

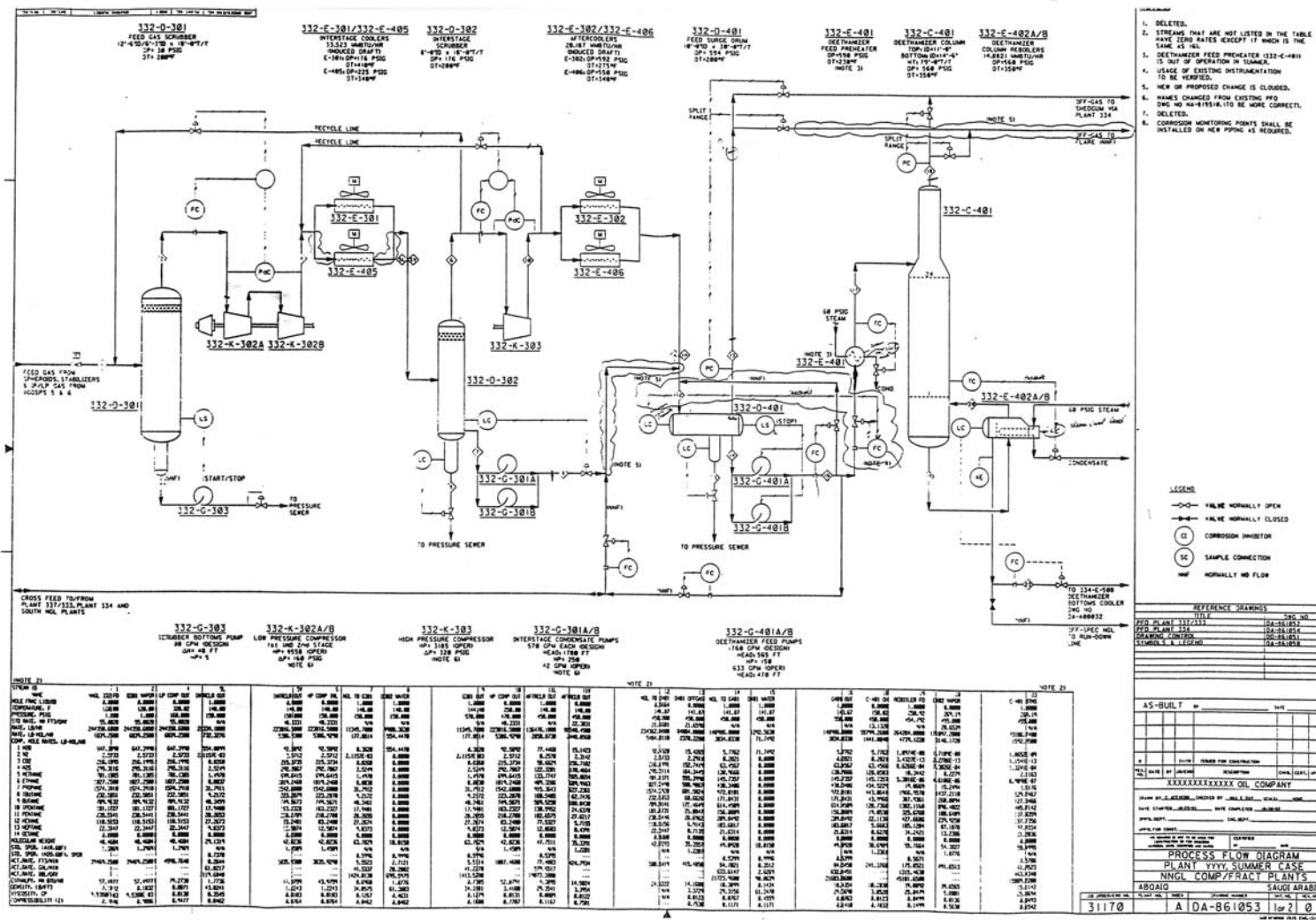
# ***Documentation of Plant Control and Instrumentation***

