

Chapter 13

PLC Programming for Applications

13.1 Introduction of application

- Material A and material B are collected in a tank.
- These materials will be mixed for particular time and then mixed product drained out through outlet valve.

Procedure:

1. Fill the material A,
2. Fill the material B,
3. Blend the mixture for a period,
4. Drain out the product.



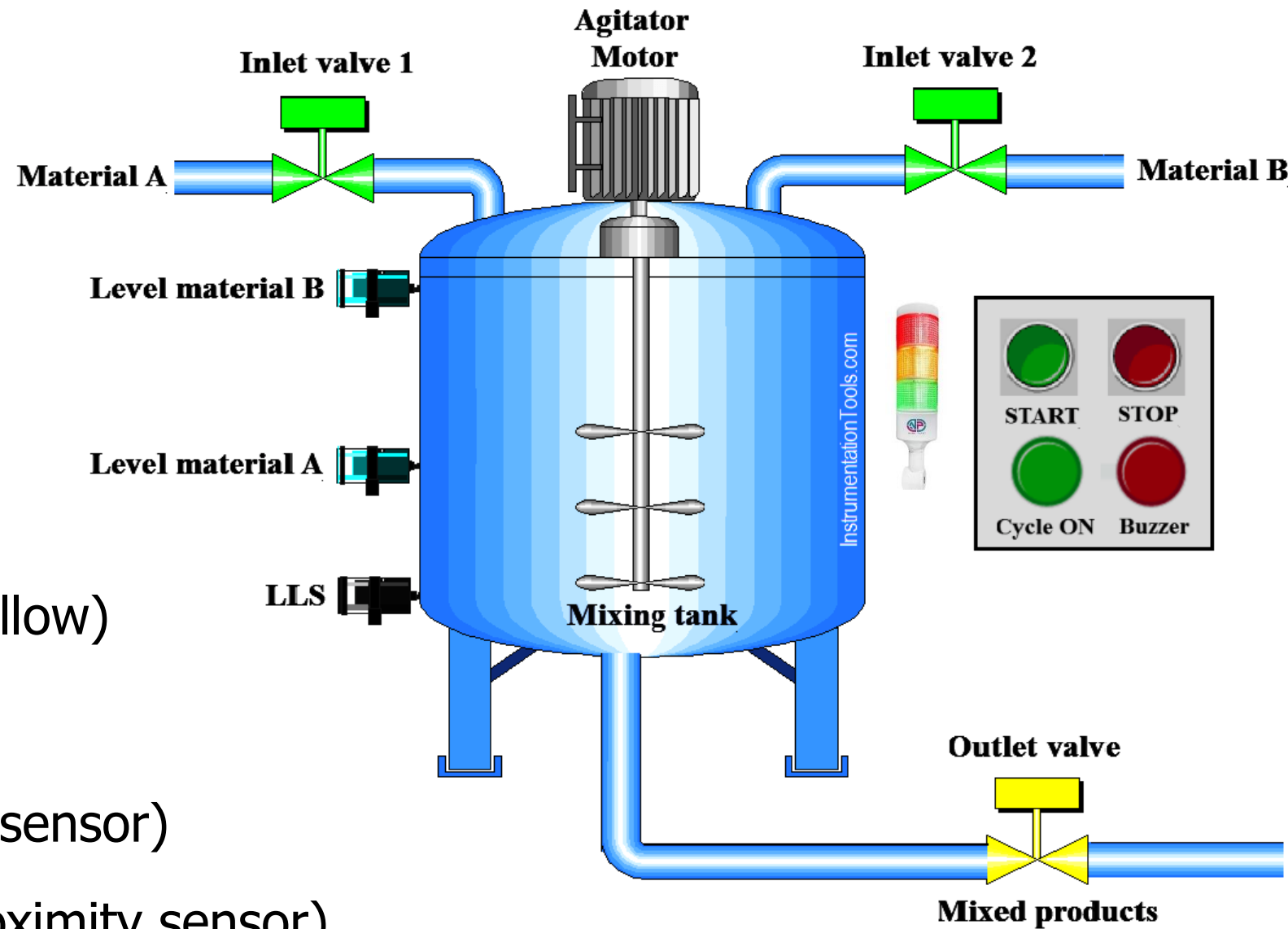
13.1 Introduction of application

○ Output:

- AC induction motor
- Inlet valve 1, inlet valve 2
- Outlet valve
- Buzzer
- Tower lamp (Red, green, yellow)

○ Input:

