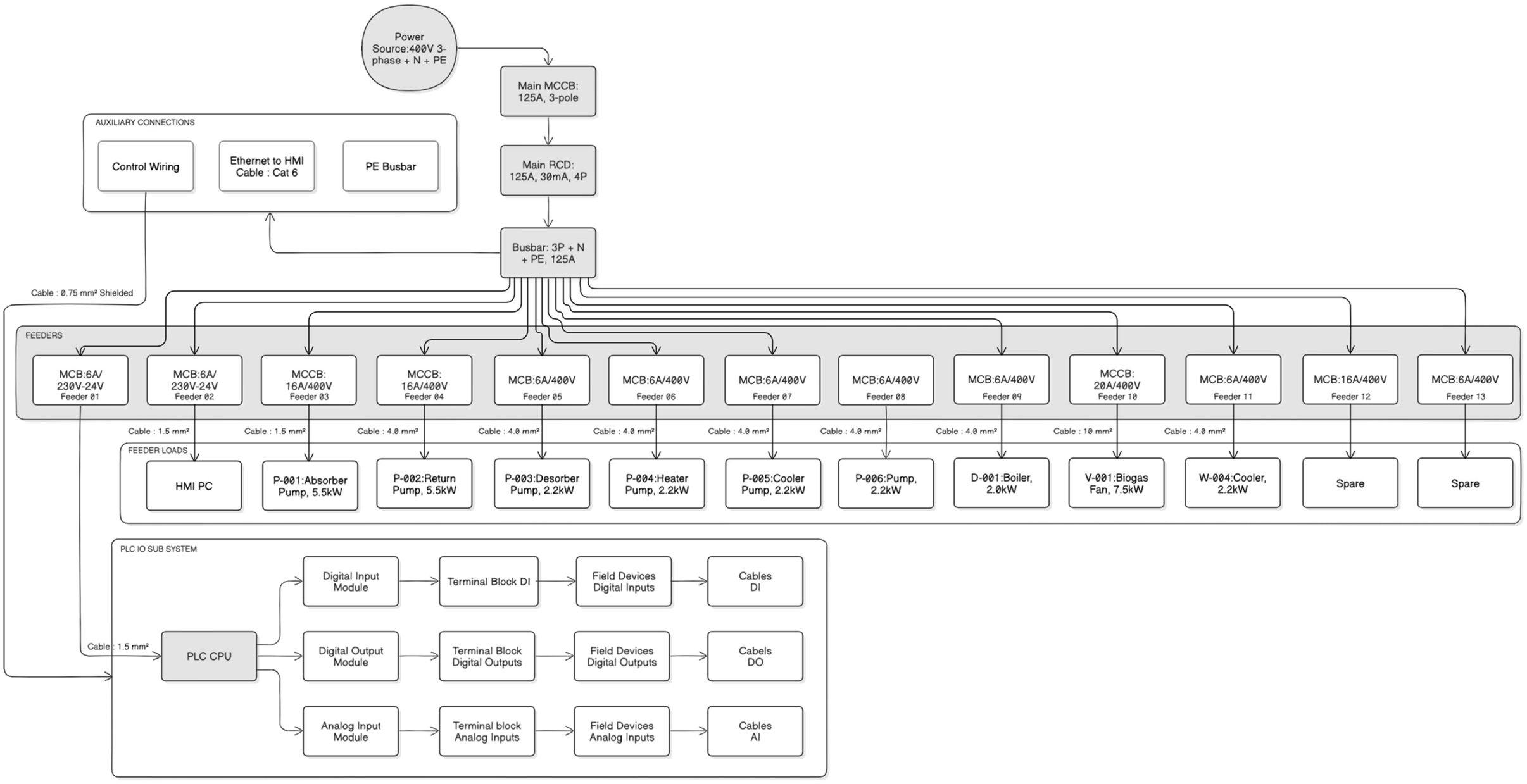
Main Electrical and PLC Distribution System for the Amine Stripper

23/06/2025

1. Distribution Daigram



2. Structure

2.1 Main Distribution Board (MDB):

- Incoming Supply: 400V 3-phase + N + PE from the mains.
- Main MCCB: 125A, 3-pole, type B.
- Main RCD: 125A, 30mA, 4-pole.
- Busbars: 3-phase + N + PE, 125A.

