# Control System Documentation

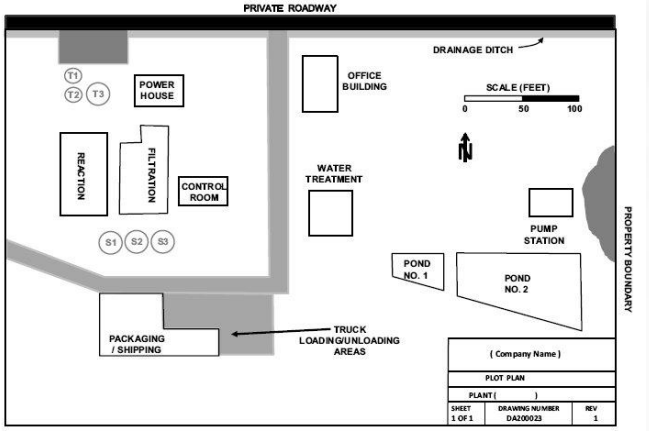


Figure 7-1. Plot Plan

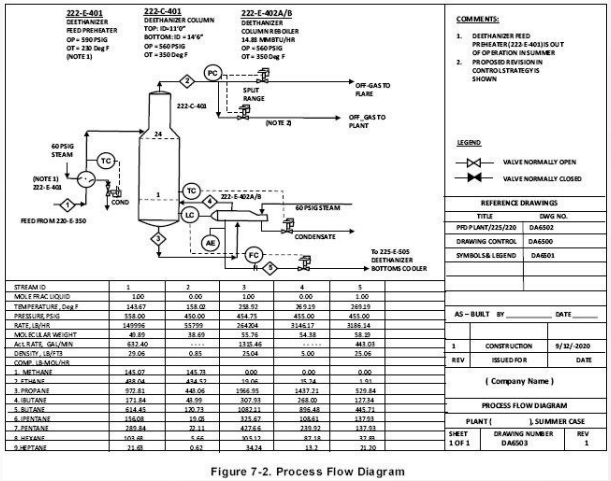


Figure 7-2. Process Flow Diagram

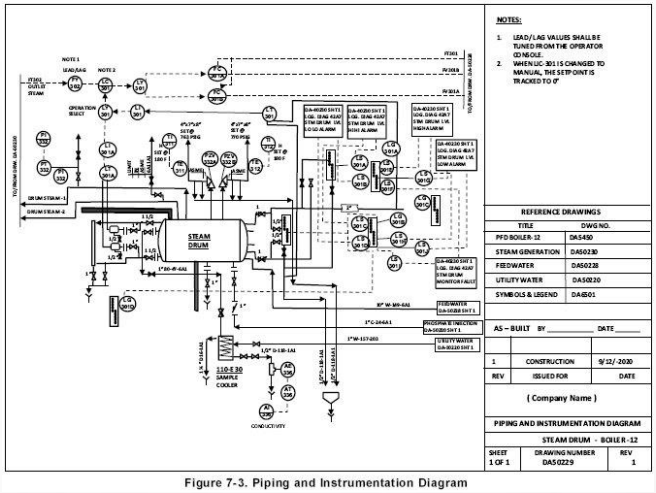


Figure 7-3. Piping and Instrumentation Diagram

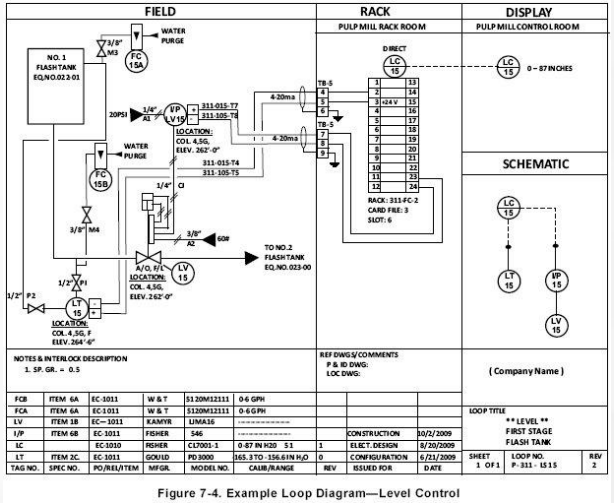


Figure 7-4. Example Loop Diagram—Level Control

- Documentation that is typically generated for a control system installation are addressed.
- The purpose of each document is explained.
- Reference provided to ISA-5.4 standard for Instrument Loop Diagrams

