ABB MEASUREMENT & ANALYTICS | OPERATING INSTRUCTION

# LMS200

## Magnetic level gauge switch



Non-invasive magnetically actuated point level switches that require no power to operate are an enhancement to a magnetic level gauge (MLG).

**Measurement made easy**

MLG switches

## Introduction

ABB's MLG switches for point level alarm and/or control can mount to a KM26 MLG or an LS series cage level switch. These switches are completely isolated from the process fluid as they are magnetically activated by a magnet equipped float (KM26) or attraction sleeve (LS series). The unique magnetic coupling action eliminates seals, diaphragms, springs, and torque tubes common to other level switching alternatives since there is no physical contact with the process fluid. The magnetic coupling also eliminates process connections to the switch; therefore, no isolation valves are required to block off the switch for maintenance. The switch 'set point' is easily adjustable without changing any process piping and the result is a more reliable and easier way to maintain level system.

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# 1 Introduction

ABB's MLG switches provide robust liquid level detection and process control equipped on the KM26 series MLGs and LS series products. These magnetically actuated electrical switches offer complete isolation from the process fluid by coupling with the magnetic floats and attraction sleeves already present in the KM26 and LS series products. This passive, non-contact method of coupling facilitates safe operation, while also eliminating the need for costly seals, diaphragms, and process connections commonly associated with point level switch technology. Set points can be adjusted without any changes to process piping, resulting in level switches that are quickly deployed, readily adjustable and easy to maintain
This manual is designed to provide information on installing, operating and troubleshooting of the LMS200 MLG switch.

Every section of this manual is dedicated to the specific phases of the LMS200 lifecycle. The start of the lifecycle begins with the receipt of the LMS200 mounted on a KM26 MLG or the LS series cage switch or shipped separately and its identification and continues through installation, the connection of all electrical components & accessories and finally ends with the troubleshooting and operations.

## General Description of LMS200

To signal specific liquid levels, the ABB's KM26 MLG or any other MLG can be equipped with different types of ABB limit switches. Magnetically actuated limit switches are the most commonly used devices. They can be clamped to the measuring chamber and are adjustable over the entire measuring range. They are actuated by a magnet incorporated into the float.

The LMS200 is a magnetically activated double pole double throw switch. When the LMS200 is mounted on a KM26 or an external chamber that has a magnetic float it can sense high or low levels within a vessel.

The unique magnetic coupling action eliminates the need for such things as seals, diaphragms, springs or torque tubes because there is no physical contact with the process. No valves are required to block off the switch from the process to perform any maintenance or operational checks, and since the LMS200 is isolated from the process, it does not need to be cleaned.

# 2 Safety

## General safety information

The following safety section provides an overview of the safety aspects that must be observed for operation of the device. The device is constructed in accordance with international and local regulations and is deemed to be operationally safe. Additionally, the device is tested and shipped from the factory in working condition. The information contained within this manual, as well as all applicable documentation and certification, must be observed and adhered to in order to maintain the factory-deployed condition throughout the operations of the LMS200 switch. Please refer to the KM26 MLG manual for additional details for installation and safety requirements when a MLG switch is mounted on the KM26 MLG.

Full compliance with the general safety requirements must be observed during operation of the device. In addition to providing general information, the individual sections within this manual contain descriptions, processes and / or procedural instructions with specific safety information for that corresponding action.

Only by observing all of the safety information the user can minimize the risk of hazards to personnel and / or the environment. The provided instructions are intended as an overview only and do not contain detailed information on all available models or every conceivable scenario that may arise during setup, operation and / or maintenance work.

For additional information, or in the event of specific issues not covered within these operating instructions, please contact the manufacturer. ABB declares the contents of this manual are not part of any prior or existing agreements, commitments or legal relationships and are not intended to amend those that are already in place.

**⚠ CAUTION**

Only qualified and authorized personnel are to be tasked with the installation, electrical connection, commissioning, decommissioning/disposal and service of the LMS200 MLG switch. Qualified personnel are those individuals who have experience in the installation, electrical connection, commissioning and operation of the LMS200 MLG switch or similar devices / systems and hold the necessary qualifications. These qualifications include but are not limited to:

- training or instruction – authorization to operate and maintain devices or systems according to safety engineering standards for electrical circuits, high pressures and aggressive media.
- training or instruction in accordance with safety engineering standards regarding maintenance and use of adequate safety systems.

For reasons of safety, ABB recommends that only sufficiently insulated tools, conforming to IEC EN 60900, be used.

Since the LMS200 may form a link within a safety chain, it is recommended that the device be replaced immediately if defects are detected. In the event of use in a hazardous area, only non-sparking tools are to be used.

# … 2 Safety

In addition, the user must observe all relevant safety regulations regarding the installation and operation of electromechanical systems and the relevant standards, regulations and guidelines concerning explosion protection.

## Improper use

The LMS200 MLG switch is designed for reliable and accurate actuation. Based on the magnetic float movement inside a MLG chamber the LMS200 provides either normally open or normally closed dry contacts that can be used to activate external devices such as alarms or solenoids based on appropriate electrical ratings. The capacity of the switch allows for a wide range of devices to be switched, as long as the stated limits are not exceeded. Use the LMS200 switch for this purpose only. The manufacturer accepts no liability for any form of damage resulting from improper use!

It is prohibited to use the device for the following but not limited to these purposes:

- as a climbing aid (for example, for mounting purposes) or support for pipes.
- removing material (for example, by drilling any part of the switch).

## Technical limit values

The device is designed for use exclusively within the values stated on the identification plates (refer to section 4) and within the technical limit values specified on the data sheets. The following technical limit values must be observed:

- The maximum ambient operating temperature must not be exceeded.
- Service temperature range. Responsibility of the end user to ensure sufficient thermal isolation between the process and the apparatus.
- The housing protection type must be observed.
- The maximum voltage and current ratings.

## Use of instruction

**DANGER**

This symbol in conjunction with the signal word ‘DANGER’ indicates an imminent electrical hazard. Failure to observe this safety information will result in death or severe injury.

**WARNING**

This symbol in conjunction with the signal word ‘WARNING’ indicates a potentially dangerous situation. Failure to observe this safety information may result in death or severe injury.

**CAUTION**

This symbol in conjunction with the signal word ‘CAUTION’ indicates a potentially dangerous situation. Failure to observe this safety information may result in minor or moderate injury. This symbol may also be used for property damage warnings.

**NOTICE**

This symbol indicates a potentially damaging situation. Failure to observe this safety information may result in damage to or destruction of the product and / or other system components.

**WARNING**

This symbol in conjunction with the signal word ‘WARNING’ indicates a potentially dangerous situation. Failure to observe this safety information may result in death or severe injury.

**Note**

**‘Note’** indicates operator tips, particularly useful information or important information about the product or its further uses. The signal word ‘IMPORTANT (NOTE)’ does not indicate a dangerous or harmful situation.

## Warranty provision

Using the device in a manner that falls outside the scope of its intended use, disregarding this manual, using underqualified personnel or making unauthorized alterations releases ABB from any liability for any resulting damage. This renders the manufacturer’s warranty null and void.

## Operator liability

In environments containing corrosive and / or abrasive substances, the user must check the level of resistance of all parts of the LMS200 switch that are coming into contact with such hazardous substances. The user must strictly observe the applicable national regulations with regards to installing, functional testing, repairing and servicing all the associated electromechanical devices.

## Qualified personnel

Installing, commissioning and maintaining the LMS200 MLG switch may be performed only by trained personnel who are authorized by the plant operator. These trained personnel must have read and understood this manual and must comply with its instructions.

# … 2 Safety

## Returning devices

For the purpose of returning the device for repair or service, use the original packaging or other suitably secure shipping method. The sender should contact the factory for return authorization number and fill out return form (provided at the end of the manual) and include it with the device. According to C guidelines other local laws for hazardous materials, the owner of the corresponding hazardous waste is responsible for its disposal. The owner must observe the proper regulations for shipping purposes. All devices returned to ABB must be free of any hazardous materials (for example, acids, alkalis and solvents).

## Disposal

ABB actively promotes environmental awareness and has an operational management system that meets the requirements of DIN EN ISO 9001:2000, EN ISO 14001:2004 and OHSAS 18001. ABB products are intended to have minimal impact on the environment and individuals during their manufacture, storage, transport, use and disposal.

