

## Practice of instrumentation and process control PIPC - 70 hours over 10 days



### Objectif

> Attendees will acquire the base theory of operation of each component of a control loop, namely measuring instruments, control valves, and P.I.D. digital controllers;  
> They will learn how to install, connect, set, tune, maintain and troubleshoot them.

### Public

Operation and Maintenance Technicians and Engineers, who are new to instrumentation and process control principles, or who wish to be "cross trained".

### Prérequis

Knowledge of basic mathematical concepts and physical laws, although not required, would be helpful.

### Methode pédagogique

> The course provides valuable information via lectures on theoretical concepts, backed-up by direct hands-on training in fully equipped classrooms.  
> More than 50% of the time is dedicated to actually working on various industrial instruments and genuine process control loops.

### Participants

Mini : 2 - Maxi : 10

### Niveau acquis en fin de stage :

Fondamentaux

### Prix HT

3230 €

### Horaire

monday 9 a.m. to friday 5 p.m.

### Votre formateur :

Philippe Trichet

### INSTRUMENTATION - WEEK 1

#### INTRODUCTION (4 h)

> Structure of a basic feedback control loop.  
> P&ID's drawing standards.  
> Basic electricity, 4 - 20 mA loop.

#### INDUSTRIAL MEASUREMENT (12 h)

> Pressure : concept, different pressure types, units, sensors, analog electronic and smart transmitters, installation and calibration, pressure switch.  
> Level : indicator, hydrostatic head, capacitive, ultrasonic, nuclear, radar, float, buoyancy, resistive, mechanical type, vibrating blades, rotating paddle.  
> Flow : differential pressure, rotameter, electromagnetic, ultrasonic, turbine, vortex, rotary, Coriolis, thermal, flow indicator and switch.  
> Temperature : thermocouple, resistance temperature detector (RTD), infrared radiation pyrometer.

#### CONTROL VALVES (4 h)

> Theory of operation, bodies, trim, actuators, flow characteristics, sizing, cavitation, shutoff pressure, leak tightness, calibration, positioners.  
> Different valve types

#### HANDS - ON TRAINING - WEEK 1 (18 h)

> Installing, wiring, setting, checking and troubleshooting various industrial measuring instruments, control valves and positioners.  
> Designing and building a complete feedback control loop.

### PROCESS CONTROL - WEEK 2

#### PID CONTROLLER (8h)

> P.I.D. control actions.  
> Controller structures.  
> Controller operating modes.  
> Stable and unstable process response.  
> Tuning (trial and error, IRA method...).  
> Controller complementary functions.

#### PARTICULAR CONTROL ARRANGEMENTS (4 h)

> Cascade control.  
> Feedforward control.  
> Override, split-range and ratio control.  
> On/off control.

#### DCS AND PLC CONTROL CAPABILITIES (1 h)

> Function blocks to be found in DCSs and PLCs.  
> Examples of control strategy programming.

#### CONTROL LOOP TROUBLESHOOTING (1 h)

> How to check if a PID controller works properly.  
> Diagnosis of process variable continuous cycling, and of permanent error between process variable and set point.

#### HANDS ON TRAINING - WEEK 2 (18 h)

> Wiring, setting and checking digital controllers.  
> Tuning P.I.D. control loops on simulated processes.  
> Tuning and troubleshooting P.I.D. control loops on genuine heat exchangers and other processes.

### Sessions du stage

Lieux	Jan	Fév	Mar	Avr	Mai	Jui	Jui	Aou	Sep	Oct	Nov	Déc
Arles	...	...	...	...	...	...	...	...	...	...	1-5 & 8-12	...