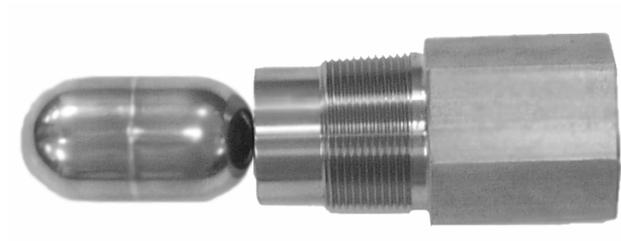


MS10 Buoyancy Level Switch

Horizontal Mounted Electric Switch

K-TEK Level products



Introduction

This operating instruction manual provides the following information:

- Specifications
- Ordering information
- Maintenance

Table of Contents

1.0 Introduction	3
2.0 Specifications	5
3.0 Approvals.....	5
4.0 Ordering Information	6
5.0 Maintenance	7
6.0 Appendix.....	7
7.0 Warranty Statement	13

1.0 Introduction

Description:

The MS10 is a magnetically isolated single pole double throw point level switch. When the MS10 is inserted into a process vessel or external chamber it can sense high or low levels within the vessel. The unique magnetic isolation action eliminates the need for such things as seals, diaphragms, springs, or torque tubes because there is no physical contact with the process. The MS10 typically requires no preventive maintenance since it is totally sealed. The switch is not protected against radiation, electro-magnetic devices, permanent magnets or excessive mechanical vibration.

Operation:

The MS10 will provide either a normally open or normally closed dry contact, which may be used to activate external devices such as alarms or solenoids. The capacity of the switch allows for control of a wide range of devices. Maximum voltage and current ratings are listed in the specification section of this manual. Variations in process fluid specific gravity (0.4 minimum clean fluid SG) have minimal effect because of the small size of the integral float. The float tracks the liquid level and provides for an electrical contact output (SPDT). These contacts are suitable for use with alarms and/or to activate a pump motor starter relay.

Installation:

The MS10 is mounted to the process vessel via the integral 1-1/2" MNPT fitting. Suitable reducers and/or adapters may be used provided they do not interfere with the full stroke of the float. The MS10 should be tightened such that the electrical connection is at its uppermost position. The following procedures outline the steps necessary to install the switch.

WARNING! MAKE SURE CIRCUIT IS DE-ENERGIZED WHILE INSTALLING THE SWITCH.

1. Inspect the switch for any signs of damage incurred during shipment. Mount the switch in a process connection at the point in which you want the switch to trip. Use of a suitable lubricant/sealing compound is recommended. During final tightening, align the MS10 electrical connection to the topmost position as shown (Figure 1). A 2" wrench is needed for tightening. The electrical contacts may be installed either before or after installing the switch housing (Figure 2). Be sure to push the retainer assembly firmly into the switch housing during installation. The retainer assembly may be removed to facilitate removal of the switch assembly, if necessary.

Note: The MS10 will also function when the electrical connection is aligned to the lowest position (bottom), however the electrical contacts will function opposite of the diagram (Figure 3).

2. Connect the field wires to the wiring harness of the MS10 according to the application. Reference Figure 3 for proper operation of contacts. Be sure to adequately insulate all electrical connections.
3. The liquid level inside the vessel should be cycled above and below the switch and operation of the contacts should be verified.
4. The float of the switch shall always be mounted in a straight horizontal position, arrow pointing up, so that the float of the switch is allowed to move freely up and down with the process. Obstruction of the float will cause inaccurate and erroneous readings to be relayed by the switch that could cause a hazardous condition to develop.
5. Competent personnel should only perform installation and maintenance procedures on process control equipment and these switches.
6. Placement of switches should be only where the effects of a hazardous atmosphere will not effect the material integrity of the apparatus. It is a requirement the installation personnel to assure the hazardous atmosphere or the surrounding atmosphere will not compromise the long-term integrity (strength, conductivity, corrosion) of the switch material.
7. Warranty/Repair/Replacement:
8. For warranty, repair, or replacement of transmitter call the ABB service department at 225-408-0898. The service department is located in Baton Rouge, LA 70817, USA.
9. The material construction of these units offers no particular protection against radiation, electro-magnetic or mechanical hazards. The construction of units is not designed to protect against other hazardous not defined in above sentence.
10. Strong magnetic fields should not be placed around the switch (reed switch is magnetically coupled) in order to prevent inaccurate and erroneous readings, which could cause a hazardous condition to develop.
11. Avoid aggressive substances that could drip, spill, pour, or fall on the switch and cause premature failure of the material or wiring resulting in inaccurate and erroneous readings which could lead to a hazardous condition.

Specific Conditions of Use:

1. The supply connection for the apparatus is by an un-terminated lead, and when installed, the connection must have an ingress protection level of at least IP20.
2. The apparatus may be fitted with a titanium float. This must be taken into account during installation to prevent possible sparking.

