Missing Bucket Detector for Bucket Elevator

SMARTsaa Instruments I Pvt Ltd has developed Missing Bucket Detector for Bucket Elevator.
These sensors find application on bucket elevator to detect missing buckets. As the bucket elevator speed is constant the time gap between two passing bucket is also constant.
Extended range proximity sensors are mounted on the side of the casing. The bucket when passes in front of the sensor a pulse is generated.
The sensor gives command to a pulse evaluation circuit. When the time between two passing buckets exceeds a control action is generated.

Specification:

Sensor:

- Supply: 10-30 V DC
- O/P: PNP or NPN, NO + NC
- Load current: 200 mA
- Size: Rectangular Block type with mounting bracket and gasket
- Object sensed: Any Ferromagnetic minimum size 150 x 150 x 2 mm
- Sensing Range: Up to 50 mm(effective 40 mm), 80 mm(Effective 50 mm), 120 mm(Effective 100 mm)
- Max operating frequency: 100 Hz
- Operating Temp: 70 degree cent
- Enclosure: ABS Plastic, IP 67

Control Unit:

- Supply: 230 V AC
- O/P: 2 C/O Relay Contact for field Mounting / 1 C/O relay contact for Panel Mounting
- Contact rating : 5 Amp resistive at 230 V AC
- Enclosure: Cat Al , IP 65 / IP 30 Panel Mounting 48 x 96 size
- With pulse gap adjustment potentiometer

OPERATING LOGIC:

The Sensors senses the bucket and when bucket passes in front of sensor, a pulse is generated. This pulse is fed to control unit. The control unit measures time gap between the bucket and when the time gap exceeds set value, the relay actuates.
Relay -On Time: After actuation, the relay will remain OFF for time set.
Relay –On Time range: 0-999 m Sec adjustable.

The signal latching circuit is to be designed by customer at PLC or Panel end.

After this delay, if controller start receiving pulses at desired interval, the relay gets ON.

Design Criteria: As given by you

No Of Buckets Passing in front of sensor per second	: 3- 4
Normal Time Gap between two buckets	: 332 m Sec - 250 m Sec
Settable time Gap range	: 0-999 m Sec

ITD: Initial Bypass Time Delay: Range 0-999 m Sec. This delay will come in picture when the controller is powered.
As initially when Bucket Elevator is given supply, it is at standstill. This ITD will allow the bucket elevator to achieve normal speed.
You need to design control circuit such that, when bucket elevator is Powered ON, Missing Bucket Detector gets power simultaneously.

SETTINGS:

Three Time Settings:

1. Initial Time Delay 0-9.999 m Sec, Required to bypass the controller while starting the elevator

2. Gap Time: 0-9.999 m Sec. To set the gap time between two passing buckets. As we are setting this time in m Sec your bucket elevator should also run fairly at specified designed RPM. If due to overload the bucket speed drops and gap time gets increased and crosses the limit, the relay will drop, tripping the bucket elevator.
   Note:
   a. This setting is very critical as for 4 buckets / sec speed the gap time is ideally 0.250 Sec. If by oversight, operator sets this time more than 0.500 Sec, single missing bucket condition cannot be detected.
   b. As O/P device is electromechanical relay, takes approx. 30 m Sec for actuation.

3. Trip Delay Time (to keep relay off after Monitor is tripped): 0- 9.999 m Sec. When the gap time increase, the relay will actuate. The relay will remain off for specified time set by Trip Delay Timer. Customer need to latch the signal at PLC end if he want to trip the bucket elevator. After this time the relay will get ON if bucket are moving and pulses are coming to controller.

4. Password: As the settings are critical, delay time entry is possible only by entering password.



Sensor



Controller-Polycarbonate Housing



Controller- Field Mounting

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