## ***Typical Documentation***

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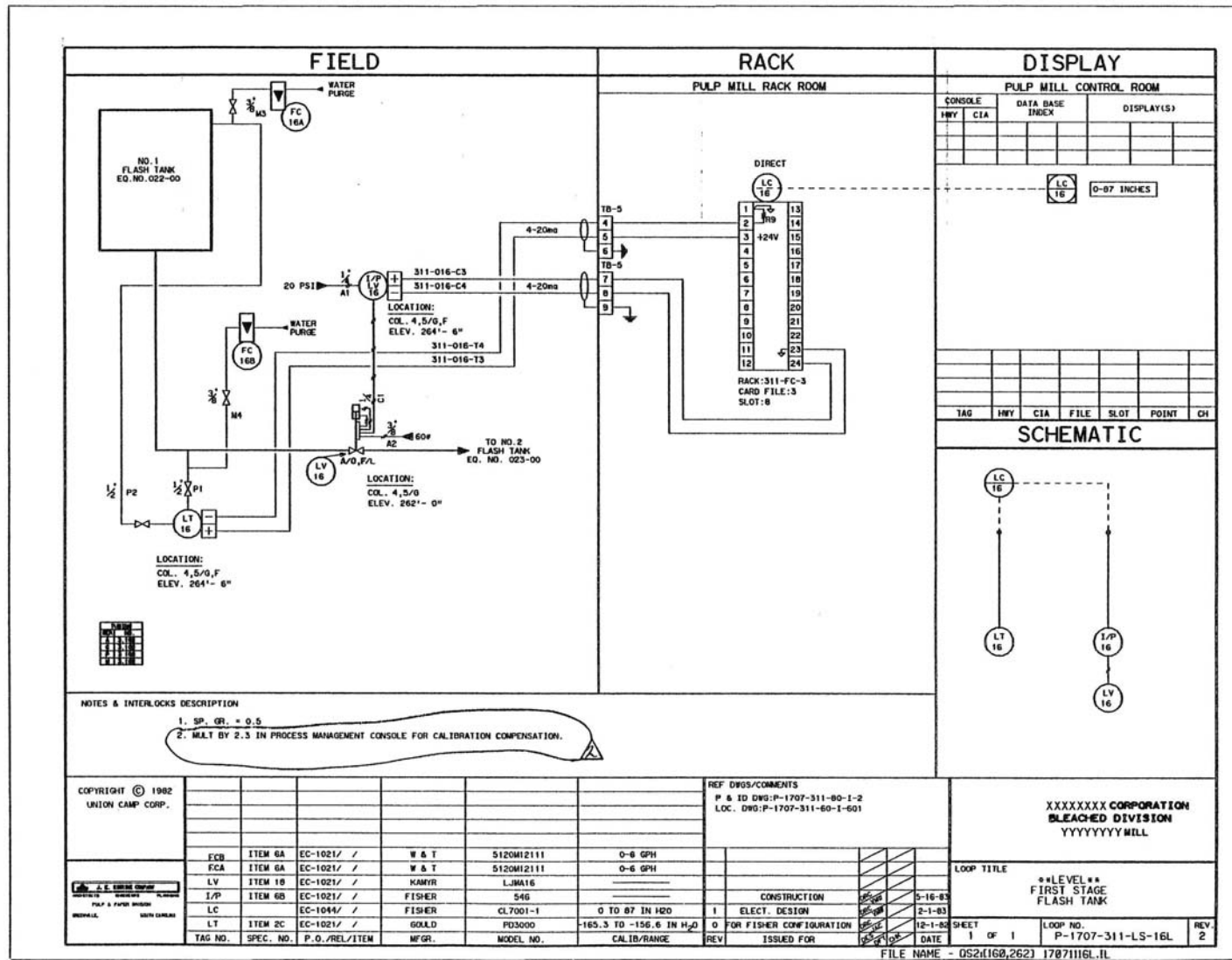
- Plot Plan – Physical layout of plant
- Process Flow Diagram – Major pieces of equipment in a process area and design operating condition
- P&ID – Shows the piping and instrumentation that will be installed
- Loop Sheet – Details field wiring and instrumentation details.