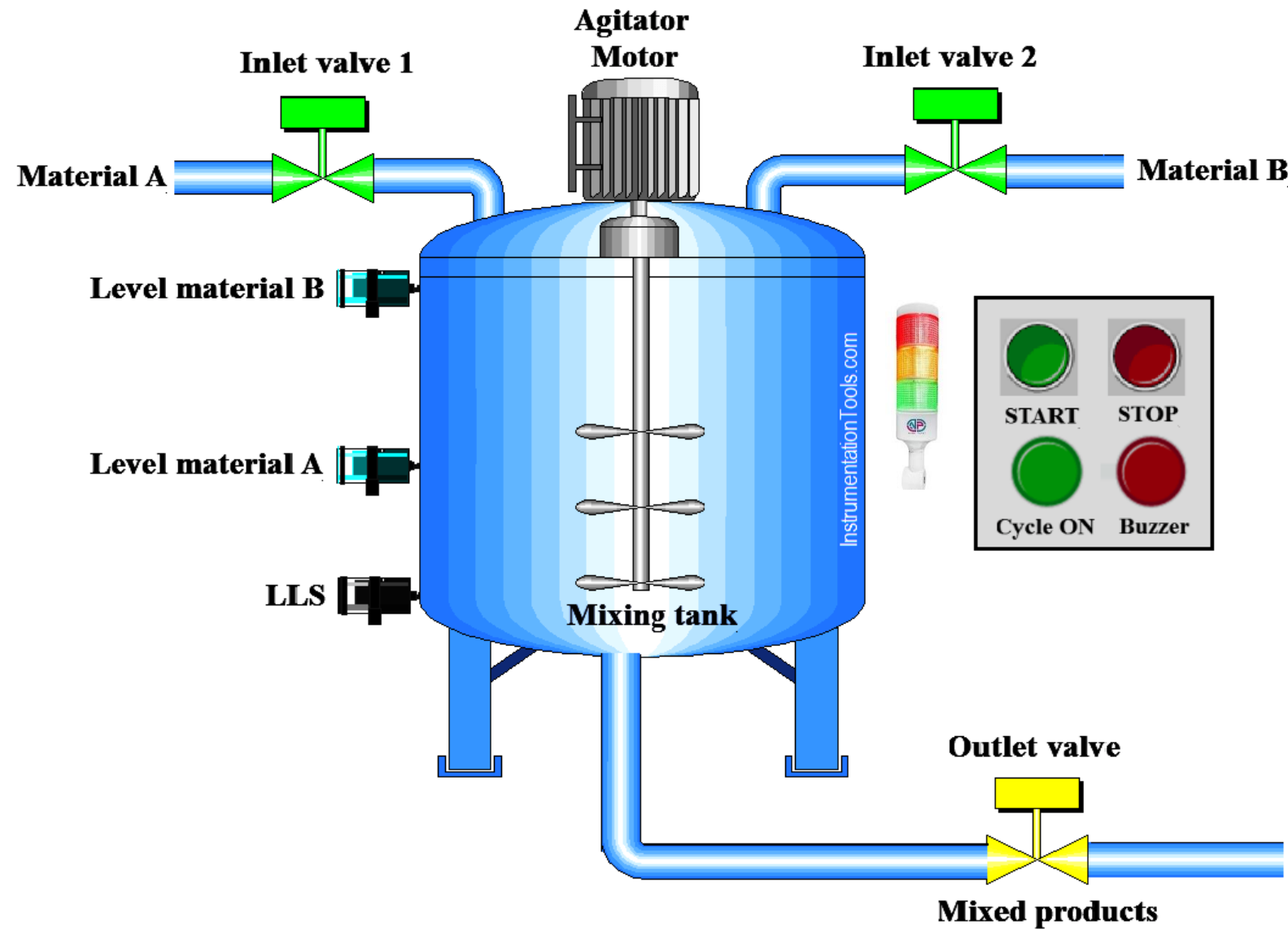
- Low level switch (Proximity sensor)
- Level material A sensor (Proximity sensor)



13.1 Introduction of application

○ Input:

- Level material B sensor
(Proximity sensor)
- Start button
- Stop button
- Cycle button



13.2 Device of Application

Mixer motor

- AC induction motor should be driven by an inverter, soft start, or contactors.
 - There is no demand for speed control: Soft start/contactors
 - Device's voltage/current must be specified.
 - The extra device such as mechanical relay, filter noise are might be needed.
 - The utilization of an inverter can provide the speed control of the motor.
 - The connection between PLC and the inverter should be established.
 - The inverter's power must match the power of the motor.

13.2 Device of Application

Mixer motor

Rated current: 9A AC-3 (400V)

Rated power: 4kW AC-3(400 V)

Control voltage: 230V AC

3 Pole main contact

NEMA size: 00



13.2 Device of Application

Mixer motor

COIL CURRENTS											
NEMA Size	No. of Poles	Inrush Current (Amps.) 60 Cycles					Sealed Current (Amps.) 60 Cycles				
		120V	208V	240V	480V	600V	120V	208V	240V	480V	600V
00	1-2-3	0.50	0.29	0.25	0.12	0.07	0.12	0.07	0.06	0.03	0.02
0	1-2-3-4	0.88	0.50	0.44	0.22	0.17	0.14	0.08	0.07	0.04	0.03
1	1-2-3-4	1.54	0.89	0.77	0.39	0.31	0.18	0.10	0.09	0.04	0.04
2	2-3-4	1.80	1.04	0.90	0.45	0.36	0.25	0.14	0.13	0.06	0.05
3	2-3	4.82	2.78	2.41	1.21	0.97	0.36	0.21	0.18	0.09	0.07
	4	5.34	3.08	2.67	1.33	1.07	0.39	0.23	0.20	0.10	0.08
4	2-3	8.30	4.80	4.15	2.08	1.66	0.54	0.31	0.27	0.14	0.11
	4	9.90	5.71	4.95	2.47	1.98	0.61	0.35	0.31	0.15	0.12
5	2-3	16.23	9.36	8.11	4.06	3.25	0.81	0.47	0.41	0.20	0.16
6	2-3	0.62	Current Shown is The Very Small AC Current Passing Through Coil of Control Relay. Any Standard Duty 120V Control Station May Be Used In This Circuit.				0.082	Current Shown is The Very Small AC Current Passing Through Coil of Control Relay. Any Standard Duty 120V Control Station May Be Used In This Circuit.			
7	2-3	0.62					0.082				
8	2-3	0.62					0.082				
9	2-3	1.2					0.16				

