Overfill Protection & Earthing System

Model SLA-S-Y

User Manual

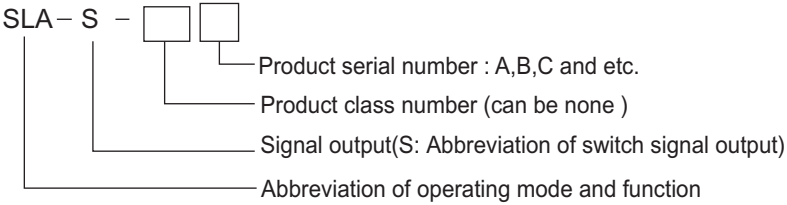
Contents

Foreword

This manual introduces the SLA-S-Y Overfill Protection & Earthing System's working principle, technical specifications, installation, system application and precautions.

The system is explosion-proof and intrinsically safe. Its controller is explosion-proof, the earthing clamp and plug & cable are intrinsically safe parts. The installer, operator and maintenance personnel must have basic knowledge of safety and a general understanding of intrinsically safe electrical equipment when using this product in hazardous areas like oil terminals, gasoline stations and chemical plants. The system meets the general requirements of EN60079-0, EN60079-1 and EN60079-11 for intrinsically safe circuit boards and electric equipments.

Model no. naming rule:



E.g. SLA-S-Y stands for alarming instrument for liquid level monitor and static earthing, outputting switch signal, Y is the serial number.

Issue date: May.22,2017.

1.0 General Information

1.1 Application

The system is explosion-proof and intrinsically safe. It comprises explosion-proof part and 2 intrinsically safe parts. The controller is explosion-proof , which can be used in zone1 or 2, while the Earthing Clamp and Plug & Cable can be used in zone1 or 2.

The system will effectively prevent the overfill of liquid and guarantee that the static earthing resistance meets the prescription of relevant safety regulations.

Recommended application for the system includes but is not limited to:

1)Tank truck loading and railway loading.

2)Loading control systems.

1.2 System Introduction

The system monitors the earthing status and liquid level, and interlocks with other apparatus. Its main features are as following.

1) Interlocking function. It provides switch signal of liquid level and earthing.

2) Stable performance.

3) Provides visual alarm.

4)The associated equipment protected by the explosion-proof enclosure, outputting and controlling circuit, primary instrument and its processing circuit are intrinsically safe circuit.

1.3 Technical Specifications

Working voltage	85VAC to 250VAC 50Hz	Ambient temperature	-20℃ to+55℃
Working current	<60mA	Monitoring set point	≤10Ω
Alarm type	Visual alarm	Ex-mark	Ⓔx II 2(1) G Ex db ia [ia Ga] IIB T5 Gb
Response time	<2s	Certification No.	Presafe 16 ATEX 8909X

Degrees of protection(IP Code):

IP65 (only applicable for controller of the product)

Output safety parameters

Earthing clamp:

Um:250VAC,Uo:14.28VDC,Io:27.2mA,Po:97mW,Co:4.17 μF,Lo:192mH

Plug:

Um:250VAC,Uo:21.42VDC,Io:149mA,Po:798mW,Co:1.19 μF,Lo:6.4mH (for overfill sensor)

Um:250VAC,Uo:14.28VDC,Io:96.2mA,Po:343mW,Co:4.28 μF,Lo:15.4mH (for earthing sensor)

2.0 System Elements and Working Principle

2.1 System Elements and Function

The system is composed of the Controller (with visual alarm), the Earthing Clamp and Plug & Cable.

1) Controller includes the controlling circuit board and the explosion-proof enclosure.

◆Checks and processes signals of the Earthing Clamp and Plug&Cable.

◆Provides visual alarm and shows the working status.

◆Outputs signals to the automation system.

2) Earthing Clamp

◆Penetrate the paint and rust to insure an effective connection with the tank truck.

◆The spiral cable can be extended to about 5 m. Available in other cable lengths and specifications options as long as the distributed capacitance and inductance meet the following requirements of Cc≤Co-Ci,Lc≤Lo-Li.

3) Plug& Cable

◆Works with the socket mounted on the tank truck. It is used to connect the overfill sensor, earthing bolt and controller.

◆The spiral cable can be extended to about 8 m. Available in other cable lengths and specifications options as long as the distributed capacitance and inductance meet the following requirements of Cc≤Co-Ci,Lc≤Lo-Li.

2.2 Working Principle

The system is based on SCM.

