



## SILO PROTECTION SYSTEMS

HYCONTROL LIMITED, Larchwood House, Orchard Street,  
Redditch, Worcestershire, B98 7DP,  
Tel : 01527 406800 Fax : 01527 406810  
Email : [sales@hycontrol.com](mailto:sales@hycontrol.com) Website : [www.hycontrol.com](http://www.hycontrol.com)

# **SILO PROTECTION PANEL SPECIFICATION**

## **HYCDP500A**

*Silo protection is required to overcome the problems of overflow and over pressurisation of a storage silo during the pneumatic delivery of powder or dry bulk products such as cement.*

*The panel HYCDP500A is designed to be used in conjunction with four other items which, in total, provide the silo protection system.*

*The primary elements are :*

- Pressure sensor FLEX 500*
- High Level sensor ME11series*
- Pressure relief valve*
- Continuous level gauge*

*Optional equipment :*

- Fill pipe lock off*
- Fill pipe shut off valve*

*This panel will monitor the pressure while filling the silo and give a continuous measurement of contents as well as an ultimate high level alarm. Both the level and pressure sensors are used to initiate audio / visual alarms and if the optional shut off valve is used, shut off the inlet to the silo. The ability to delay closure of the valve from a high level condition is also included.*

### **Display Panel mechanical configuration:**

*IP65 GRP enclosure suitable for mounting outdoors.*

*Multi tone siren (IP65) mounted on the panel side.*

*Large flashing alarm beacon mounted on top of the panel.*

*Supply voltage 110v or 230 v 50 hz (for alternative options please ask).*

*Large bar graph and numeric 4 digit display of silo pressure.*

*Large bar graph and numeric 4 digit display of silo continuous level.*

*IP65 protection cover for bar graph display.*

*Key operated silo enable switch for authorised personnel only.*

*Key operated switch for authorised personnel to mute and acknowledge alarm condition if reached.*

*Integral panel heater for frost protection*

*Ground level test facility for level sensor.*

*Ground level test facility for pressure sensor (see note 1)*

*Indicator warning lamps to show :*

- Level sensor fault*
- Pressure sensor fault*
- High level alarm*
- High pressure alarm*
- Power to panel*
- Ok to fill condition*
- Early high level warning*

## SILO PROTECTION PANEL HYCDPS500A



### Note

*The above panel is a standard layout that has been designed for operators to view the important parameters when filling a silo. The use of high visibility large LEDS and full 101segment bar graph indicators mean it can be seen clearly at a glance if either the level or pressure is in a high condition.*

## **Note**

1. *There are many silo protection systems available on the market but none that can carry out a true **ground level test (GLT)** of the silo pressure sensor, which it could be argued is the most important sensing element of the system. Hycontrol is the only company which can test the sensor over its full operating range, clean the sensor, test the output integrity and also confirm if the air to the filters is on (see silo protection brochure).*
2. *The panel configuration and display is designed to be simple to read and simple to operate using the simple flow diagram attached.*
3. *Other panel options are available if required please consult Hycontrol for further information.*
4. *This panel and associated equipment is for use in non-hazardous area locations only. For ATEX certified equipment consult Hycontrol Ltd.*

## **HYCDPS500A PANEL OPERATING PROCEDURE**

The system is designed to provide a safe and practical solution to the risk of over filling or over pressurising a silo, during a delivery from a road tanker.

The procedure for receiving a delivery is detailed below.

On arrival the tanker driver reports to the site person responsible.

The appropriate silo's panel is activated using a key. Without this key the valve in the discharge pipe will not be capable of opening and no delivery will be possible.

Once the key has activated the panel, and no alarms are in operation, the driver must press the GROUND LEVEL TEST button and release it.

The High Level and High Pressure Alarm lamps and the siren should be active for 5 seconds after the Sensor Test button has been pressed. If the sensors pass the Test the White "Ready to Fill" lamp will be illuminated, indicating that the discharge valve has opened and delivery can proceed.

If either the Level or Pressure sensor fail the test then the appropriate Sensor Fault lamp will be on and the Ready to Fill lamp will be off.

If the Level Sensor has failed the test, the Sensor Fault lamp will be flashing.

If the Pressure Sensor has failed the test, the Sensor Fault lamp will be on permanently or flashing depending upon the reason for failure.

Refer to the instruction manual for details on Troubleshooting and Fault finding. It will be necessary to determine the reason for failure and rectify it before the delivery can proceed.

Reset the system using the key switch and start the procedure again.