Figure 1 – MS10 Alignment

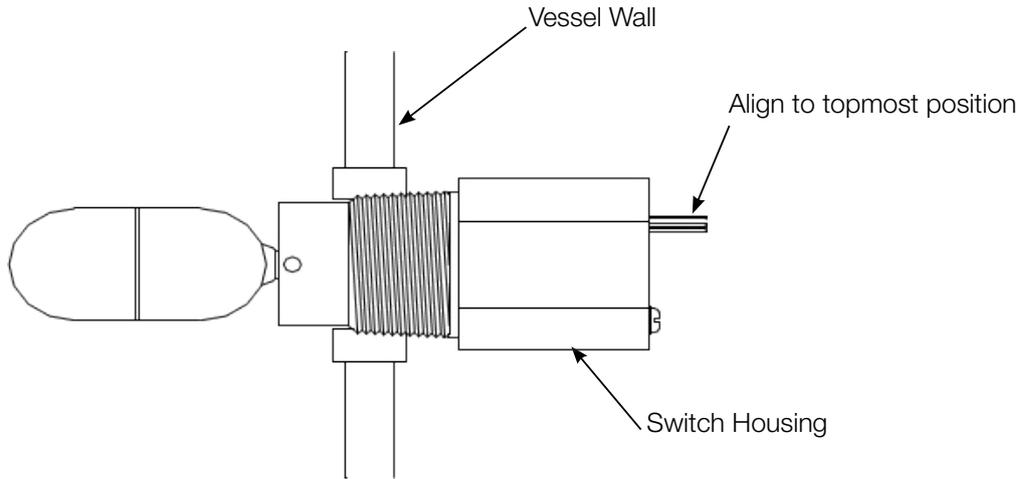


Figure 2 – Installation of MS10 Electrical Contacts

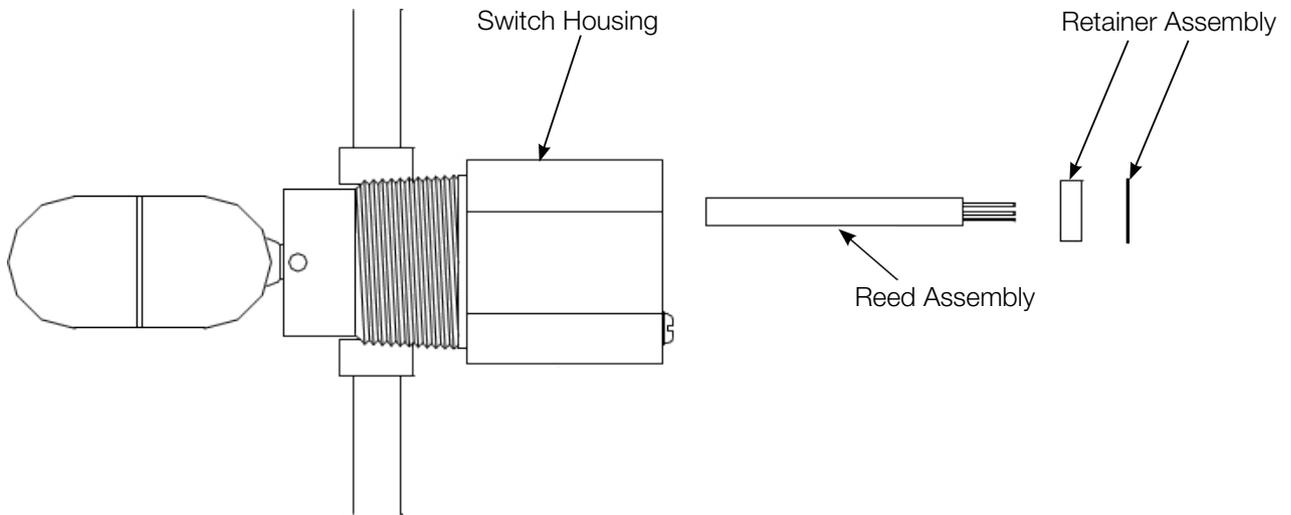
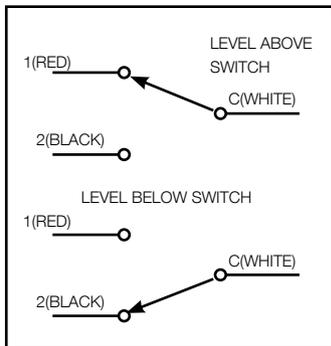


Figure 3 – Operation of Electrical Contacts



Note:

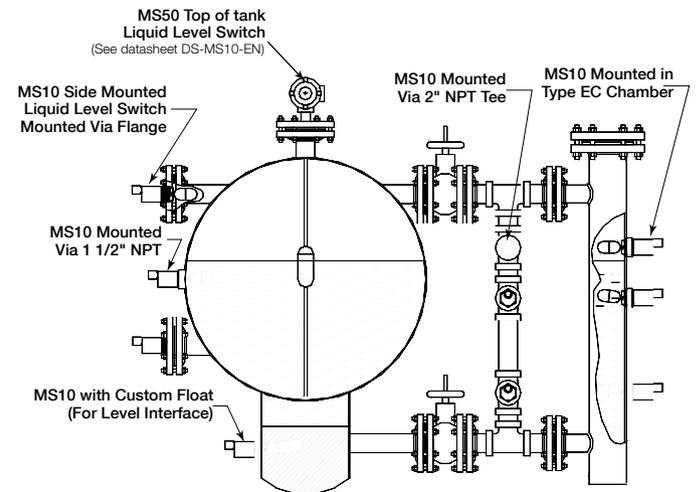
A.) Field wiring connected to the MS10 switch must comply with applicable sections of the National Electrical Code. Do not install/use in environments that would allow the metal of the switch to react with the contents (liquid or vapor) which could cause corrosion and metal fatigue.