OPERATING TIME		
Size	Approximate Operating Time in Milliseconds 3 Pole Contactors	
	Pick-up	Drop-out
00	28	13
0	29	14
1	26	17
2	32	14
3	35	18
4	41	18
5	43	18
6	88	40
7	88	45
8	118	94
9	118	84

13.2 Device of Application

Mixer motor

Rated current: 9A AC-3 (400V)

Rated power: 4kW AC-3(400 V)

Control voltage: 230V AC

3 Pole main contact

NEMA size: 00



13.2 Device of Application

Inlet/Outlet Valves

Technical Parameters

Drive power: 220VAC, 50-60HZ

Power: 6W

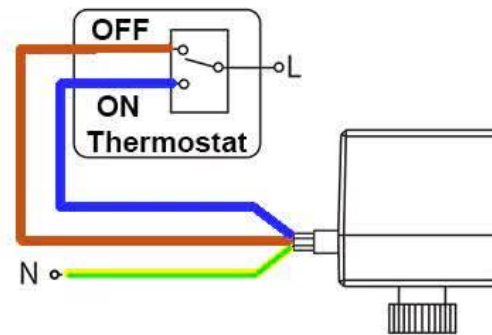
Medium: cold / hot water

Medium temperature: 2 °C -90 °C

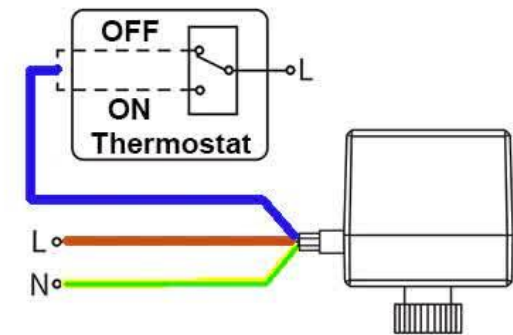
Control: three-wire two control.



