

**PART 3**

**PLC CONTROL AND PLC ELECTRICAL SPECIFICATIONS**

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### **PART 3 – PLC CONTROL AND PLC ELECTRICAL SPECIFICATIONS**

The Contractor will be required to submit to the Company the detailed specifications of the control system 2 months after contract award.

#### 1. CONTROL SYSTEM

##### 1.1 FUNCTION

The control system consists of all PLC programs and logic including hardware circuits which controls all movement of conveyors, scissor lifts etc. The programs will work with sensors, switches, joystick etc as inputs and the outputs will to the motors and other output devices. A EPROM on the PLC for uploading and downloading of all PLC programs should be installed on the PLC.

##### 1.2 Powered Conveyor System

The conveyor system will be a manual system which is operator driven. An operator will operate the joystick at the conveyors and scissor lifts.

##### 1.3 PLC Program

The components of the PLC hardware shall basically be identical for the function groups. The software components eg programming modules for communication for transport, to drives weight measurement shall be identical for all systems and functional groups. Program and structure shall correspond to sequence of conveyor design and operation. The application shall be programmed in blocks. The transport of ULDs/pallets shall be accomplished without stops or delays. Where additional steps are required to improve reliability of equipment or safety this should be included.

##### 1.4 For all cases there must be line of sight from OCP/maintenance panel to the deck/lift being controlled

#### 2. PLC ELECTRICAL

The field modules such as the terminal blocks shall be mounted in junction boxes which are splash proof. The junction boxes should be easily accessible. Provision should be made for easy expansion.

The PLCs shall be located in the main control panel. Power supply to the PLC should be filtered to ensure incoming power to the PLC is 'clean'. The door of the panel shall be lockable. An isolator switch shall be provided in front of the panel.

##### 2.1 Other Electrical Equipment

The following information shall be provided in the tender.

- a. Motor Controls used
- b. Brake controls
- c. Electrical Capacity requirements for the MHS (kW)
- d. Text-indication, displays, lamps, etc. if any.

3. MODES OF OPERATION

3.2 There should be two modes of operation for the conveyor/workstation.

- a. Maintenance Mode
- a. Manual Mode

3.3 There should be two modes of operation for the cold room

- a. Maintenance Mode
- b. Manual Mode

3.4 There should be two modes of operation for the dolly interface conveyor

- a. Maintenance Mode
- b. Manual Mode

3.7 For all of the above there should be an Off mode to switch off all operation of moving equipment

4. OPERATOR CONTROL PANELS

4.1 OCP for airside dolly interface (Dolly Side)

Each conveyor deck shall be equipped with one OCP, located besides the deck. The OCP shall be installed in a safe location, away from ULD and dolly traffic, as well as providing sufficient space for operator to operate the panel safely without interference to ULD and dolly movement. Sufficient clearance must be given for dolly traffic carrying AAU-type of ULDs. The deck sensors or other sensors should be able to detect the length of the ULD so that they are stored properly and not caused a clash of the ULDs in the storage lanes during operations.

The OCP shall include at a minimum but not limited to the following functions/buttons:

- a. Emergency Stop button – Mushroom-shaped push button with integral light
- b. Emergency Stop indicator lamp
- c. Overload indicator lamp
- d. Lamp Test push button
- e. Start button – Illuminated push button (to restart after E Stop is pressed)
- g. “MANUAL” and “MAINTENANCE” mode indicator lamps

- i. "GO/REMOVE" – illuminated push button to convey ULD into/out of conveyor deck
- j. "ALIGN ULD" illuminated push button to allow alignment of ULD (adjacent to dolly) by conveying ULD against deck stop.
- k. "Convey" button to move ULD
- l. Key switch for On/Off

#### 4.1.2 OCP for airside dolly interface (Castor Deck Side)

Each conveyor deck shall be equipped with one OCP, located besides the deck. The OCP shall be installed in a safe location, away from ULD and dolly traffic, as well as providing sufficient space for operator to operate the panel safely without interference to ULD and dolly movement. Sufficient clearance must be given for dolly traffic carrying AAU-type of ULDs. The deck sensors or other sensors should be able to detect the leading edge of the ULD when pushed from the castor deck .

The OCP shall include at a minimum but not limited to the following functions/buttons:

- a. Emergency Stop button – Mushroom-shaped push button with integral light
- b. Emergency Stop indicator lamp
- c. Overload indicator lamp
- d. Lamp Test push button
- e. Start button – Illuminated push button
- g. "MANUAL" and "MAINTENANCE" mode indicator lamps
- m. "Convey" button to move the deck

#### 4.2 OCPs for coldroom (Dolly end)

One OCP per cold room at a height which is convenient for the operator. This OCP shall include at a minimum but not limited to the following functions/buttons:

- a. Emergency Stop button – Mushroom-shaped push button with integral light
- b. Emergency Stop indicator lamp
- c. Overload indicator lamp
- d. "IN OPN" and "MAINTENANCE" mode indicator lamps
- e. "DOOR OPEN" and "DOOR CLOSE" illuminated push buttons to control the opening and closing of the coldroom door
- f. Lamp Test Button
- g. "GO/REMOVE" – illuminated push button to convey ULD into/out of conveyor deck
- h. "ALIGN ULD" illuminated push button to allow alignment of ULD (adjacent to edge) by conveying ULD against deck stop.
- i. A key switch to select Off Mode
- j. "Convey" joystick to move ULD to next deck
- k. On/ Selector Switch (independent of main control panel)

4.3 OCP for workstation/scissor lift/lowerable roller deck and interface conveyor

Movement of ULD along the roller decks shall be controlled by joystick. .

- a. Emergency Stop button – Mushroom-shaped push button with integral light
- b. Emergency Stop indicator lamp
- c. “Overload” indicator lamp
- d. Lamp Test illuminated push button
- e. Start button – Illuminated push button
- f. “Manual” and “Maintenance” mode indicator lamps
- g. “Convey” joystick to move ULD to next deck
- h. Up/Down Button
- i. Home and Floor Level Selection
- j. On/Off Key switch for that group of roller decks
- k. Start Button to restart after E Stop is pressed

5. MAINTENANCE CONTROL PANEL REQUIREMENTS

- 5.1 All maintenance control panel functions shall be designed with priority given to easy and safe maintainability of the equipment subgroup it is controlling.
- 5.2 The maintenance control panels can be mounted outside the doors of Motor Control Panels whenever possible and in line with the specifications herewith.
- 5.3 At a minimum, the maintenance control panels shall provide the following functions, subject to Company’s approval:
  - a. Maintenance mode
  - b. Emergency Stop button – Mushroom-shaped push button with integral light
  - c. Emergency Stop indicator lamp
  - d. “Motor Overload” indicator lamp
  - e. Lamp Test illuminated push button
  - f. Start button – Illuminated push button
  - g. “POWER-ON-OFF” 2-way key selector switch
  - h. “Mode Status ( Manual etc)” and “MAINTENANCE” mode indicator lamps
  - i. 2-way selector key switch for selection of “MANUAL” and “MAINTENANCE” mode
  - j. Control switches and/or buttons for stops, motors and pumps, etc, as per Contractors design
  - k. Various status indicator lamps, e.g. stop status, vertical positions (for TV & lowerable decks), etc, as per Contractor’s design
  - l. Lamp test button
- 5.5 Maintenance Control panels shall be provided for the control of all decks, motors bypassing sensors and safety circuits unless it is not desirable to do so because of danger to personnel. Provision should be made to operated the decks, hoist the platform and move the ULD in maintenance mode from the cabin.