2.2 Feeder Circuits:

- **Feeder 1: PLC Power Supply:**
  - MCB: 6A, 1-pole + N, type C.
  - Cable: 1.5 mm^2 Cu, 3-core (L, N, PE), PVC insulated.
  - PSU Output: 24V DC, 5A, connected to the PLC CPU315-2 via a 1.5 mm^2 2-core cable.
- **Feeder 2: HMI Power Supply:**
  - MCB: 6A, 1-pole + N, type C.
  - Cable: 1.5 mm^2 Cu, 3-core (L, N, PE), PVC insulated.
  - PSU Output: 24V DC, 5A, connected to the HMI PC via a 1.5 mm^2 2-core cable.
- **Feeder 3: P-001 (Absorber Pump):**
  - MCCB: 16A, 3-pole, type C.
  - Cable: 4 mm^2 Cu, 4-core (L1, L2, L3, PE), routed to P-001 motor starter.
- **Feeder 4: P-002 (Return Pump):**
  - MCCB: 16A, 3-pole, type C.
  - Cable: 4 mm^2 Cu, 4-core, routed to P-002 motor starter.
- **Feeder 5: P-003 (Desorber Pump):**
  - MCB: 6A, 3-pole, type C.
  - Cable: 4 mm^2 Cu, 4-core, routed to P-003 motor starter.
- **Feeder 6: P-004 (Heater Pump):**
  - MCB: 6A, 3-pole, type C.
  - Cable: 4 mm^2 Cu, 4-core, routed to P-004 motor starter.
- **Feeder 7: P-005 (Cooler Pump):**
  - MCB: 6A, 3-pole, type C.
  - Cable: 4 mm^2 Cu, 4-core, routed to P-005 motor starter.
- **Feeder 8: P-008 (Pump):**
  - MCB: 6A, 3-pole, type C.
  - Cable: 4 mm^2 Cu, 4-core, routed to P-005 motor starter.
- **Feeder 9: D-001 (Boiler):**
  - MCB: 6A, 3-pole, type C.
  - Cable: 4 mm^2 Cu, 4-core, routed to D-001 heater control.
- **Feeder 10: V-001 (Biogas Fan):**
  - MCCB: 20A, 3-pole, type C.
  - Cable:10 mm^2 Cu, 4-core, routed to V-001 motor starter.
- **Feeder 11: W-004 (Cooler):**
  - MCB: 6A, 3-pole, type C.
  - Cable: 4 mm^2 Cu, 4-core, routed to W-004 cooler control.
- **Feeder 12 and 13: Spare:**
  - MCB: 16A, 3-pole, type C. Reserved for future load.
  - MCB: 6A, 3-pole, type C. Reserved for future load.

3. Control Wiring:

- PLC I/O Connections: 0.75 mm^2 Cu, shielded twisted pair cables for digital inputs (DI), outputs (DO), and analog inputs (AI), terminated at terminal blocks in the MDB.
- HMI Communication: Ethernet cable (Cat 6) from PLC to HMI.

3.1 PLC Wiring

Digital Inputs (DI) - Connections:

I2.0: Start-Seq1 to Terminal 1-2	I2.6: Stop-Seq3 to terminal 13-14
I2.1: Start-Seq2 to terminal 3-4	I2.7: Stop-Seq4 to terminal 15-16
I2.2: Start-Seq3 to terminal 5-6	I2.8: Reset Alarm-Seq1 to terminal 17-18
I2.3: Start-Seq4 to terminal 7-8	I2.9: Reset Alarm-Seq2 to terminal 19-20
I2.4: Stop-Seq1 to terminal 9-10	I2.10: Reset Alarm-Seq3 to terminal 21-22
I2.5: Stop-Seq2 to terminal 11-12	I2.11: Reset Alarm-Seq4 to terminal 23-24

Shielding: Connected to PE at the PLC end.

Digital Outputs (DO) - Connections:

Q3.0: Valve HA-100 terminal 1-2	Q4.0: Valve HA-115 via terminal 31-32
Q3.1: Valve HA-101 terminal 3-4	Q4.1: Valve HA-116 via terminal 33-34
Q3.2: Valve HA-102 terminal 5-6	Q4.2: Valve HA-117 via terminal 35-36
Q3.3: Valve HA-103 terminal 7-8	Q4.3: Valve HA-118 via terminal 37-38
Q3.4: Valve HA-104 terminal 9-10	Q4.4: Valve HA-119 via terminal 39-40
Q3.5: Valve HA-105 terminal 11-12	Q4.5: Valve HA-120 via terminal 41-42
Q3.6: Valve HA-106 terminal 13-14	Q5.0: P-001 Pump to terminal 43-44
Q3.7: Valve HA-107 terminal 15-16	Q5.1: P-002 Pump to terminal 45-46
Q3.8: Valve HA-108 via terminal 17-18	Q5.2: P-003 Pump to terminal 47-48
Q3.9: Valve HA-109 via terminal 19-20	Q5.3: P-004 Pump to terminal 49-50
Q3.10: Valve HA-110 via terminal 21-22	Q5.4: P-005 Pump to terminal 51-52
Q3.11: Valve HA-111 via terminal 23-24	Q5.5: P-006 Pump to terminal 53-54
Q3.12: Valve HA-112 via terminal 25-26	Q5.6: V-001 Fan to terminal 55-56
Q3.13: Valve HA-113 via terminal 27-28	Q5.7: W-001 Cooler to terminal 57-58
Q3.14: Valve HA-114 via terminal 29-30	Q6.0: D-001 Boiler to terminal 59-60

Shielding: Connected to PE at the PLC end.

Analog Inputs (AI) – Connections:

IW200: LT-001 Level (LT) to terminal 1-2	IW208: CH4_Sensor to terminal 9-10
IW202: LT-003 Level to terminal 3-4	IW210: Temp_Des to terminal 11-12
IW204: LI-001 Absorber to terminal 5-6	IW212: Temp_Ab to terminal 13-14
IW206: LI-002 Desorber to terminal 7-8	

Shielding: Connected to PE at the PLC end, isolated at the sensor end.

4. Standards

- **Cable Selection**: Based on IEC 60364.
- **Wiring**: Use PVC-insulated cables in conduit, confirms to EN 50265.
- **Termination**: Crimp lugs and terminal blocks - EN 60947.
- **Labeling**: All circuits labeled per EN 60446.
- **Safety**: Install emergency stop buttons per EN 60204-1.