## Example – Process Flow Diagram





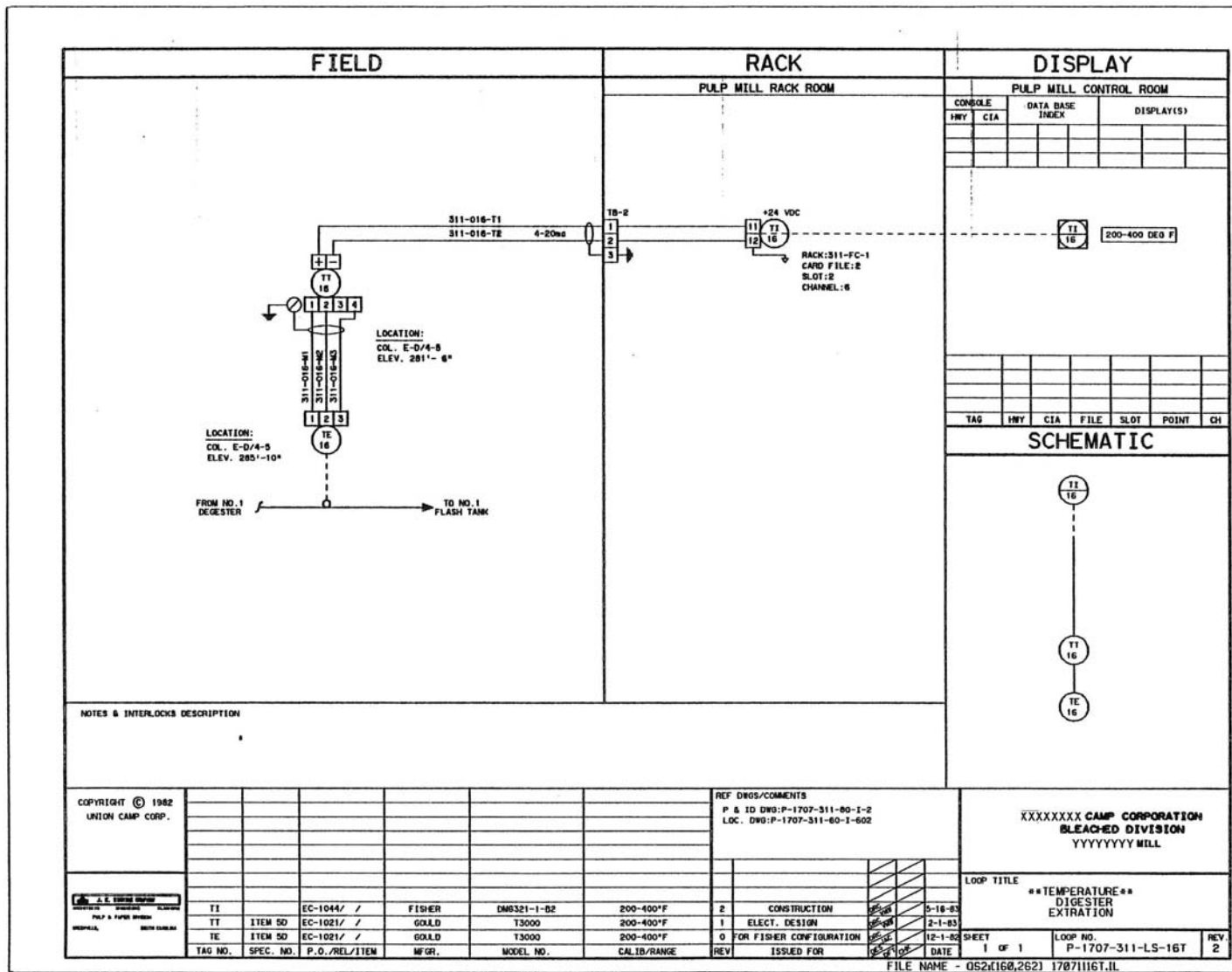
# Example – Loop Sheet



Process Control  
Documentation of Plant



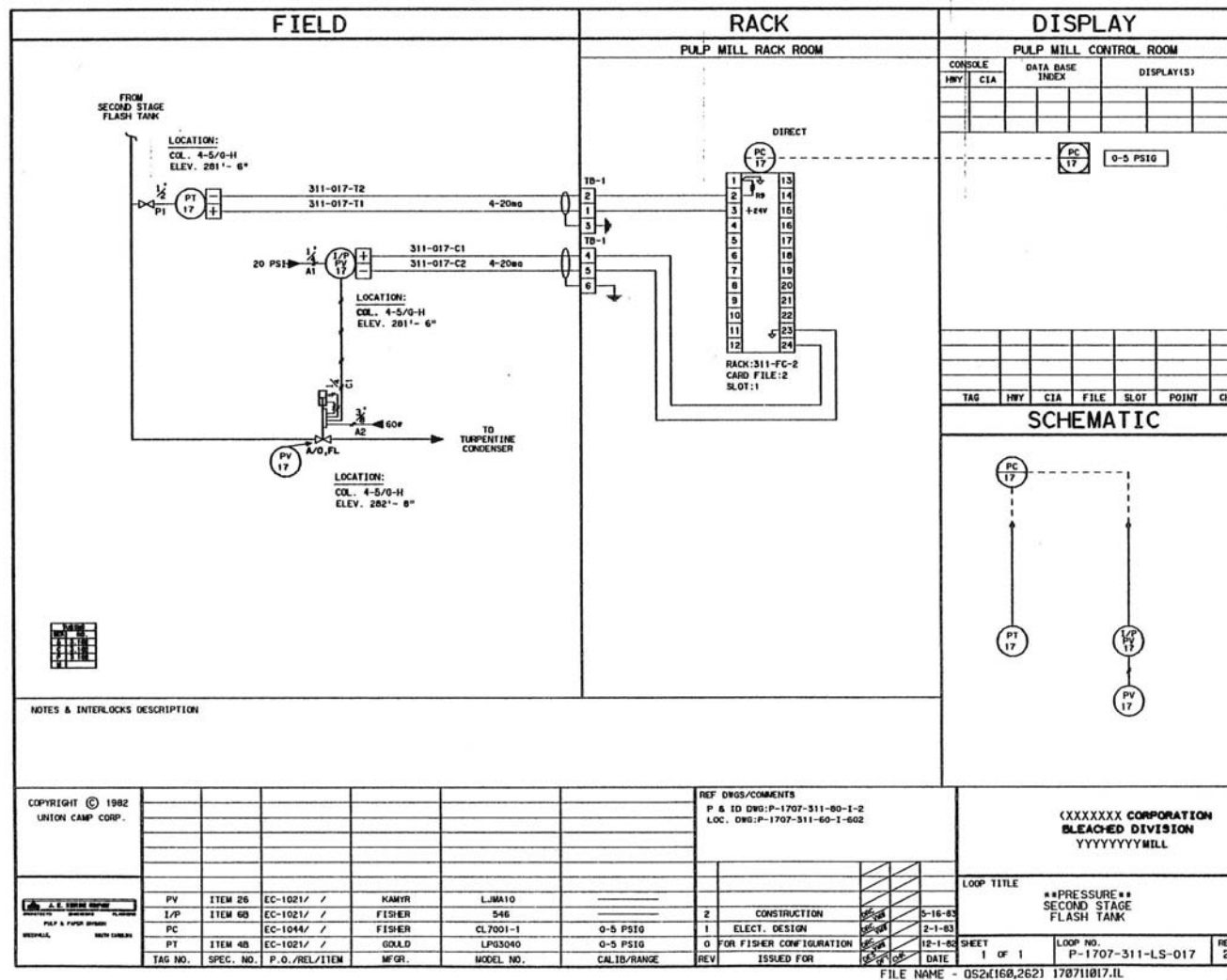
## Example - Loop Sheet



## Process Control

### Instrumentation of Plant

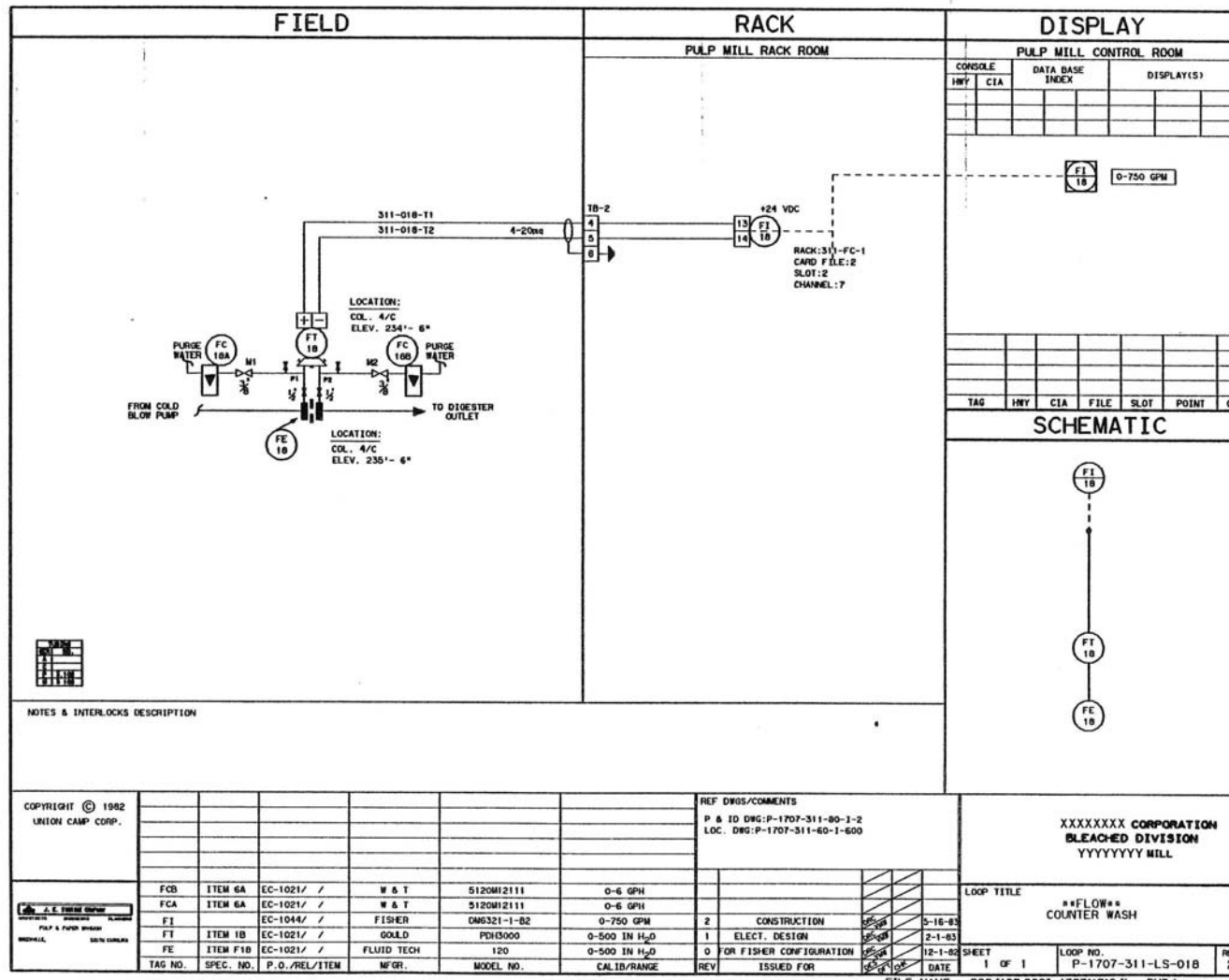
# Example – Loop Sheet



Slide 3 - 7

Process Control  
Documentation of Plant

# Example – Loop Sheet



Process Control  
Documentation of Plant



# Example – Loop Sheet

FIELD	RACK	DISPLAY																																			
	<p style="text-align: center;">PULP MILL RACK ROOM</p>	<p style="text-align: center;">PULP MILL CONTROL ROOM</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <th colspan="2">CONSOLE</th> <th colspan="2">DATA BASE</th> <th colspan="2">DISPLAY(S)</th> </tr> <tr> <th>HWY</th> <th>CIA</th> <th>INDEX</th> <th></th> <th></th> <th></th> </tr> <tr> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> </table>	CONSOLE		DATA BASE		DISPLAY(S)		HWY	CIA	INDEX																										
		CONSOLE		DATA BASE		DISPLAY(S)																															
HWY	CIA	INDEX																																			
<p>NOTES &amp; INTERLOCKS DESCRIPTION</p>	<p>SCHEMATIC</p>																																				