Wiring Diagram



three wires two controllers



three wires one controller

13.2 Device of Application

Inlet/Outlet Valves

Mechanical Relay

Coil: 24VDC

Contact Number: 2 points

Rated current: 10A

Rated voltage: 250VAC



13.2 Device of Application

Buzzer – Tower lamp

Light, buzzer: 24VDC

Red light: Red

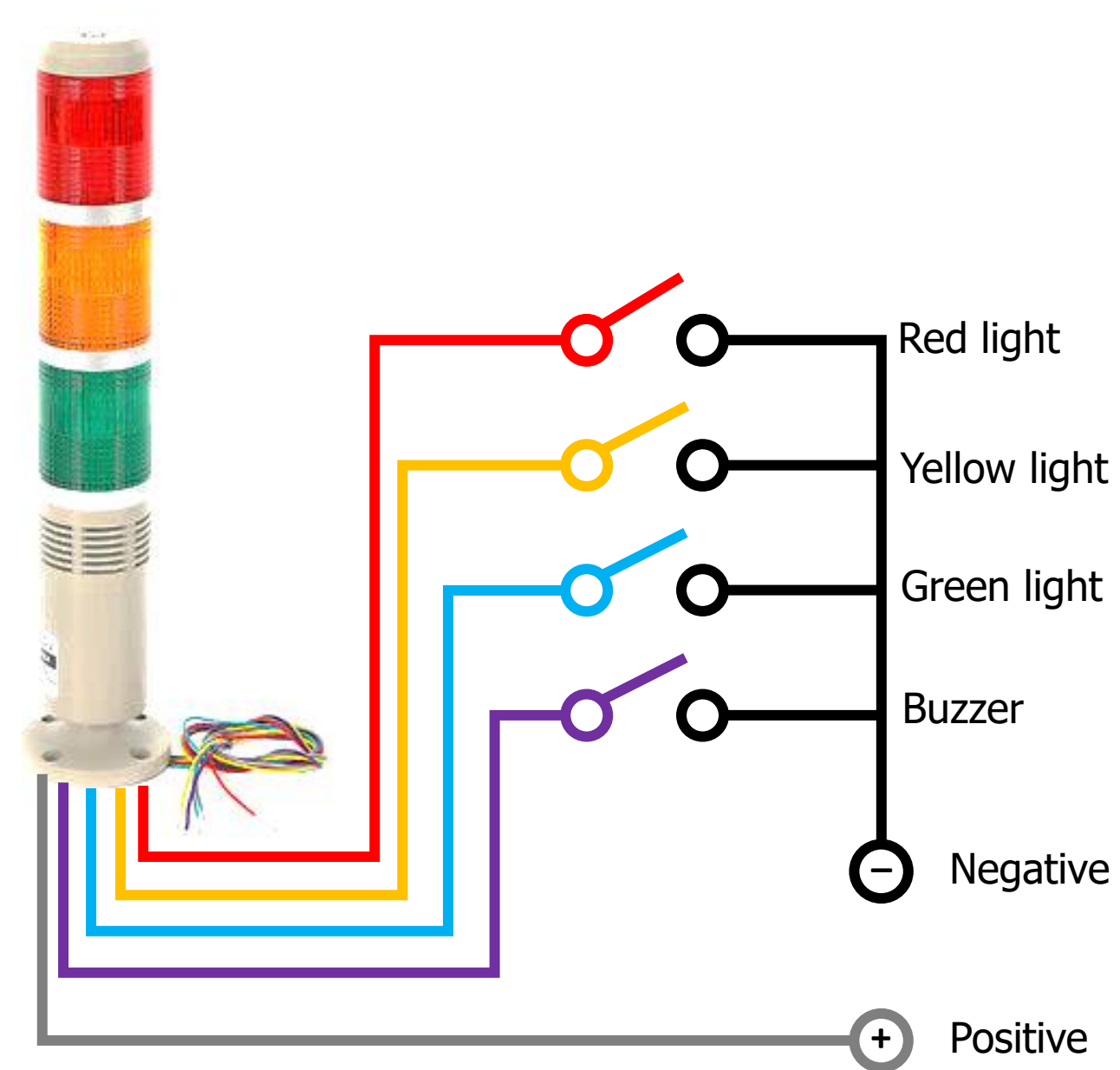
Yellow light: Yellow

Green light: Blue

Buzzer: Purple

Positive: Gray

Power: 3W

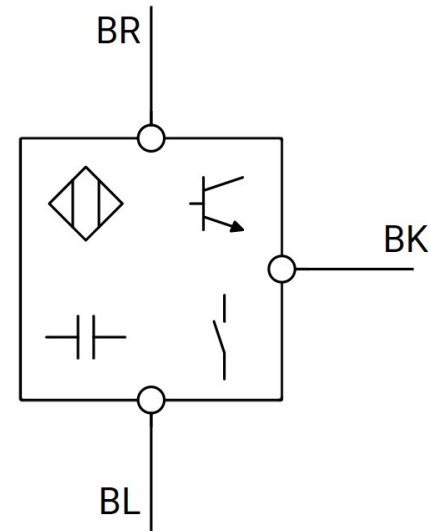


13.2 Device of Application

Capacitive proximity sensor



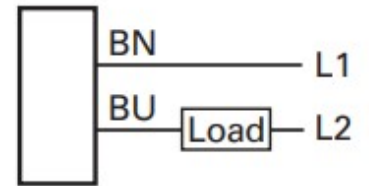
- Two-wire AC—20 to 250V
- Three-wire DC—10 to 30V, NPN and PNP
- Contact ratings— AC: 300 mA DC: 300 mA
- Enclosure ratings— NEMA® 1, 2, 3, 3S, 4, 12, 13 IP65



Two-Wire Sensors

20–250 Vac

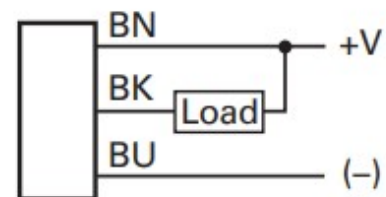
NO and NC



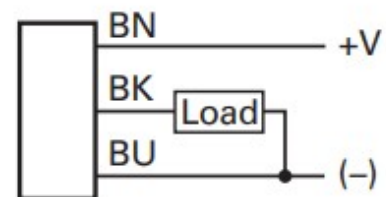
Three-Wire Sensors

10–30 Vdc

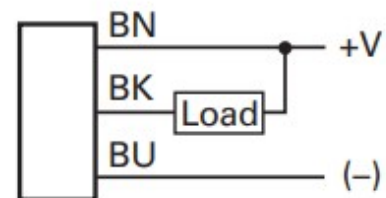
NO (NPN)



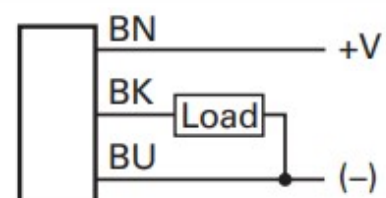
NO (PNP)



NC (NPN)



NC (PNP)



13.2 Device of Application

Button

Number of contacts: 2 point

Rated current: 5A

Rated voltage: 250VAC

No latched



13.2 Device of Application

Input			Output	
	Start button			Contactor coil
	Stop button			Relay coil for inlet1
	Cycle button			Relay coil for inlet2
	Low level prox. sensor			Relay coil for outlet
	Material A level sensor			Buzzer
	Material B level sensor			Red light
	Thermal overload relay			Green light
				Yellow light

Input: 7 points, spare: 3 point

Total: 10 points

Output: 8 points, spare: 4 point

Total: 12 points

13.2 Device of Application



Requirements:

Input: 10 points at least

Output: 12 points at least

Specification:

Input: 16 points

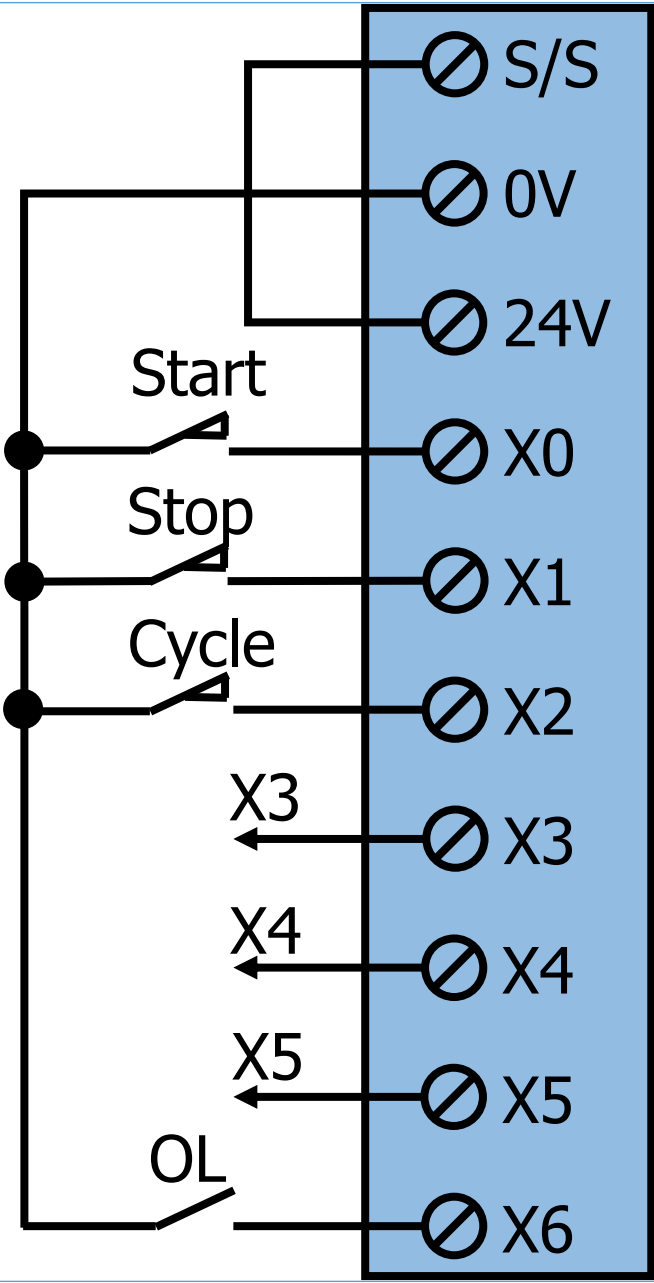
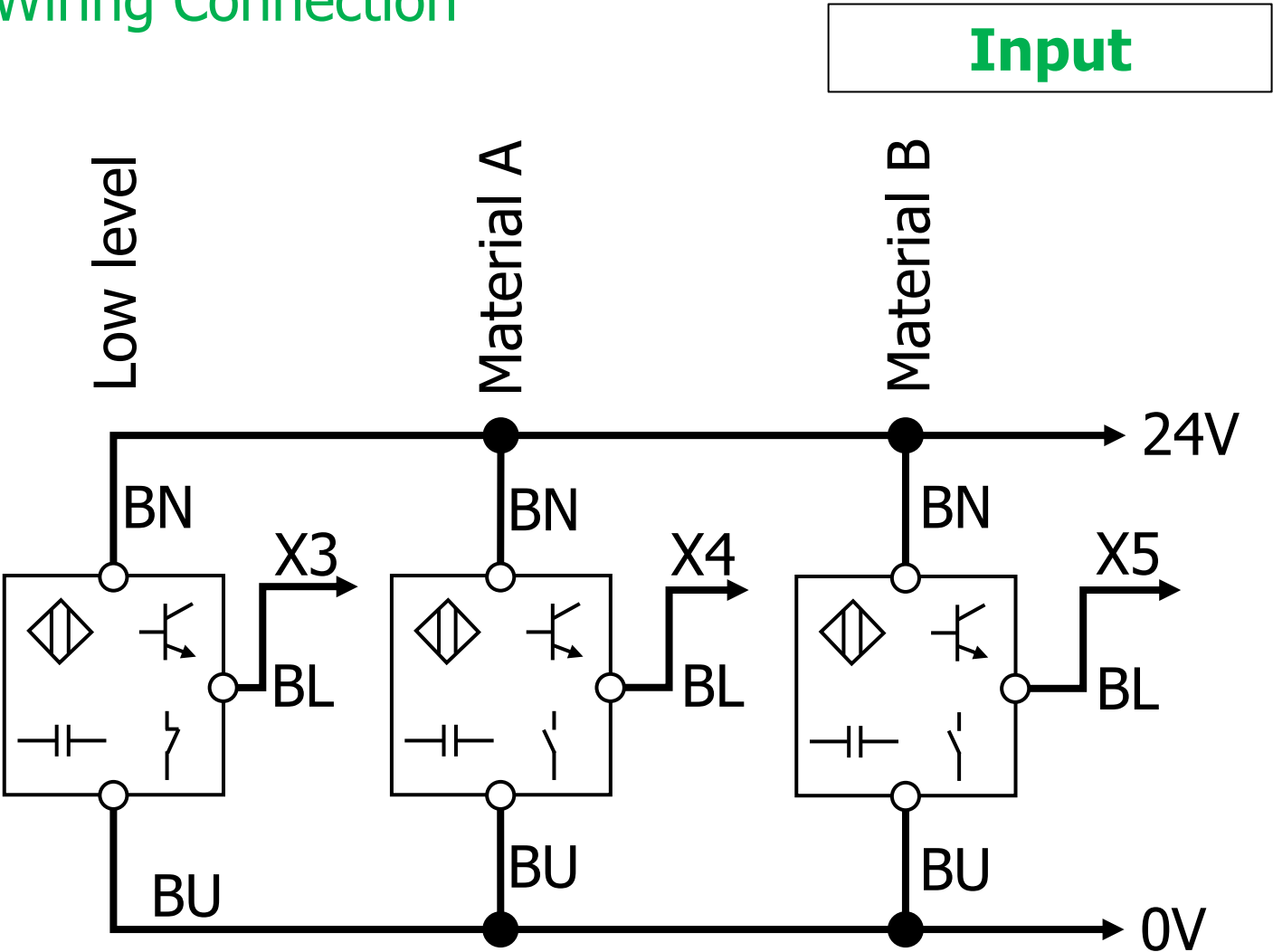
Output: 16 points