This adherence to environmental standards includes the use of natural resources. In this endeavor, ABB maintains an open dialog with the public through its publications.
The product / solution is manufactured from materials that can be reused by specialized recycling companies.

## Information on WEEE Directive 2012/19/EU (Waste Electrical and Electronic Equipment)

Electrical and electronic equipment marked with symbol of a crossed-out wheeled bin may not be disposed as unsorted municipal waste. Waste of electrical and electronic equipment (WEEE) shall be treated separately using the collection framework available to customers for the return, recycling and treatment of WEEE.

From August 15, 2018 onward, the LMS200 is subject to the scope of the Waste Electrical and Electronic Equipment Directive (2012/19/EU). The aim of the WEEE directive is to prevent or reduce the negative environmental effects resulting from the generation and management of electrical and electronic equipment.



## Safety information for inspection and service

Any inspection and service work may be performed only by trained personnel. Before removing the device, depressurize / de-energize the device. Check whether hazardous materials have been used as measured materials before opening the device.

Within the scope of operator responsibility, check the following as part of a regular inspection:

- measurement-related function
- leak-tightness
- wear (corrosion)

## Safety information for electrical installation

**WARNING**

Electrical connections may only be established by authorized personnel in accordance with the electrical circuit diagrams. The electrical connection information in the manual must be observed; otherwise, the application protection type may be affected. Establish protective earth grounding as per NEC, CEC, or any other applicable regional electrical codes.

**WARNING**

There is no EMC protection or protection against accidental contact when the housing cover is open. There are electric circuits within the housing which are dangerous if touched. Therefore, the auxiliary power must be switched off before opening the housing cover.

## Explosives atmospheres installation

For installation requirements in explosives atmospheres applications refer to IEC 60079-14 and any local safety or electric code regulations mandatory in your area.

## Specific conditions for use

**DANGER**

1. When the manufacturer of the equipment has not identified the type of protection on the label, the user shall, on installation, permanently mark the label with the type of protection used.
2. The non-metallic label and painted enclosure may store an electrostatic charge and become a source of ignition in Group II and Group III environments. Care should be taken to prevent the buildup of electrostatic charge. Only clean with a damp cloth.
3. For the complete list of specific condition for use and the relationship between the temperature class, the maximum surface temperature, the ambient temperature and the process temperature and the process temperature, refer to the respective approvals certificate of the LMS200 product.
4. Housing and cover are made from aluminum. Assess material suitability for the target environment before deploying to avoid an ignition hazard due to impact or friction.

# 3 Switch overview

The following represents an exploded view of the components comprising the LMS200 MLG switch (see figure 3).

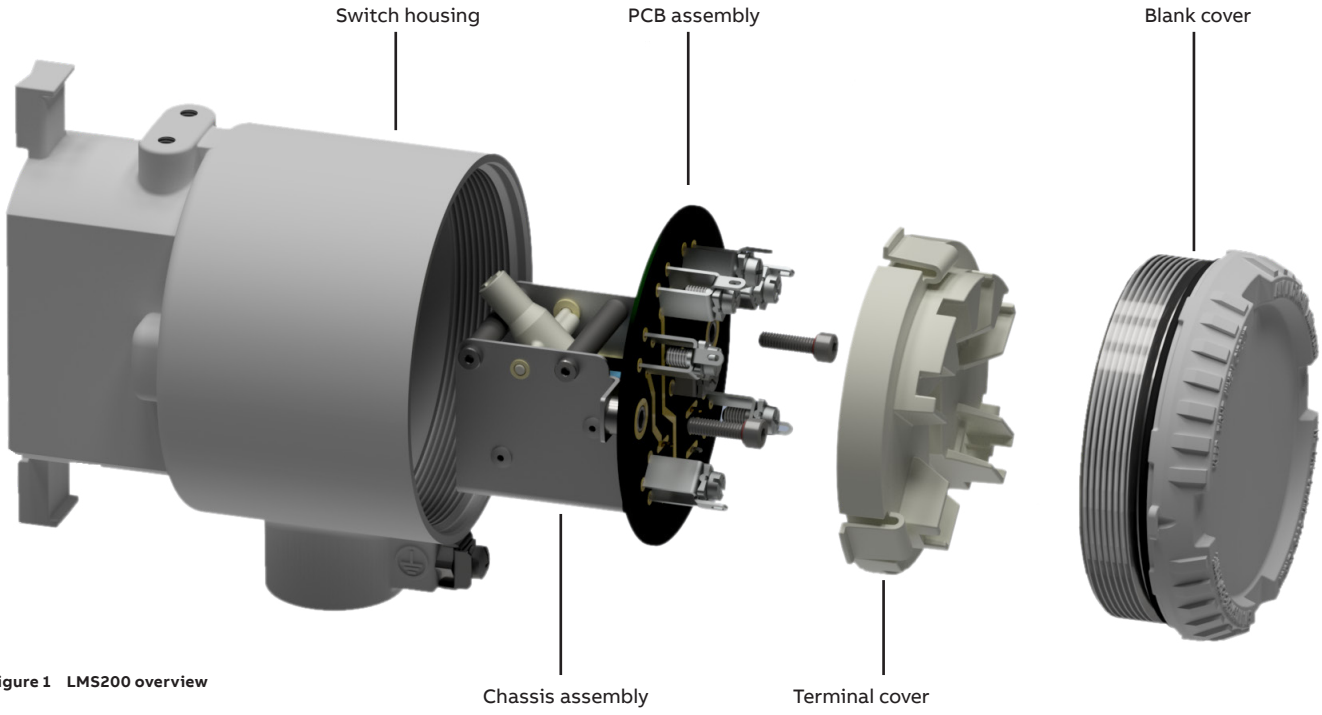



**Figure 1 LMS200 overview**

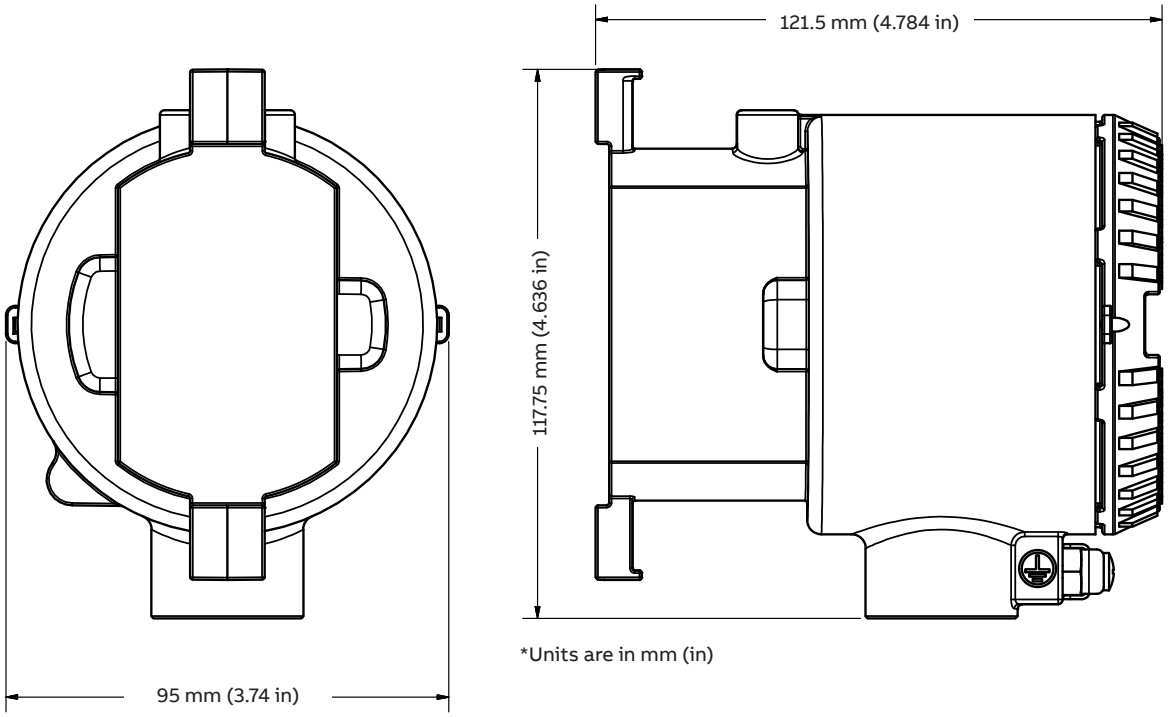



**Figure 2 LMS200 dimensions**

# 4 Unpacking

## Identification

The switch is identified by the product nameplate. This provides information (see figure 3) concerning items such as the model number, ratings, serial number, and temperature limits This also contains the certification-related parameters for use in a hazardous area.

