# Silo Simulator

A computer screen shot of a machine

Description automatically generated

## I/O Specifications

Inputs

|  |  |  |  |
| --- | --- | --- | --- |
| Name | Address | Type | Description |
| Button\_START | I:1/0 | Monostable NO | This button when pressed start the conveyor |
| Button\_STOP | I:1/1 | Monostable NC | This button when pressed stops the conveyor |
| Prox\_Sensor\_ON | I:1/3 | Sensor NC | This sensor marks if the box is in position |
| Level\_Sensor | I:1/4 | Sensor NC | This sensor when open marks a box being full |

Outputs

|  |  |  |  |
| --- | --- | --- | --- |
| Name | Address | Type | Description |
| Motor\_ON | O:2/0 | Motor Control Forward | This motor moves the belt forward |
| Valve\_Open | O:2/1 | Solenoid NC | This valve closes and open |
| Run\_LED\_ON | O:2/2 | Signal Lamp 24V | This is a lamp that works when the conveyor is working |
| Fill\_LED\_ON | O:2/3 | Signal Lamp 24V | This is a lamp that indicates when the box is being filled |
| Full\_LED\_ON | O:2/4 | Signal Lamp 24V | This is a lamp that indicates the box being full |

## Process description

The conveyor belt in this case will meet the following criteria:

* The buttons START and STOP are used to respectively stop and start the conveyor belt.
* The button STOP has an immediate interruption of the belt movement. After the interruption, the conveyor can be started again, by pressing the START button.
* The Proximity and Level sensor will regulate the movement of the box on the belt. If the Proximity sensor is on, then the box will stop in the marked place.
* The Signal lamps indicate the state of the belt (Run\_LED), and the box state (Fill\_LED; Full\_LED).
* The Solenoid valve will open once the Proximity sensor is on and remain open while the Level sensor is not triggered.

The following critical conditions will be taken into account:

* The conveyor may never move in both directions at the same time.
* The conveyor may never be stopped and started at the same time.

## Program

A screenshot of a computer

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## Safety / Security concerns

* In case that the Proximity sensor stops working, the conveyor will keep on running and the boxes will be empty all the time.
* In case of malfunction of the Level sensor, the boxes might get overfilled causing problems during production.
* Manipulation of the memory values might disrupt the work of filling system.
* Malfunction of Run\_LED might disrupt the opening/closing of the solenoid valve.
* In case of Full\_LED, the solenoid valve might not get closed, once the box was filled.
* In case of the STOP button malfunction, the conveyor will not be able to stop.
* In case of Motor malfunction, the conveyor will not be able to move the boxes.