1)For bottom loading, it monitors the liquid level via overfill sensor(s), when the liquid reaches the sensor(s), or the grounding resistance in the circuit is larger than 10 ohms, visible alarm will be sent out .

2) For top loading, it automatically monitors the earthing status of the tank truck via the earthing clamp. If the resistance between the tank truck and earthing point exceeded 10 ohms, visible alarm will be outputted.

3) It will provide earthing and liquid level signals to the third party system.

3.0 Installation and Checkout

3.1 Cautions during Installation

1. Field repairs of flameproof joints should not be undertaken by the end user. In the event that flameproof joint must be repaired, contact the manufacturer. Repairs of flameproof joints must be made in compliance with the structural specifications in manufacturer's drawings. Repairs must not be made on the basis of values specified in tables 1 and 2 of IEC 60079-1.
2. Overfill protector shall be installed at the location where its display can be seen and maintenance can be easily made.
3. Specification requirements for ground cable of the enclosure: Single core yellow green line, its sectional area shall not be less than 4 mm^2 .
4. Connection impedance between the device earthing point and main power supply earthing point shall not be more than 1Ω at the installation site.
5. Do not open with energized, P02 plug and spiral cable only are allowed to be wiped with wet cloth, and all the operations that may produce electrostatic are prohibited.
6. When the product is connected with device of Zone 0, connection to isolated transformer required in clause 16.3 of IEC/EN 60079-14 shall be considered.
7.When connecting to the cable, the moment of force for the pressing nut is 13Nm, and 15Nm for pressing connector of the cable entries.
8.The installation, operation and maintenance of this system should meet the related requirements of EN60079-19, EN60079-14 and EN60079-17.

3. 2 Connecting with Automatic Refueling System

The signal interface of the automated refueling systems is different, so we have to debug the interface.

The system provides two kinds of signals: static earthing signal and overfill protection signal. Each signal can be normal open or normal close; the two signals can be combined or separately output.

1. Choose normal open or normal close.

Terminal \ Status		Power off	Normal	Alarming
Static earthing signal	No.5 and No.4	Close	Open	Close
	No.5 and No.6	Open	Close	Open
Overfill protection signal	No.8 and No.7	Close	Open	Close
	No.8 and No.9	Open	Close	Open

2. Signals combined output or separately output can be adjusted via dial switch.

3.3 Installation and Checkout

3.3.1 Electrical Installation

See Appendix 1 Power Wiring.

3.3.2 Mechanical Installation

See Appendix 2 Installation Wiring Diagram.

See Appendix 3 Controller Dimensions.

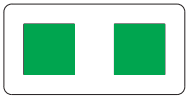
3.3.3 Technical Requirements

1. Connect the wires according to the power wiring diagram.

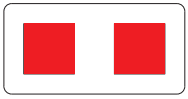
2. Make the wires in order and in good connection.

4.0 Operation Procedures

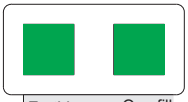
4.1 Working Status



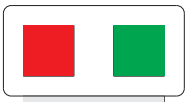
4. 1. 1



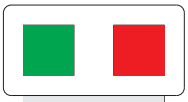
4. 1. 2



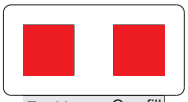
4. 1. 3



4. 1. 4



4. 1. 5



4. 1. 6

Top loading

1. Normal earthing

When the earthing clamp is clipped onto the tank truck, the indicators are green if the earthing connection is effective, the relay outputs normal working signal.

2.Earthing alarm

When the earthing clamp is clipped onto the tank truck, the indicators turn to red if the earthing connection is ineffective, the relay outputs alarming signal.

Bottom loading

1. Normal working status

When the P02 plug is connected with the socket, if the earthing connection is effective and without overfill, the indicators for both earthing and overfill are green, the replay outputs normal working signal.

2. Earthing alarm

When the P02 plug is connected with the socket, if the earthing connection is ineffective and there is no overfill, the earthing indicator turns to red and the overfill indicator turns to green, the replay outputs earthing alarm signal.

3. Overfill alarm

When the P02 plug is connected with the socket, if the earthing connection is effective and there is overfill, the earthing indicator turns to green and the overfill indicator turns to red, the replay outputs overfill alarm.

4. Earthing alarm and overfill alarm at the same time

When the P02 plug is connected with the socket, if the earthing connection is ineffective and the overfill sensor detects liquid, the indicators for both earthing and overfill turn to red, the replay outputs signals of earthing alarm and overfill alarm.

4.2 Operation Procedures

Top loading

Step 1: Put the earthing clamp onto the tank truck, loading begins when the indicator becomes green.

