Piping & Instrument Diagrams
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- 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

X Y Z

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
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)
Some instruments are part of a Distributed Control System (DCS) where a specific controller or indicator can be selected from many others but shown in one location (like a terminal screen).
Piping & Instrument Diagrams

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)
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Valves
- Gate Valve, Hand-operated
- Globe Valve, Hand-operated
- Plug or Cock Valve, Hand-operated
- Check Valve
- Butterfly Valve
- Angle Valve, Hand-operated

Control Valve
Solenoid Valve
Motor-operated
Piston-operated
Safety Valve or Relief Valve
Piping & Instrument Diagrams

FIC – Flow Indicating Controller
TIC – Temperature Indicating Controller
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 bypass/on-off valves and check valves needed.
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If heat exchangers are to be cleaned while plant is in operation then they need a by pass and all on-off valves needed.