Please refer to the serial number when speaking to ABB service department personnel.

**Note**
The name plates shown here are only examples. The nameplates attached to the device may be different to what you see below.

**Note**
Before installing the switch, permanently indicate the protection concept associated with the hazardous area by making the corresponding box on the product label. Only one box shall be marked. The chosen concept cannot be altered and shall govern the use of the product until the end of life. If more than one protection concept is marked, the switch must be removed from the hazardous area immediately.

## Unpacking and handling

If the LMS200 switch is shipped independent of the MLG or LS series products, then remove the switch and all included hardware from the shipping carton.

- Do not discard the packaging material until the installation is complete.
- Normal good practice should be observed, handling with care and assistance.

## Transport and storage

After unpacking the MLG switch, inspect it for damage.

- check the packaging for accessories.
- during intermediate storage or transport, only store the switch in the original packaging.
- if required, storage prior to installation should be indoors at ambient temperatures, not to exceed the following:
  - temperature range: -40 °C to 85 °C (-40 °F to 185 °F)
  - humidity: 0 to 95% RH, non-condensing

Although there is no limit on the duration of storage, the warranty conditions stipulated on the supplier's order of acknowledgement still apply.

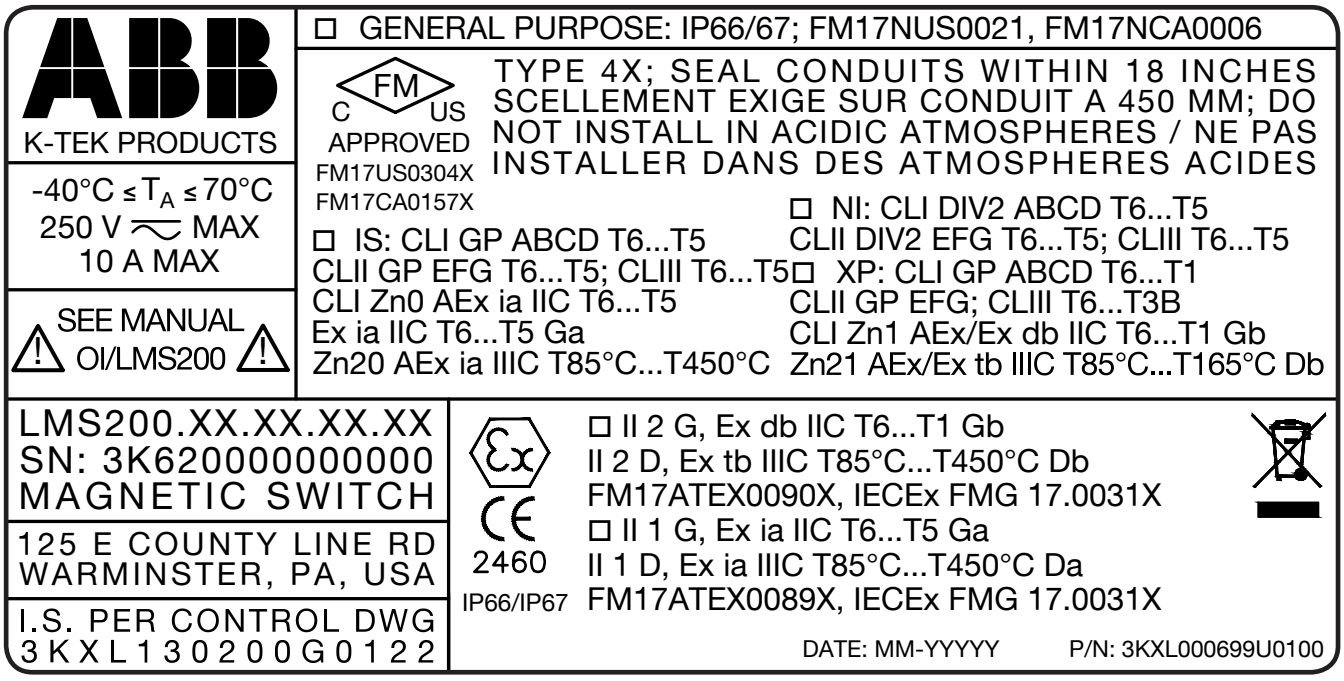



**Figure 3 LMS200 nameplate**

# 5 Mounting

## General

Read the following installation instructions carefully before proceeding. Failure to observe the warnings and instructions may cause a malfunction or personnel hazard. Before installing the LMS200 switch, ensure the device design meets the requirements of both measurement technology and safety point of view. This applies to:

- hazardous location certification
- measuring range
- temperature
- operating voltage and current

In addition, the relevant directives, regulations, standards and accident prevention regulations must be observed. Measurement accuracy is largely dependent on the correct installation of the LMS200 switch and the magnetic strength of the MLG float or the LS attraction sleeves. In instances where it is possible, the measuring setup should be free from critical ambient conditions such as large variations in temperature, vibrations or shocks.

**⚠ WARNING**

The LMS200 can be directly coupled to chambers that operate at elevated temperatures under normal circumstances. Proper care should be taken when installing, adjusting, servicing, or removing the product from active process chambers to mitigate the risk of thermal hazards to personnel.

## All installations

Prior to installation, verify the model of the LMS200 switch is suitable for the intended application.
The LMS200 MLG switch is generally mounted on to the ABB's KM26 MLG at the factory, based on the order requirements and delivered as completely factory assembled.

**⚠ DANGER**

- failure to observe all applicable regulations governing electrical installations can lead to serious injury or death by electrical shock, fire, or explosion.
- the LMS200 shall not be operated beyond the absolute maximum electrical ratings published on the product nameplate. The user shall provide, if needed, switch-off elements, overvoltage protection, and/or surge suppression to prevent the electrical ratings from being exceeded.
- operating the LMS200 at high voltage can be present a shock hazard at the terminal connections. Always install, service, and decommission in the zero voltage state and avoid contact with terminals while energized.
- do not connect the LMS200 unless the hazardous area rating marked on the product nameplate is consistent with the area classification of the installation site.

**⚠ WARNING**

Do not remove the LMS200 MLG switch cover when power is supplied to the unit.

## Hazardous location considerations

Ensure that the certification plate is permanently fixed on the switch housing. Before installing the switch, permanently indicate the protection concept associated with the hazardous area by making the corresponding box on the product label. Only one box shall be marked. The chosen concept cannot be altered and shall govern the use of the product until the end of life. If more than one protection concept is marked, the switch must be removed from the hazardous area immediately. For specific conditions for safe use of the LMS200, refer to the specific conditions for use in the respective approvals certificate.

**⚠ CAUTION**

When the certification plate label is not identified with the type of protection, the user shall, on installation, mark the label with the type of protection. The certification will be void if there are more than one type of protection marked on the label.

## IP protection and designation

The LMS200 MLG switch is certified as conforming to protection type IP66/67 (according to IEC 60529) or NEMA 4X (according to NEMA 250). The first number indicates the type of protection the integrated electronics have against the entry of foreign bodies, including dust. '6' means that the housing is dust-proof (for example, no ingress of dust). The second number indicates the type of protection the housing has against the entry of water. '6' means that the housing is protected against water; specifically, powerful jets of water under standardized conditions.

## Standard mounting

A LMS200 magnetically actuated switch is usually mounted using two stainless steel clamps that are attached to the switch housing and strapped around the KM26 MLG chamber. The switch can be easily positioned by loosening the clamp with a $^{5}/_{16}$ in screwdriver and sliding the switch to the correct fraction on the chamber (figure 4) The following procedure outlines the steps necessary to install the switch:

1 Mount the switch to the chamber in its intended trip switch set point. The switch should be mounted 90 ° from the indicator assembly to ensure optimum magnetic coupling.

2 The float must be cycled past the switch in both directions to ensure that the switch will operate properly when put into service.

# ... 5 Mounting

## Rod mounting

For high temperature applications using insulation jackets (blankets) this alternate mounting approach is used (figure 6). When mounting/adjusting rod mounted LMS200, ensure that the mounting 'ears' of the switch are flush against the float chamber or insulation jackets (blankets) to allow proper switch function. Also, be sure to tighten all mounting bolt hardware once switch is mounted correctly into position.