# Tag Convention – ISA S5.1

TYPICAL TAG NUMBER

TIC 103 - Instrument Identification or Tag Number
T 103 - Loop Identifier
103 - Loop Number
TIC - Function Identification
T - First-letter
IC - Succeeding-Letters

EXPANDED TAG NUMBER

10-PAH-5A - Tag Number
10 - Optional Prefix
A - Optional Suffix

**ISA S5.1 Tag Number Convention**

| | First Letters | | Succeeding Letters | | |
|---|---|---|---|---|---|
| | Measured/Initiating Variable | Variable Modifier | Readout/Passive Function | Output/Active Function | Function Modifier |
| A | Analysis | | Alarm | | |
| B | Burner, Combustion | | User's Choice | User's Choice | User's Choice |
| C | User's Choice | | | Control | Close |
| D | User's Choice | Difference, Differential | | | Deviation |
| E | Voltage | | Sensor, Primary Element | | |
| F | Flow, Flow Rate | Ratio | | | |
| G | User's Choice | | Glass, Gauge, Viewing Device | | |
| H | Hand | | | | High |
| I | Current | | Indicate | | |
| J | Power | Scan | | | |
| K | Time, Schedule | Time Rate of Change | | Control Station | |
| L | Level | | Light | | Low |
| M | User's Choice | | | | Middle, Intermediate |
| N | User's Choice | | User's Choice | User's Choice | User's Choice |
| O | User's Choice | | Orifice, Restriction | | Open |
| P | Pressure | | Point (Test Connection) | | |
| Q | Quantity | Integrate, Totalize | Integrate, Totalize | | |
| R | Radiation | | Record | | Run |
| S | Speed, Frequency | Safety | | Switch | Stop |
| T | Temperature | | | Transmit | |
| U | Multivariable | | Multifunction | Multifunction | |
| V | Vibration, Mechanical Analysis | | | Valve, Damper, Louver | |
| W | Weight, Force | | Well, Probe | | |
| X | Unclassified | X-axis | Accessory Devices, Unclassified | Unclassified | Unclassified |
| Y | Event, State, Presence | Y-axis | | Auxiliary Devices, | |
| Z | Position, Dimension | Z-axis, Safety Instrumented System | | Driver, Actuator, Unclassified final control element | |

Figure 7-9. ISA-5.1 Identification Letters

# Representation of Signals and Instruments

- Instrument supply or connection to process
- Pneumatic Signal
- Electric Variable or Binary
- Communication Link

