CHEMICAL ENGINEERING DESIGN & SAFETY

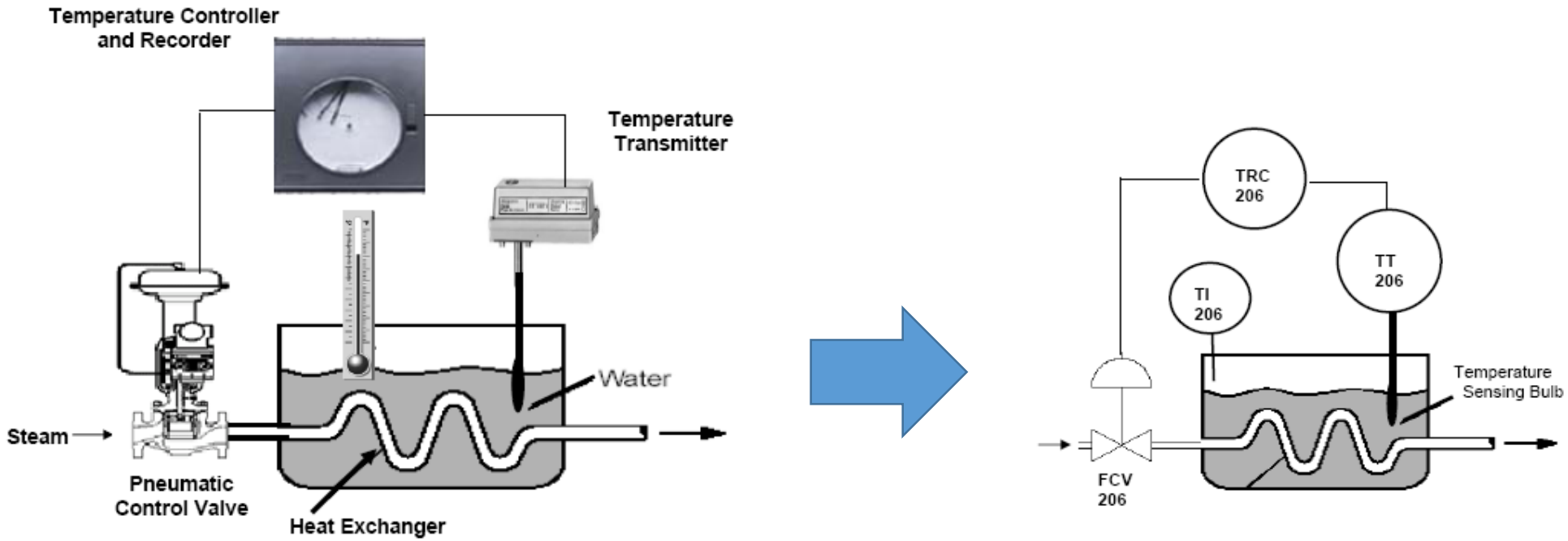
CHE 4253

Prof. Miguel Bagajewicz

Piping and Instrument Diagrams (PID)

Piping & Instrument Diagrams

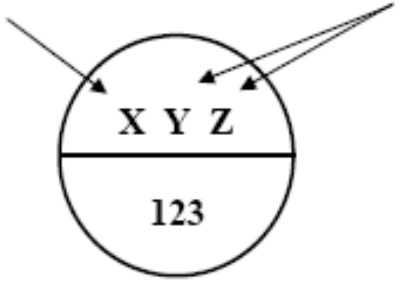
- Show ALL piping connecting equipment
- Show ALL valves
- Show ALL instrumentation (measuring, transmitters, Controllers, actuators)



Piping & Instrument Diagrams

*The first letter is used to designate the **measured variable***

*The succeeding letter(s) are used to designate the **function** of the component, or to **modify** the meaning of the first letter.*



Pressure

Level

Flow

Temperature

Indicator

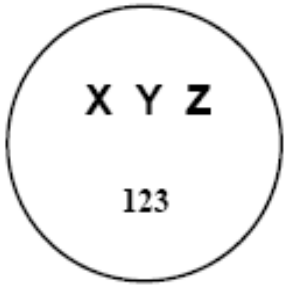
Recorder

Controller

Transmitter

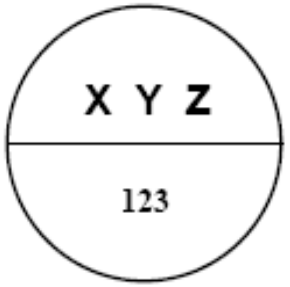
Piping & Instrument Diagrams

The presence or absence of a line determines the location of the physical device. For example ***no line*** *means the instrument is installed in the field near the process.*