Step 2: Take the earthing clamp off from the tank truck and put it back to its original place after using.

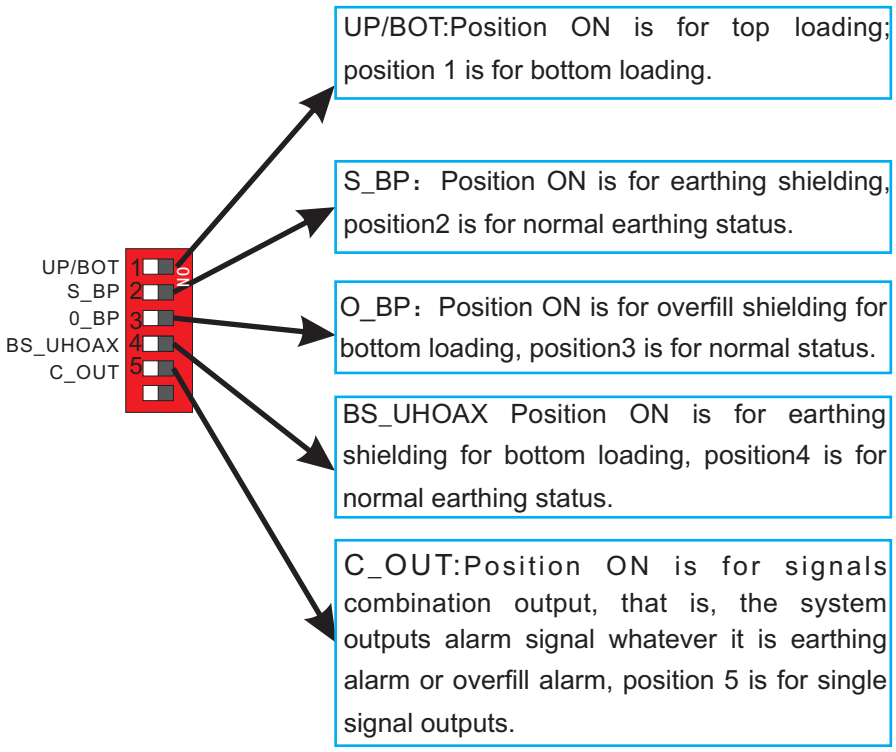
Bottom loading

Step 1: Connect the P02 Plug with the socket on the tank truck, loading begins when all the indicators becomes green;

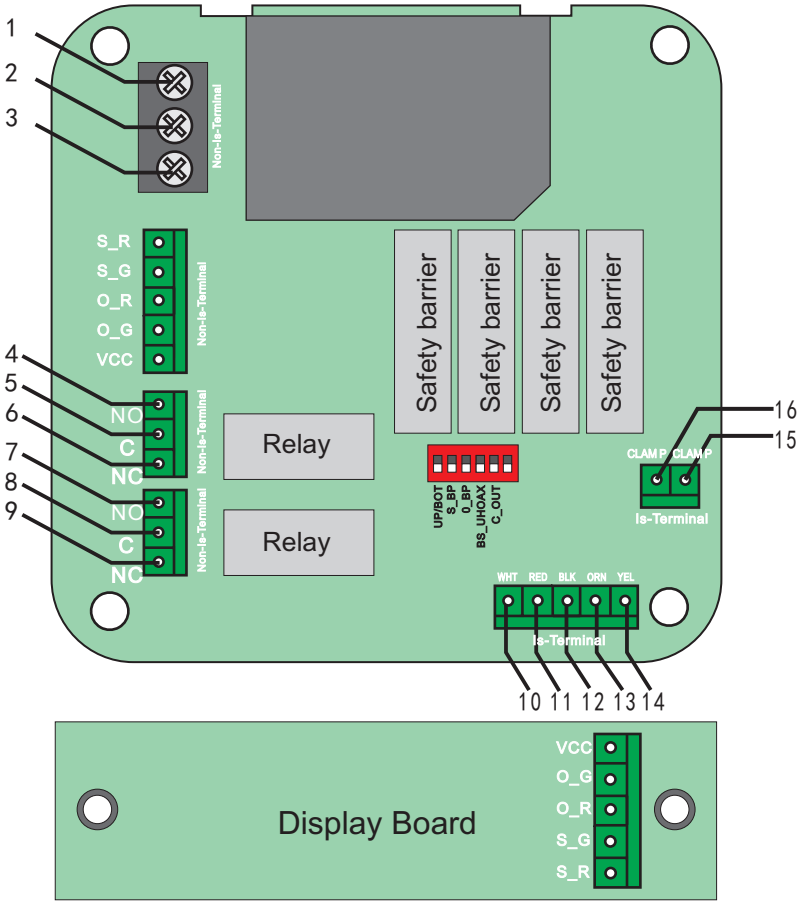
Step 2: The corresponding indicator will turn to red if there is earthing alarm or overfill alarm, and the loading operation is stopped.