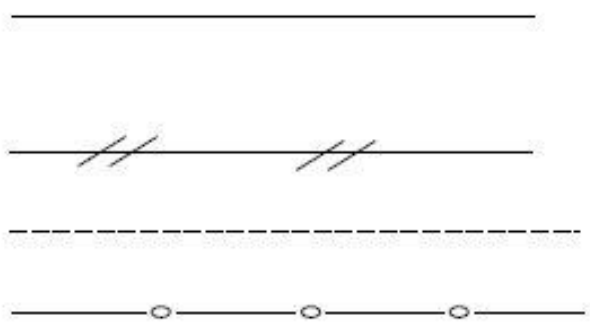

Figure 7-10. Excerpt from ISA-5.1 Instrument Line Symbols

Discrete Instrument, field mounted

Discrete instrument, accessible to operator

Visible on video Display

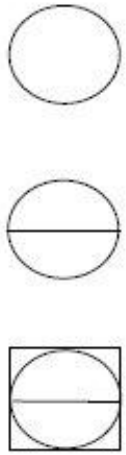

Figure 7-11. Excerpt from ISA-5.1 General Instrumentation or Symbol Function

# Symbols for Field devices and Elements

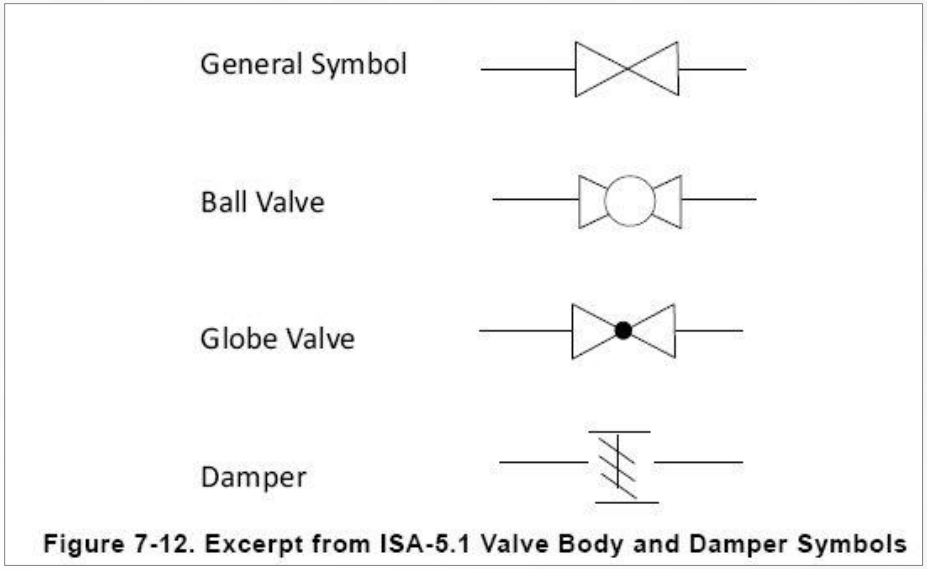


**Figure 7-12. Excerpt from ISA-5.1 Valve Body and Damper Symbols**

- Generic actuator, Spring-diaphragm
- Spring-diaphragm with positioner
- Linear piston actuator with positioner
- Rotary motor operated actuator
- Solenoid actuator for on-off valve