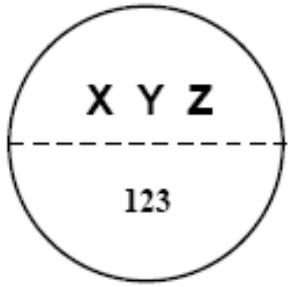
No Line

The instrument is mounted in the field near the process, (close to the operator)



Solid Line

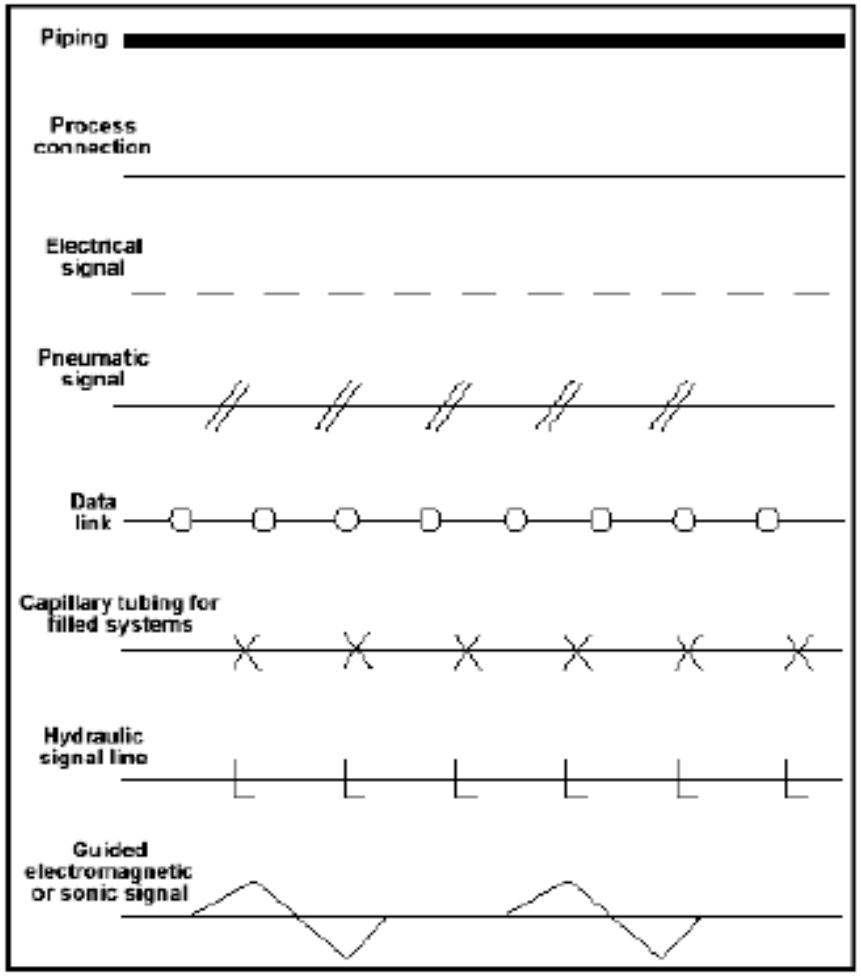
The instrument is mounted in the control room (accessible to the operator)



No Line

The instrument is mounted out of sight (not accessible to the operator)