If the Ready to Fill lamp is illuminated, the delivery can proceed.

If a High Level condition is reached, the High Level lamp will illuminate, the siren will sound and the Red beacon will flash. A countdown timer will close the discharge valve after 30 seconds, giving the driver time to cease filling and clear down his line. The siren can be muted using a key held by the site personnel. The High Alarm condition will remain until the level in the silo falls.

If a High Pressure condition is reached, the High Pressure lamp will illuminate, the siren will sound and the Red beacon will flash. The discharge valve will be closed immediately. The siren can be muted using a key held by site personnel. The High Pressure alarm will stay on until the pressure falls to a safe value.

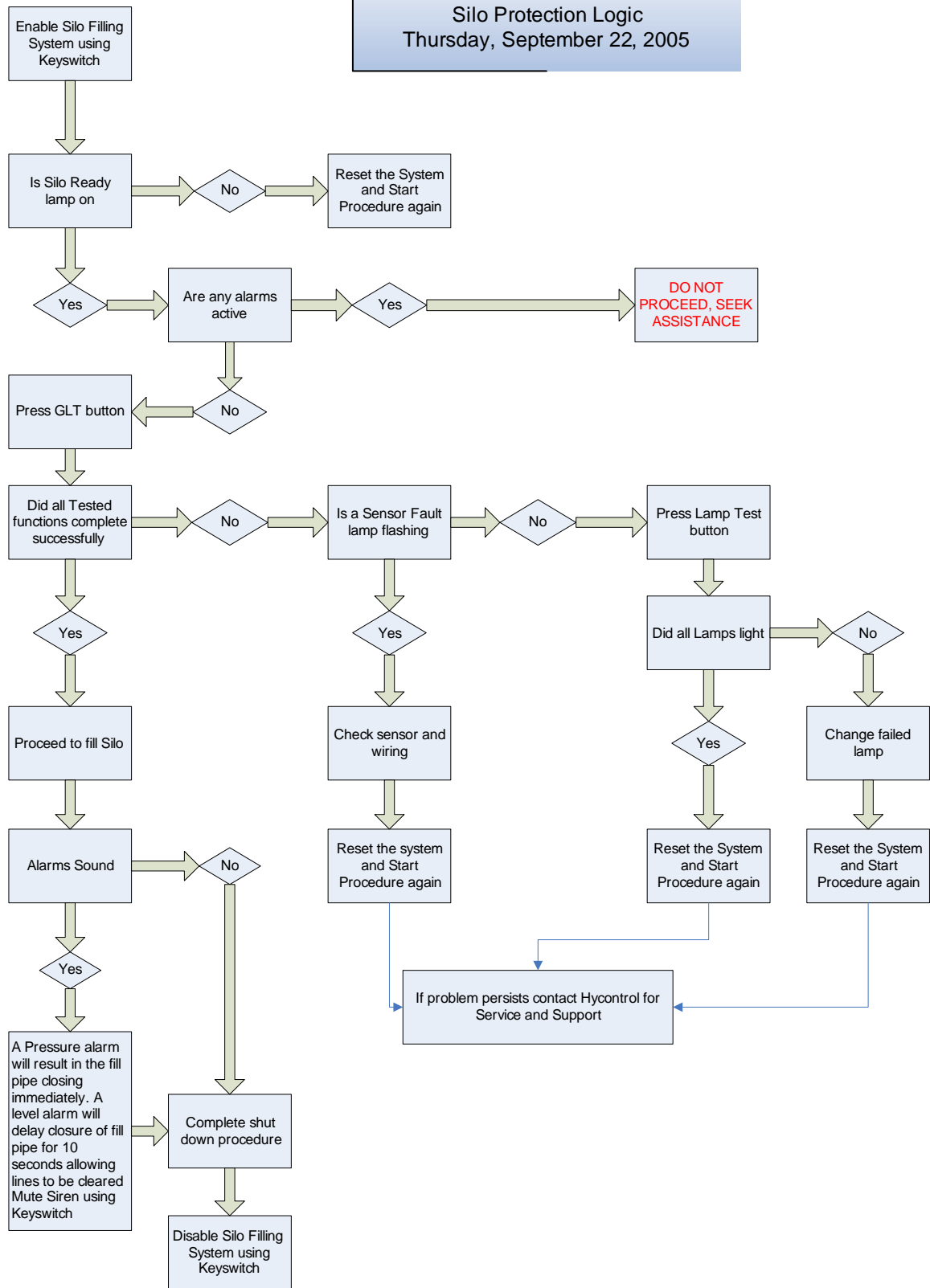
When delivery is completed the system should be disabled by removing the key from the panel. The bar graph showing level and pressure will remain active but no alarms will be enabled and no deliveries will be possible until the panel is activated again using the key.