**Figure 7-13. Excerpt from ISA-5.1 Actuator Symbols**

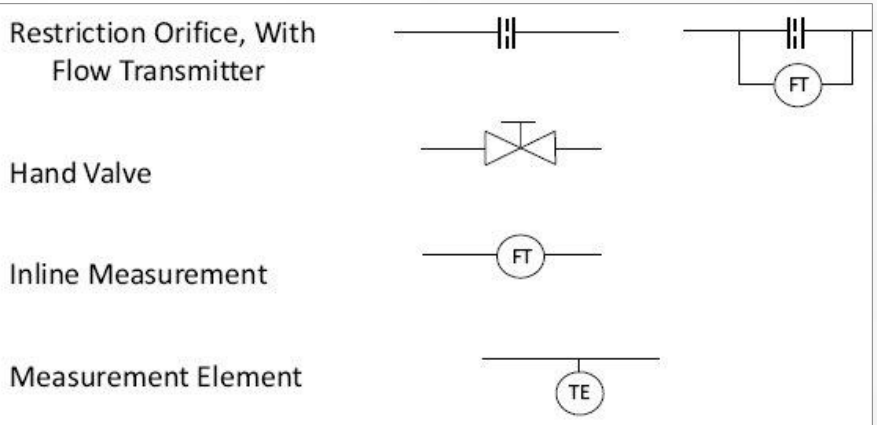


**Figure 7-14. Excerpt from ISA-5.1 Symbols for Other