ABB's KM26 MLG chambers that are furnished with factory installed insulation blankets may have switches mounted via special rod mount brackets to a factory installed switch mount rod that is external to the insulation.

## Stand alone LMS200

For LMS200 switch not factory assembled to the KM26 MLG chamber or other chambers, the following informational guidelines have been provided for the installation. Please refer to the specific application switch and MLG manual for complete steps and procedure for proper installation.

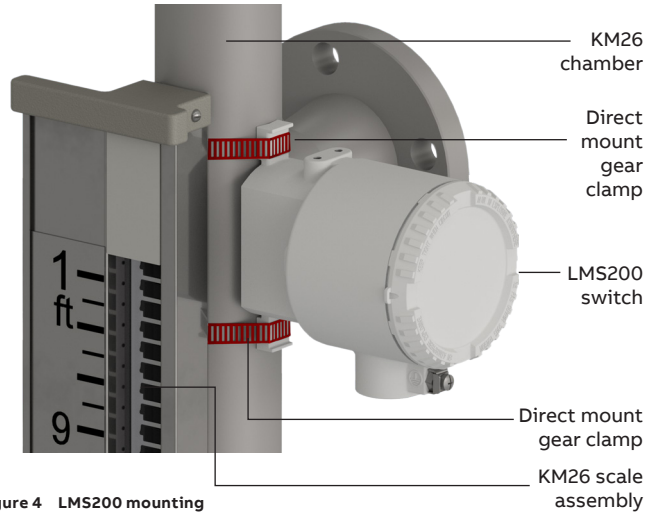



**Figure 4 LMS200 mounting**

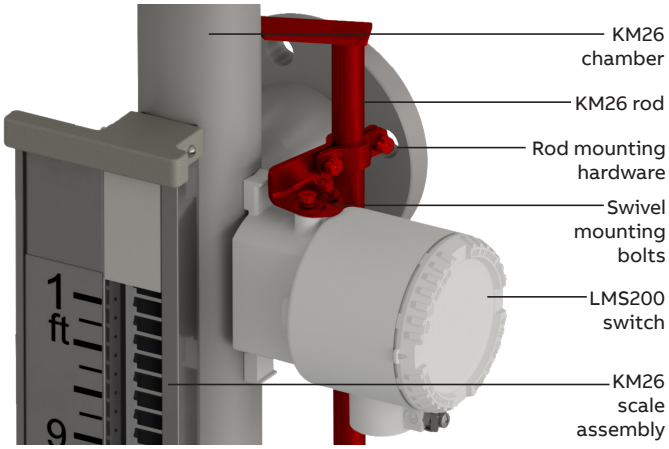



**Figure 6 LMS200 rod mounting**

**Example configurations:**

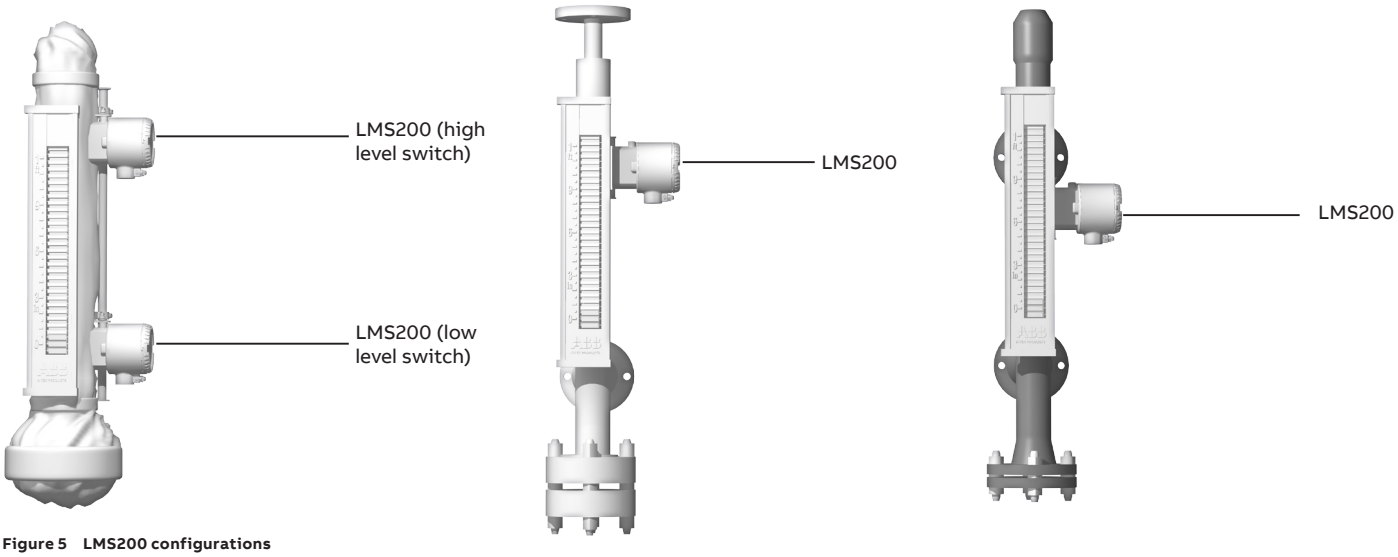



**Figure 5 LMS200 configurations**

# ... 5 Mounting

## General installation guidelines

**WARNING**

Make sure all circuits are de-energized prior to installation.

1 Mount the switch to the chamber at the required trip point. Connect or terminate wiring to the switch according to the application. Refer to the switch manual wiring diagram.
2 The KM26 float must be cycled past the switch in both directions to ensure the switch will operate properly when put in service.
3 All field wiring that is connected to a LMS200 switch must comply with NEC, CEC, or any other applicable regional electrical codes.
4 Reference the insulation section of the MLG manual for installing and dismantling insulation jackets.
5 KM26 chambers can be supplied with factory installed insulation jackets or insulation pads. Magnetically actuated switches can be mounted in two different configuration

   a. If an insulation jacket is used, rod mount brackets are required.

   b. If insulation pads are used, stainless steel gear clamps are required.

6 These adjustable brackets and clamps allow re-positioning this switch at any point along the measuring range of the level gauge. Note: Insulation jacket pads are intended to wrap only the KM26 chamber, not the limit switches themselves.
7 Any conduit or fittings connected to a ABB magnetically actuated limit switch should be constructed of stainless steel or other non-ferrous material. This is necessary to avoid interference with the operation of the KM26 float or the associated switches.
8 Multiple switches and switch models can be used on a single KM26.
9 Two magnetically actuated limited switches can be mounted so that they may trip at the same point or at two different points separated by less than the length of the switch.
10 Limit switches cannot be within 1 in of the upper and lower process connections because the float must travel past the switch. Process connections, gussets, support brackets etc. may interfere with installation at desired locations. Cam actuated switches must be mounted in the correct orientation.

**DANGER**

Explosion hazard. Do not open or disconnect equipment when a flammable or combustible atmosphere is present.

# 6 Installation

**WARNING**

Service temperature of the LMS200 is dependent on a number of factors such as process temperature, mounting method, insulation usage, sources of radiant heat and any other sources of heating or cooling. Although each application is unique, the table below can be used as a starting point for determining the appropriate insulation and mounting configuration for the target application. Ultimately, it is the responsibility of the end user to ensure that no point on the housing exceeds the minimum or maximum service temperature ratings published in the product data sheet or the hazardous area temperature classification, where applicable. This is especially critical for any surface making direct contact with any external source of heating or cooling such as process chambers.

**CAUTION**

To ensure safe and reliable operation, do not operate the switch beyond the following maximum electrical parameters:

Max. voltage: 250 V AC / DC
Max. current: 10 A

| Process temperature | Insulation | Mounting |
|---|---|---|
| Up to 257 °F (125 °C) | None (Y0) | Standard (A1) |
| Up to 350 °F (176.6 °C) | None (Y0) | *Rod mount (A2) |
| Up to 575 °F (301.6 °C) | Insulation pad (P1) | Standard (A1) |
| Up to 800 °F (426.6 °C) | Chamber insulation | Rod mount (A2) |

* Ensure >2 mm (0.008 in) air gap between the target chamber and the LMS200 mounting surfaces

**Table 1 Temperature vs mounting**




**Figure 7 LMS200 terminal wiring**

**WARNING**

The LMS200 can be directly coupled to chambers that operate at elevated temperatures under normal circumstances. Proper care should be taken when installing, adjusting, servicing, or removing the product from active process chambers to mitigate the risk of thermal hazards to personnel.

