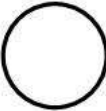
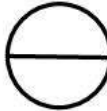
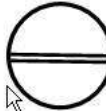
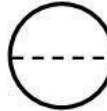
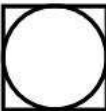
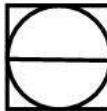
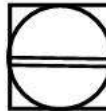
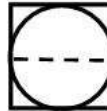

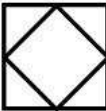
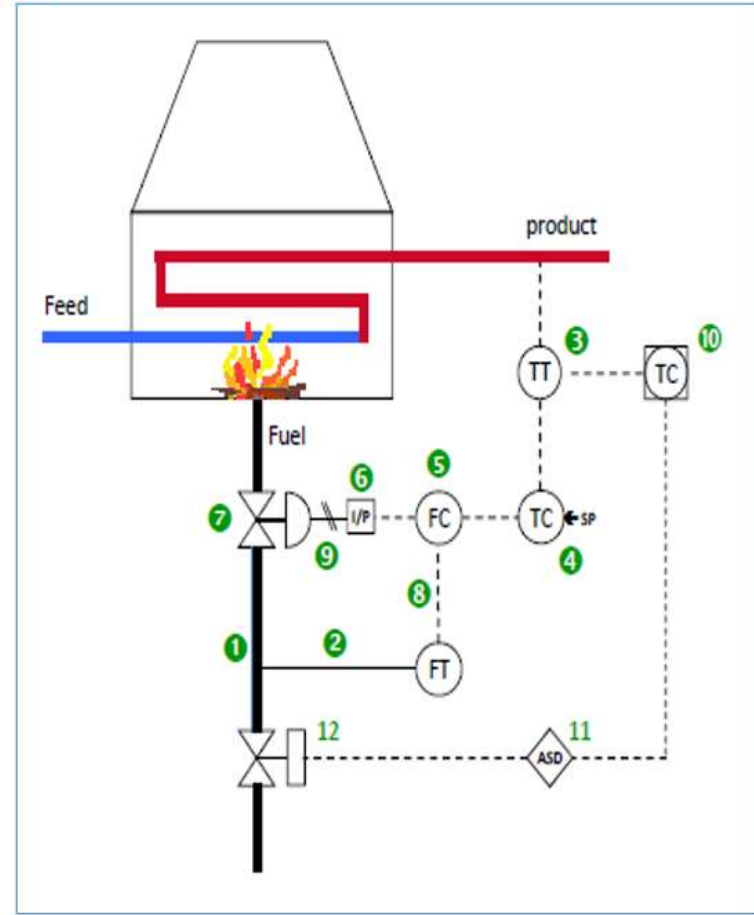
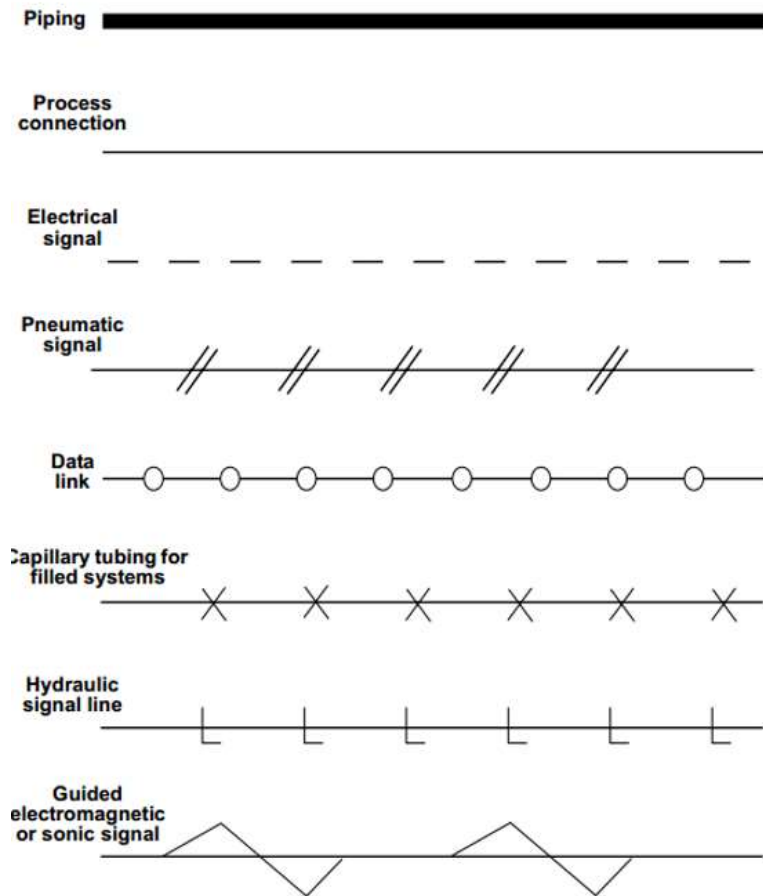


