PERFORMANCE MADE SMARTER

产品手册
5437
二线制 HART 7 温度变送器



HART COMMUNICATION FOUNDATION

温度 | 本质安全 | 通讯接口 | 多功能 | 隔离器 | 数显表

No. 5437V111-ZH-CHS
产品版本：01.00.00-01.99.99

PR electronics

6 大特色产品

满足您的一切需求

单品出色，组合无敌

我们的创新型专利技术，能使信号调节更加简单、智能。我们的产品线由 6 个产品大类组成，具备多种模拟量和数字量模块，涵盖超千种工业自动化应用。所有产品保证符合甚至超越行业最高标准，在最恶劣的环境下也能保持可靠运行。长达 5 年的产品保修期，让您更加安心。



Temperature

我们的温度变送器和温度传感器系列产品，可以提供从温度测量点开始的一站式信号解决方案，最大程度保证信号的完整性。仅需一套点对点解决方案，您就可以在任何环境中将工业过程中的温度信号转换为模拟量信号、总线信号或数字通讯信号。该方案具备响应速度快、校准自动化，搭载传感器故障检测、漂移低和 EMC 性能出色等优点。



I.S. Interface

我们采用最严格的安全标准来检验产品，力保提供最安全的信号。秉承着创新精神，我们已经在 SIL 2 全面评估 I.S. 接口方面取得了领先地位。种类齐全的模拟量和数字量本质安全栅，为现场提供了多种输入输出可能性。在大型项目安装过程中，新的背板方案则能大大简化安装和布线，且能与标准 DCS 系统无缝集成。



Communication

我们提供经济实惠且使用方便的通讯接口，以便您与 PR 产品通讯。所有接口均可拆卸，并带有屏幕和按钮，可以显示过程值/诊断值和对参数进行配置。产品特定功能包括通过 Modbus 和蓝牙进行通讯，以及使用我们的便携式设备主管 (PPS) 应用程序进行远程访问，可用于 iOS、Android 等终端。



Multifunction

我们的多功能系列产品，单款亦能兼容大量的现场应用，可轻松按照您的现场标准进行配置。如此一款产品可适配多种应用的方式，即节省了安装和培训时间，也大大简化了库存备件管理。我们的产品长期稳定性佳，功耗低、抗电气干扰性能优异，且设置简单。



Isolation

我们基于微处理器技术开发的 6 mm 隔离器小巧精致、响应迅速、品质一流，可在极低的功耗下表现出优异的性能，EMC 抗干扰能力强，适用于多种应用。水平或垂直安装皆可保证贴合紧密。



Display

我们的显示仪表系列以其灵活性和稳定性著称。该设备系列几乎满足过程信号读数显示的所有需求并具备通用型输入和供电能力。无论哪种行业，无论环境条件何其苛刻，该设备均能实时测量过程值并提供用户友好型界面和值得信赖的继电器信号。

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产品功能

- RTD，TC，电位器，线性电阻和双极性 mV 输入
- 单路或真双路输入，具备传感器冗余和漂移检测功能
- 广泛的环境工作温度范围：-50 至 +85° C
- 总精度 0.014%
- 2.5 kVAC 电气隔离性能
- 符合 IEC61508：2010 的全面评估，适用于 SIL 2/3 应用

功能亮点

- 测量各类 TC 和 RTD 温度输入类型。
- 转换大跨度线性电阻和电位器输入为 4...20 mA。
- 转换双极性 mV 信号为 4...20 mA。
- 整合入资产管理计划。
- 需要高精度和/或传感器冗余和漂移检测的关键应用。