# … 6 Installation

## General installation

**WARNING**

Make sure all circuits are de-energized prior to installation.

1 To remove the cover, first unlock the cover security bolt located at the 5 o'clock position of the cover, by turning it clockwise with an M3 hex key. When the bolt head no longer touches the cover, grip the cover tightly and rotate it counterclockwise to remove.




**Figure 8 LMS200 cover bolt**

2 Loosen the terminals intended for use by rotating the screws counterclockwise. Insert field wires beneath the square washers according to the application and rotate the screws clockwise until hand tight. Ensure that any unused terminals are also hand tight. See the wiring diagram below. (figure 9)

3 All field wiring that is connected to the LMS200 switch must comply with NEC, CEC, or any other applicable regional electrical codes.

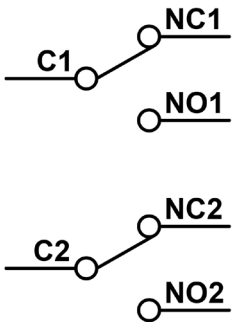



**Figure 9 LMS200 wiring scheme**

**WARNING**

4 Place back the blank cover that was removed in Step 1 by rotating clockwise onto the housing until it is fully tight.

5 Finally, rotate the security bolt clockwise until it latches to lock the blank cover.

## Cable connection

Depending on the design supplied, the electrical connection is established via a cable entry, M20 x 1.5 or ¾ in NPT thread.

**WARNING**

For use in 'Zone 2', a qualified cable gland for this type of protection must be installed by the user. ¾ in NPT threads are located in the electronics housing for this purpose. For switch with a flame-proof enclosure (Ex d) type of protection, the housing cover must be secured using the locking screw (security bolt).

All threaded fittings, cable glands, and conduits installed by the user for use in hazardous areas must be suitably certified for the deployment area classification and for the type of protection marked on the product nameplate. These components shall also maintain the ingress protection rating of the product by using an appropriate sealing method, where applicable (such as O-rings, PTFE thread sealing tape, or non-hardening thread sealants).

**CAUTION**

- The cable entry device shall comply with the requirements of EN 60079-0 and maintain IP 66/67 or better as required by the installation conditions.
- Field wiring should be rated at least 10 °C above the maximum ambient temperature.
- Internal temperatures of the LMS200 can reach up to 125°C (257°F) when operated at maximum process and maximum ambient temperatures. The service temperature range of cable glands and field wiring shall be chosen accordingly.

## Grounding

Protective earth grounding terminals are available on both the outside of the housing and inside of the LMS200 switch. Both terminals are electrically connected to one another (see figure 10).




**Figure 10 LMS200 grounding**

# … 6 Installation

The LMS200 switch is supplied with both an internal and external ground connections for protective grounding. Wire this ground connection to a suitable earth ground. Protective earth wire gauge shall comply with NEC, CEC, or any other applicable regional electrical codes. In-use conductors should be appropriately sized based on ampacity and ambient and process temperature requirements The insulation material shall be chosen based on service temperature as well.

**⚠ WARNING**

A protective grounding connection is absolutely necessary to ensure personnel protection and to prevent explosions in potentially explosive environments.

## Requirements for hazardous locations

The LMS200 switch is designed for use in division 1 and 2 or at the boundary of a zone 0, zone 1 and zone 2 hazardous areas.

**⚠ CAUTION**

The flameproof joints of the equipment are not intended to be repaired. Consult the manufacturer if repair of the flameproof joints is necessary.

Cable or conduit entries must be fitted with a suitably certified cable entry device, with or without the use of a suitably approved thread adaptor. Where conduit is used in the installation, an approved conduit seal or stopping box is required immediately after (ATEX/IECEx) or within 18 inches of (FM/FM-C/CSA) the end-user field wiring entrance.

Installation and use of apparatus in hazardous locations shall be in accordance with an IEC 60079-14 or applicable regional standards.

**Note**

- the LMS200 has been evaluated as an Installation (overvoltage) category 1 / pollution degree 2 apparatus per IEC 1010.
- the maximum altitude of operation is 6560 feet (2000 meters).
- the LMS200 is designed with both internal and external protective earth (ground) terminals.
- housing and cover are made from aluminum. Assess material suitability for the target environment before deploying to avoid an ignition hazard due to impact or friction.
- the non-metallic label and painted enclosure may store an electrostatic charge and become a source of ignition in Group II and Group III environments. Care should be taken to prevent the buildup of electrostatic charge. Only clean with a damp cloth.
- do not torque any attached conduits, thread adapters, reducers, elbows, or cable glands beyond the manufacturer's recommended installation torque. Torque requirements for the LMS200's optional thread adapters are listed (table 2).

| Option | Description | Recommended torque |
|---|---|---|
| A2 | ¾ in MNPT X M20F reducer (stainless steel) | 35 Nm |
| A3 | ¾ in MNPT X M20F reducer (nickel-plated brass) | |
| C1 | ¾ in MNPT X ¾ in FNPT 90 ° elbow (stainless steel) | |
| C2 | ¾ in MNPT X ¾ in FNPT 90 ° elbow (nickel-plated brass) | |
| C3 | ¾ in MNPT X M20F elbow (stainless steel) | |
| C4 | ¾ in MNPT X M20F elbow (nickel-plated brass) | |

**Table 2 Torque requirement**

## Flame proof / explosion proof installation

The LMS200 is designed for use in zone 1 / division 1 hazardous areas. Installation and use of apparatus in hazardous locations shall be in accordance with an IEC 60079-14 or applicable regional standard.

If conduit is used in the installation, an approved conduit seal or stopping box is required immediately after (ATEX / IECCEx) or within 18 inches of (FM / FM-C) the end-use field wiring entrance.

Internal temperatures of the LMS200 can reach up to 257 °F (125 °C) when operated at maximum service temperature and maximum ambient temperatures. The service temperature range of cable glands and field wiring shall be chosen accordingly.

Temperature classifications of the LMS200 are dependent on the temperature of the coupled process vessel. Use the table 3 below to determine temperature class:

| Maximum process temperature | Temperature class |
|---|---|
| 75 °C (167 °F) | T6 |
| 90 °C (194 °F) | T5 |
| 125 °C (257 °F) | T4 |
| 190 °C (374 °F) | T3 |
| 290 °C (554 °F) | T2 |
| 416 °C (780 °F) | T1 |

**Table 3 Ex d temperature classification**

## Protected by enclosure / dust-protected installation

Field wiring fittings such as cable glands and conduit must maintain the ingress protection rating of the enclosure (IP6X).

Temperature classification of the LMS200 is related to process temperature. The temperature class of the LMS200 can be determined by using figure 11.

# … 6 Installation

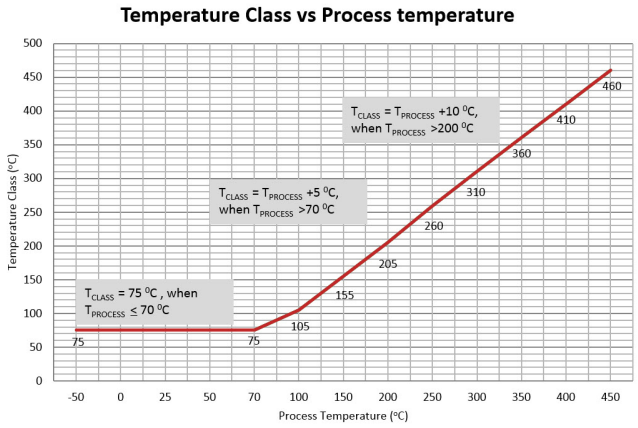



**Figure 11 Temperature Class vs Process Temperature**

| Maximum process temperature | Temperature class |
|---|---|
| 176 °F (80 °C) | 185 °F (85 °C) |
| 203 °F (95 °C) | 212 °F (100 °C) |
| 266 °F (130 °C) | 275 °F (135 °C) |
| 383 °F (195 °C) | 392 °F (200 °C) |
| 563 °F (295 °C) | 581 °F (305 °C) |
| 780.8 °F (416 °C) | 798.8 °F (426 °C) |