Piping & Instrument Diagrams

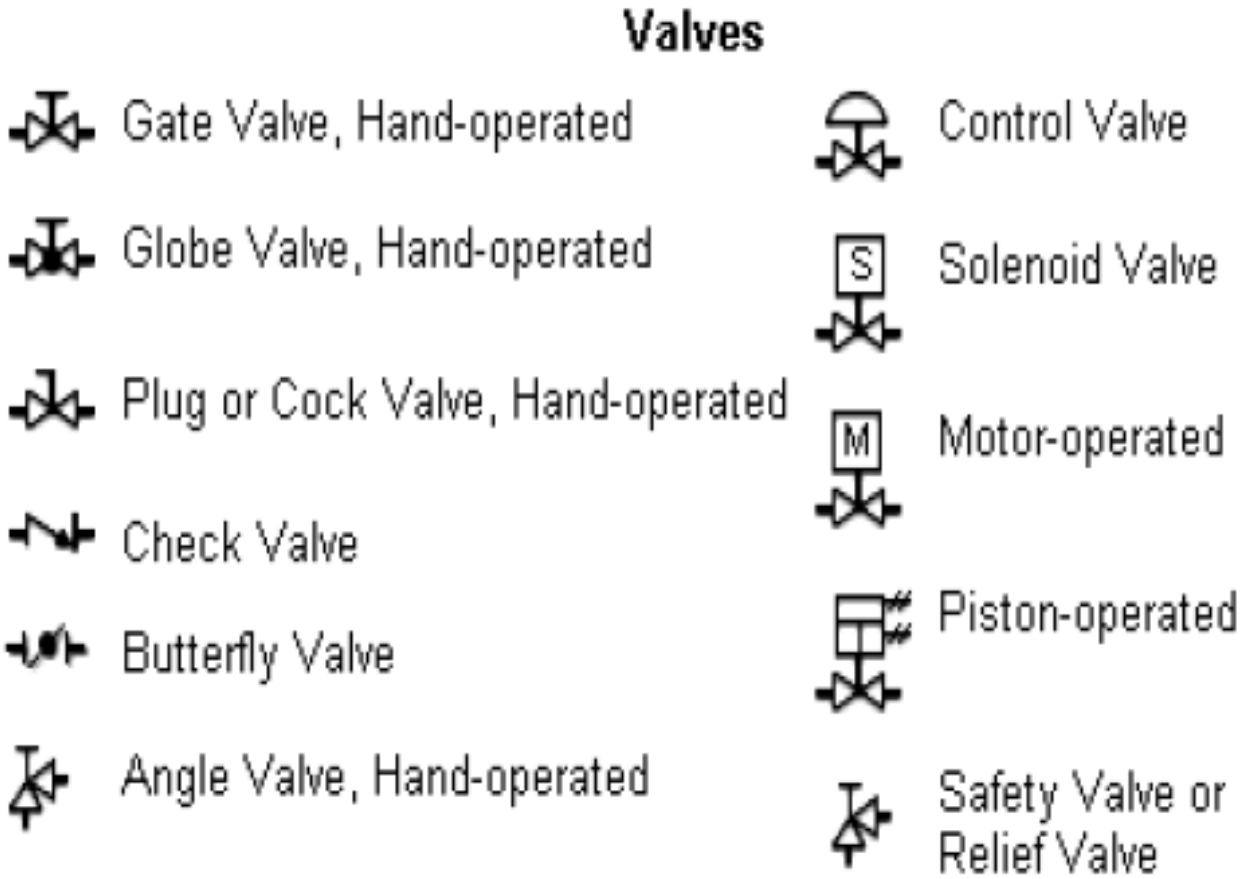


Piping and Connection Symbols

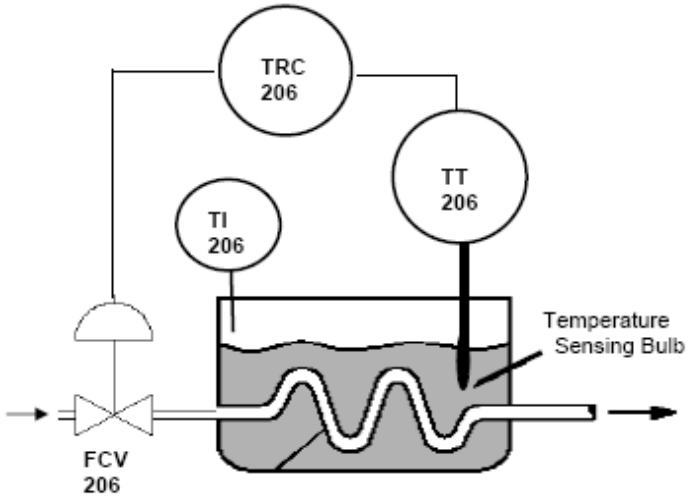
These symbols are used to identify how the instruments in the process connect to each other.

