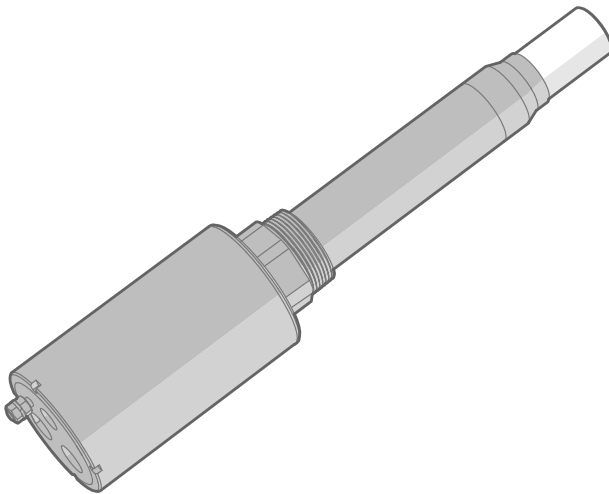


Installation and Safety Guide

Vaisala Multigas Probe for Methane, Carbon
Dioxide, and Humidity Measurement

MGP261



VAISALA

PUBLISHED BY

Vaisala Oyj

Vanha Nurmijärventie 21, FI-01670 Vantaa, Finland

P.O. Box 26, FI-00421 Helsinki, Finland

+358 9 8949 1

Visit our Internet pages at www.vaisala.com.

© Vaisala Oyj 2019

No part of this document may be reproduced, published or publicly displayed in any form or by any means, electronic or mechanical (including photocopying), nor may its contents be modified, translated, adapted, sold or disclosed to a third party without prior written permission of the copyright holder. Translated documents and translated portions of multilingual documents are based on the original English versions. In ambiguous cases, the English versions are applicable, not the translations.

The contents of this document are subject to change without prior notice.

Local rules and regulations may vary and they shall take precedence over the

information contained in this document. Vaisala makes no representations on this document's compliance with the local rules and regulations applicable at any given time, and hereby disclaims any and all responsibilities related thereto.

This document does not create any legally binding obligations for Vaisala towards customers or end users. All legally binding obligations and agreements are included exclusively in the applicable supply contract or the General Conditions of Sale and General Conditions of Service of Vaisala.

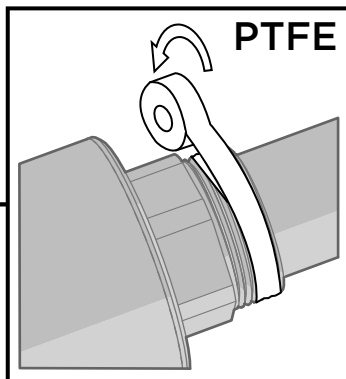
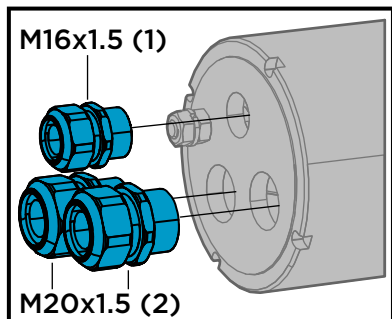
Table of Contents

English.....5

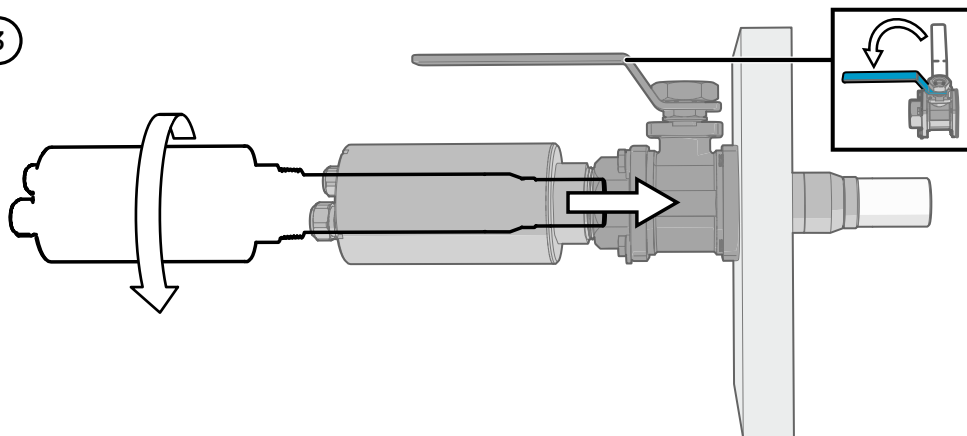
中文.....19

1

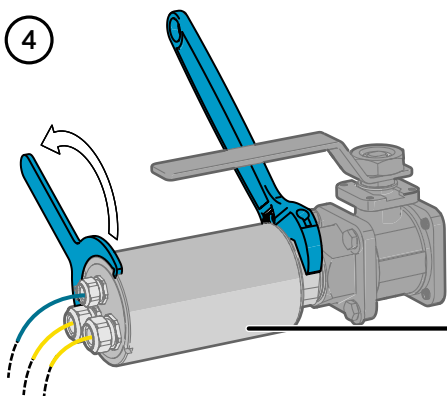
2



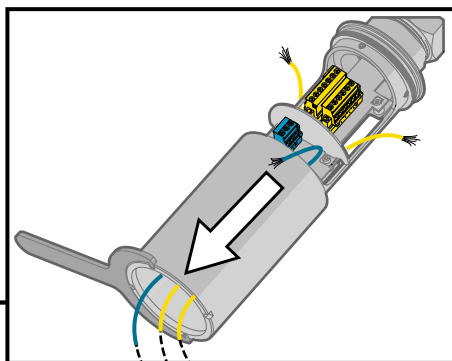
3



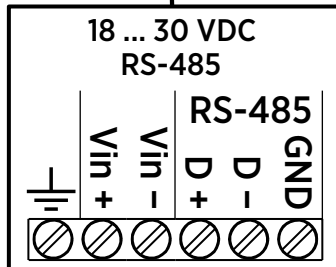
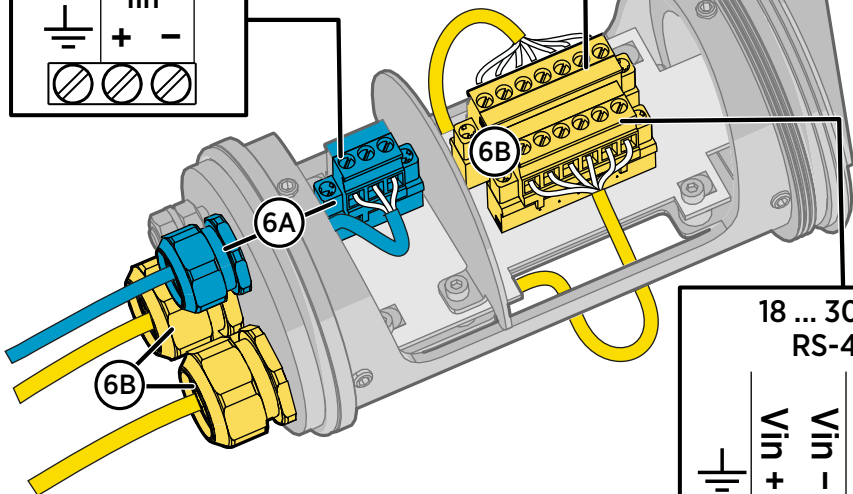
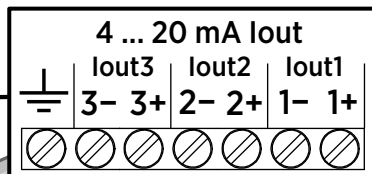
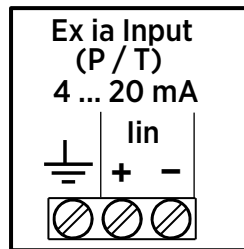
4