2.0 Specifications

Switch type	Magnetically actuated, hermetically sealed, bi-stable switch. Single pole, double throw (Form C)
Contact Material	Rhodium alloy
Switch Action	Break before make
Max Deadband	Approx. +/- 0.50" of float travel
Contact Ratings	AC rating (max): 250 V or 1 amp resistive or 100 VA DC rating (max): 125 V or 0.5 amp resistive or 100 W Lamp Load Rating: 1/3 A @ 125 VAC See IR10 for higher Switch Contact Ratings
Process Temp.	-40 to 450°F / -40 to 232°C Contact factory regarding use in colder applications
Contact Temp.	-40 to 302°F / -40 to 150°C
Maximum Pressure	1500 psig / 103 bar standard 5000 psig / 345 bar with HP option
Customer Connections	1-1/2" MNPT Process, 1/2" FNPT conduit and AWG 20 wiring harness (18 inch). MS10 housing is 2" Hex for tightening into process connection
Insertion Length	4" (101mm) Standard; Optional 5" (127mm), 6" (152mm) or 6-1/2" (165mm) Up to 14" (356mm) Insertion Length
Materials	316/L Stainless Steel
Specific Gravity	0.4 Minimum (Clean Fluids)
Consult Factory for Special Application Requirements	

3.0 Approvals

Factory Mutual Research Corp and CSA Canadian Standards Associations Hazardous Locations:		
FM	 	CL I, Div 1 & 2, GP A,B,C,D T6@Ta=176°F (80°C) DIP CL II, Div 1 & 2, GP E,F,G CL III I / 1 / AEx d IIC T6@Ta=176°F(80°C) IS I / 1 / A,B,C,D T6@Ta=176°F(80°C) I / 0 / AEx ia IIC T6@Ta=176°F(80°C)
ATEX	 	II 1 G Ex ia IIC T6 Ga (-40°C < Tamb < +80°C) (-40°F < Tamb < +176°F)



Sample Application Using ABB Inc, K-TEK Level Switches

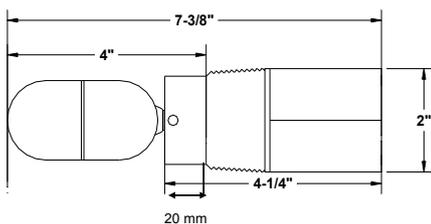
4.0 Ordering Information

Omit items that are standard or not required

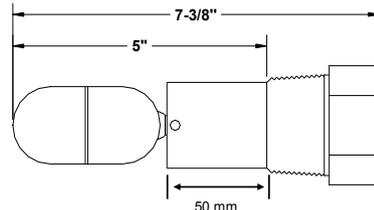
MS10.a.b.c.d.e.f.g:

a	Process Connection CAUTION: Requires minimum 2 ½" nozzle ID.
15	1½ MNPT (Standard)
20	2" MNPT
WP	Welded Flange
FL	Loose Flange
	Mounting Adapter
T2	2" NPT, 3000# Modified Tee Includes 1½ x 2" reducer bushing
S2	2" Socket Weld, 3000# Modified Tee Includes 1½ x 2" reducer bushing
b	Flanged Process Connection Material
X	None
316	316L Stainless Steel
CST	Carbon Steel
c	Process Connection Size / Rating / Type
XXX	Specify type, material & rating from SLG-00001-1 Flange Designation Chart
d	Tag with Customer Specified Information
X	None
NT	316 Stainless Steel Hanging Name Tag
e	Insertion Length
EXT1	4 in. / 101 mm Insertion Length (Standard)
EXT2	5 in. / 127 mm Insertion Length
EXT3	6½ in. / 165 mm Insertion Length
EXT4	6 in. / 152 mm Insertion Length (HP Option Only)
EXTN	Custom Insertion Length 6 5/8 to 14 in / 168 to 356 mm

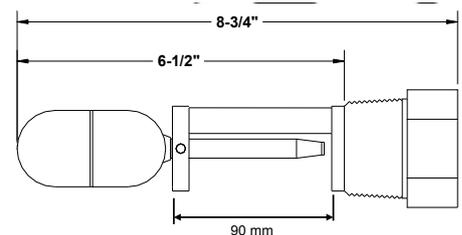
f	High Pressure Option
X	None
HP	HP Up to 5000 psig / 345 bar 1. 5000 psig max with CRN approval. 2. Flanged process connection required 3. Only available with EXT4 insertion length 4. Contact factory regarding materials of construction 5. Requires a 3½" minimum nozzle ID 6. HP uses a titanium float
g	Approvals
X	None
E1	ATEX / IECEx Exia or Ex nA
E2	ATEX / IECEx Flameproof housing
N3	FM and CSA Ex Housing, Intrinsically safe or Non-Incendive
Application Note	Inductive and Capacitive loads require special considerations. Contact factory for technical literature and/or applications assistance.
	Services will follow the model code with // and will not be included on the device tag