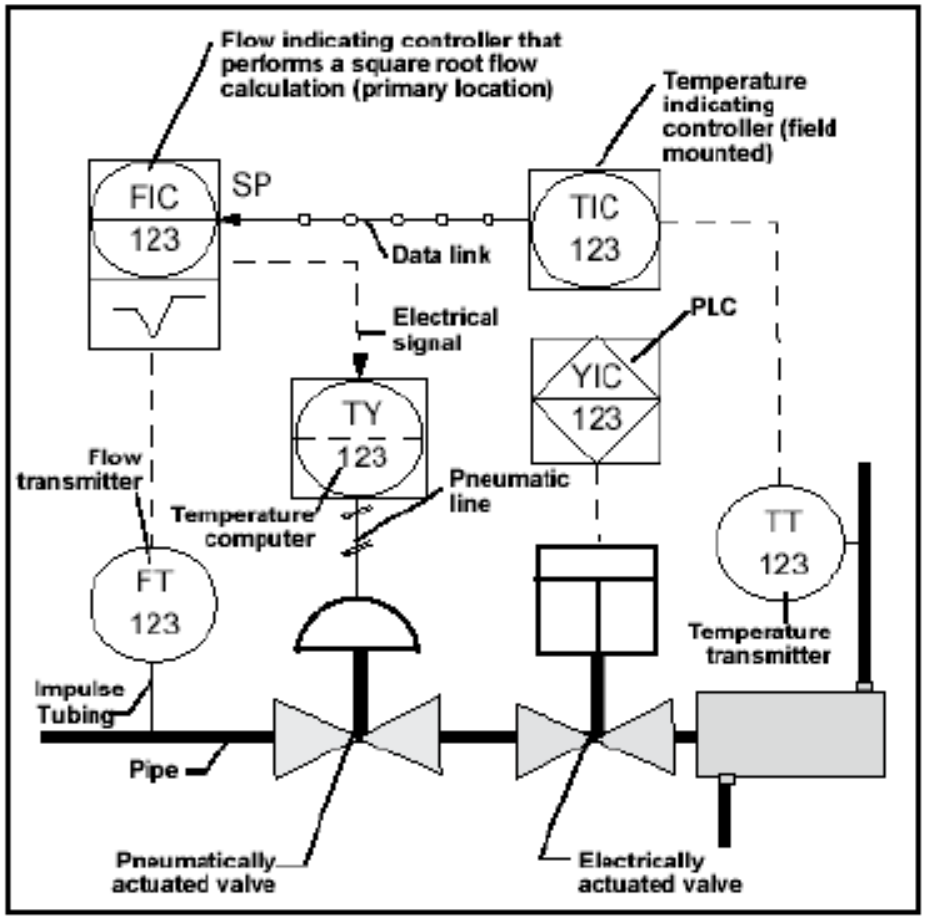
And what type of signal is being used. (electrical, pneumatic, data, etc)

Piping & Instrument Diagrams



Piping & Instrument Diagrams





FIC –
Flow Indicating Controller

TIC
Temperature Indicating Cont.