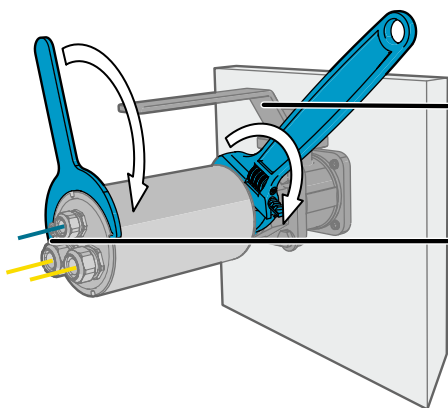
5



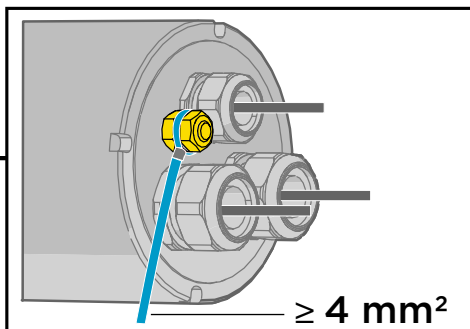
6



7



8



HAZARDOUS AREA

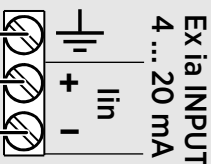
ZONE 0

EXTERNAL SENSOR
(PRESSURE OR TEMPERATURE)

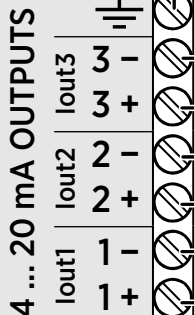


FOR POSSIBLE UNUSED WIRES;
INTERNALLY CONNECTED WITH
PROBE GROUNDING TERMINAL

ZONE 1



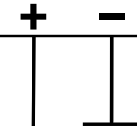
MGP261



GROUNDING
TERMINAL

SAFE AREA

24 VDC
POWER SUPPLY FOR
ANALOG OUTPUTS



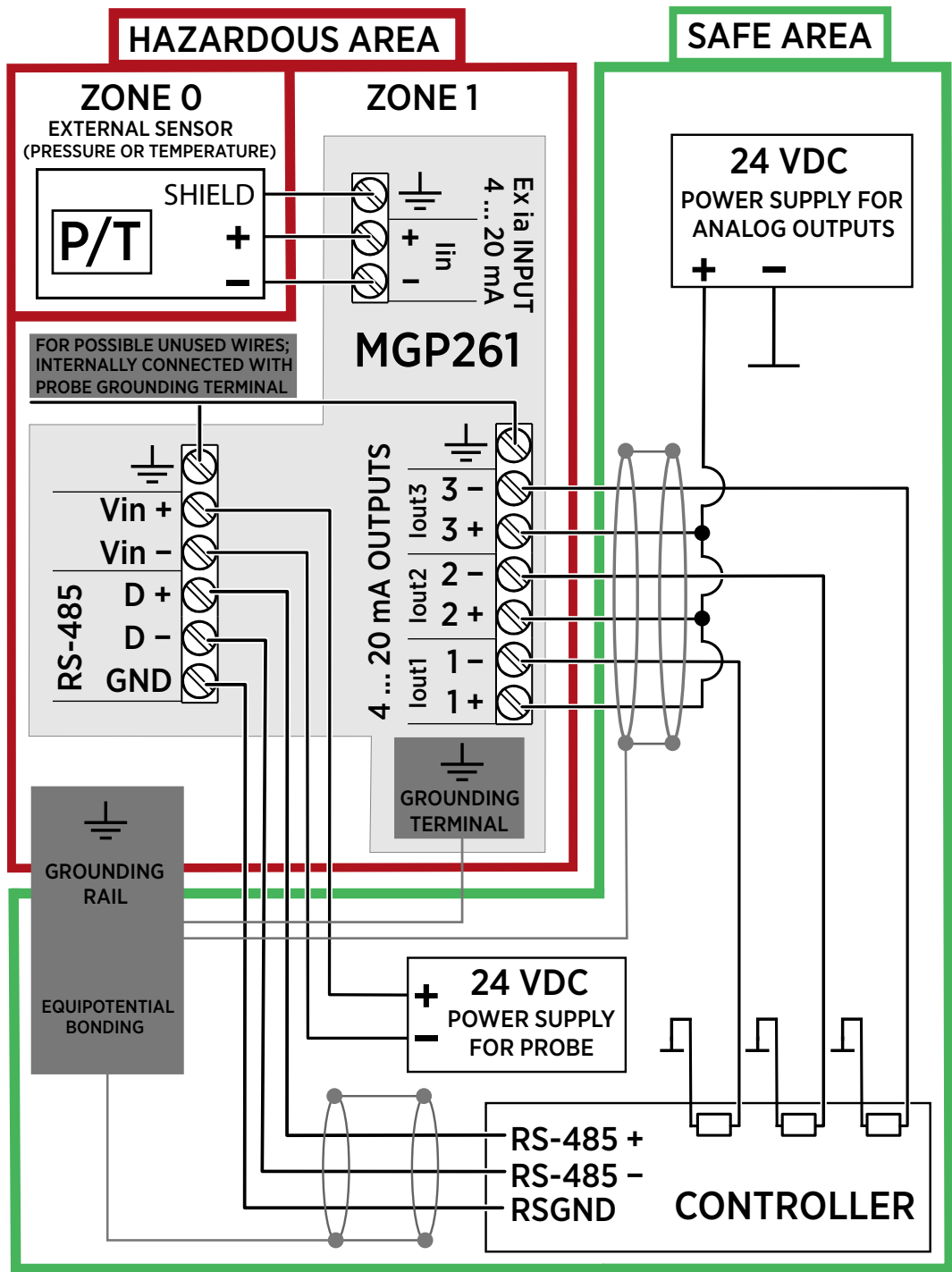
GROUNDING
RAIL

EQUIPOTENTIAL
BONDING

24 VDC
POWER SUPPLY
FOR PROBE

RS-485 +
RS-485 -
RSGND

CONTROLLER



1 Introduction to MGP261

Vaisala CARBOCAP® MGP261 Multigas Probe for Methane, Carbon Dioxide, and Humidity Measurement is a compact and durable in situ probe for methane (CH₄), carbon dioxide (CO₂), and moisture (H₂O vapor) measurements in demanding biogas processing conditions. MGP261 probes are Ex certified for use in Ex Zone 0 (parts inserted into process) and Ex Zone 1 (parts outside the process).