<p>COPYRIGHT © 1982 UNION CAMP CORP.</p>	<p>REF DWGS/COMMENTS P &amp; ID DWG: P-1707-311-80-1-2 LOC. DWG: P-1707-311-60-1-600</p>	<p style="text-align: center;">XXXXXXXXX CORPORATION BLEACHED DIVISION YYYYYYYYY MILL</p>																																			
<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <th>TAG NO.</th> <th>SPEC. NO.</th> <th>P.O./REL/ITEM</th> <th>MFGR.</th> <th>MODEL NO.</th> <th>CALIB/RANGE</th> <th>REV</th> <th>ISSUED FOR</th> <th>DATE</th> </tr> <tr> <td>TI</td> <td></td> <td>EC-1044/ /</td> <td>FISHER</td> <td>DW6321-1-B2</td> <td>200-400°F</td> <td>2</td> <td>CONSTRUCTION</td> <td>5-18-83</td> </tr> <tr> <td>TT</td> <td>ITEM 50</td> <td>EC-1021/ /</td> <td>GOLD</td> <td>T3000</td> <td>200-400°F</td> <td>1</td> <td>ELECT. DESIGN</td> <td>2-1-83</td> </tr> <tr> <td>TE</td> <td>ITEM 50</td> <td>EC-1021/ /</td> <td>GOLD</td> <td>T3000</td> <td>200-400°F</td> <td>0</td> <td>FOR FISHER CONFIGURATION</td> <td>12-1-83</td> </tr> </table>	TAG NO.	SPEC. NO.	P.O./REL/ITEM	MFGR.	MODEL NO.	CALIB/RANGE	REV	ISSUED FOR	DATE	TI		EC-1044/ /	FISHER	DW6321-1-B2	200-400°F	2	CONSTRUCTION	5-18-83	TT	ITEM 50	EC-1021/ /	GOLD	T3000	200-400°F	1	ELECT. DESIGN	2-1-83	TE	ITEM 50	EC-1021/ /	GOLD	T3000	200-400°F	0	FOR FISHER CONFIGURATION	12-1-83	<p>LOOP TITLE **TEMPERATURE** QUENCH CIRCULATION</p>
TAG NO.	SPEC. NO.	P.O./REL/ITEM	MFGR.	MODEL NO.	CALIB/RANGE	REV	ISSUED FOR	DATE																													