Devices**

# Process Symbols

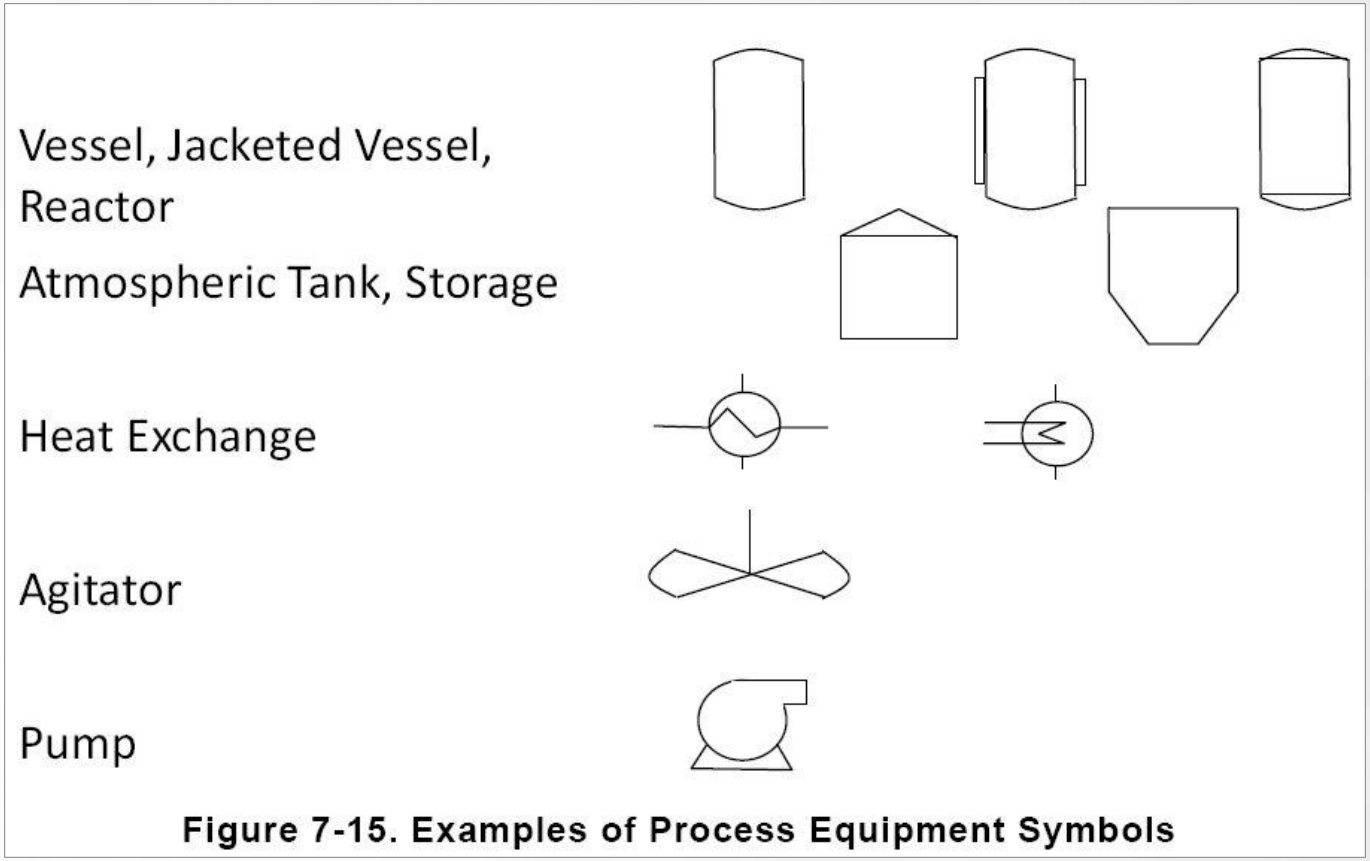


**Figure 7-15. Examples of Process Equipment Symbols**

# Symbol Example – P&ID