MGP261 can be installed directly into raw process gas, removing the need for sample treatment. Application areas include anaerobic digestion of industrial and municipal waste and sludge from waste water treatment, landfill gas monitoring, activated carbon filter monitoring in biogas treatment process, and CHP engine feed gas monitoring.

The proprietary infrared technology of MGP261 provides superior stability and repeatability. Thanks to condensation elimination through probe heating and corrosion-resistant steel and plastic materials, the IP66-rated instrument is highly robust and durable.

MGP261 measurement output options include 3 analog current output channels (4 ... 20 mA) and Modbus RTU over RS-485. The probe also provides a 4 ... 20 mA Ex ia input for connecting an optional external pressure or temperature sensor.

For easy-to-use access to configuration, diagnostics, and calibration and adjustment functionalities, MGP261 can be connected to Vaisala Insight PC software with a USB cable accessory.

1.1 Basic Features and Options

- Available measurement parameters: methane (CH₄), carbon dioxide (CO₂), and moisture (H₂O vapor)
- Ex classification: **Ex II 1/2 (1) G Ex eb mb [ia] IIB T3 Ga/Gb -40 °C ≤ Tamb ≤ +60 °C**
- Operating pressure: -500 ... +500 mbar
- 3 analog outputs (4 ... 20 mA, scalable, isolated)
- Digital output: Modbus RTU over RS-485
- Optional external temperature or pressure sensor input (4 ... 20 mA, Ex ia)
- Power supply input: 18 ... 30 VDC
- Direct installation into process: for pipeline ports with 1.5" female NPT thread
- Compatible with Vaisala Insight PC software

1.2 More Information

For further information on using, configuring, and maintaining the probe after installation, see MGP261 User Guide (available at www.vaisala.com/MGP261).

2 Using MGP261 in Hazardous Locations



WARNING! MGP261 has been designed for use in hazardous locations as specified by the product classification. The personnel installing, using, or maintaining the probe are responsible for determining the appropriate protection concept for the specific application the probe is used in, and that the hazardous area classification of the probe meets the requirements of the application.

MGP261 is certified for use in hazardous areas as defined by the following classification:



Ex II 1/2 (1) G Ex eb mb [ia] IIB T3 Ga/Gb -40 °C ≤ Tamb ≤ +60 °C



CAUTION! The personnel installing, operating, and maintaining MGP261 must have the required competencies for working in the hazardous location, as defined by the applicable standards.

For information on the standards that apply to using MGP261 based on the classification of the device, see MGP261 certification documentation and the declarations of conformity related to MGP261 at www.vaisala.com/declarationofconformity.

2.1 Guidelines for Safe Use in Hazardous Conditions

Process Connection and Partition Wall

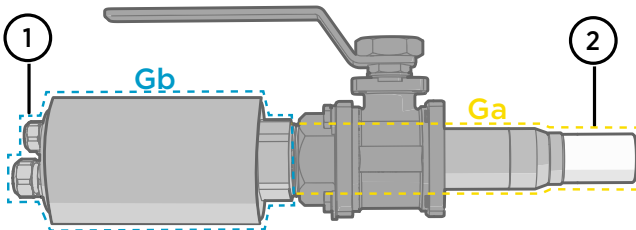


Figure 1 MGP261 Probe Ga/Gb Division

- 1 The part outside of the process (up until to the NPT 1.5" connection thread) complies with the **Gb** Equipment Protection Level (EPL).
- 2 The part inside the process (starting from the NPT 1.5" thread) complies with the **Ga** EPL. The partition wall is made of stainless steel, sapphire glass, and silicone adhesive. The stress limit temperature range of the silicone adhesive is -40 ... +60 °C (-40 ... +140 °F).



WARNING! While installing or uninstalling the device, there is a risk of flammable gas release or flame entrance.

Wiring Requirements

- The wiring of the optional intrinsically safe (Ex ia) external pressure or temperature sensor input terminal must be kept separate from the analog input, power supply input, and RS-485 wiring.
 - See the installation overview and installation instructions for more information.
- The cable glands and wires used for wiring MGP261 must be Ex compliant.
 - Unused lead-throughs must be sealed using Ex compliant plugs.
- Select a strain relief option that suits the application (either use cable glands that include strain relief or install separate clamps: see IEC 60079-14).
- See [Table 1 \(page 7\)](#) for screw terminal requirements.
- Permitted supply short-circuit current (I_k): 50 A
- MGP261 analog outputs must be externally powered.



CAUTION! Connect only de-energized wires. Never switch on the power supply input before completing the wiring and closing the connection box.

Screw Terminal Connections

Table 1 Screw Terminal Wiring Requirements

Property	Specification
Connection torque	0.5 Nm ... 0.6 Nm
Connection capacity (solid and flexible)	0.2 mm ² ... 2.5 mm ² (AWG 24 ... 12)
Stripping length	7 mm (0.27 in)

Intrinsic Safety

The overvoltage category of MGP261 is I (non-mains equipment), as defined in IEC 60664-1.

MGP261 is in conformance with the IEC 60079-11 dielectric strength requirement. For the intrinsic safe IIB output parameters, see [Table 2 \(page 7\)](#).

Table 2 Intrinsic Safe IIB Output Parameters

Parameter	Value
U_o	25.2 V
I_o	78 mA

Parameter	Value
P_o	0.5 W
U_m	40 V
C_o	820 nF
L_o	20 mH

The parameters listed in [Table 2 \(page 7\)](#) apply when one of the two conditions below is given:

- the total L_i of the external circuit (excluding the cable) is $< 1\%$ of the L_o value; or
- the total C_i of the external circuit (excluding the cable) is $< 1\%$ of the C_o value.

The parameters are reduced to 50% when both of the two conditions below are given:

- the total L_i of the external circuit (excluding the cable) is $\geq 1\%$ of the L_o value; and
- the total C_i of the external circuit (excluding the cable) is $\geq 1\%$ of the C_o value.

Note: the reduced capacitance of the external circuit (including cable) shall not be greater than $1\mu\text{F}$ for Groups I, IIA, IIB & IIIC, and 600nF for Group IIC.

The values of L_o and C_o determined by this method shall not be exceeded by the sum of all of the L_i plus cable inductances in the circuit and the sum of all of C_i plus cable capacitances, respectively.

Connecting Probe to Insight PC Software

The Insight PC software connection cable must only be used outside the explosion hazardous area. Remove the probe from the process for configuration, and use only the Vaisala accessory PC connection cable to connect the probe to Insight.