**CEN4415
PROCESS DESIGN I**

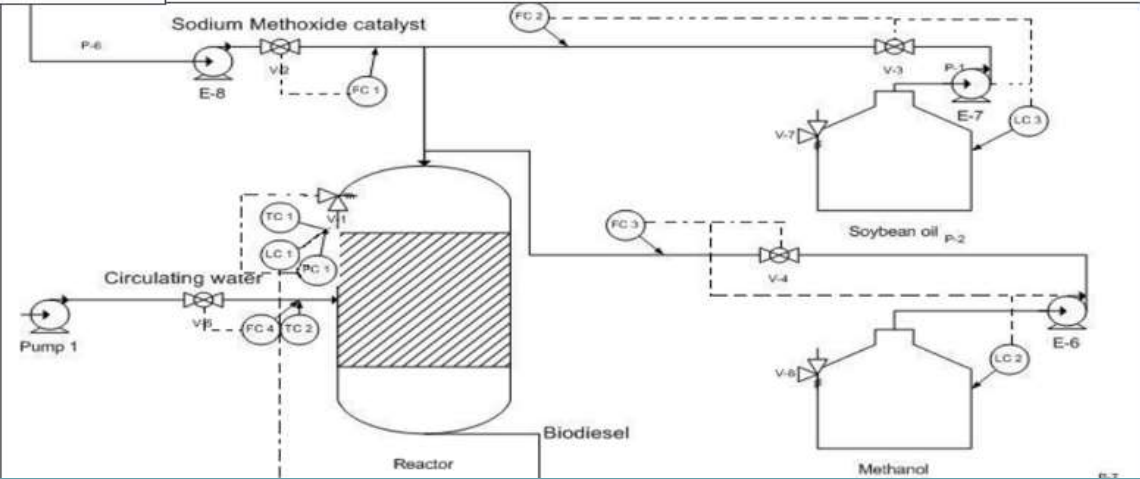
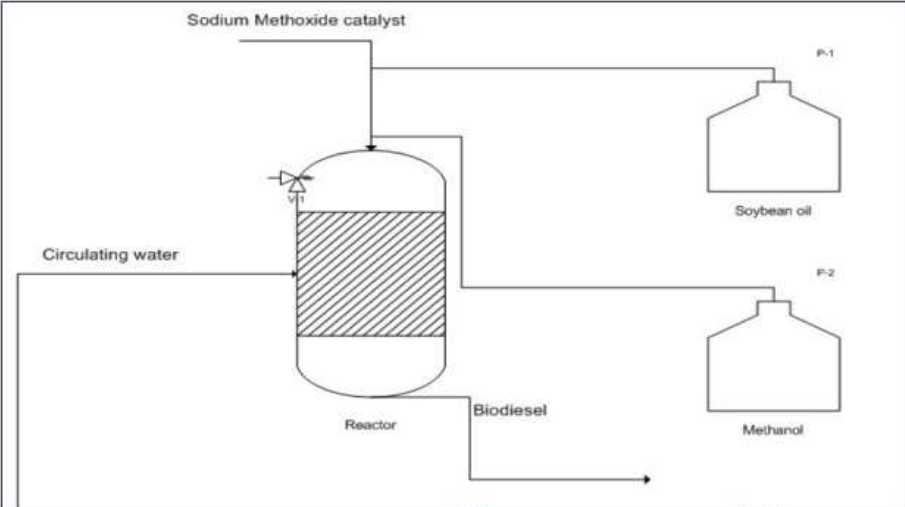
Instrumentation and Control Symbols