EXT1 Option (Standard)

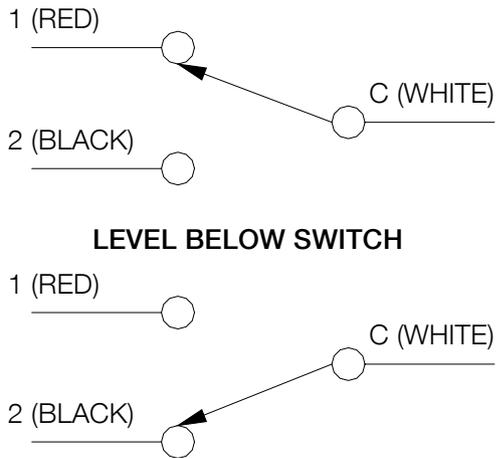


EXT2 Option

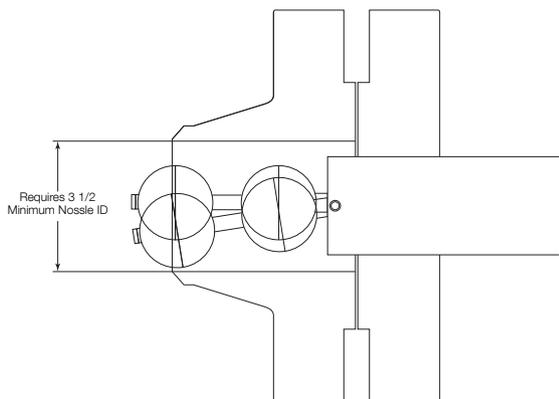


EXT3 Option

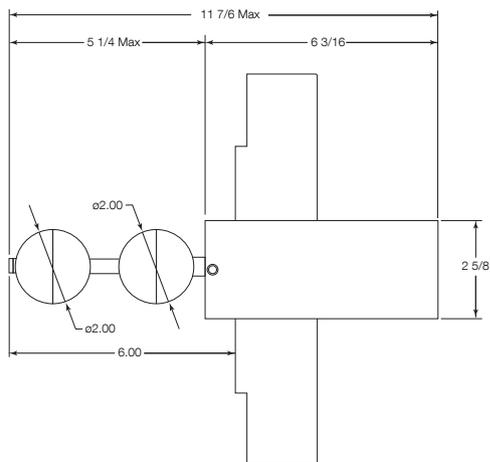
Figure 4 Operation of Electrical Contacts



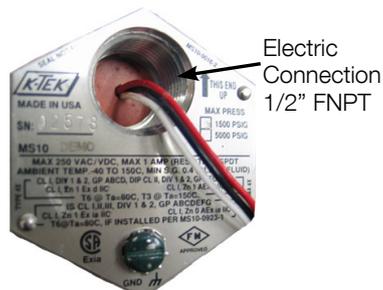
HP Option Through Nozzle Installation



HP Pressure (HP) EXT 4 Option



Wiring Connection Photo



5.0 Maintenance

The MS10 does not require any routine maintenance in normal day to day operation.

WARNING: If there is a need to take the switch out of service or disconnect it for any reason, then make sure the circuit is de-energized, or insure that the area is known to be non-hazardous!

Handling & Storage Requirements:

There are no special handling and storage requirements associated with this device.

6.0 Appendix

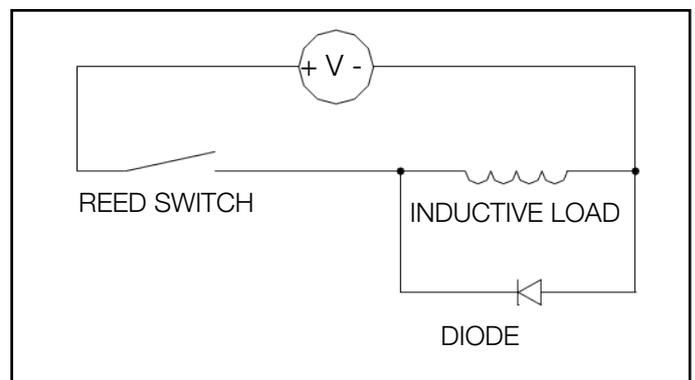
Explosion Proof Installation:

Many of ABB's switch products (MS10, LMS100, MS50) are based on magnetically operated reed switches. Since reed switches have the inherent characteristic of very closely spaced switch contacts, it is extremely important to protect these contacts from high voltage transients caused by inductive loads. When an inductive load is de-energized, the collapsing magnetic field induces a high voltage of opposite polarity into itself and thus the switch. Two basic methods exist to clamp this voltage and thus protect the switch contacts.

D.C. Applications

For D.C. applications, a diode is placed in parallel with the inductive load (note the polarity of the diode and power supply). A 1N4001 general purpose diode is normally sufficient to clamp the induced voltage of the inductive load to a safe level.

