



Silo Safety Instructions – JJR Ready Mix Ltd

The silo safety system has been developed to ensure the safe filling of storage silos that are refilled using tanker and blower systems.

It uses a Smart Logic Controller (SLC) to control the filling process whilst monitoring the status of the safety equipment.

The system is run from the silo operator panel using illuminated switches and indicator lights.

The system can normally be retro fitted to any silo which has:

- Silo fill pipe Butterfly Shut Off Valve
- Silo Filter
- Silo High Level Indicator with fault signal
- 355 Pressure Relief Valve (PRV)

The system comprises of:

- Silo fill pipe shut off valve with spring return mechanism.
- Silo High Level Indicator with fault signal.
- Pressure Relief Valve.
- IPE Diaphragm Pressure Switch
- Silo Filter
- Air Supply Pressure Switch.
- Klaxon Alarm
- Silo Safety Control Panel

Filling Procedure:

1. Press and hold the “LAMP TEST” button for a minimum of 3 seconds. This energises the illuminated switches, the indicator lights, and the sounder beacon (giving both a visual and a sound alarm).
2. The operator checks that all the Push button Switches and indicator lights have illuminated, and the sounder beacon is operating. The “FILTER START” button should then be pressed, it will illuminate.
3. When the “FILTER START” button is pressed the system checks all the safety inputs in preparation for filling. The green light on the panel will illuminate to show the system is operating correctly. The silo fill pipe valve will open, and the fill pipe open indicator light will illuminate. The fill valve will remain open for a maximum of 45 minutes from this time provided the FILTER STOP button is not pressed or there is a system fault.
4. Filling of the silo can proceed.
5. When filling is complete the operator should press the “FILTER STOP” button to close the silo fill pipe valve.
6. Filter cleaning will run for a further 10 minutes.

Trouble Shooting:

1. If a high-level incident takes place the warning sounder will energise, and the beacon will illuminate to alert the operator to stop filling. The red indicator light on the panel will become illuminated and the fill pipe valve will close in 45 seconds.
2. When the fill pipe valve closes due to a high-level incident it will not open until the level of the material in the silo falls below the high-level limit, the red silo high level lamp will also remain lit.

3. The following incidents will cause IMMEDIATE closure of the fill pipe valve and the warning sounder beacon will energise.

- Either the Pressure Relief Valve or the Silo Pressure Switch is activated.
- Low Air Pressure signal.
- High Level Indicator fault.

If a fault or faults occur the relevant illuminated switches and/ or indicator lights will light up red and stay red until the fault is cleared. The pressure relief fault and silo high pressure fault sensors need to be reset by resetting the “SILO RESET SWITCH” switch.

The difference between the faults can be identified on the operator panel by the following:

- Constant red light. Silo high pressure fault.
- Flashing red light. Silo pressure relief fault.

Silo high level alarm:

The high-level Indicator has a motor driven paddle shaft which extends down into the silo.

When the paddle encounters the material in the silo it stops turning.

The motor exerts pressure against the paddle which activates the monitoring switches to give a high-level alarm signal.

This signal will sound the alarm for 45 seconds before closing the silo fill pipe valve.

This 45 second delay is to allow the operator enough time to stop filling and uncouple the fill pipe.

The level indicator also has a “sensor healthy signal” which feeds into the system.

If the indicator develops a fault the system will shut down immediately.

The Silo High Level Indicator Fault lamp will light.

PRV activated:

If the silo becomes pressurised the PRV valve will operate giving a high-pressure signal to the SLC.

The fill valve will close immediately.

Probable causes:

- The fill rate is too fast. Clear the alarm and start to fill again at a slower rate.
- The silo filter has become clogged. Check and clean the filter before restarting the filling procedure.

SYSTEM CHECKS:**ONCE MONTHLY OR PRIOR TO DELIVERY**

For correct operation by a competent member of staff.

The checks required are as follows:

1. All the illuminated switches and the indicator lights and are operating correctly.
2. Sounder beacon is operating correctly.
3. Silo shut off valve is opening and closing correctly.
4. High level indicator is operating and giving a high-level alarm when stopped and closing the fill shut off valve after 45 Seconds of alarm.
5. PRV proximity switch is operating when PRV valve is manually lifted, sounding the alarm, and shutting the fill valve immediately.
6. IPE Diaphragm Pressure Switch.

Key points to Remember:

1. The fill pipe shut off valve is spring activated; it is normally closed. It will only open when there are no faults on the system.
2. If the filter is blocked, the silo will pressurise, and the PRV/High pressure sensor will activate closing the silo fill pipe.
3. If the air supply is off or the pressure low the silo fill pipe valve will not open.
4. If the electrical supply is interrupted the silo fill pipe valve will not open.
5. If the electrical supply is interrupted whilst the silo is being filled the fill pipe valve will close.
6. If any one of the silo safety components fails the silo fill pipe valve will not open.
7. If the silo fill pipe valve does not open, the silo cannot be over-filled or over-pressurised.