Where → What ↓	In the Field Locally Mounted	On a Main Panel or Screen	On a Subpanel Or Remote Location	Inaccessible, Hidden or Back/Inside Panel
Instruments & Devices				
Graphics on a Computer Screen				
Computer Functions (Seldom Used)				
PLC/DCS Functions (Seldom Used)				

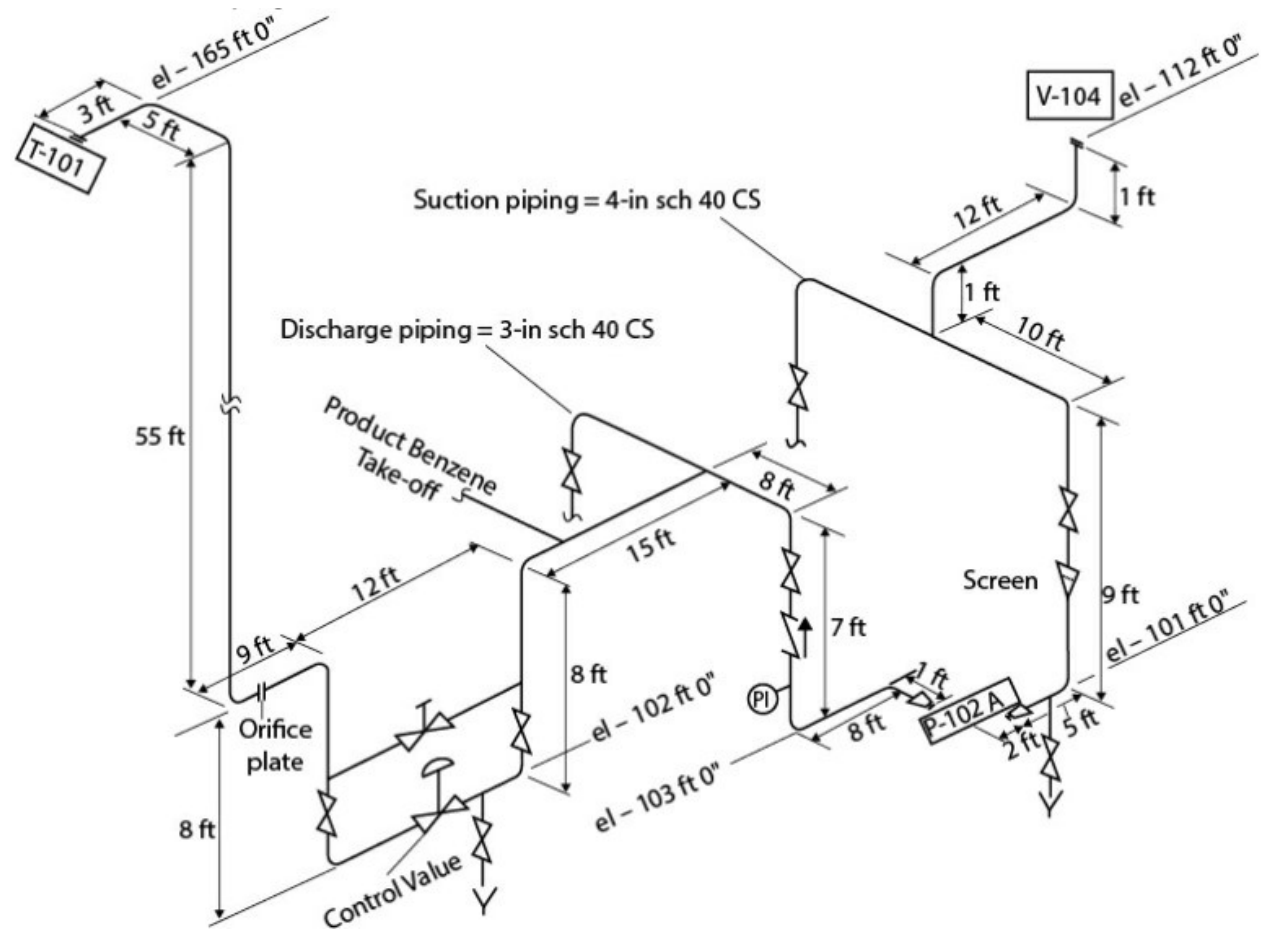
Piping Connection Symbols



From Process Flow Sheet to P&ID



Piping Isometrics

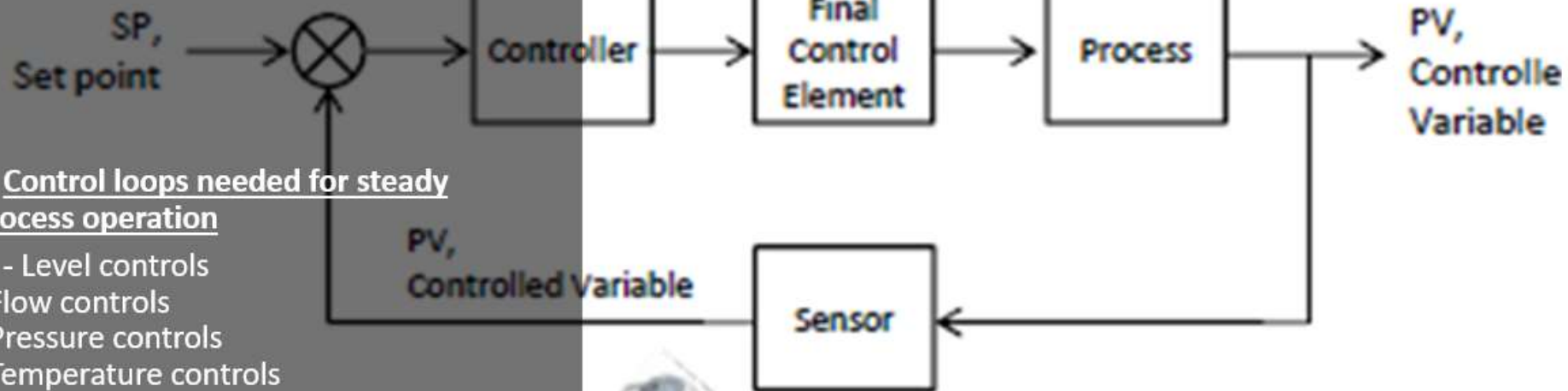


CONTROL & INSTRUMENTATION

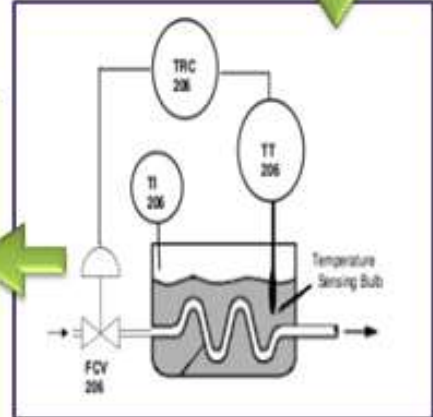