Maintenance

The probe filter is the only user-replaceable part in MGP261. For other maintenance requirements, contact Vaisala.



CAUTION! Live maintenance is not allowed.

The content in this chapter is maintained in the following separately tracked document:

Document ID: M212241EN

Revision: B (21 Jan 2019)

3 Probe Parts



Items A ... K refer to the probe parts illustration in the beginning of the document.

Table 3 Probe Parts

Item	Description
A	Connection box key
B	Grounding terminal: use $a \geq 4 \text{ mm}^2$ wire to connect to the grounding rail
C	Lead-throughs for wiring (3): install cable glands as required (see C1 and C2) and seal unused lead-throughs  Cable glands are not provided by Vaisala. When selecting cable glands for your application, note the requirements in Guidelines for Safe Use in Hazardous Conditions (page 6).
C1	M16x1.5 wiring lead-through (1): used when wiring the optional Ex ia external pressure or temperature sensor input terminal
C2	M20x1.5 wiring lead-throughs (2): used when wiring the analog output, power supply input, and RS-485 terminals
C3	The depth of the lead-throughs is 6 mm (0.24 in): the maximum thread length for the plugs used in the lead-throughs is 8 mm (0.31 in) and the maximum cable gland length is 5 cm (1.97 in)
D	Connection box cover: open with connection box key (A) to access wiring terminals
E	Tightening nut: only tighten from the tightening nut when installing
F	1.5" male NPT thread: never install the probe to any other thread type than 1.5" female NPT thread
G	Probe filter
H	Wiring terminals for optional 4 ... 20 mA input from external pressure or temperature sensor (Ex ia)
I	Barrier separating the intrinsically safe (Ex ia) optional external sensor input terminals from the analog output, power supply input, and RS-485 terminals
J	Wiring terminals for 4 ... 20 mA analog outputs, 18 ... 30 VDC power supply input, and RS-485 communication
K	Measurement cuvette with optics and CARBOCAP® sensor inside the probe filter

4 Installation Overview

Figure 2 (page 11) shows an example MGP261 ball valve installation. The figure highlights the correct wiring routes and shows the recommended installation depth and orientation.



CAUTION! Always use a separate cable for the optional (Ex ia) external pressure or temperature sensor input wiring (1), and make sure the wiring remains separated from the terminals and wiring (2) on the other side of the metal barrier (3) on the component board.



CAUTION! Make sure the installation valve and threads are appropriate from the valve specifications. The correct thread type in which to install MGP261 is **1.5" female NPT**. Installing into any other thread type can damage the equipment and compromise the leak tightness of the connection. If unsure, verify the thread type with a 1.5" NPT thread gauge.

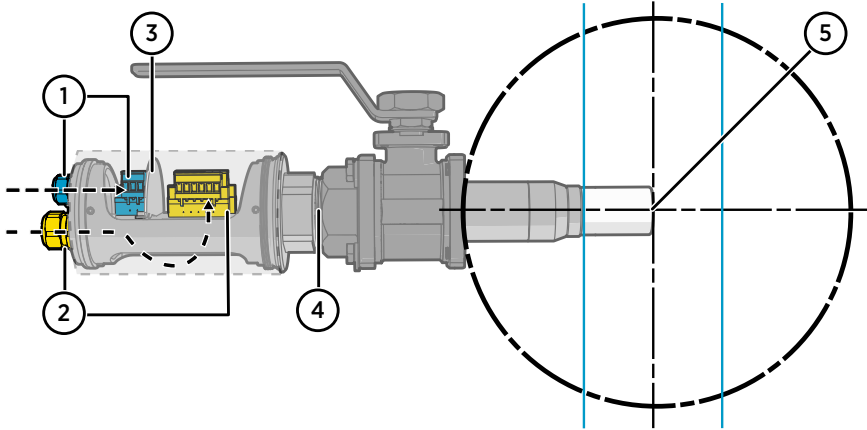


Figure 2 MGP261 Installation Example with Wiring Routes and Recommended Orientation and Depth

- 1 Optional external pressure or temperature sensor input wiring (Ex ia): use the M16x1.5 lead-through and route the cable directly to the terminal.
- 2 Standard analog output, power supply input, and RS-485 communication wiring: use the M20x1.5 lead-throughs and route the cables to the terminals through the openings below the component board.
- 3 Metal barrier separating the intrinsically safe optional external sensor input terminals from the analog output, power supply input, and RS-485 terminals on the component board.
- 4 1.5" male NPT thread on MGP261: **never install to any other thread type than 1.5" female NPT.**
- 5 For best results, install MGP261 horizontally and position the tip of the probe within 1/3 d of the pipe centerline. In smaller pipes, the installation depth can be adjusted by using an adapter (for example, a ball valve).

4.1 Recommended Installation Position on Pipeline

Figure 3 (page 12) shows the recommended installation position for MGP261. Install the probe in a straight run of pipeline, ≥ 5 pipe diameters downstream of the closest bend or other feature affecting gas flow, and ≥ 2 pipe diameters upstream to the next bend or similar feature. For best results, use the orientation and installation depth shown in Figure 2 (page 11).

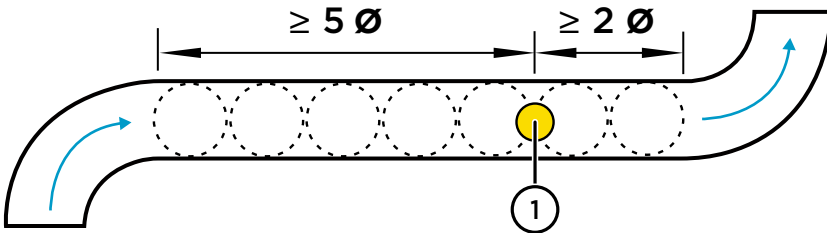


Figure 3 Recommended MGP261 Installation Position on Pipeline

1 Recommended MGP261 installation position on pipeline.

4.2 Gas Safety During Installation



WARNING! While installing or uninstalling the device, there is a risk of flammable gas release or flame entrance.



WARNING! Exposure to hazardous gases (for example, hydrogen sulfide (H_2S)) is possible when installing or removing MGP261 from the process.

- Always follow local safety guidelines. Ensure that the work area is safe and meets local regulations (for example, related to ventilation and personal protective equipment).
- Use a personal gas detector to monitor the safety of the area you are working in.
- After installation, use a gas detector to ensure that process connections are leak-free.



CAUTION! To avoid compromising the leak tightness of the installation:

- Ensure that the thread type of the installation port is 1.5" female NPT. If unsure, verify the thread type with a 1.5" NPT thread gauge.
- Apply PTFE tape to the 1.5" male NPT thread of MGP261 as instructed in [Installing into Process \(page 14\)](#), and make sure that the PTFE tape seal has not been damaged by rotating the probe open (counter-clockwise) in the installation port.

