**Exercise 4. Write a program in LAD (and optional IL) in the FX program for the following example.**

**Part Separation**

|  |  |
| --- | --- |
| Category | E: |
| Exercise | E-4. Drilling |
| Objective | Control the drill and other devices. |

**Training Screen**

Graphical user interface

Description automatically generated

**Device Assignment**

|  |  |  |  |
| --- | --- | --- | --- |
| **Type** | **Device No.** | **Device name** | **Operation** |
| Input | X24 | Start NO | Start all system |
| X25 | Stop NC | Stop all system |
| X0 | Drilling | ON while drilling. |
| X1 | Part under drill | ON when part is under the drill. |
| X2 | Drilled correctly | ON when part is drilled correctly. Previous result is cleared when drilling starts. |
| X3 | Drilled wrong | ON when part is not drilled correctly. Previous result is cleared when drilling starts. |
| X5 | Sensor | ON when part is detected at the right end. |
|  | X21, | Error Sensor | Stop system |
|  | X22 | Error Sensor | Stop system |
|  | X23 | Error resset buton | resset system |
| Output | Y0 | Supply command | One part is supplied when Y0 is ON. A process cycle begins: Large metal cube. |
| Y1 | Conveyor forward | Conveyor moves forward when Y1 is ON. |
| Y2 | Start drilling | Starts drilling when Y2 is ON (A process cycle that cannot be stopped partway). |
| Y20 | lamp | Indicated error of system |

**Control Objective**

Drill holes in parts supplied from the hopper.

**Control Specifications**

1) When [SW1] (X24) on the operation panel is turned ON, system.

When [SW1] (X25) is turned ON, the system stop.

Store them in internal relay M100 and use them in all Outputs

2) When [PB1] (X20) on the operation panel is pressed, **Supply command** (Y0) for the hopper is turned ON.

When [PB1] (X20) is released, **Supply command** (Y0) is turned OFF. When **Supply command** (Y0) is turned ON, the hopper supplies a part.

2) When [SW1] (X20) on the operation panel is turned ON, the conveyor moves forward.

**Control of drill**

1) When the sensor for **Part under drill** (X1) in the drill is turned ON, the conveyor stops.

2) When **Start drilling** (Y2) is turned ON, the drilling starts.

**Start drilling** (Y2) is turned OFF when **Drilling** (X0) is set ON.

3) When **Start drilling** (Y2) is turned ON, either **Drilled correctly** (X2) or **Drilled wrong** (X3)

is set ON after the drill machine has operated for one complete cycle. (The drill cannot be stopped in the middle of an operation.)

4) After **Drilled correctly** (X2) or **Drilled wrong** (X3) is confirmed, the work is carried and put on the tray at the right.

When multiple holes are drilled, **Drilled wrong** (X3) is set ON. In this exercise no specified

control for scrap parts exists.

**Control of error**

Store errors caused by sensor X20 or sensor X21 in an internal memory M101. When there is an error, the Y20 LED lights up and every process stops immediately until the error resset. Errors are resset with button X22.