13.3 Wiring Connection

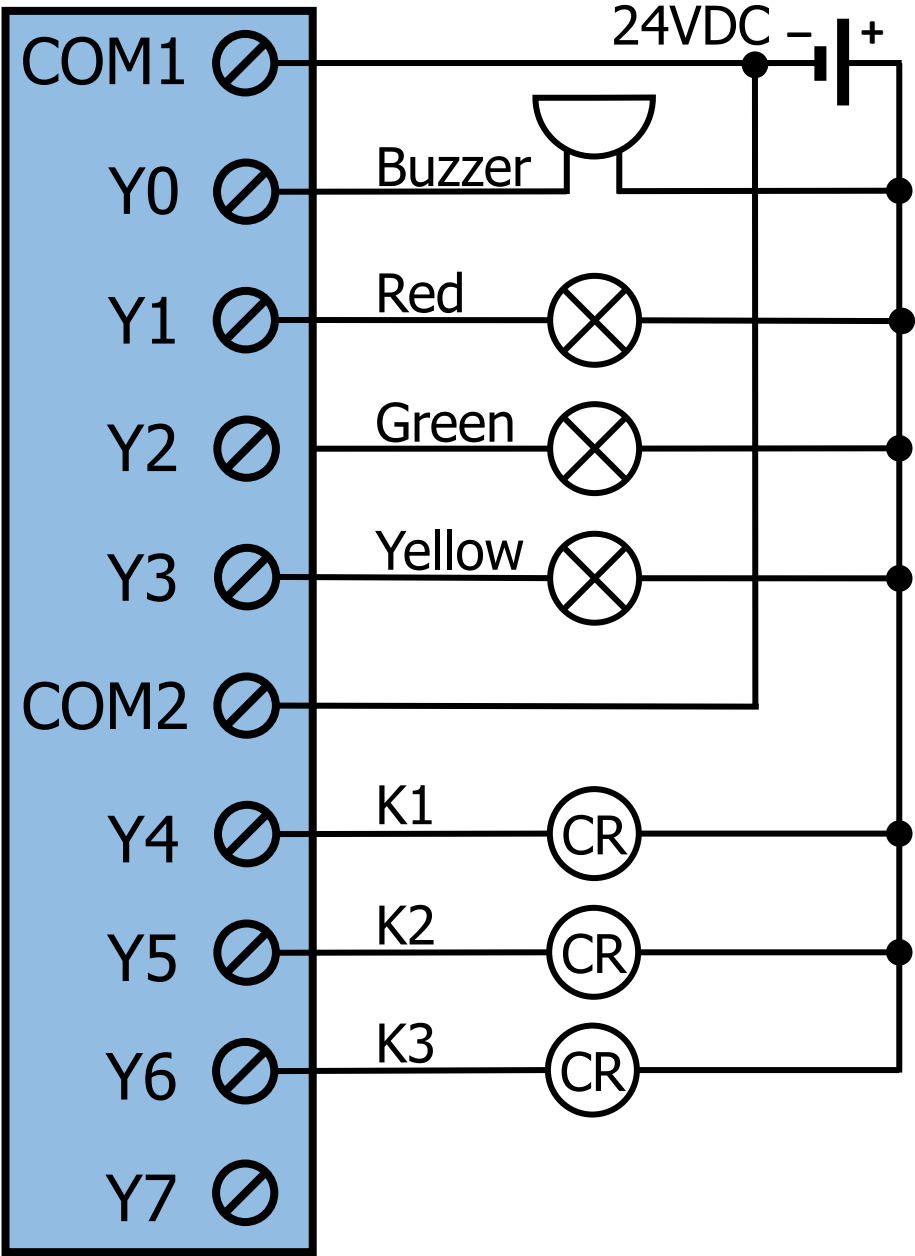
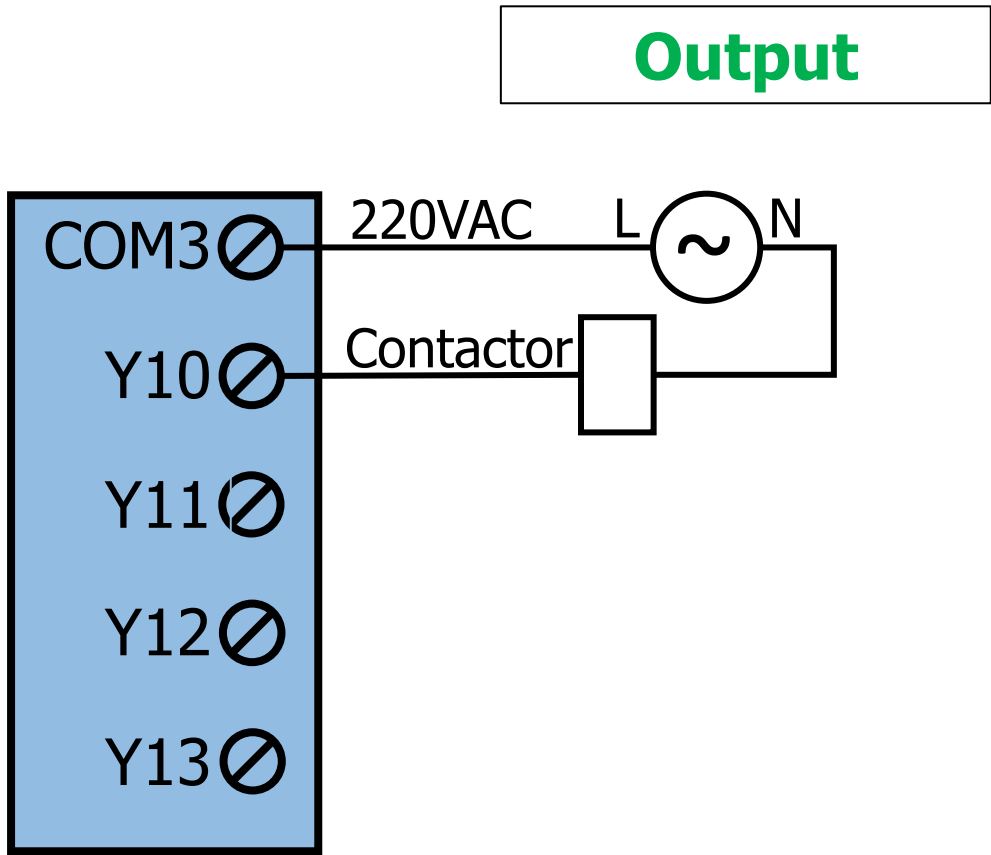
Allocated
Address