4.3 Before Starting Installation

Before starting the installation, check the following:

- Make sure that your installation site suits the Ex classification of MGP261:
Ex II 1/2 (1) G Ex eb mb [Ia] IIB T3 Ga/Gb -40 °C ≤ Tamb ≤ +60 °C
- Review the hazardous area information in [Using MGP261 in Hazardous Locations \(page 6\)](#) and make sure that the conditions for safe use are met.
- Review the wiring diagram included in this document for power supply requirements: MGP261 requires a dedicated 24 VDC power supply. Note that in addition to the power supply input for the probe, each analog output must be externally powered.
- Inspect the probe for any possible damage or dirt that could compromise the leak tightness of the device (for example, bent or punctured parts of the probe body, or dirt on the connection box threads preventing it from closing fully).
- When selecting the cable glands and plugs for your application, make sure they are Ex compliant.

5 Installing into Process



Steps 1 ... 8 steps refer to illustrations 1 ... 8 in the beginning of the document.



The following tools are required when installing:

- Adjustable wrench (or a similar suitable tool) for turning the tightening nut
- Connection box key (provided)
- Input and output cables for wiring
- Cable glands and plugs for unused lead-throughs (as required in your application)
- Small slotted screwdriver for screw terminals
- PTFE tape (wide) for the probe threads



WARNING! Before starting the installation, make sure that your installation site matches the Ex classification of MGP261 and the requirements listed in [Using MGP261 in Hazardous Locations \(page 6\)](#).

- ▶ 1. Attach cable glands (not provided by Vaisala) to the wiring lead-throughs as required. Note the cable gland requirements listed in [Guidelines for Safe Use in Hazardous Conditions \(page 6\)](#): for lead-through dimensions, see the probe parts illustration.
 - Use an M16x1.5 gland for the optional external sensor input wiring (Ex ia).
 - Use 1 or 2 M20x1.5 glands for wiring the 4 ... 20 mA analog output, power supply input and RS-485 terminals (as required in your application).
 - Seal unused lead-throughs.
2. Apply PTFE tape on the probe threads.
 - Inspect the threads and remove any possible dirt. Note that the edges may be sharp.
 - Wrap 2-3 revolutions of tape in the direction of the thread spiral, starting from the first thread. Keep the edge of tape parallel to the face of the thread while wrapping.
 - Do not tape beyond the first thread or leave loose tape hanging.

3. Insert the probe into the 1.5" female NPT installation port and rotate it clockwise until it sits firmly in the port. Do not tighten the probe to full tightness, only enough to keep it securely in place when wiring.



CAUTION! The correct thread type in which to install MGP261 is **1.5" female NPT**. Installing into any other thread type can damage the equipment and compromise the leak tightness of the connection. If unsure, verify the thread type with a 1.5" NPT thread gauge.



CAUTION! Rotating the probe open after it has been installed into the port can tear the PTFE tape. Only adjust the position of the probe in the installation port by tightening.

4. Use a wrench to hold the probe by gripping the tightening nut and open the connection box by turning the cover counter-clockwise with the connection box key.



Loosen the cable glands and insert the wiring cables into the connection box before pulling the connection box cover open.

5. Pull the connection box cover open to access the wiring terminals.



CAUTION! Connect or disconnect only de-energized wires. Never open the connection box in an explosion hazardous area when the device is energized.

6. Connect the input, output, and power supply wiring as required in your application. The wiring diagram in this guide shows an example of wiring the device when all inputs and outputs are used.
 - **6A:** Optional external pressure or temperature sensor input wiring (Ex ia): route the cable to the terminal through the M16x1.5 lead-through, above the component board.
 - **6B:** Analog output, power supply input and RS-485 wiring: route the cables to the terminals through the M20x1.5 lead-throughs (1 or 2) from below the component board.

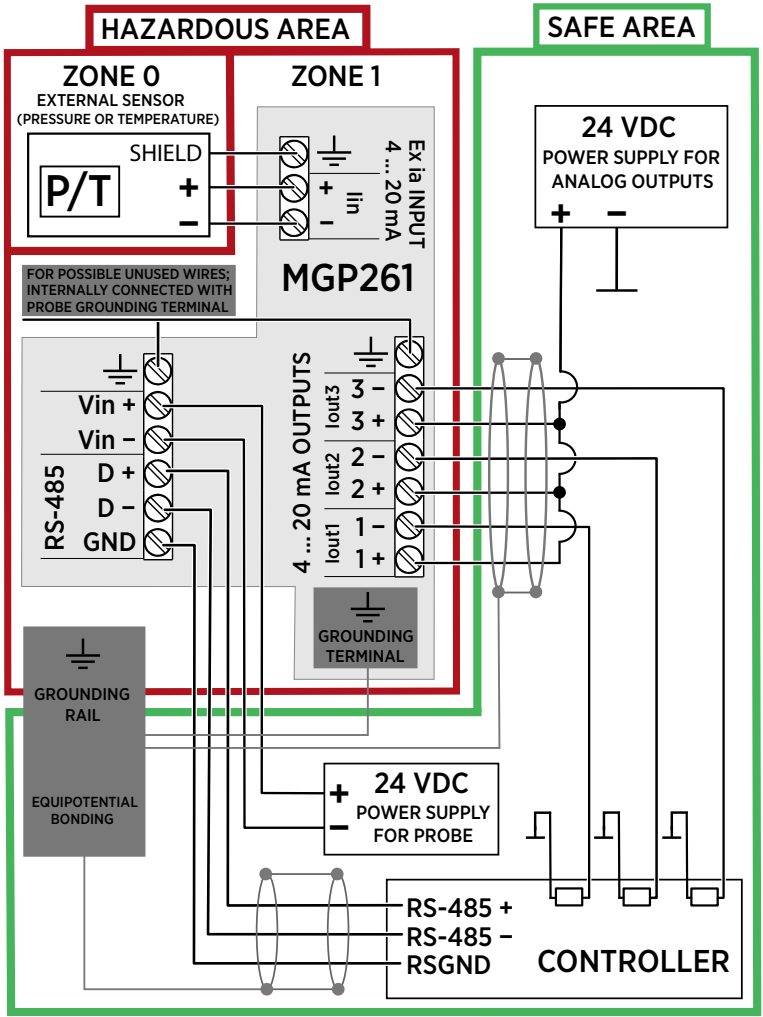
After connecting the wiring, adjust cable length and attach strain relief.



CAUTION! The optional Ex ia external sensor input wiring (**6A**) must be kept separate from the analog output, power supply, and RS-485 wiring (**6B**). Always use separate cables on each side of the metal barrier.

7. Close and tighten the connection box (< 0.55 mm cover gap) and cable glands, and tighten the probe to final tightness on the installation port by turning the tightening nut with the wrench.
8. Connect the grounding terminal to the grounding rail with a ≥ 4 mm² wire. In ball valve installations, lock the valve handle in the open position with the safety pin. When done, switch on the power supply input.