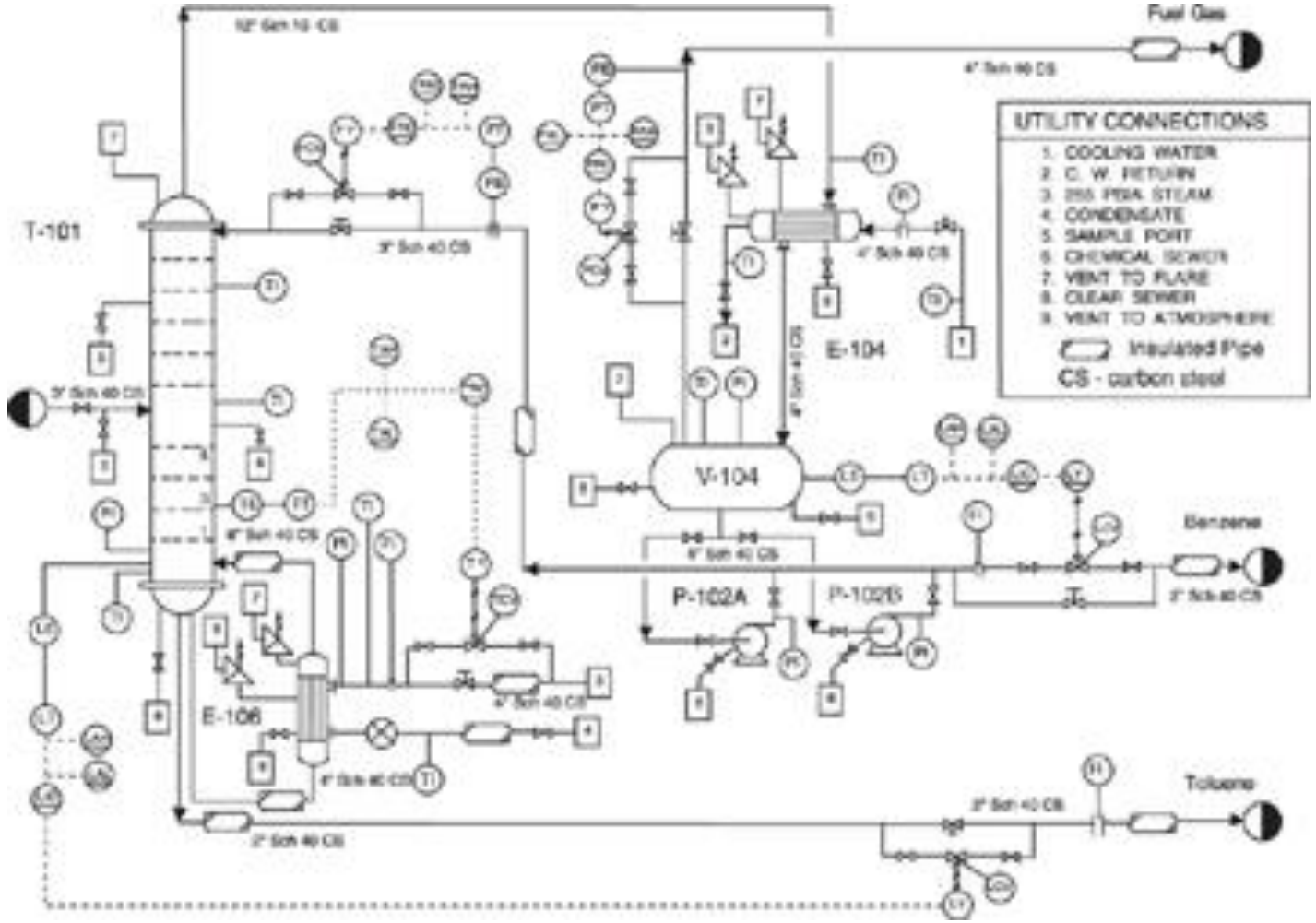
YIC
PLC Indicating Controller

TY
Temperature Computer Output

FT
Flow Transmitter

TT
Temperature Transmitter

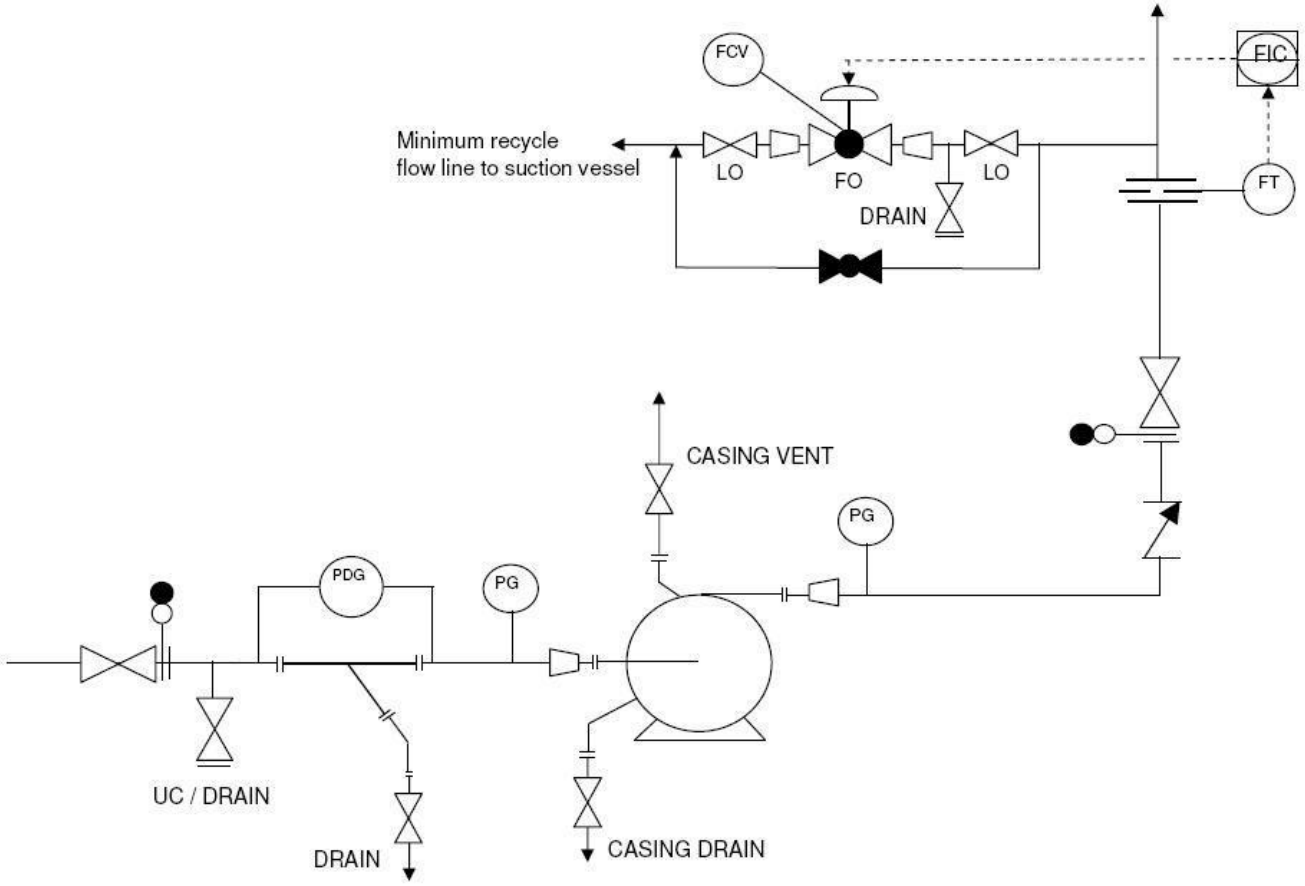
Piping & Instrument Diagrams



Piping and Instrumentation Diagram for Benzene Distillation (adapted from Kauffman, D., *Flow Sheets and Diagrams*