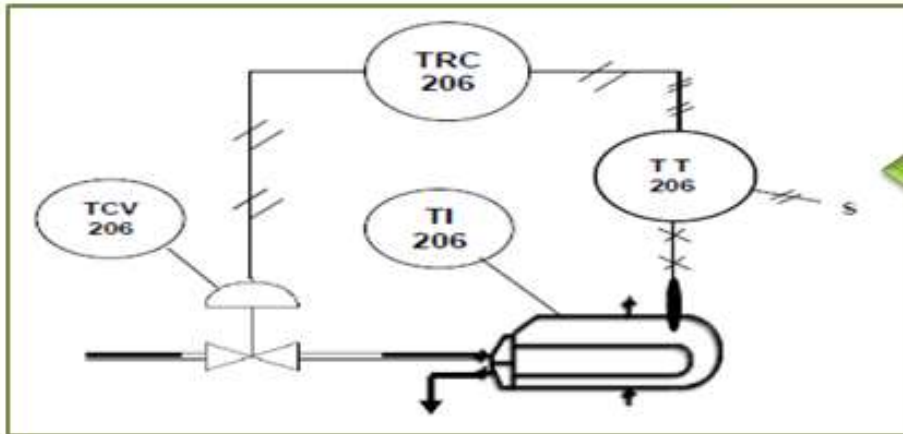
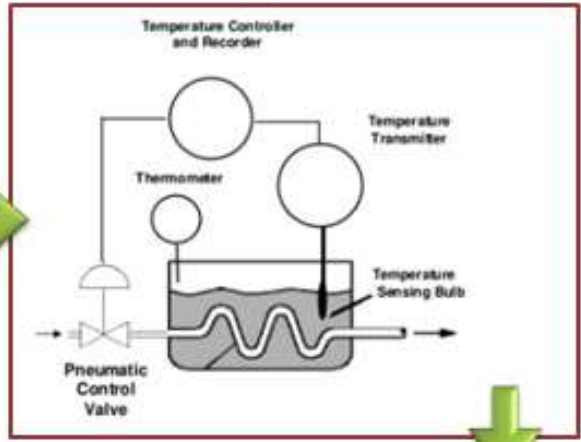
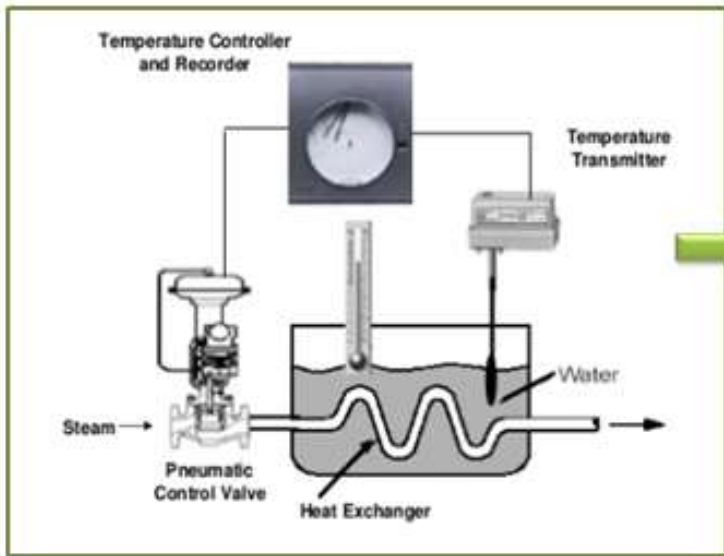
- Instruments are provided to monitor the *key process variable* during plant operation.
- They may be incorporated in **automatic** control loops, or used for **manual** monitoring of the process operation.
- It is desirable that the *process variable* that is to be monitored should be measured **directly**; however, this is often **impractical** and some *dependent variable* that is **easier** to measure is monitored in its place.

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AUTOMATIC CONTROL SCHEMES in P&IDs



- Control loops needed for steady process operation
- - Level controls
- Flow controls
- Pressure controls
- Temperature controls



REFERENCES

1. Sinnott, R.K. 1999, *Coulson's & Richardson's Chemical Engineering, Volume 6, Chemical Engineering Design*, ButterWorth Heinemann, Oxford.
2. Turton R., Bailie R.C., Whitin W.C., Shaeiwitz J.A. 1998, *Analysis, Synthesis and Design of Chemical Processes*, Prentice Hall, New Jersey.