## Intrinsic safety / non-incendive installation

The relationship between the temperature class, the maximum surface temperature, the ambient temperature and the process temperature is as follows:

For gases and vapours:

| Maximum process temperature | Temperature class |
|---|---|
| 167 °F (75 °C) | T6 |
| 194 °F (90 °C) | T5 |

For dusts and fibres:

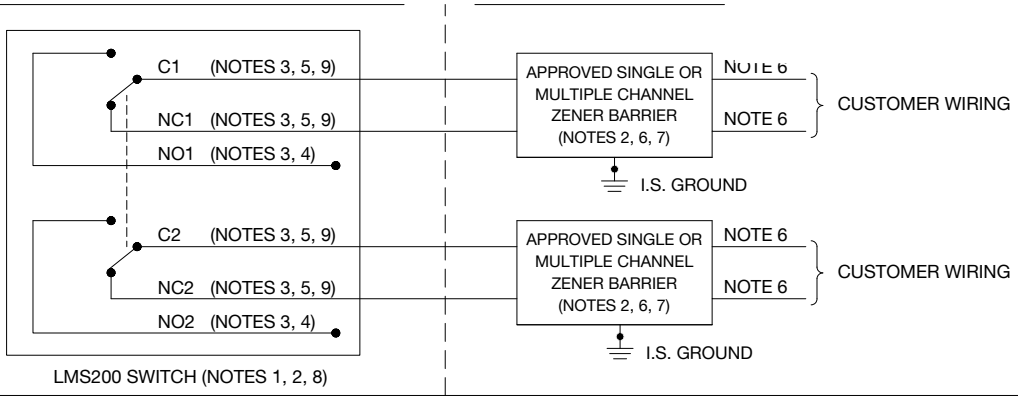
| Maximum process temperature | Temperature class |
|---|---|
| 176 °F (80 °C) | T85 °C |
| 203 °F (95 °C) | T100 °C |
| 266 °F (130 °C) | T135 °C |
| 383 °F (195 °C) | T200 °C |
| 563 °F (295 °C) | T305 °C |
| 780.8 °F (416 °C) | T450 °C |

CE 2460
Ex ia IIC T6...T5 Ga
Ex ia IIIC T85°C...450°C Da

II 1 G
II 1 D

CLI DIV1 GP ABCD T6...T5
CLII DIV1 GP EFG T6...T5
CLI DIV2 GP ABCD T6...T5
CLII DIV2 GP EFG T6...T5
CLIII T6...T5

CLI Zn0 AEx ia IIC T6...T5
Ex ia IIC T6...T5 Ga
Zn20 AEx ia IIIC T85°C...T450°C




GENERAL NOTES

1. SWITCH I.S. INPUT PARAMETERS (PER CIRCUIT):
   Ui = 14 V, Ii = 1200 mA, Pi = 4.20 W Ui = 30 V, Ii = 101 mA, Pi = 757 mW
   Ui = 18 V, Ii = 440 mA, Pi = 1.98 W Ui = 60 V, Ii = 29 mA, Pi = 435 mW
   Ui = 24 V, Ii = 174 mA, Pi = 1.04 W
2. SWITCH NON-INCENDIVE INPUT PARAMETERS (PER CIRCUIT):
   Ui = 14 V, Ii = 4500 mA, Pi = 15.75 W Ui = 30 V, Ii = 900 mA, Pi = 6.75 W
   Ui = 18 V, Ii = 2880 mA, Pi = 12.96 W Ui = 120 V, Ii = 180 mA, Pi = 5.4 W
   Ui = 24 V, Ii = 1440 mA, Pi = 8.64 W
3. I.S. AND NON-INCENDIVE SWITCH CONTACTS SHALL NOT BE USED UNLESS CONNECTED TO AN APPROVED SAFETY BARRIER.
4. ANY UNUSED SWITCH CONTACTS MUST BE ELECTRICALLY ISOLATED.
5. IN USE SWITCH CONTACTS SHALL ONLY OCCUPY ONE SAFETY BARRIER CHANNEL PER POLE.
6. VOLTAGE APPLIED OR SUPPLIED BY ASSOCIATED APPARATUS MUST NOT EXCEED 250 V.
7. PARALLEL OR SERIES COMBINATION OF SAFETY BARRIER OUTPUT TERMINALS IS NOT PERMITTERD
8. WARNING: SUBSTITUTION OF COMPONENTS MAY IMPAIR SUITABILITY FOR USE IN HAZARDOUS LOCATIONS. AVERTISSEMENT: LA SUBSTITUTION DE COMPOSANTS PEUT RENDRE CE MATERIEL INACCEPTABLE POUR LES EMPLACEMENTS DANGEREUX.
9. WARNING: EXPLOSION HAZARD - DO NOT DISCONNECT EQUIPMENT UNLESS POWER HAS BEEN SWITCHED OFF OR THE AREA IS KNOWN TO BE NON-HAZARDOUS / AVERTISSEMENT: RISQUE D'EXPLOSION - AVANT DE DISCONNECTER L'EQUIPMENT, COUPER LE COURANT OU S'ASSURER QUE L'EMPLACEMENT EST DESIGNE NON DANGEREUX.

NOTES RELATED TO FM/FM-C APPROVAL:

- SWITCH CONFORMS TO FM APPROVAL STANDARD 3610.
- INSTALL IN ACCORDANCE WITH ANSI/ISA RP12.6 AND ANSI/NFPA 70 SECTIONS 504 AND 505.
- ASSOCIATED EQUIPMENT MUST BE FM APPROVED.

NOTES RELATED TO CSA APPROVAL:

- INSTALLATION SHALL CONFORM TO PART I OF THE CANADIAN ELECTRICAL CODE AND TO THE INSTRUCTIONS SUPPLIED WITH ASSOCIATED EQUIPMENT.
- ASSOCIATED EQUIPMENT MUST BE CSA APPROVED.

NOTES RELATED TO ATEX/IEC APPROVAL:

- INSTALLATION AND USE OF APPARATUS IN HAZARDOUS LOCATIONS SHALL BE IN ACCORDANCE WITH IEC 60079-14 OR EQUIVALENT REGIONAL STANDARD.

# 7 Operation

The LMS200 will provide either normally open or normally closed dry contacts that can be used to activate external devices such as alarms or solenoids. The capacity of the switch allows for a wide range of devices to be switched, as long as the stated limits are not exceeded.

Since the LMS200 is magnetically activated, it is suited for any application where it is necessary to sense the passing of a magnet or magnetic field near it. However, its main application is to sense the passing of a magnetic float in a KM26 or similar chamber attached to a vessel containing a fluid. This will provide for the detection of a start/stop trip point of either a total or interface level in any vessel. These trip points can be used for alarms or to activate a pump motor starter relay.

The LMS200 consists of two snap action switches assembled in a double pole double throw configuration, and a precision cam/spindle assembly which contains a rod magnet. A magnetic ABB float passing by the LMS200 will cause its magnet to rotate through approximately 60 ° of arc, causing the integral snap action switches to actuate. The action of the contacts is break before make.

The spindle is not totally free to rotate unless a strong magnetic field is passed parallel to the LMS200 switch because the spindle magnet is magnetically latched to one of two stops. The spindle magnet attraction for a stop is great enough to keep the spindle from rotating on its own, but the magnetic field of a float is strong enough to cause the spindle magnet to release from the stop to which it is attached and rotate to align itself with the float's magnetic field. As the float passes by the LMS200 switch, the spindle magnet will latch to the opposite stop. It will remain in this position until the float passes by again

# 8 Troubleshooting

If the switch does not work, check if:

- switch installed upside down. Remove and install correctly.
- float does not travel past the switch during operation. Float may encounter float stop prior to activating switch. Switch point should be a minimum of 1 in inside the upper and lower stop points for the float.
- contacts damaged due to excessive load, inductive load, or dead short in the circuit. Replace the switch.
- magnet has been demagnetized by proximity to magnetic source or ferrous materials. Replace the switch and remove the interference.
- distance between the switch and float is too large. Strap may be loose, insulation may be too thick, attachment to a switch mount rod may have moved or the switch has been moved away from the location of a guided float.
- float has become demagnetized and indicator also decouples readily. Have the float re-magnetized at the factory and remove the source of demagnetizing.