6 Wiring Diagram



1 MGP261 介绍

用于甲烷、二氧化碳和湿度测量的维萨拉 CARBOCAP®MGP261 多组分气体分析探头是一种结构紧凑且耐用的原位安装探头，用于在严苛沼气处理条件下甲烷（CH₄）、二氧化碳（CO₂）和水分（H₂O 水气）的测量。MGP261 探头经过 Ex 防爆认证，用于防爆 0 区（工艺管道内部分）和防爆 1 区（工艺管道外部分）中使用。

MGP261 可直接安装到原料工艺气体中，这样无需对样品进行处理。其应用领域包括废水处理产生的工业和城市污水污泥处理过程的厌氧发酵、填埋气体监测、沼气处理过程中活性炭过滤器监测，以及热电联供发动机进气监测。

MGP261 的专利红外技术提供了优越的稳定性和可重复性。通过探头加热可消除凝露，加上采用了耐腐蚀的钢材和塑料材料，使得 IP66 级的仪器非常坚固耐用。MGP261 测量输出选配项包括 3 个模拟电流输出通道（4~20 mA）和 RS-485 的 Modbus RTU 通讯协议。探头同样提供了一个 4~20 mA Ex ia 输入，用于连接选配的外部压力或温度传感器。

为了便于使用配置、诊断、校准和调整功能，MGP261 可通过采用 USB 数据线配件连接至维萨拉 Insight PC 软件上。

1.1 基本功能和选项

- 可用测量参数：甲烷（CH₄）、二氧化碳（CO₂）、水分（H₂O 水蒸气）
- 防爆分类：**Ex II 1/2 (1) G Ex eb mb [ia] IIB T3 Ga/Gb -40 °C ≤ 环境温度 ≤ +60 °C**
- 工作压力：-500~+500 mbar
- 3 个模拟输出（4~20 mA，量程可自定义，隔离式）
- 数字输出：RS-485 的 Modbus RTU 通讯协议
- 选配外部温度或压力传感器输入（4~20 mA，Ex ia）
- 电源输入：18~30 VDC
- 工艺管道中直接安装：用于带有 1.5" NPT 内螺纹的管道端口
- 兼容维萨拉 Insight PC 软件

1.2 更多信息

有关探头安装后使用、配置和维护的更多信息，请参见《MGP261 用户指南》（可访问 www.vaisala.com/MGP261 查阅）。

2 在危险场所使用 MGP261



警告 警告！ MGP261 设计用于产品分类中所指定的危险场所。探头的安装、使用或 维护人员应负责为探头的具体应用确定适当的保护概念，并确保探头的危险区域分类符合应用要求。

MGP261 已通过认证，可用于以下定义类别的危险区域：

Ex II 1/2 (1) G Ex eb mb [ia] IIB T3 Ga/Gb -40 °C ≤ 环境温度 ≤ +60 °C



警告 注意！ MGP261 的安装、操作和维护人员必须具备适用标准中所规定的在危险场所工作所需的能力。

有关根据设备分类使用 MGP261 所适用的相关标准，请参见 MGP261 认证文件和 MGP261 相关的符合性声明（www.vaisala.com/declarationofconformity）。

2.1 危险条件下安全使用指南

工艺管道连接和隔断墙

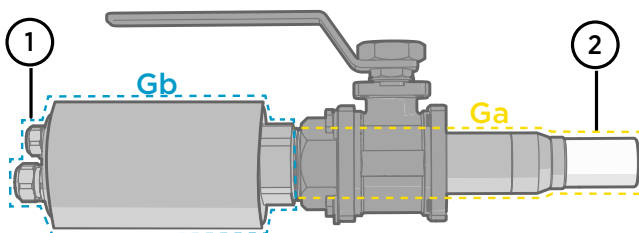


图 4 MGP261 探头 Ga/Gb 划分

- 1 工艺管道外部分（向上直至 NPT 1.5"连接螺纹处）符合 Gb 设备保护等级（EPL）。
- 2 工艺管道内部分（从 NPT 1.5"螺纹处开始）符合 Ga 设备保护等级（EPL）。
隔断墙 由不锈钢、蓝宝石玻璃和有机硅粘合剂组成。有机硅粘合剂的应力极限温度范围为 -40~+60°C (-40~+140°F)。



警告 安装或拆卸设备时，请注意可燃气体释放或火焰进入的风险。

接线要求

- 选配的本安型（Ex ia）外部压力或温度传感器输入端子的接线必须与模拟输入、电源输入和 RS-485 接线分开。
 - 有关更多信息，请参见安装概述和安装说明。
- 用于 MGP261 接线的电缆夹套和电线必须符合 Ex 标准。
 - 未使用的穿引线缆孔必须采用符合 Ex 标准的密封头进行密封。
- 选择适合于本应用的应力消除选配件（可使用包含应变消除的电缆格兰头或安装单独的夹具：请参见 IEC 60079-14）。
- 螺丝端子要求见 表 4（第 21 页）。
- 允许电源短路电流 (I_k): 50 A
- MGP261 模拟输出必须由外部供电。



警告 只连接非带电电缆。在完成接线和关闭接线盒之前，切勿接通电源输入。

螺丝端子连接

表 4 螺丝端子接线要求

参数名称	规格
连接力矩	0.5 Nm~0.6 Nm
连接容量（坚固和柔性连接）	0.2 mm ² ~2.5 mm ² (AWG 24 ... 12)
剥离长度	7 毫米 (0.27 英尺)

本质安全性

MGP261 的过电压类别为 I（非主要设备），如 IEC 60664-1 中的定义。MGP261 符合 IEC 60079-11 的耐电压强度要求。有关本安 IIB 输出参数，请参见 表 5（第 21 页）。

表 5 本安 IIB 输出参数

参数	值
U_o	25.2 V
I_o	78 mA
P_o	0.5 W
U_m	40 V
C_o	820 nF
L_o	20 mH

表 5（第 21 页）。中所列参数适用于下列两种情况之一：

- 外部电路（不包括电缆）的总输入电感 L_i 小于输出电感 L_o 值的 1%；或
- 外部电路（不包括电缆）的总输入电容 C_i 小于输出电容 C_o 值的 1%。

当以下两种情况同时满足时，参数值降低 50%：

- 外部电路（不包括电缆）的总输入电感 L_i 大于等于输出电感 L_o 值的 1%；以及
- 外部电路（不包括电缆）的总 C_i 大于等于 C_o 值的 1%。

注：外部电路（包括电缆）的减少电容值不应大于 $1\mu\text{F}$ （对于 I、IIA、IIB & IIIC 组），且不应大于 600nF （对于 IIC 组）。

电路的所有 L_i 值加上电缆电感之和以及所有 C_i 值加上电缆电感之和均不得大于采用上述方法所确定的 L_o 和 C_o 值。

将探头连接至 Insight PC 软件

Insight PC 软件连接电缆只能在爆炸危险区范围外使用。将探头从工艺流程管道中移除，并仅采用维萨拉随附的 PC 连接电缆将探头连接至 Insight。

维护

探头过滤器是 MGP261 中唯一可由用户更换的部件。有关其他维护要求，请联系维萨拉。



警告 不允许进行带电维护。

本章内容保存在以下具有单独跟踪信息的文档中：

文档 ID: M212241EN	修订: B (2019 年 1 月 21 日)
------------------	-------------------------