TI		EC-1044/ /	FISHER	DW6321-1-B2	200-400°F	2	CONSTRUCTION	5-18-83																													
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TE	ITEM 50	EC-1021/ /	GOLD	T3000	200-400°F	0	FOR FISHER CONFIGURATION	12-1-83																													
<p>FILE NAME - 0524168,262 17871119T.JL</p>	<p>1 OF 1</p>	<p>REV. 2</p>																																			

Process Control  
Documentation of Plant

# ***ISA S5.1 Tag Number Convention***

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## 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

Note: Hyphens are optional as separators

# ISA S5.1 IDENTIFICATION LETTERS

	First-letter		Succeeding- Letters		
	Measured or Initiating variable	Modifier	Readout function	Output function	Modifier
A	Analysis				
C				Control	
D		Differential			
F	Flow Rate	Ratio			
H	Hand				High
I	Current		Indicate		
L	Level				Low
P	Pressure, vacuum				
Q	Quantity	Totalizer			
S		Safety		Switch	
T	Temperature			Transmit	
V	Vibration			Valve, Damper	
z	Position			Actuator	

## ***Examples – Typical Letter Combination***

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- AIC, AI, AT, AY
- FRC, FIC, FC, FY, FE, FQI
- II, IIC, IT
- LIC, LI, LT, LE,
- PIC, PC, PCV, PI, PSH, PIT, PSL
- TIC, TCV, TI, TSH, TE, TY
- ZC, ZSH, ZSL ZT