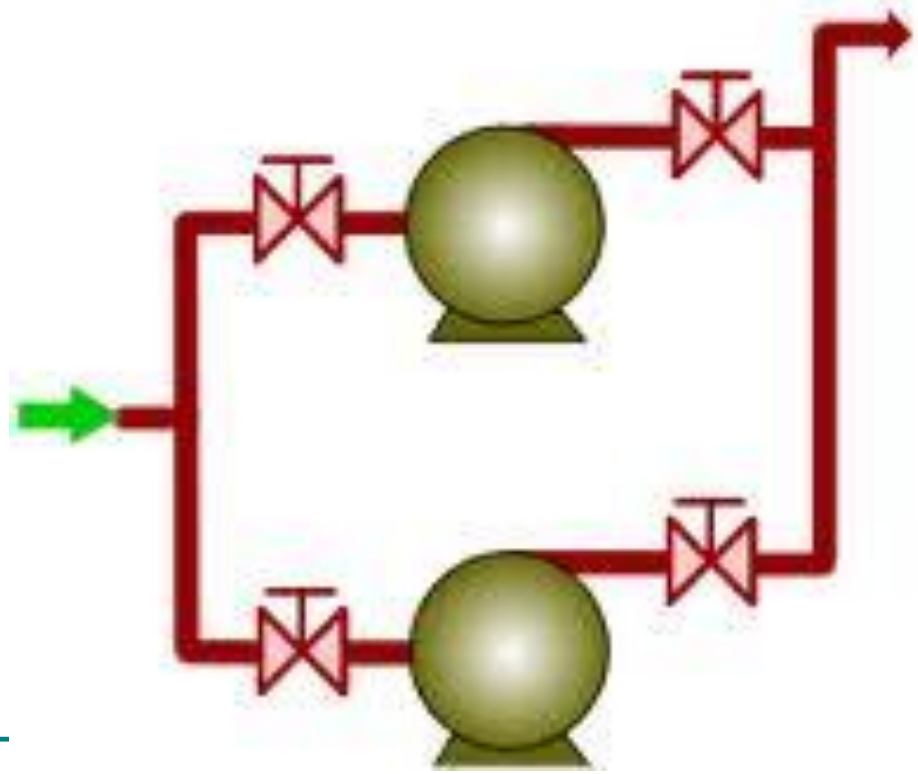
Piping & Instrument Diagrams

Control valves need spares



Piping & Instrument Diagrams

Pumps need a spare with all the necessary by-passes/on-off valves and check valves needed.



Piping & Instrument Diagrams

If heat exchangers are to be cleaned while plant is in operation then they need a by pass and all on-off valves needed.