmitter (TT 100)

I/P Converter

LY 100

Analog OUT

Check Connection Delete Connection Hint Next Level



Showing 16 to 17 of 17 entries

Previous 1 2 3 4 Next



Brave File Edit View History Bookmarks Profiles Tab Window Help 46% Tue 11:02 AM

New Tab Lab 1: I to P Converter Virtual Labs

plcip-coep.vlabs.ac.in/exp/ip-level-control/simulation.html

For quick access, place your bookmarks here on the bookmarks bar. Import bookmarks now ...

Virtual Labs An MIT, Govt of India Initiative

Calibration and fault finding of current to pneumatic converter... ☆☆☆☆☆

Rate Me Report a Bug

In this level characterize the LY 100

Supply pressure (1.4 kg/cm²)

Restriction

Signal pressure (0.2-1 kg/cm²)

4 (mA)

E shape Magnet

Damper

Nozzle

Flapper

Pivot

Spring

Soft iron plate

In this level calibrate the LY 100

Zero Error	Span Error	Linearity	Accuracy AVG(%)
0.202	-0.176	0.751	0.271

Level Control System (LY 100)

Output(kg /cm²)

Input(mA)

Standard Output Observed Output

Trial Version

Zero Adjusted Successfully!!!

Span Adjusted Successfully!!!

Linearity Algorithm 1

+

-

I/P converter

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