Drawing

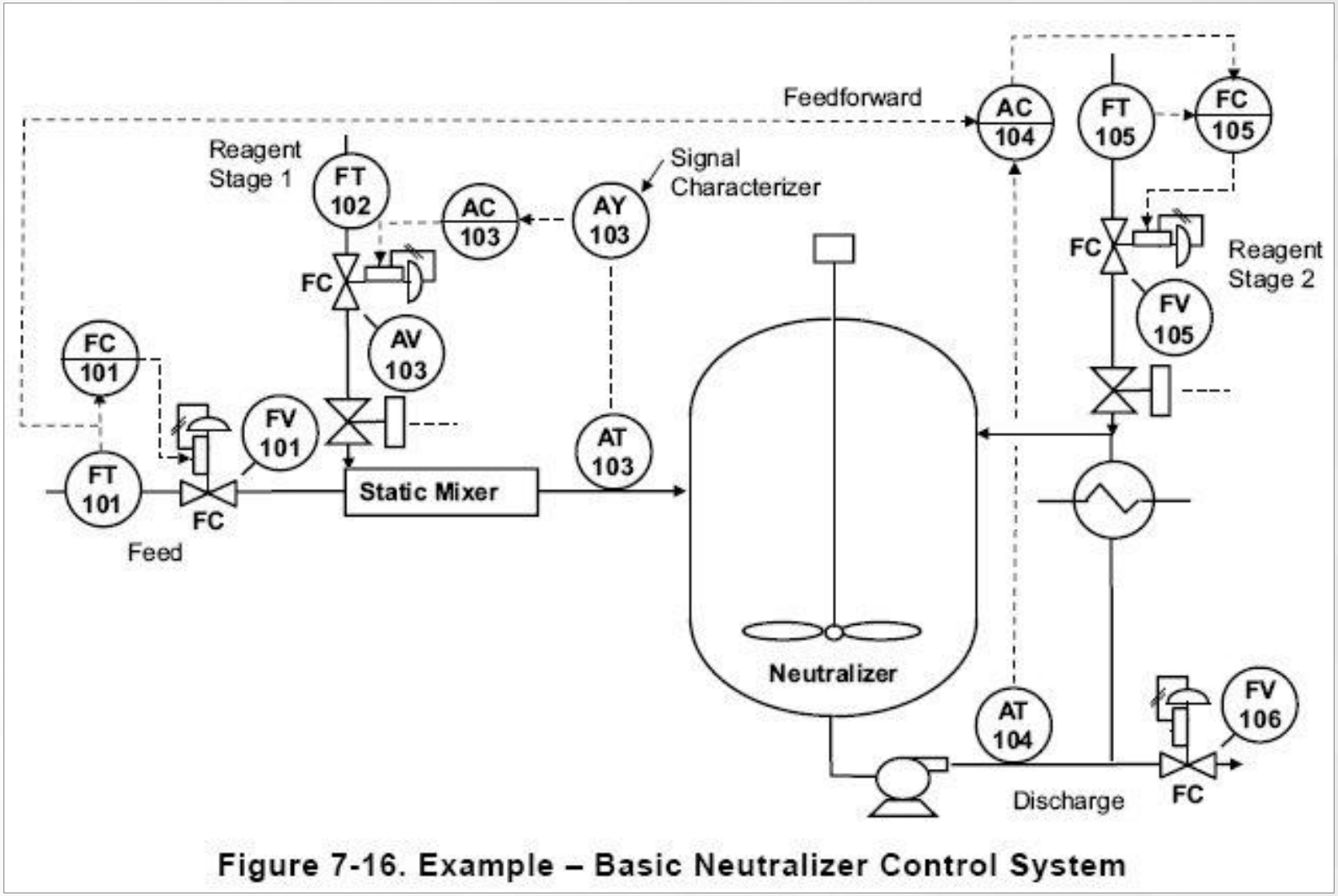


Figure 7-16. Example – Basic Neutralizer Control System

# Symbol Example(Cont.)