# 9 Service

The LMS200 does not require any routine maintenance in normal day to day operation.

**⚠ CAUTION**

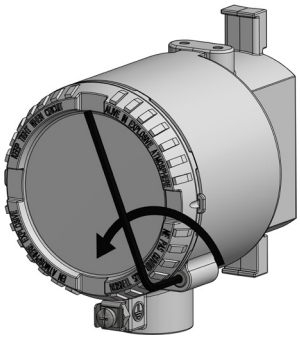
De-energize all field wiring before servicing. If there is a need to take the switch out of service or disconnect it for any reason, then make sure the circuit is de-energized or that the area is known to be non-hazardous.

**⚠ WARNING**

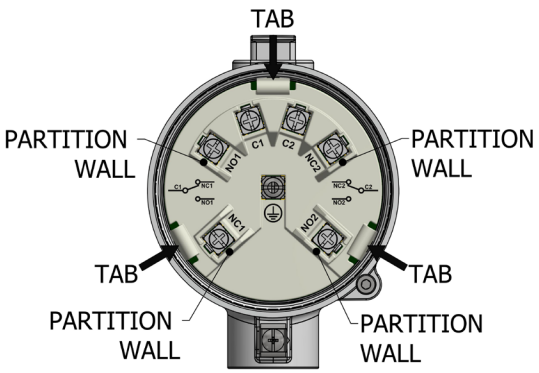
The LMS200 can be directly coupled to chambers that operate at elevated temperatures under normal circumstances. Proper care should be taken when installing, adjusting, servicing, or removing the product from active process chambers to mitigate the risk of thermal hazards to personnel.

**Service work instructions for replacing LMS200 core assembly:**

1 To remove the housing cover, first unlock the cover security bolt by turning it clockwise with an M3 hex key. Continue turning until the bolt head is recessed inside the housing. Grip the housing and rotate it counterclockwise to remove.

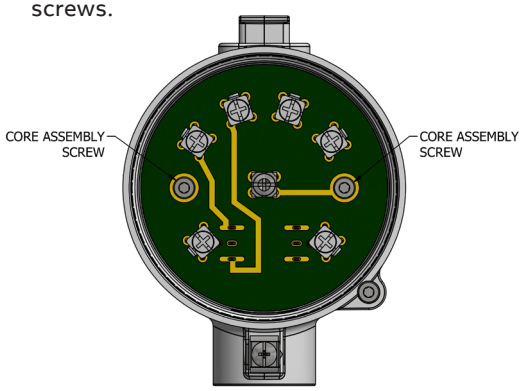


2 Loosen all terminal screws, including the screws of unused terminals.
3 Disconnect all field wiring from the terminals.
4 Working one tab at a time, remove the terminal cover by compressing the tab with a flat object while simultaneously gripping the adjacent partition wall with pliers. Pull outward on the pliers to dislodge the tab. Repeat for each adjacent tab.

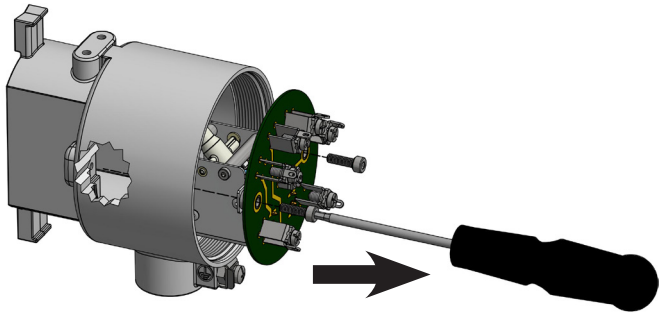


## ... 9 Service

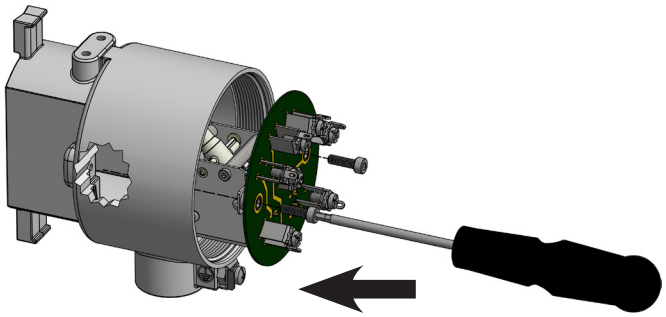
5 Using an M3 hex drive, remove each of the core assembly screws.




6 Remove the core assembly



7 Set the new core assembly in place, using the asymmetrical mounting tabs as guides.
8 Apply high strength threadlocker the each of the supplied M4 socket cap head screws.
9 Hand tighten the screws into place.



10 Working one tab at a time, compress the terminal cover tab with a flat object and insert the terminal cover into the housing just beyond the threaded entry. Repeat for each adjacent tab and rotate the terminal cover so that each square opening is aligned with the terminals.
11 Ensuring the square terminal washers are aligned with the openings in the terminal cover, press the terminal cover firmly into place. This operation should be followed by an audible snap. The terminal cover openings should now be flush or slightly sub-flush with the terminal surfaces.
12 Reconnect the field wiring as per the application.
13 Place back the housing cover that was removed in step 1 by rotating clockwise onto the housing until it is fully tight.
14 Finally, rotate the security bolt clockwise until it latches to lock the housing cover.

## 10 Standards and declarations

### Standards

The LMS200 has been designed, evaluated, and certified to the following international and regional standards:

EN 60079-0:2012+A11:2013
EN 60079-1:2014
EN 60079-11:2012
EN 60079-15:2010
EN 60079-31:2014
EN 60529:1991+A1:2000+A2:2013
IEC 60079-0:2011
IEC 60079-1:2014
IEC 60079-11:2011
IEC 60079-15:2010
IEC 60079-31:2013
IEC 60529:2013
ANSI/NEMA 250
ANSI/ISA 60079-0:2013
ANSI/UL 60079-1:2015
ANSI/ISA 60079-11:2014
ANSI/ISA 60079-15:2013
ANSI/ISA 60079-31:2015
ANSI/IEC 60529:2004
ANSI/UL 61010-1:2015
UL 50:2015
UL 50E:2015
CAN/CSA C22.2 No. 0-10:2015
CAN/CSA C22.2 No. 0.4:2017
CAN/CSA C22.2 No. 0.5:2016
CAN/CSA C22.2 No. 25:2017
CAN/CSA C22.2 No. 30:2016
CAN/CSA C22.2 No. 94.1:2015
CAN/CSA C22.2 No. 94.2:2015
CAN/CSA C22.2 No. 157:2016
CAN/CSA C22.2 No. 213:2017
CAN/CSAC22.2 No. 60079-0:2015
CAN/CSA C22.2 No. 60079-1:2016
CAN/CSA C22.2 No. 60079-11:2014
CAN/CSA C22.2 No. 60079-15:2016
CAN/CSA C22.2 No. 60079-31:2015
CAN/CSA C22.2 No. 60529:2016
CAN/CSA C22.2 No. 61010-1:2015

### EU declaration of conformity

The EU declaration of conformity can be downloaded at the following link:

https://publish.library.e.abb.com/api/documents/831264/attachment

# 11 LMS200 overview and mounting options

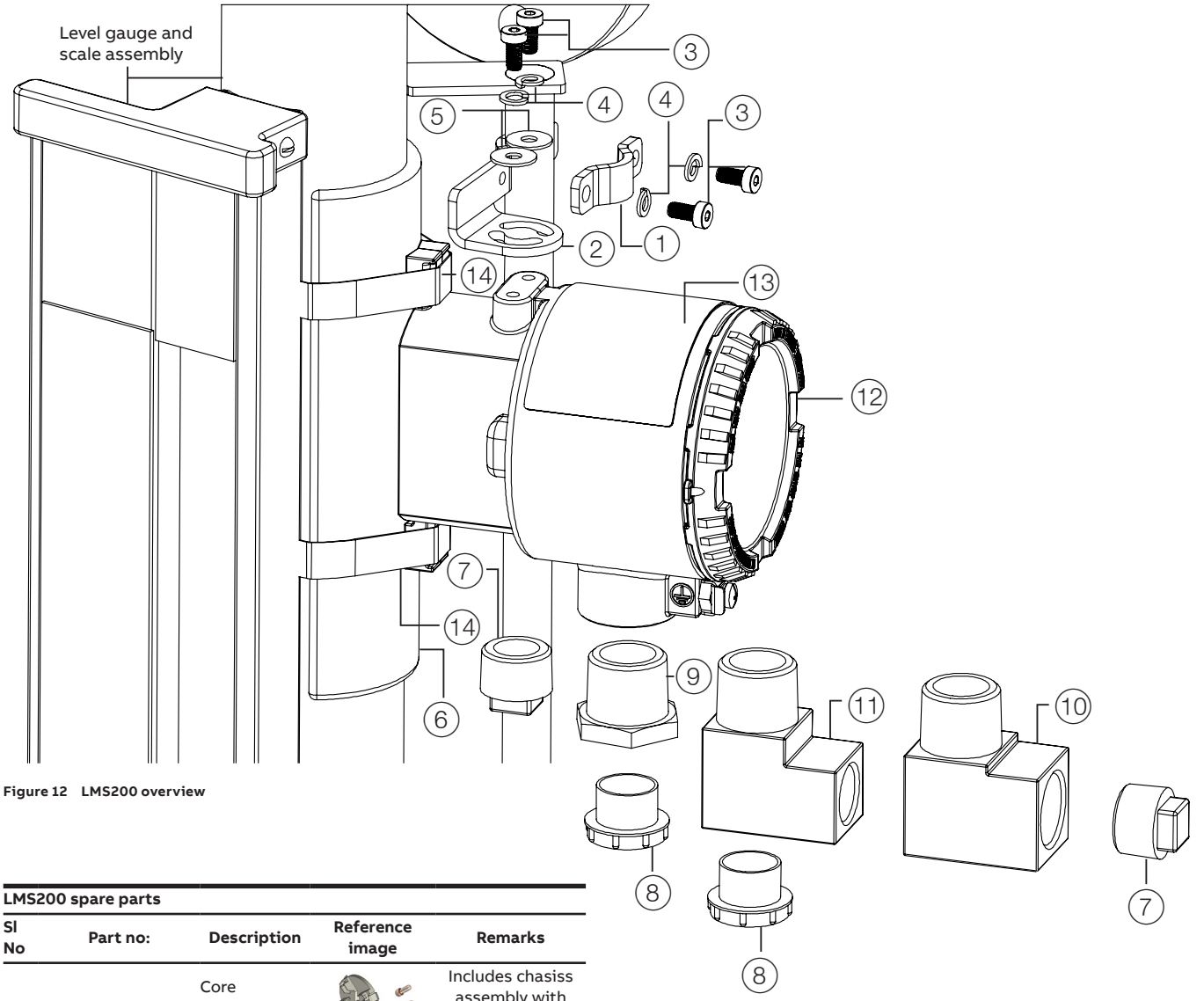



**Figure 12 LMS200 overview**

**LMS200 spare parts**

| Sl No | Part no: | Description | Reference image | Remarks |
|---|---|---|---|---|
| 1 | 3KXL130200L0001 | Core assembly replacement kit |  | Includes chasiss assembly with PCBA, O-ring, terminal cover and screws |
| 2 | 3KXL130200L0002 | ¾ in X M20F 316 SS reducer (ATEX/IECEx) |  | To be used for approval codes E5 or E6 |
| 3 | 3KXL130200L0003 | ¾ in X M20F nickel-plated brass reducer (ATEX/IECEx) |  | To be used for approval codes E5 or E6 |
| 4 | 3KXL130200L0004 | ¾ in X M20F 316 SS reducer (NEC/CEC) |  | To be used for approval code N4 |
| 5 | 3KXL130200L0005 | ¾ in X M20F nickel-plated brass reducer (NEC/CEC) |  | To be used for approval code N4 |
| 6 | IHPAD | Insulation pad |  | One pad with ½ in ceramic fiber insulation |

| LMS200 overview and mounting options | |
|---|---|
| Rod mount U–bracket | 1 |
| Rod–switch bracket | 2 |
| Hex–screw DIN7984_M5X10-A4-70/PL | 3 |
| Split lock washer DIN7980_M5-A2 | 4 |
| Washer ISO7093-1_15X1-A4/PL | 5 |
| IHPAD – insulation pad | 6 |
| ¾ in blue plastic plug | 7 |
| 20mm yellow plastic plug | 8 |
| ¾ in MNPT xM20F reducer | 9 |
| ¾ in MNPT x ¾ in FNPT 90° elbow | 10 |
| ¾ in MNPT x M20F 90° elbow | 11 |
| LMS200 switch | 12 |
| LMS200 nameplate | 13 |
| Direct mounting gear clamp | 14 |

# 12 Warranty statement

5 YEAR WARRANTY FOR:
KM26 vv; MagWave dual chamber system; LS series mechanical level switches (LS500, LS550, LS600, LS700); EC external chambers, STW stilling wells and ST95 seal pots.

3 YEAR WARRANTY FOR:
KCAP300 & KCAP400 capacitance switches.

2 YEAR WARRANTY FOR:
AT100 and AT200 series transmitters; LMT100 and LMT200 series transmitters; RS85 liquid vibrating fork switches; TX thermal dispersion switches; IR10 and PP10 external relays; MT2000, MT5000, MT5100 and MT5200 radar level transmitters; RI100 repeat indicators; A75 RF capacitance level switches; buoyancy level switches (MS50 and MS10); magnetic level switches (LMS100, MS41 and PS45).

SPECIAL WARRANTY CONSIDERATIONS:
ABB does not honor OEM warranties for items not manufactured by ABB (such as palm pilots). These claims should be handled directly with the OEM.

ABB will repair or replace, at ABB's election, defective items which are returned to ABB by the original purchaser within the period specified above from the shipment date of the item and which is found, upon examination by ABB, 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's warranty does not include onsite 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 and request a returned material authorization before returning the material to ABB, with transportation prepaid by the purchaser. (To expedite all returns / repairs from outside of the United States, consult ABB's customer service team at 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 for best-way transportation only. ABB is not responsible for expedited shipping charges. If the product is shipped to ABB freight collect, then it will be returned to the customer freight collect.

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

The materials of construction for all ABB 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'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 ANY OTHER LIABILITY IN CONNECTION WITH THE SALE OF ABB'S PRODUCTS. THE REMEDIES SET FORTH IN THIS WARRANTY ARE EXCLUSIVE OF ALL OTHER REMEDIES AGAINST ABB. ABB SHALL NOT BE LIABLE FOR ANY CONSEQUENTIAL, INCIDENTAL, OR SPECIAL DAMAGES OF ANY KIND. ABB'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.

# 13 RMA form

ABB, Inc
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Baton Rouge, LA 70810
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Service: +1 225 677 5836
Fax: +1 225 673 2525
Service email: ktek-service@us.abb.com

*** IMPORTANT CUSTOMER NOTICE: PLEASE READ PRIOR TO RETURNING PRODUCTS TO ABB***

Be sure to include the Return Authorization (RA) number on the shipping label or package to the attention: Customer Service. A copy of this document should also be included with the packing list. ABB wants to maintain a safe work environment for its employees. In the event, the returned product or material has been in contact with a potentially hazardous chemical, per federal regulations, the customer must provide evidence of decontamination and the related chemical composition and characteristics. In order to expedite your return, please include the applicable Material Safety Data Sheets (MSDS) and decontamination tags by affixing these documents in close proximity to the shipment label for identification purposes.

| **Return Authorization Form** | |
|---|---|
| Customer: | Date: |
| Contact Name: | Product: |
| Contact Email: | Serial No: |
| Contact Phone: | Job No: |
| Contact Fax: | Service Rep: |

**Completed by Customer**

Reason

Problem Found: None

Action: None
Requested:
Is expedited return shipping requested? ☐Yes
If yes, please provide a purchase order or your shipper's account number (ex. FedEx or UPS). ABB pays return transport via standard ground shipments only.

If purchase order is issued, a copy of purchase order must be included with return documentation.
Is ABB authorized to repair items determined to be non-warranty? ☐Yes
If yes, a copy of purchase order must be included with return documentation.

Account #:

Customer PO:

Date:

Has product been in contact with any potentially hazardous chemical? ☐Yes
If yes, documentation product and forward MSDS to ABB, "ATTN: Customer Service"

| Return Repaired Product to Address | |
|---|---|
| Shipping Address: | Billing Address: |
| | Ship Via: |

# Notes

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