3 探头部件



项目 A~K 参考文件开头的探头部件插图。

表 6 探头部件

项目	说明
A	接线盒开启/锁闭扳手
B	接地端：采用 $\geq 4\text{ mm}^2$ 的导线连接至接地导轨
C	接线穿引孔(3个)：按要求安装电缆格兰头（参见 C1 和 C2），并对未使用的穿引孔进行密封  维萨拉不提供电缆格兰头。在为您的应用选择电缆夹套时，请注意“危险条件下安全使用指南”（第 20 页）中的要求。
C1	M16x1.5 接线格兰头（第 1 个）：用于选配 Ex ia 外部压力接线或温度传感器输入端子
C2	M20x1.5 接线格兰头（第 2 个）：用于模拟输出接线、电源输入和 RS-485 端子
C3	穿引口密封件深度为 6 毫米（0.24 英寸）：穿引件用接插件的最大螺纹长度为 8 毫米（0.31 英寸），电缆格兰头的最大长度为 5 厘米（1.97 英寸）
D	接线盒盖：用接线盒开启扳手（A）打开，以进入接线端子
E	紧固螺母：安装时仅从紧固螺母上紧固
F	1.5" NPT 外螺纹：不要将探头安装到除 1.5" NPT 内螺纹以外的任何其他螺纹上
G	探头过滤器
H	用于外部压力或温度传感器（Ex ia）选配 4~20 mA 输入的接线端子
I	用于将选配的本安型（Ex ia）外部传感器输入端子与模拟输出、电源输入和 RS-485 端子分隔开的隔板
J	用于 4~20 mA 模拟输出、18~30 VDC 电源输入和 RS-485 通信的接线端子
K	探头过滤器内置光学和 CARBOCAP®传感器的测量池。

4 安装概述

图 5（第 24 页）展示了 MGP261 球阀的安装示例。图中突出显示了正确的布线路径，并说明了建议的安装深度和方向。



警告 对于选配的（Ex ia）外部压力或温度传感器输入接线（1），始终采用单独的电缆，并确保接线与组件板上金属隔板（3）另一侧的端子与接线（2）分开。



警告 确保安装阀门和螺纹符合阀门规格。安装 MGP261 所采用的正确螺纹类型为 1.5" NPT 内螺纹。采用任何其他类型螺纹安装可能损坏设备，并破坏连接的密封性。如果不确定，请使用 1.5" NPT 螺纹规验证螺纹类型。

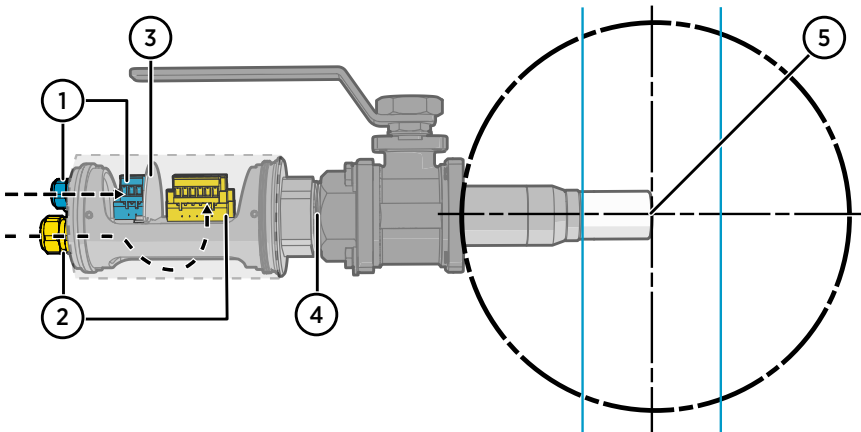


图 5 MGP261 安装示例（显示布线路径和建议的方向与深度）

- 1 选配外部压力或温度传感器输入接线（Ex ia）：使用 M16x1.5 穿引件，将电缆直接引至端子处。
- 2 标准模拟输出、电源输入和 RS-485 通信接线：使用 M20x1.5 穿引件，通过组件板下的开孔，将电缆引至端子处。
- 3 用于将选配的本安型外部传感器输入端子与组件板上的模拟输出、电源输入和 RS-485 端子分隔开的金属隔板。
- 4 MGP261 上的 1.5" NPT 外螺纹：**不要采用除 1.5" NPT 内螺纹以外的螺纹类型进行安装。**
- 5 为了达到最佳效果，请水平安装 MGP261，并将探头的尖端置于管道中心线的 1/3 d 范围内。在较小的管道中，可采用适配器（例如：球阀）调整安装深度。

4.1 管道上的建议安装位置

图 6（第 25 页）显示了 MGP261 的建议安装位置。将探头安装在管道的直管段上，具体位置在最近的管道弯头（或影响气体流动的其他特征）下游大于等于 5 个管道直径，以及下一弯头（或类似特征）上游大于等于 2 个管道直径处。为了获得最佳效果，请采用图 5（第 24 页）中所示的方向和安装深度。

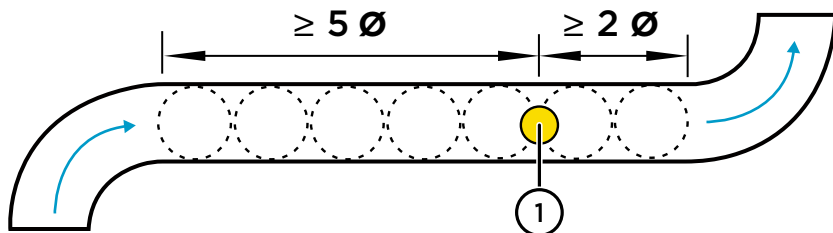


图 6 MGP261 在管道上的建议安装位置

1 MGP261 在管道上的建议安装位置。

4.2 安装期间的气体安全



警告 安装或拆卸设备时，请注意可燃气体释放或火焰进入的风险。



警告 在工艺管道上安装或移除 MGP261 时，可能会接触到危险气体（例如：硫化氢（ H_2S ））。

- 始终遵循当地的安全指南。确保工作区域安全，并符合当地规定（例如：与通风和个人防护装备相关的规定）。
- 采用个人气体探测器来监测工作区域的安全。
- 安装完成后，采用气体探测器来确保工艺管道连接无泄漏。



警告 为避免影响装置的密封性，须注意以下各项：

- 确保安装端口的螺纹类型为 1.5" NPT 内螺纹。如果不确定，请使用 1.5" NPT 螺纹规验证螺纹类型。
- 按照“安装至工艺管道”（第 11 页）中的指示，将聚四氟乙烯（PTFE）胶带贴在 MGP261 的 1.5" NPT 外螺纹上，并确保在安装端口内（逆时针）旋转打开探头时不会破坏 PTFE 胶带密封。