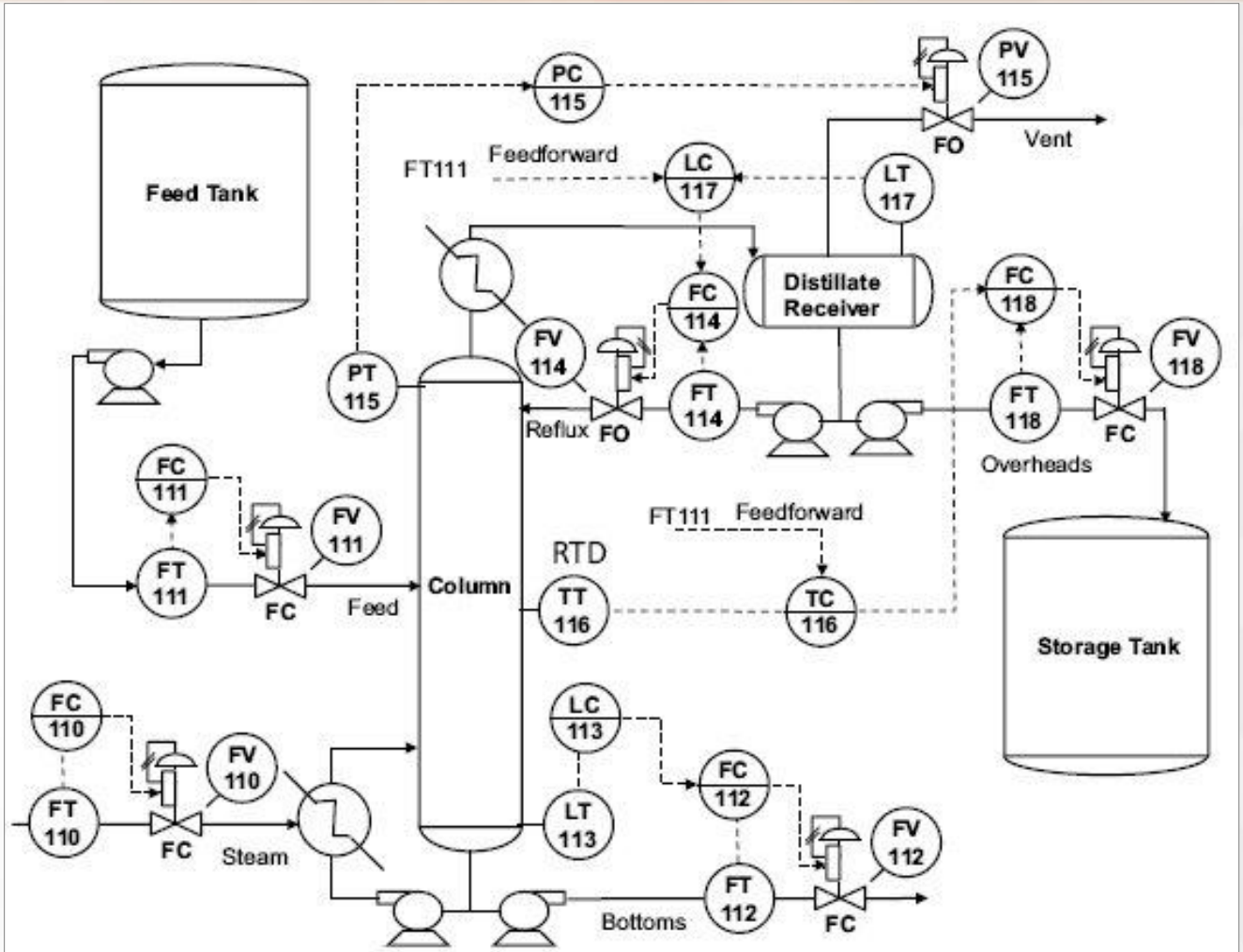


Figure 7-17. Basic Column Control System

# Symbol Example(Cont.)

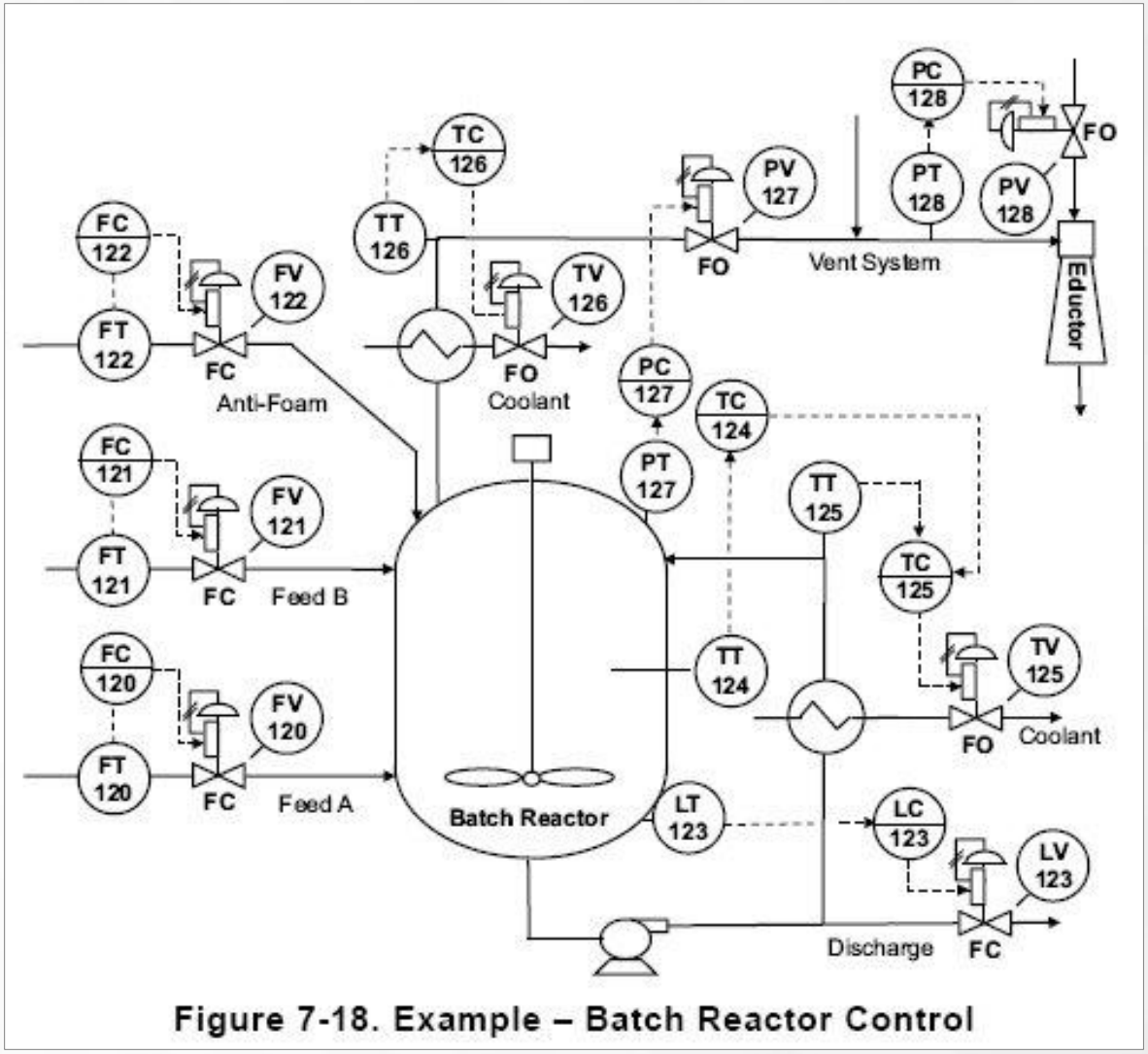


