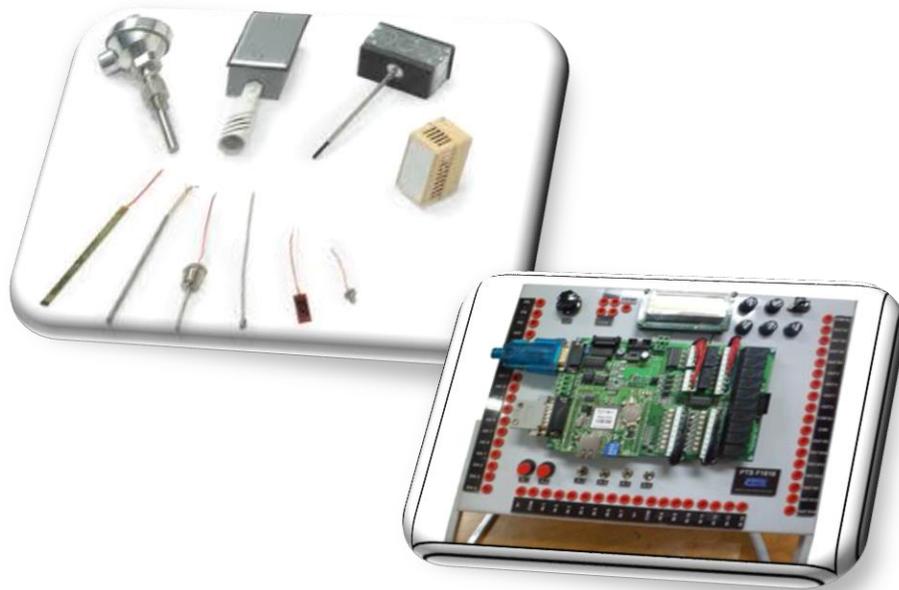


Instrumentation

Course Kit

Level 1



**Space Saving
Solution!**

Sensors and Instrumentation.

Everything changes and learning methodologies too. It has been proven that a student gets better education when he works with real materials instead of classes with just theoretical presentations or virtual labs.

Our methodology is theory and practice, where they both are combined immediately with real equipment, changing the learning process into a fun activity for the student.

All the necessary elements are available on the workspace, without the need of big or extra room, to understand the real concepts by making lab practices for transducers, measurement, metrology, calibration and control.

The course has been homologated with the curricula of several worldwide Universities!

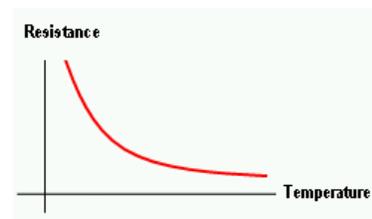
Our advantages?

- More advanced topics.
- More real practice labs.
- More applied instrumentation.
- More practice than theory
- Simulation for student's work at home.
- Less equipment on the work table
- Industrial solutions and not just educational.
- More learning levels.
- More number of real labs.
- Fully compatible with our mini plants.
- Less lab development time.
- Space saving solution.

What is included?

Our basic kit includes **CINCO (5)** units of each of the following devices:

- ✓ PTS F888. DAQ/Trainer for stand-alone operation and simulation.
- ✓ Thermistor sensor.
- ✓ K thermocouple sensor.
- ✓ PT100 /RTD sensor.
- ✓ 4-20mA transmitter (Tc y RTD).
- ✓ Low pressure sensor.
- ✓ Laser distance sensor.
- ✓ Peltier plate with heatsinks.
- ✓ Universal module.





Experiments which can be implemented (Some devices not included)

1. *Concepts of Measurements*
2. *Analog and Digital Meters*
3. *Principles of Metrology.*
4. *Norms and Symbols.*
5. *Concepts on instrumentation of industrial processes .*
6. *Industrial features of instruments.*
7. *Training Station PTS F888/1616*
8. *Software for data acquisition, control and simulation.*
9. *Instrumentation (Sensing, processing, indication, actuators and control)*
10. *AD and DA Conversion*
11. *Signal scaling and Indication*
12. *Variables of industrial processes.*
13. *Standard signals.*
14. *Discrete signal detection.*
15. *Instrumentation and control for Discrete Levels.*
16. *Instrumentation and control with ultrasonic sensors.*
17. *Instrumentation and control for analog height measurement.*
18. *Instrumentation and control for Distance.*
19. *Instrumentation and control for Temperature with Thermistor.*
20. *Instrumentation and control for Temperature with RTD.*
21. *Instrumentation and control for Temperature with Thermocouple.*
22. *Instrumentation and Control of Pressure.*
23. *Instrumentation and Control of Flow.*
24. *Instrumentation and Control of Weight.*
25. *Instrumentation and Control of Position (linear and angular).*
26. *Instrumentation and Control of Speed.*
27. *Instrumentation and Control of PH.*
28. *Instrumentation and Control of Actuators.*
29. *Control of on/off valves.*
30. *Control of proportional valves.*
31. *Control de DUTY CYCLE*
32. *Control with PWM.*
33. *Control of DC motors.*
34. *Control of AC motors.*
35. *Control of Thermocoolers.*
36. *Smart Transmitters.*
37. *Communications and Protocols.*
38. *Modbus Protocol.*
39. *Hart Protocol.*
40. *Smart sensors.*
41. *Wireless systems.*
42. *Telemetry and Telecontrol.*
43. *Safety on instrumentation.*
44. *Introduction to industrial processes*
45. *New technologies in instrumentation.*
46. *New Technologies. Plant design.*



About the learning process.