# ***ISA S5.1 Instrument Line Symbols***

→ Instrument supply  
or connection to process



→ Pneumatic Signal



→ Electric Signal



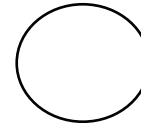
→ Internal System Link



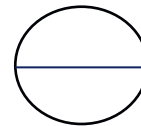


# ***ISA S5.1 General Instrument or Function Symbol***

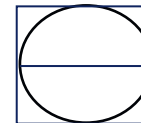
Discrete Instrument,  
field mounted



Discrete instrument,  
accessible to operator

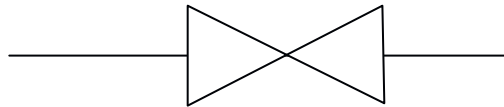


Shared display,  
shared control

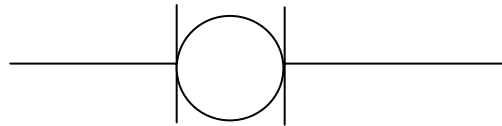


# ***ISA S5.1 Valve Body, Damper Symbols***

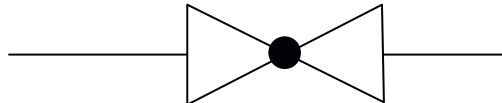
General Symbol



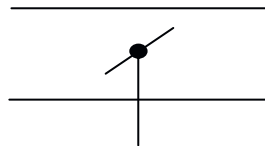
Rotary Valve



Globe Valve

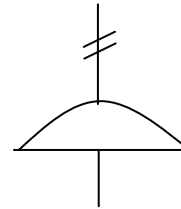


Damper

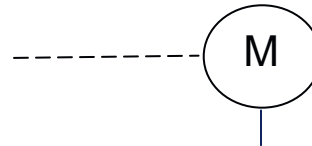


# ISA S5.1 Actuator Symbols

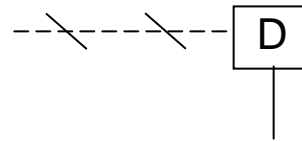
→ Diaphragm, spring-opposed



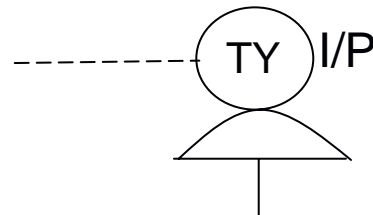
→ Rotary Motor



→ Digital



Valve Actuator with  
Electro-pneumatic  
converter



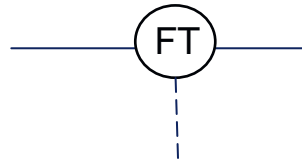
# ISA S5.1 Symbols for Other Devices

Restricting Orifice, With  
Flow Transmitter

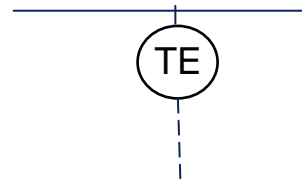


Hand Valve

Inline Measurement

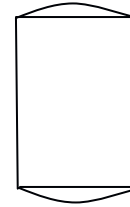
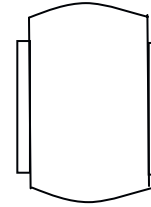
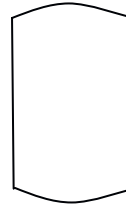


Measurement Element

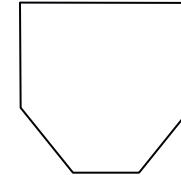
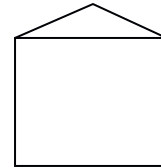


# ISA 5.5 Process Symbols

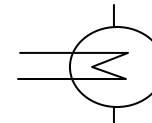
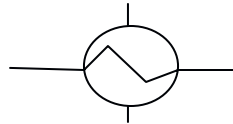
Vessel, Jacketed Vessel,  
Reactor