Figure 7-18. Example – Batch Reactor Control

# Symbol Example(Cont.)

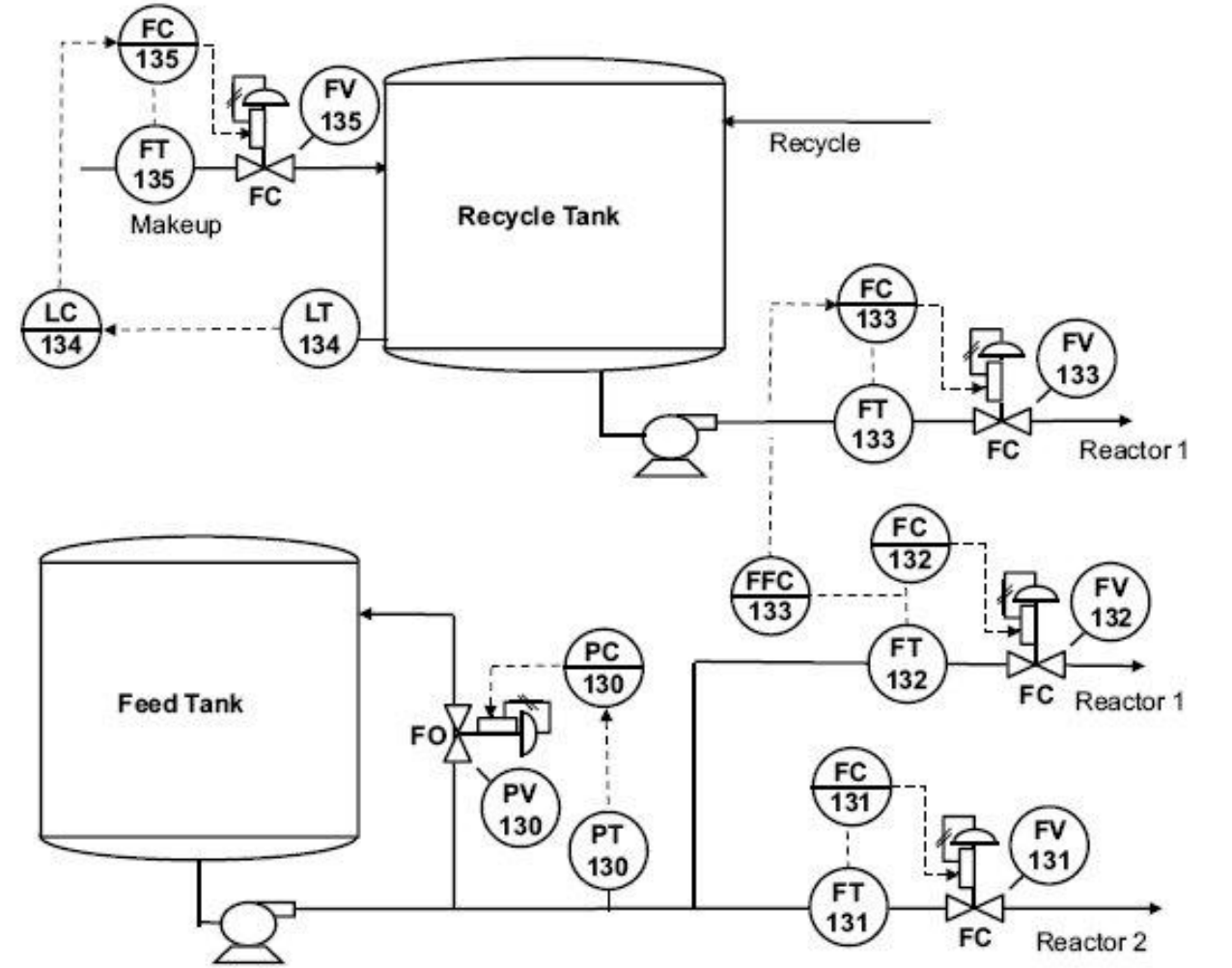


Figure 7-19. Example – Continuous Feed and Recycle Tank