Input			Output	
X0	Start button		Y0	Buzzer
X1	Stop button		Y1	Red light
X2	Cycle button		Y2	Green light
X3	Low level prox. sensor		Y3	Yellow light
X4	Material A level sensor		Y4	Relay coil for inlet1
X5	Material B level sensor		Y5	Relay coil for inlet2
X6	Thermal overload relay		Y6	Relay coil for outlet
X7			Y7	
X10			Y10	Contactor coil
X11			Y11	
X12			Y12	
X13			Y13	

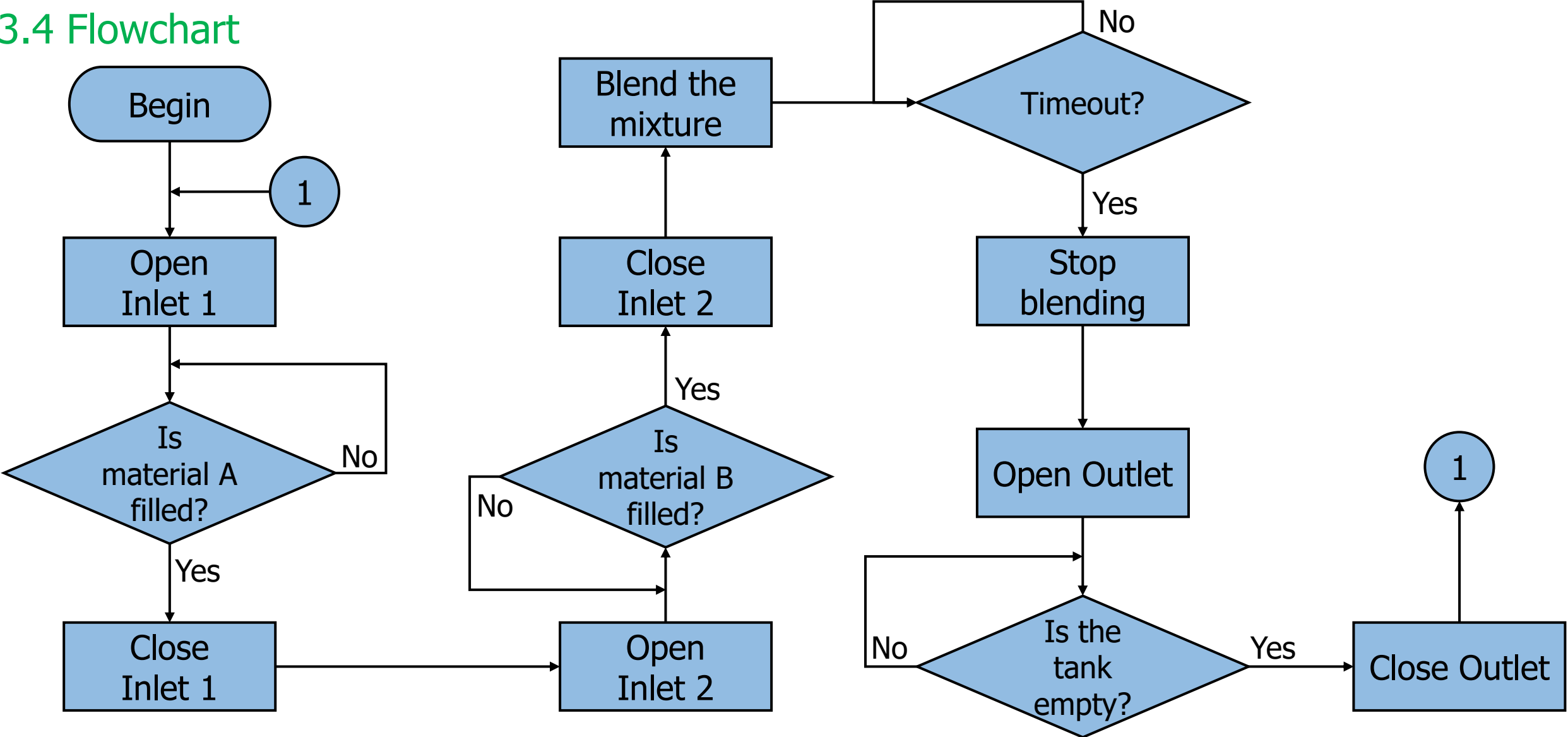
13.3 Wiring Connection



13.3 Wiring Connection

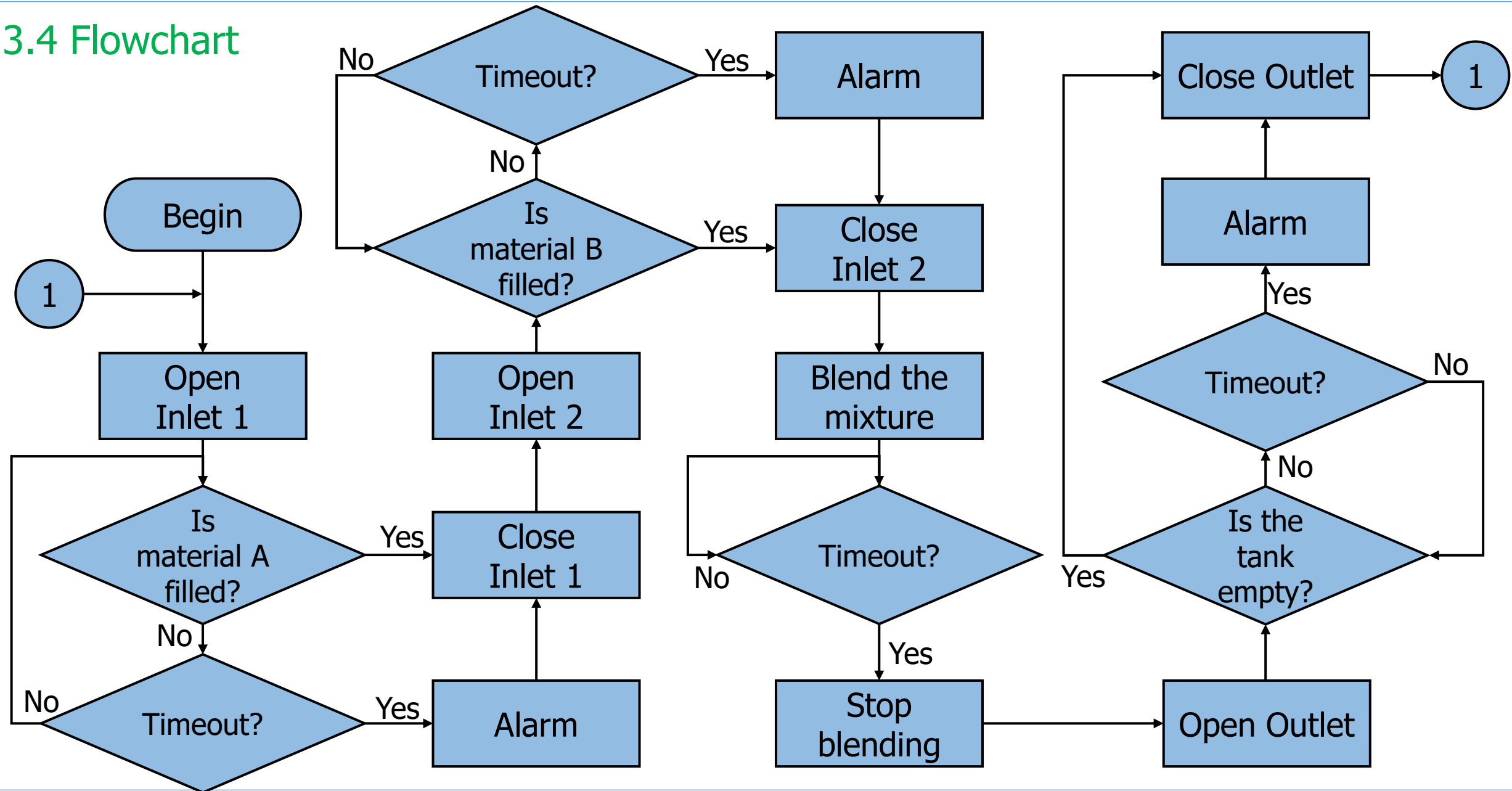


13.4 Flowchart



Basic Flow Chart

13.4 Flowchart



13.5 Control Program