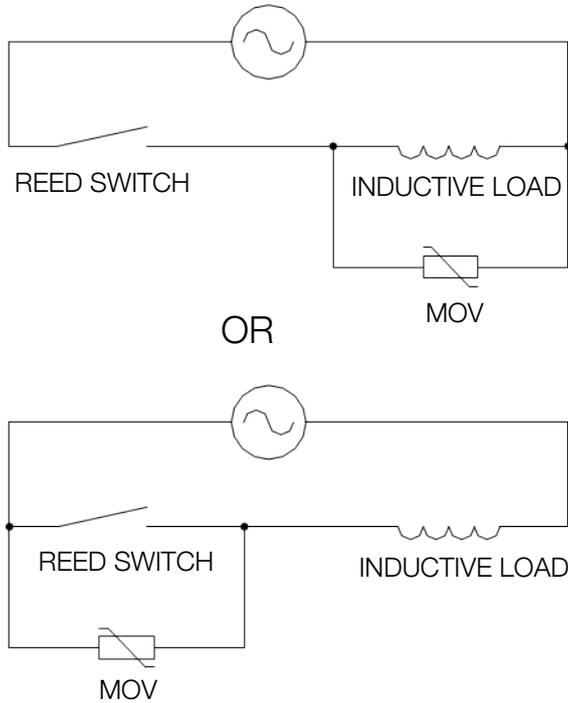
D.C. Contact Protection



A.C. Applications

For A.C. applications, a Metal Oxide Varistor (MOV transient surge suppressor) is placed either in parallel with the switch or the inductive load. The MOV changes from a high impedance to a very low impedance when the voltage across the MOV exceeds its rated voltage (the MOV rating must correspond with the power supply voltage). For 120 VAC control systems a typical MOV would be part number V130LA10A provided by Littelfuse®. In either case shown, the result is the limiting of the switch voltage to approximately 130 volts.

A.C. Contact Protection



Explosion Proof Applications

The switch has been rated for explosion proof applications by FM Global and CSA Group only. For typical/specific explosion proof installation see NEC 500 or NEC 505, or IEC directives. The MS10 is not approved for flameproof (European) application at this time.

Intrinsically Safe Applications

This switch is ATEX approved in IS installations (Ex ia) Zone 0 in Europe by FM Global, in the U.S. by FM and in Canada by CSA. This switch can be used in areas/processes that do not have explosive environments. For a typically IS installation application please see the example below.

If only two wires are used, then the 3rd wire must be electrically and physically insulated from the circuit. For use with three (3) wires, that is, use of the Normally Closed (NC) and Normally Opened (NO) contacts, a second IS barrier is required.

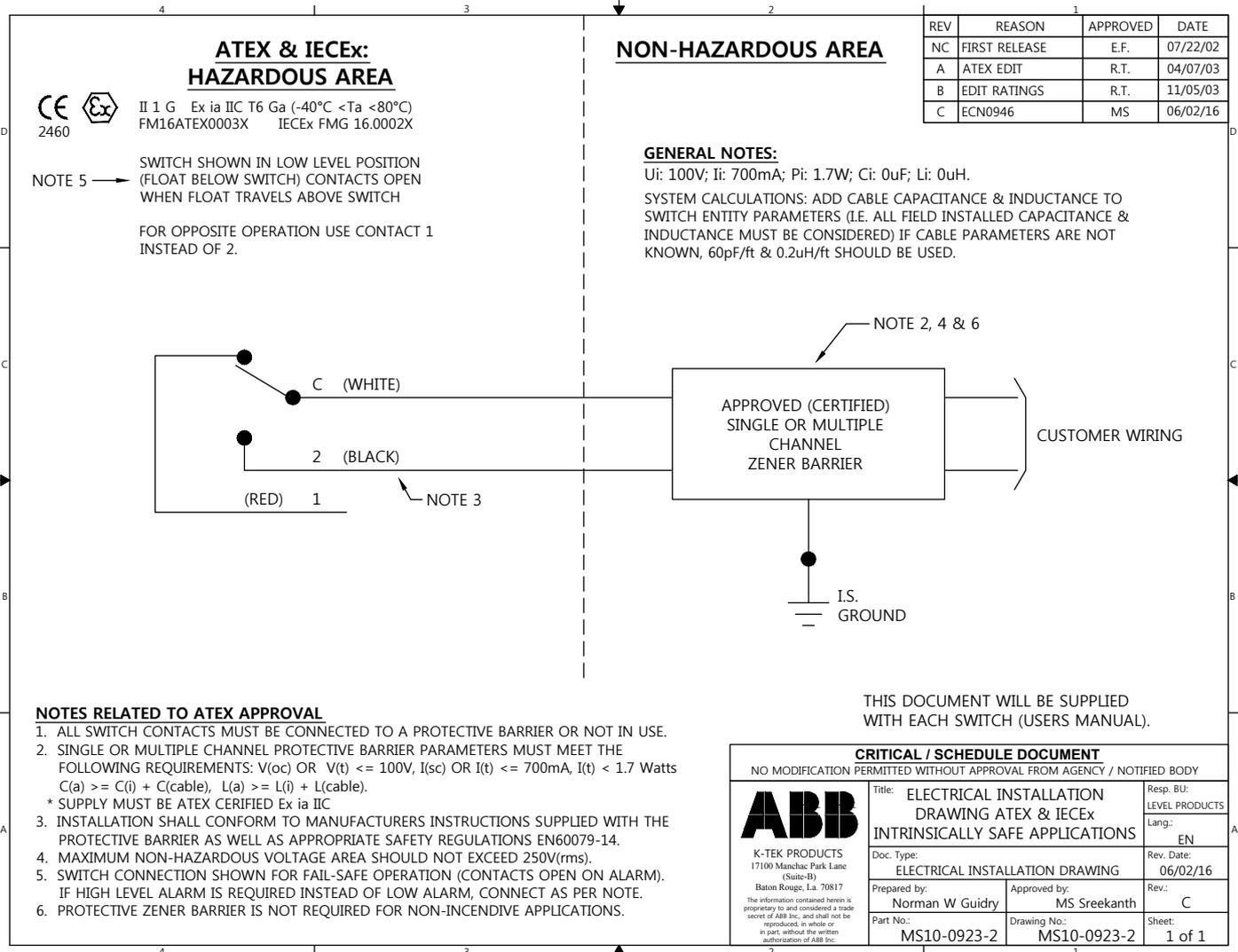
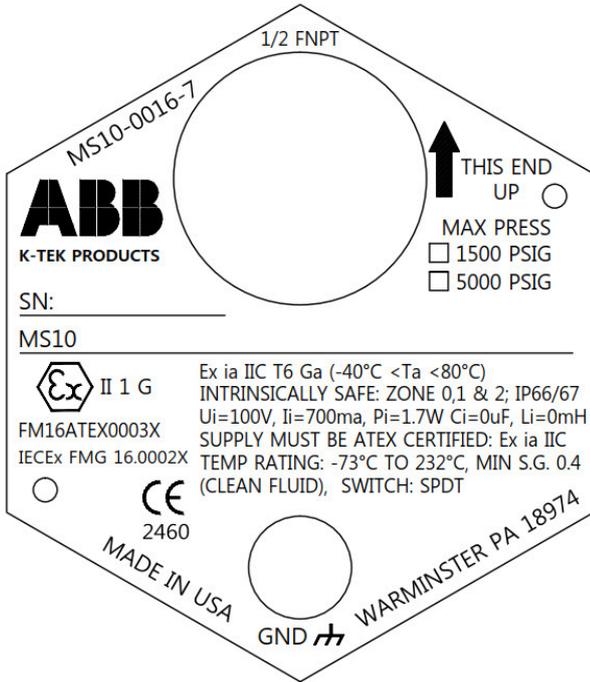
This IS installation hook-up is good for:

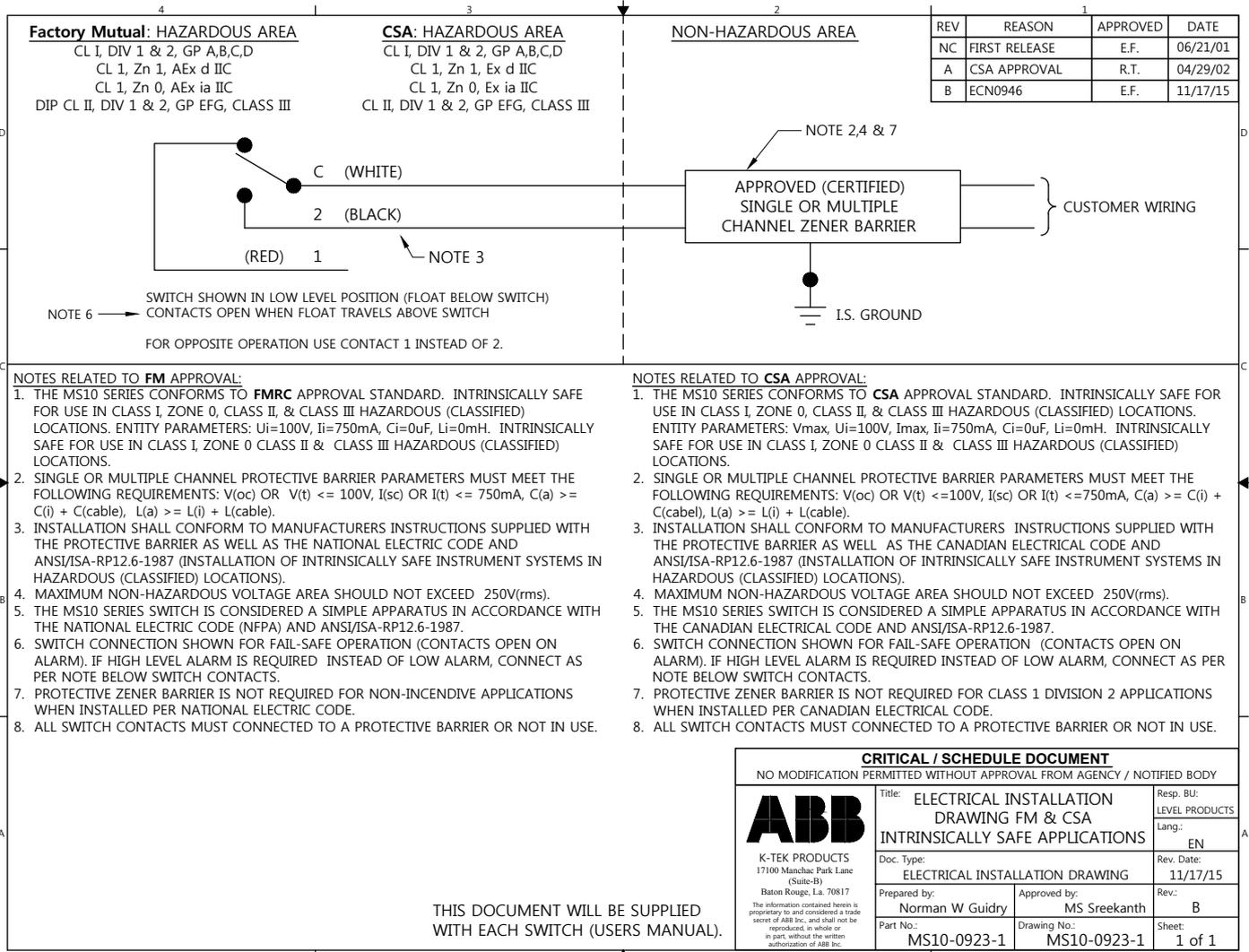
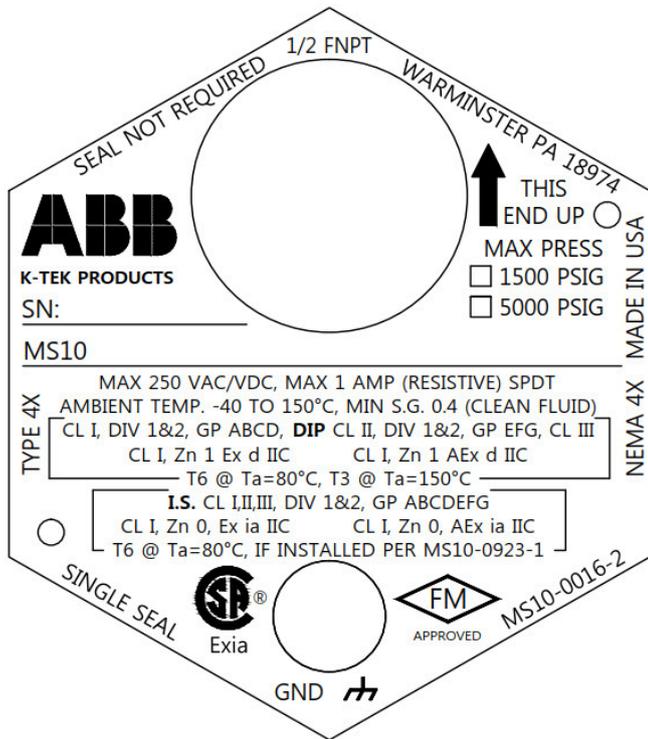
Europe under ATEX approval
U.S. under FM approval
Canada under CSA approval

