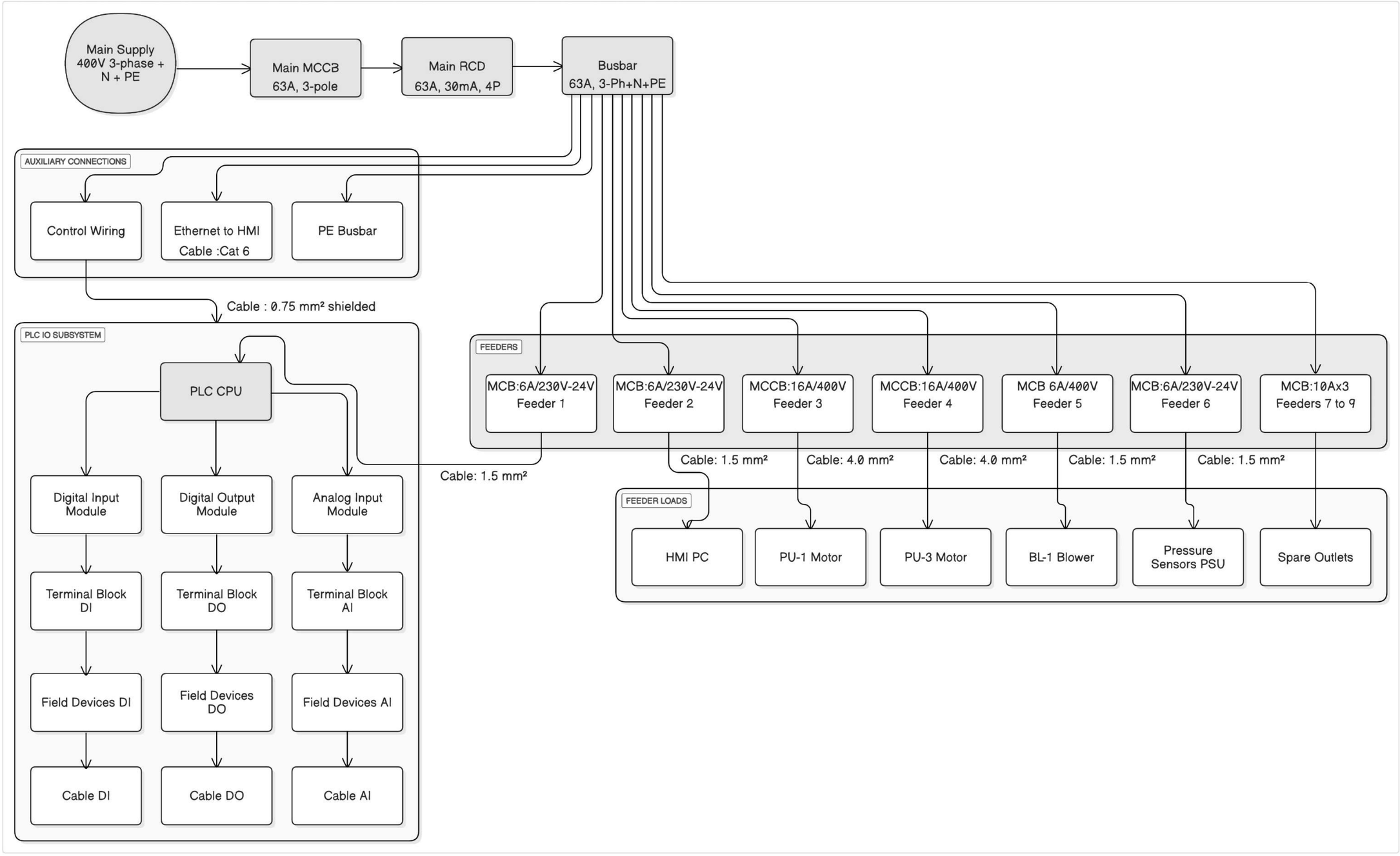
Main Electrical and PLC Distribution System for the Slope Bottom Reactor

1. Distribution Daigram



2. Structure

2.1 Main Distribution Board (MDB):

- **Incoming Supply**: 400V 3-phase + N + PE from the mains.
- **Main MCCB**: 63A, 3-pole, type B
- **Main RCD**: 63A, 30mA / 4-pole
- **Busbars**: 3-phase + N + PE / 63A.