For short term courses (4 to 6 months), the learning process is highly improved. Because the included software allows simulation, and that it can be used by the student at home, he can make a pre-lab report before attending the practice session.

Once at the lab, the student uploads the control program to the PTS 888 Trainer and makes all types of connection to develop the operation on the subject with practical results.

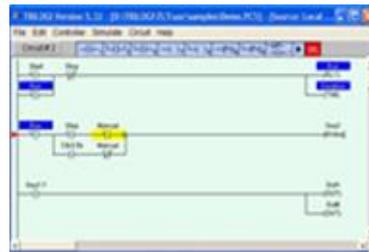
It is suggested that the professor performs an introduction of around 20 min on the subject. Then, the student will have the remaining time of the class to develop the whole experiment according to the lab course.

Basic devices in the Kit



PTSF888

Assorted Sensors



Programa/Simulation Software

Why use the Trainer PTS F888?

This instrumentation course uses the training station/ data acquisition system PTS F888, because of its powerful arsenal of features. Other solution would require a lot of control and measurement equipment and wiring.

The PTSF888 requires small space because of its vertical stand. It can be located near to the laptop or computer and there is no need for extra hardware since sensor mounting support, display and power supply are included.

For every experiment it's possible to acquire the signal, display the values, make modifications on the scaling to show either Celsius or Fahrenheit, error calculations, record data, perform math operations, control. The system can have stand-alone operation simulating the construction of a meter or control device.

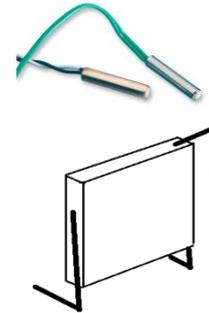
Some technical features.

1. **Ethernet port:** Imagine accessing the devices from any place in the world!
2. **Analog I/O:** 8 input channels (0-5V) and 2 output channels (0-5V) with 8 bits of resolution.
3. **Comm Ports:** Ethernet, RS 232, and RS 485. It's possible to send data via email and save files over the internet.. Easy user-to user (trainer to trainer) communication. Modbus/TCP Server (5 simultaneous connections) y Modbus/TCP Client. Direct connection to LAN or Internet for programming, supervision or remote control. The serial ports support: MODBUS RTU, MODBUS ASCII, OMRON C20H Host Link protocols.
4. **LCD Display.** Two lines x 16 characters for easy visualization of application, data control, meters, work on resolution, accuracy, etc.
5. **Power supply** included. The trainer has its own power supply
6. **Multifunction Digital Outputs.** 8 outputs available on strip connectors. Outputs 1-4 and 9-10 are relay outputs with 5 amps capacity. Outputs 5-8 can be used as normal DC (npn) outputs, PWM or like Dimmer by changing the trigger angle of external Triacs or SCRs. The outputs can also drive unipolar steppers motors (4 wires) o dos unidades de motor paso a paso (pulso y dirección).Ideal para control de movimiento.
7. **Multifunction Digital Inputs.** 8 DC inputs (NPN o PNP) available on the lower connector. The two first inputs are assigned to the pushbuttons; the other 4 are toggle switches for control or simulation of digital inputs. Additionally, inputs to 6 are high speed inputs for connection to quadrature encoders. Inputs 7-8 are normal digital inputs.
8. **Clock/Calendar, Back-up battery.** Real time clock/calendar (Year, Day, Month, Hour, Min, Sec) - Battery CR1632 for backup (5 years with external power supply and 10years if its turned off half of the time). The real time clock can be synchronized to atomic watch NIST if the PLC is connected to internet.
9. **Potentiometer.** With knob and precisión power supply for setting of analog values which is useful to simulate or control analog variables.

Lab examples

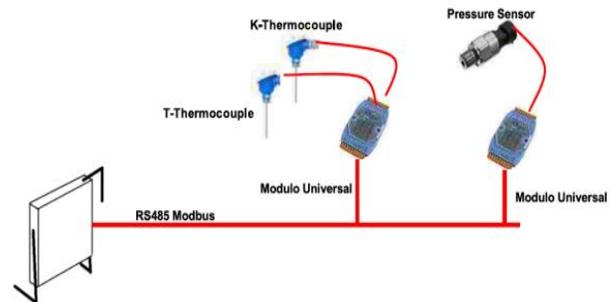
The Thermistor

- 1) Principles of operation.
- 2) Applications. Measuring of temperature with thermistors.
- 3) Circuit and connection of a thermistor
- 4) Temperature curve and connection to the Trainer.
- 5) Acquiring and saving temperature data
- 6) Accuracy, precision, resolution, range, response time.
- 7) Temperature control with a thermistor.
- 8) Temperature limits and alarms



Telemetry and Telecontrol (Advanced)

- 1) Modbus Protocol
- 2) Universal Module.
- 3) Networking and DAQ
- 4) Standard signals and transmitters
- 5) Remote measurement and saving of variables
- 6) Algorithms and Control actions.
- 7) SCADA



This lab, more advanced, Works on telemetry, communications, protocols, sensors, measurement, metrology, transmitters, etc.



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