4.3 开始安装前

在开始安装前，请检查以下内容：

- 确保安装地点符合 MGP261 的 Ex 分类：
Ex II 1/2 (1) G Ex eb mb [ia] IIB T3 Ga/Gb -40 °C ≤ 环境温度 ≤ +60 °C
- 在危险场所使用 MGP261（第 4 页）时，查阅危险区域信息，并确保符合安全使用的条件。
- 查看本文件中的接线图，以了解电源要求：MGP261 需要专用的 24 VDC 电源。请注意，除探头的电源输入外，每个模拟输出同样必须由外部供电。
- 检查探头是否存在可能影响设备密封性的任何损坏或污垢（例如：探头本体弯曲或穿孔，或接线盒螺纹上存在污垢，导致接线盒无法完全关闭）。
- 在为应用选择电缆格兰头和接插件时，应确保它们符合 Ex 标准。

5 安装至工艺管道



步骤 1 至步骤 8 参考文件开头的插图 1 至插图 8。



安装时，需使用以下工具：

- 活动扳手（或类似的合适工具），用于转动紧固螺母
- 接线盒开启扳手（已提供）
- 接线用输入和输出电缆
- 用于未使用的穿引口的电缆格兰头和接插件（根据应用所需）
- 螺丝端子用小一字螺丝刀
- 探头螺纹用 PTFE 胶带（宽）



警告 开始安装前，请确保安装位置符合 MGP261 的 Ex 分类以及在危险场所使用 MGP261（第 20 页）中所列的要求。

- ▶ 1. 根据需要将电缆夹套（维萨拉未提供）连接到接线穿引件上。请注意危险条件下安全使用指南（第 4 页）中所列的电缆夹套要求：有关穿引件尺寸，请参见探头部件插图。
 - 选配的外部传感器输入接线（Ex ia）采用 M16x1.5 夹套。
 - 对 4~20 mA 模拟输出、电源输入和 RS-485 端子（根据应用所需）接线采用 1 个或 2 个 M20x1.5 夹套。
 - 对未使用的穿引口进行密封。
2. 在探头螺纹上粘贴 PTFE 胶带。
 - 检查螺纹，清除任何可能存在的污垢。须注意边缘可能很锋利。
 - 从第一圈螺纹开始，沿螺纹螺旋方向缠绕 2-3 圈胶带。缠绕时，保持胶带边缘平行于螺纹面。
 - 不要将胶带缠在第一圈螺纹之外，或任凭松弛的胶带垂落。
3. 将探头插入 1.5" NPT 内螺纹安装端口，并顺时针旋转，直到其牢固地固定在端口中。不要将探头紧固到完全紧固的状态，只需保证其在接线时达到足够稳固即可。



警告 安装 MGP261 所采用的正确螺纹类型为 1.5" NPT 内螺纹。采用任何其他类型螺纹安装可能损坏设备，并破坏连接的密封性。如果不确定，请使用 1.5" NPT 螺纹规验证螺纹类型。



警告 将探头安装到端口后旋转打开探头可能会撕裂 PTFE 胶带。只需通过拧紧探头来调整其在安装端口内的位置。

4. 用扳手夹紧固螺母来固定探头，并用接线盒钥匙逆时针旋转外盖，以打开接线盒。



松开电缆夹套，将接线电缆插入接线盒内，然后拉开接线盒外盖。

5. 拉开接线盒外盖，进入接线端子。



警告 仅连接或断开断电电线。当设备通电时，切勿在爆炸危险区域打开接线盒。

6. 根据应用所需，连接输入、输出和电源线路。本指南中的接线图显示了在使用所有输入和输出时对设备进行接线的示例。
- **6A:** 选配外部压力或温度传感器输入接线（Ex ia）：通过组件板上方的 M16x1.5 穿引件，将电缆引至端子处。
 - **6B:** 模拟输出、电源输入和 RS-485 接线：通过组件板下方的 M20x1.5 穿引件（1 个或 2 个），将电缆引至端子处。

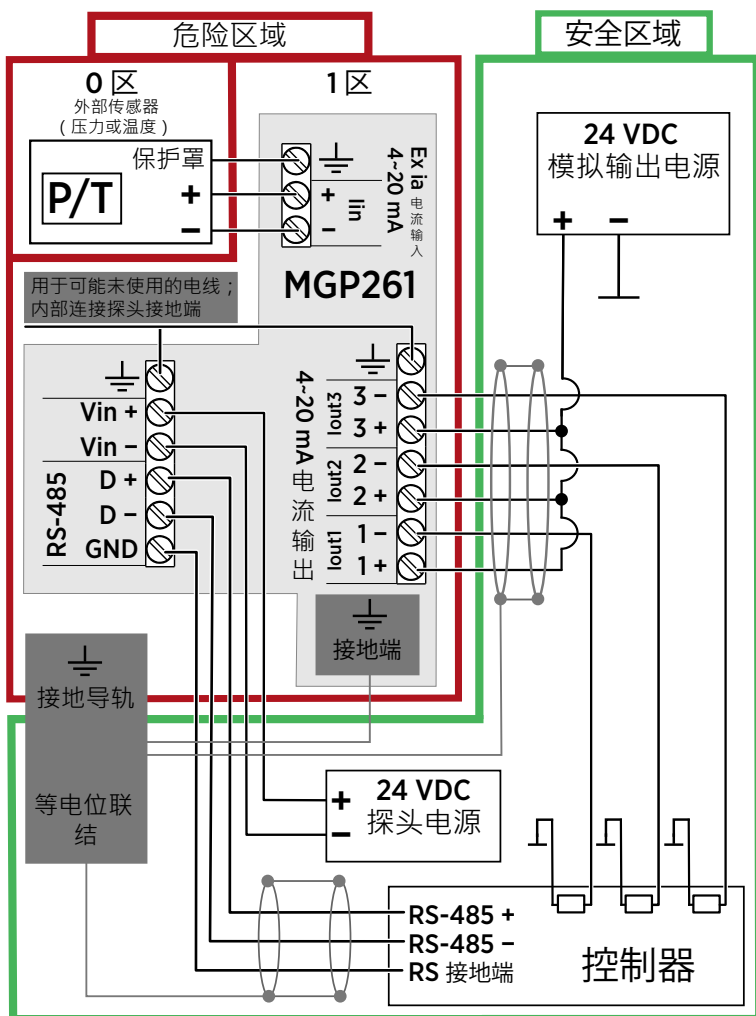
接线连接后，调整电缆长度并接上应变消除装置。



警告 选配的 Ex ia 外部传感器输入接线（6A）必须与模拟输出、电源和 RS-485 接线（6B）分开。在金属隔板的每一侧始终使用单独的电缆。

7. 关闭并紧固接线盒（< 0.55 mm 外盖间隙）和电缆夹套，并用扳手转动紧固螺母，将探头固定到安装端口上至最终紧固状态。
8. 采用 $\geq 4 \text{ mm}^2$ 电线将接地端连接到接地导轨上。在球阀安装中，用安全销将阀门手柄锁定在开启位置。完成后，启动电源输入。

6 接线图



VAISALA

www.vaisala.com