Any problems contact technical assistance on 01527 406800.

#### Standard protection components

PANEL - HYCDP500A  
HIGH LEVEL PROBE - ME11ADT1000MDG  
PRESSURE SENSOR – FLEX 500  
PRESSURE RELIEF VALVE – PRV350  
(Adaptor may be required POA)  
LEVEL GAUGE TDR  
NORMALLY CLOSED 3" BUTTERFLY VALVE  
NORMALLY CLOSED 4" BUTTERFLY VALVE  
PILOT valve for above  
FILL PIPE LOCK OFF c/w microswitch

## Silo Protection Logic Thursday, September 22, 2005



## Silo protection pressure sensor

### FLEX 500

This sensor monitors the pressure in the silo during fill conditions and transmits a 4-20mA signal back to a control panel to form an essential part of the silo protection system. The unit can be used with a standard Hycontrol silo protection panel or with other manufacturer's equipment capable of powering a 4-20mA transmitter.

The FLEX 500 is unique in that it can be tested while in the silo. A true functional test to guarantee it is working satisfactorily, before a powder delivery takes place can be initiated at the press of a button. The test can detect if the sensor is blocked, damaged or faulty and also completes a self-clean operation every time the button is pressed. As this test utilises the same air as the filters it will also detect if the supply to the filters is not on.

### Performance Specification

Measuring Range	:	0 – 100 mbar (0 – 1000 inches H <sup>2</sup> O)
Accuracy	:	+/- 0.25% full scale
Hysteresis	:	< +/- 0.25% full scale
Repeatability	:	< +/- 0.25% full scale

### Hardware Specification

Sensor power supply	:	24 VDC 2 wire loop powered
GLT power supply	:	110 VAC 50 Hz (24vdc optional)
Air supply for GLT	:	50 psi min 150 psi max (see note 1)
Analogue output	:	4-20 mA
Ambient Temp range	:	-20 to +70 deg C
Enclosure	:	IP67 Robust Glass filled Nylon
Electrical entry	:	M20 x 1.5mm cable entry
Process connection	:	1" BSPP as standard other options available

**FLEX 500 Pressure sensor with ground level test facility to determine if the sensor is damaged, blocked or faulty. It also detects if the air to the filters is on.**



## **SILO PRESSURE RELIEF VALVE**

The PRV350 is a combined pressure and vacuum relief valve and is designed to protect silos from the effects of over pressurisation during either a fill or empty condition.



The Pressure relief valve can exhaust up to 13000m<sup>3</sup> / hour and is available with a wide range of mounting options.

Sized for 13000m<sup>3</sup> / hour outflow

Sized for 5000m<sup>3</sup> / hour inflow

Quick release cover

External springs high tolerance to dust

Fully compliant with HSE guidelines

Suitable for pressures up to 900mm w.g.  
(Standard pressure setting is 500mm w.g.)

Suitable for vacuum up to 250mm w.g.

Stainless steel construction body

EPDM gasket material

Optional proximity switch for under or over-pressure

Optional adaptors available for new and retrofit requirements.



## **SILO HIGH LEVEL WARNING SENSOR**

The prime function of this device is to protect the silo from overfilling and blinding the filters. These are available in a wide range of technologies but the most commonly used is capacitance. This is a universal technology for both liquids and solids and can detect a wide range of products. All Hycontrol level probes incorporate the ground level test function.



The level probe is available in a rigid rod or flexible cable version depending upon the range required.

ME11ADT0250MDG available in lengths up to 1.5m

ME50ADT3000MDG available in lengths up to 3.0m

- Die-cast Aluminium Body/Electrical Housing
- IP65 housing protection
- Screw terminal electrical connection
- 2 x M20 electrical entries
- Failsafe HI / LO Selectable
- Power consumption 2w
- 1" BSP process connection
- Stainless steel and UPE probe
- Probe length variable
- 20 to +80 deg C operating temperature
- 1 SPDT set of contacts. 5A rating at 240Vac or 30Vdc
- Adjustable time delay 0 to 6 seconds
- Integral sensitivity adjustment with adjustment indicator
- Unit in contact with material indicator
- Integral ground level test facility
- 110/220Vac supply voltage