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 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 via a 1.5 mm^2 2-core cable.
- **Feeder 3: PU-1 (Pump)**:
  - MCCB: 16A, 3-pole, type C.
  - RCD: 16A, 30mA, 4-pole (optional).
  - Cable: 4 mm^2 Cu, 4-core (L1, L2, L3, PE), routed to PU-1 motor starter.
- **Feeder 4: PU-3 (Pump)**:
  - MCCB: 16A, 3-pole, type C.
  - RCD: 16A, 30mA, 4-pole (optional).
  - Cable: 4 mm^2 Cu, 4-core, routed to PU-3 motor starter.
- **Feeder 5: BL-1 (Blower)**:
  - MCB: 6A, 3-pole, type C.
  - Cable: 1.5 mm^2 Cu, 4-core, routed to BL-1 motor starter.
- **Feeder 6: Pressure Sensor 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, 5-10A, connected to the PS via a 1.5 mm^2 2-core cable.
- **Feeder 7-9: Spare MCBs**:
  - Three spare MCBs: 10A, 3-pole, type C, for future loads.

3. Control Wiring:

- **PLC I/O Connections**: 0.75 mm^2 Cu, shielded twisted pair cables for digital inputs (I0.0-I1.0), outputs (Q0.0-Q2.0), and analog inputs (IW100-IW114), 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:

I0.0: Start_2_1 (push button) to terminal 1-2	I0.6: Start_2_7 to terminal 13-14
I0.1: Start_2_2 (push button) to terminal 3-4	I0.7: Start_2_8 to terminal 15-16
I0.2: Start_2_3 to terminal 5-6	I0.8: Start_2_9 to terminal 17-18
I0.3: Start_2_4 to terminal 7-8	I0.9: Stop_2_9 to terminal 19-20
I0.4: Start_2_5 to terminal 9-10	I1.0: Doors_Closed (limit switch) to terminal 21-22
I0.5: Start_2_6 to terminal 11-12	

Shielding: Connected to PE at the PLC end.

Digital Outputs (DO) - Connections:

Q0.0: PU-1 (to motor starter coil) via terminal 1-2	Q1.1: MV-12 via terminal 23-24
Q0.1: PU-3 (to motor starter coil) via terminal 3-4	Q1.2: MV-13 via terminal 25-26
Q0.2: BL-1 (to blower starter coil) to terminal 5-6	Q1.3: MV-14 via terminal 27-28
Q0.3: MV-4 (to valve actuator) to terminal 7-8	Q1.4: MV-15 via terminal 29-30
Q0.4: MV-5 to terminal 9-10	Q1.5: MV-19 via terminal 31-32
Q0.5: MV-6_Close via terminal 11-12	Q1.6: MV-20_DV01 via terminal 33-34
Q0.6: MV-7 via terminal 13-14	Q1.7: MV-20_LCV01 via terminal 35-36
Q0.7: MV-8 via terminal 15-16	Q1.8: MV-22 via terminal 37-38
Q0.8: MV-9 via terminal 17-18	Q1.9: AV-3 via terminal 39-40
Q0.9: MV-10 via terminal 19-20	Q2.0: AV-4 via terminal 41-42
Q1.0: MV-11 via terminal 21-22	

Shielding: Connected to PE at the PLC end.

Analog Inputs (AI) – Connections:

IW100: LE-1 (level transmitter) terminal 1-2	IW108: GE3 (gas sensor) terminal 9-10
IW102: LE-2 terminal 3-4	IW110: GE4 terminal 11-12
IW104: LE-3 terminal 5-6	IW112: TE12 (temperature sensor) terminal 13-14
IW106: PE-9 (pressure transmitter) terminal 7-8	IW114: TE16 terminal 15-16

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.