Step 3: Disconnect the P02 Plug from the socket and put it back to its original place after using.

4.3 Dial Switch



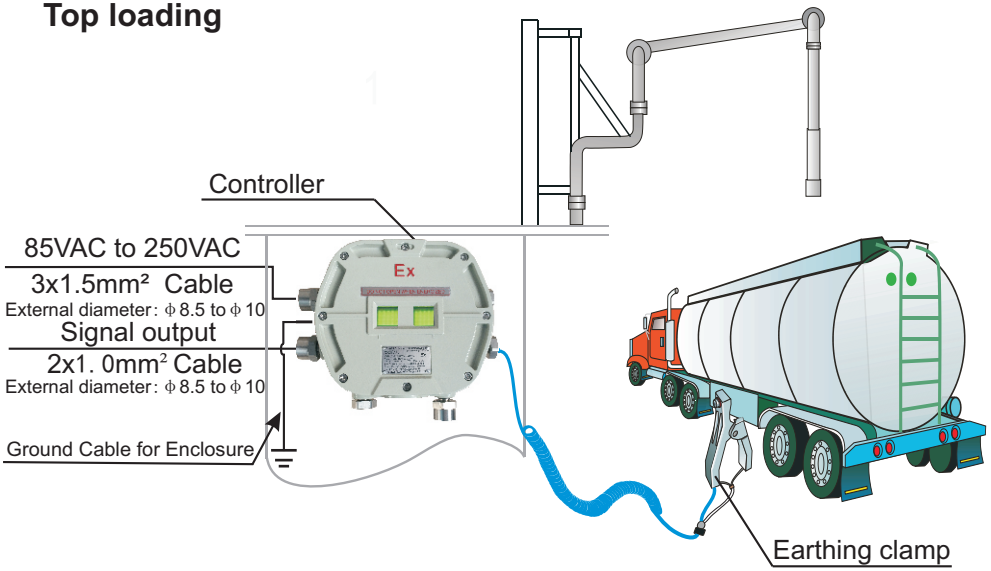
Appendix 1 Power Wiring Diagram



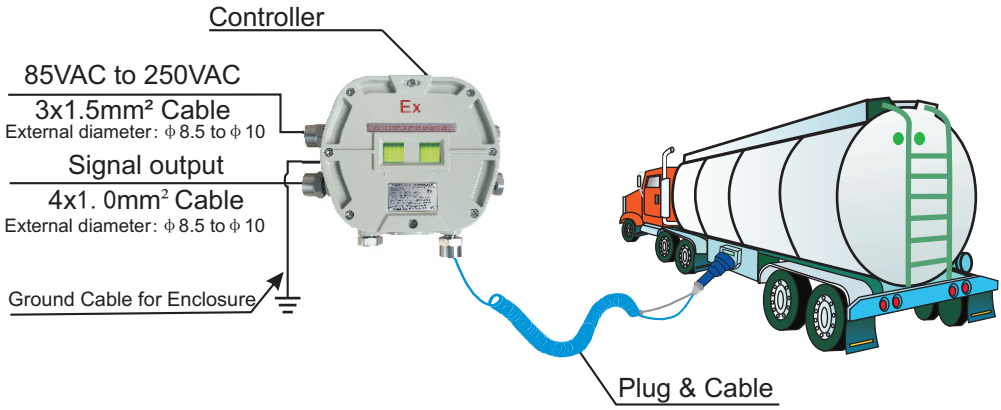
Terminal No.	Terminal Wiring	Terminal No.	Terminal Wiring
1	Pow er ground	9	Overfill relay normal close
2	Alternating current input	10	Plug w hite w ire
3	Alternating current input	11	Plug red w ire
4	Earthing relay normal open	12	Plug black w ire
5	Earthing relay public end	13	Plug orange w ire
6	Earthing relay normal close	14	Plug yellow w ire
7	Overfill relay normal open	15	Clamp red w ire
8	Overfill relay public end	16	Clamp blue w ire

Appendix 2 Installation Wiring Diagram

Top loading



Bottom loading



Appendix 3 Controller Outline Drawing