ATEX Note:

"High Pressure" (HP) option switch uses a titanium float.

Caution: Foreign objects (metals made of other material) sticking the titanium float could cause a spark. Use caution to prevent such conditions for arising.





Replacement of switch (SPDT) on the MS10:

* The MS10 switch must be replaced with ABB's part number MS10-4 reed switch because the switch is potted for dimensions to fit inside of the SS tubing.

1. Disconnect the power that runs through/to the switch (Assure that removing the power will not effect your process or process control)
2. Lock-out and Tag-out the power so that power can not be applied to the switch until after the switch has been completely repaired/replaced
3. It is not necessary to remove the MS10 from the process to replace the reed switch
4. Remove retaining ring with small screwdriver
5. Remove the rubber grommet
6. Pull out the magnetic reed switch by the wires
7. Put in the replacement reed switch
8. Replace grommet & retaining ring

9. Disconnect the wires (2 or 3 wires) on old switch, noting the connections and colors, and re-connect the wires to the new switch according to hook-up of the old wiring.
10. Ensure that the applied wattage & current do not exceed the power & current rating of the switch
11. Remove the Lock-out / Tag-out device from the applied power
12. Before applying power assure that this will not effect your process or process control
13. Apply power and check the switch to assure that it is functioning properly

Note: For the switch to operate (make and break contact) in the process, the fluid/process must be lower and raised above the level of the float.

6.0 Declaration of Conformity

[For the latest MS10 EU Declaration of Conformity, click this link](http://new.abb.com/products/measurement-products/level/buoyancy-level-sensors-and-switches/ms10-electric-level-switch) or visit here: <http://new.abb.com/products/measurement-products/level/buoyancy-level-sensors-and-switches/ms10-electric-level-switch>

7.0 Warranty Statement

5 YEAR WARRANTY FOR:

KM26 Magnetic Liquid Level Gauges; MagWave Dual Chamber System; LS Series Mechanical Level Switches (LS500, LS550, LS600, LS700, LS800 & LS900) (does NOT include switching mechanisms, ie. MS40, LMS100, MS41, PS35 & PS45); EC External Chambers, STW Stilling Wells and ST95 Seal Pots.

2 YEAR WARRANTY FOR:

AT100, AT100S and AT200 series transmitters; RS85 liquid vibrating fork switches; TX & TS, thermal dispersion switches; IR10 and PP10 External Relays; MT5000, MT5100 and MT5200 radar level transmitters; RI100 Repeat Indicators; KP paddle switches; A02 & A75 RF capacitance level switches; Buoyancy Level Switches (MS50 & MS10); Magnetic Level Switches (MS40, MS41, PS35, PS45 and LMS100).