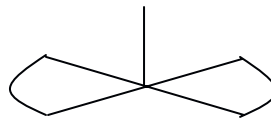
Atmospheric Tank, Storage



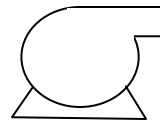
Heat Exchange



Agitator

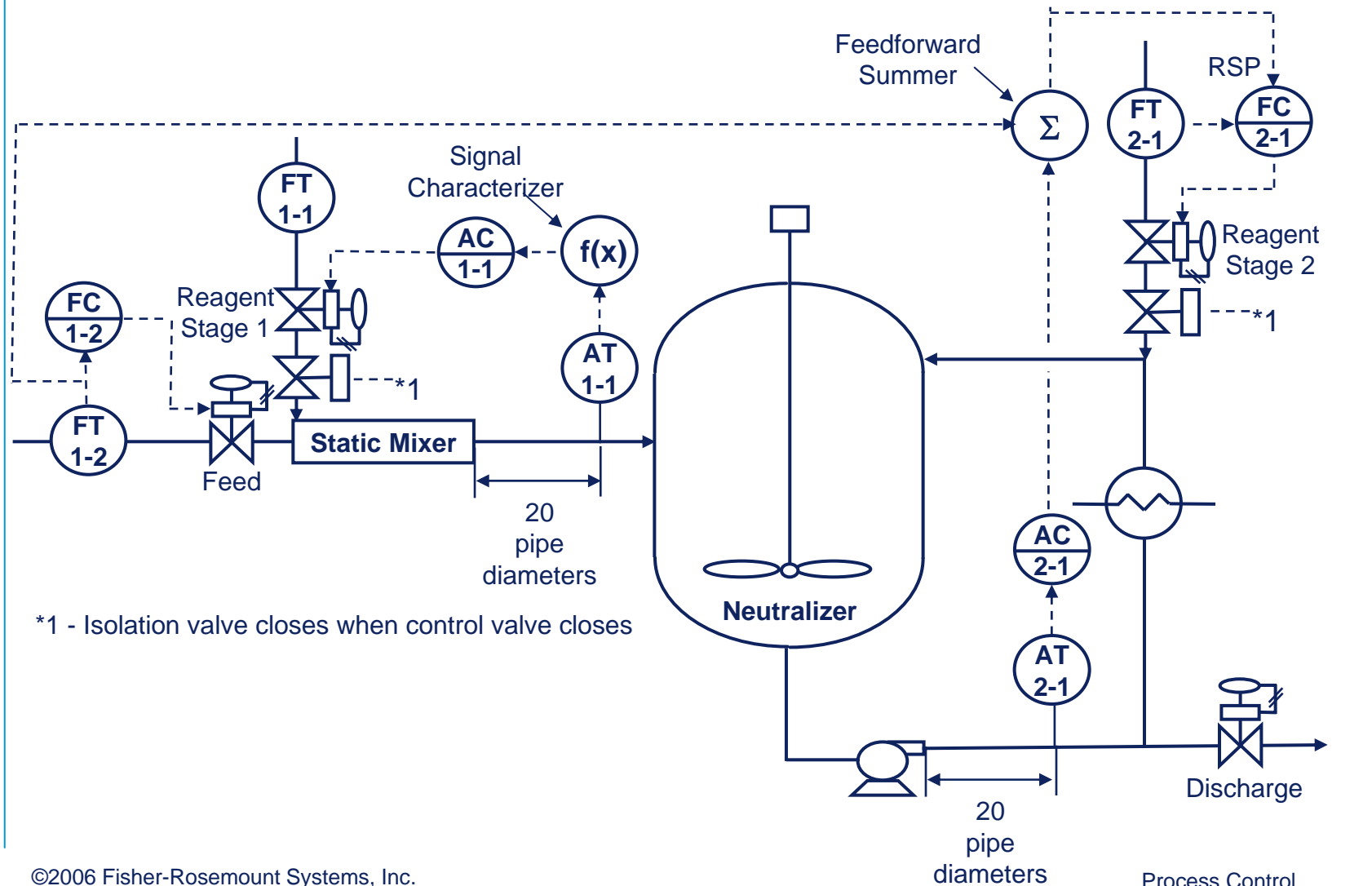


Pump

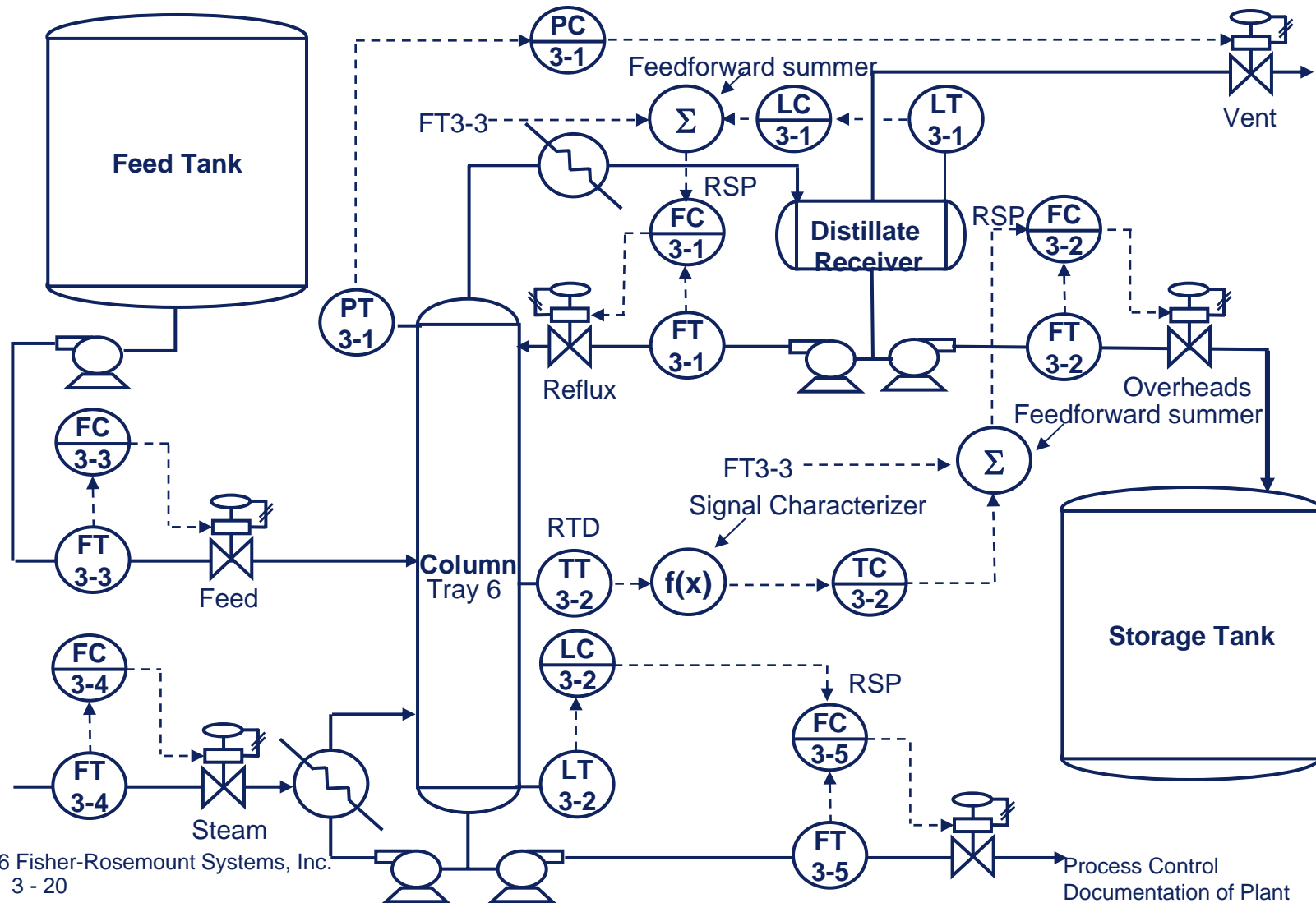




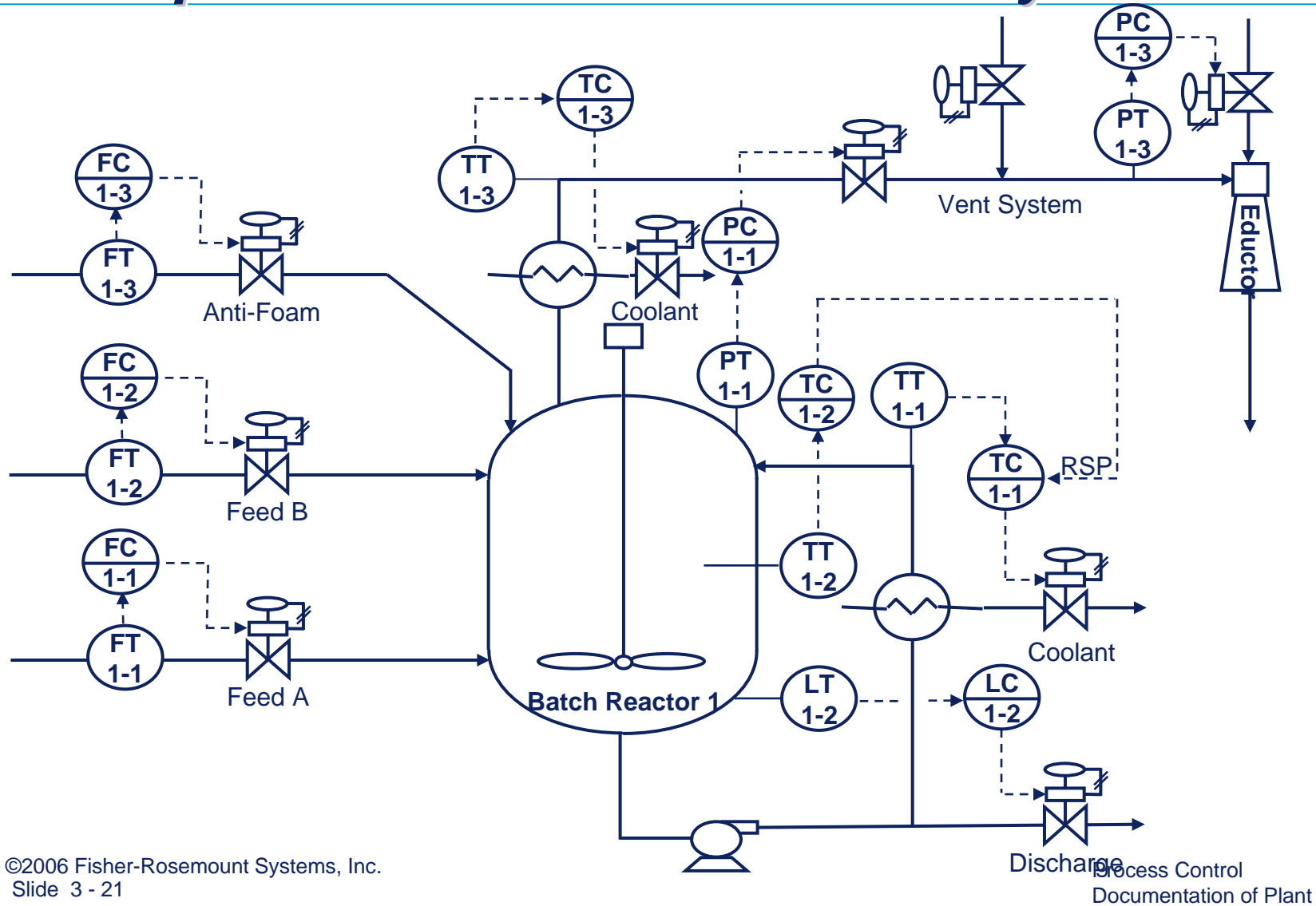
# Example – Basic Neutralizer Control System



# Basic Column Control System



# Example – Batch Reactor Control System



The diagram illustrates a chemical process involving a Feed Tank, a Recycle Tank, and two reactors (Reactor 1 and Reactor 2). The Feed Tank feeds into a line that branches to a pressure control loop (PC 1-1, PT 1-1) and a reactor feed loop (FT 1-2, FC 1-2). The Recycle Tank receives makeup feed (FT 1-1, FC 1-1) and recycles product from Reactor 1 (FT 1-3, FC 1-3). The Recycle Tank also feeds into Reactor 1 (FT 1-4, FC 1-4) and Reactor 2 (FT 1-2, FC 1-2). The system includes level control (LC 1-1, LT 1-1) for the Recycle Tank and a recycle stream (RSP) from Reactor 1 back to the Recycle Tank. The diagram shows the integration of these components for process control.