1 YEAR WARRANTY FOR:

AT500 and AT600 series transmitters; DPM100 digital indicators; APM100 analog indicators; GRANUPOINT vibrating fork switches.

SPECIAL WARRANTY CONSIDERATIONS:

ABB Inc, K-TEK Products, does not honor OEM warranties for items not manufactured by ABB Inc, K-TEK Products, (i.e. Palm Pilots). These claims should be handled directly with the OEM.

ABB Inc, K-TEK Products, will repair or replace, at ABB Inc, K-TEK Product's, election, defective items which are returned to ABB Inc, K-TEK Products, by the original purchaser within the period specified above from the shipment date of the item and which is found, upon examination by ABB Inc, K-TEK Products, to its satisfaction, to contain defects in materials or workmanship which arose only under normal use and service and which were not the result of either alterations, misuse, abuse, improper or inadequate adjustments, applications or servicing of the product. ABB Inc, K-TEK Products's, warranty does not cover the repair or replacement of units that fail from the effects of excessive vibration unless the units are originally designed for vibration application. In addition, ABB Inc, K-TEK Products's warranty does not include on-site repair or services. Field service rates can be supplied on request.

If a product is believed to be defective, the original purchaser shall notify ABB Inc, K-TEK Products, and request a Returned Material Authorization before returning the material to ABB Inc, K-TEK Products, with transportation prepaid by the purchaser. (To expedite all returns/repairs from outside of the United States, consult ABB Inc, K-TEK Product's customer service team

(service@ktekcorp.com) to determine an optimal solution for shipping method and turnaround time.) The product, with repaired or replaced parts, shall be returned to the purchaser at any point in the world with transportation prepaid by ABB Inc, K-TEK Products, for best-way transportation only. ABB Inc, K-TEK Products, is not responsible for expedited shipping charges. If the product is shipped to ABB Inc, K-TEK Products, freight collect, then it will be returned to the customer freight collect.

If inspection by ABB Inc, K-TEK Products, does not disclose any defects in material or workmanship, ABB Inc, K-TEK Product's, normal charges for repair and shipment shall apply (minimum 250.00 USD).

The materials of construction for all ABB Inc, K-TEK products, are clearly specified and it is the responsibility of the purchaser to determine the compatibility of the materials for the application.

THE FOREGOING WARRANTY IS ABB INC, K-TEK PRODUCT'S, SOLE WARRANTY AND ALL OTHER WARRANTIES EXPRESSED, IMPLIED, OR STATUTORY, INCLUDING ANY IMPLIED WARRANTY OF MERCHANTABILITY OF FITNESS FOR A PARTICULAR PURPOSE, ARE EXCLUDED AND NEGATED TO THE MAXIMUM EXTENT PERMITTED BY LAW. NO PERSON OR REPRESENTATIVE IS AUTHORIZED TO EXTEND ANY OTHER WARRANTY OR CREATE FOR ABB INC, K-TEK PRODUCTS, ANY OTHER LIABILITY IN CONNECTION WITH THE SALE OF ABB INC, K-TEK'S PRODUCTS. THE REMEDIES SET FORTH IN THIS WARRANTY ARE EXCLUSIVE OF ALL OTHER REMEDIES AGAINST ABB INC, K-TEK PRODUCTS. ABB INC, K-TEK PRODUCTS, SHALL NOT BE LIABLE FOR ANY CONSEQUENTIAL, INCIDENTAL, OR SPECIAL DAMAGES OF ANY KIND. ABB INC, K-TEK PRODUCT'S, SOLE OBLIGATION SHALL BE TO REPAIR OR REPLACE PARTS (FOUND TO BE DEFECTIVE IN MATERIALS OR WORKMANSHIP) WHICH ARE RETURNED BY THE PURCHASER TO ABB INC, K-TEK PRODUCTS.

Contact us

ABB Inc.

Industrial Automation
125 E. County Line Road
Warminster, PA 18974 USA
Tel: +1 215 674 6000
Fax: +1 215 674 7183

ABB Inc.

17100 Manchac Park Lane - Suite B
Baton Rouge, LA 70817 USA
Phone: +1 225 408 0800
Service: +1 225 408 0898
Fax: +1 225 408 0897
Service e-mail: service@us.abb.com

ABB Engineering (Shanghai) Ltd.

No. 4528, KangXin Hwy.
Pudong New District
Shanghai, 201319, P.R. China
Phone: +86 10 64231407
Service: +86 21 61056421
Fax: +86 10 64371913
E-mail: norman-suijun.xia@cn.abb.com
Service e-mail: rola.li@cn.abb.com

www.abb.com/level

Note

We reserve the right to make technical changes or modify the contents of this document without prior notice. With regard to purchase orders, the agreed particulars shall prevail. ABB does not accept any responsibility whatsoever for potential errors or possible lack of information in this document.

We reserve all rights in this document and in the subject matter and illustrations contained therein. Any reproduction, disclosure to third parties or utilization of its contents - in whole or in parts - is forbidden without prior written consent of ABB.

Copyright© 2017 ABB
All rights reserved

3KXL535001R4201



Sales



Service