技术亮点

- 真正的双输入变送器。高密度 7 端子设计可接受最广泛的双输入组合。
- 传感器冗余 – 在主传感器故障的情况下，输出自动切换到备用传感器，保证过程正常运行。
- 传感器漂移检测 – 当传感器差异超过用户定义限制时进行报警，增强维护优化。
- 过程数据的动态变量映射，例如双输入功能的均值、差值以及最小/最大值追踪。
- 在全量程输入范围和环境条件下的突破性数字和模拟信号精度。
- 广泛的传感器匹配，包括 Callendar Van Dusen 和自定义线性化表。
- 可设定的输入限值配合运行时间统计，确保最大的过程可追溯性和传感器超范围保护。
- IEC 61508：2010 标准最高至 SIL 3 的完整评估，以及符合 IEC 61236-3-1 标准的增强 EMC 功能安全测试。
- 5437xxSx 的故障率符合根据 ISO-13849 达到的性能等级“d”。
- 符合 NAMUR NE21、NE43、NE44、NE89、NE95 和 NE107 标准诊断信息。

程序设计

- 通过 PR5909 Loop Link 使用 PReset 软件 / HART 调制解调器进行配置，或者通过资产管理工具（例如 Pactware、AMS、HART 通讯器）进行配置，需确保相关设备描述文件（DD）、增强设备描述文件（eDD）及设备类型管理器（DTM）已完备。

安装/调试

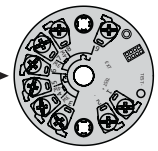
- 标准 DIN B 型传感器头部安装。
- A 产品版本可以安装于 zone 2 和 zone 22 / Class I、Division 2、Groups A、B、C、D 区域。
- B 产品版本可以安装于 zone 0、1、2 和 zone 21、22 以及 M1 区域。
- D 产品版本可以安装于 zone 0、1、2 和 zone 21、22 以及 M1 / Class I、Division 1、Groups A、B、C、D 区域。

应用

双输入

输入

2 x 2/3/4-线 RTD
2 x TC（2/3/4-线，外部 CJC）
2 x TC（内部 CJC）
TC（内部 CJC）+ 2/3/4-线 RTD
TC（2/3-线，外部 CJC）+
2/3/4-线 RTD
2 x 2/3/4-线线性电阻
2 x 3/4-线电位器
5-线电位器 + 3-线电位器
2 x mV 单极性
2 x mV 双极性

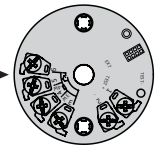


输出

4...20 mA
（高级功能）

单输入

2/3/4-线 RTD
TC（2/3-线，外部 CJC）
TC（内部 CJC）
2/3/4-线线性电阻
3/4-线电位器
mV 单极性
mV 双极性

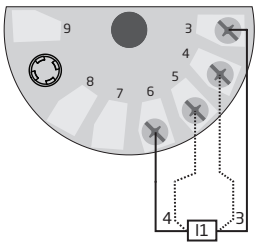


4...20 mA

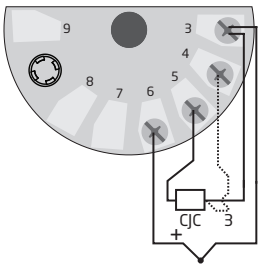
接线方式

单输入

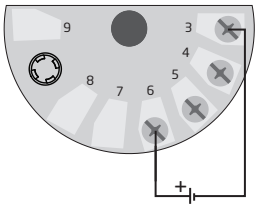
2w / 3 w / 4 w
RTD 或线性电阻



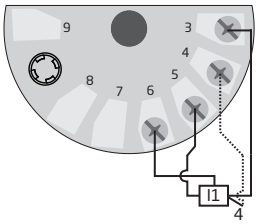
TC (内部 CJC 或外部
2 w / 3 w CJC)



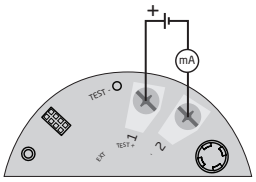
mV



3 w / 4 w 电位器

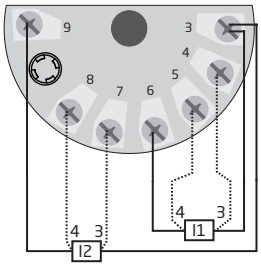


输出

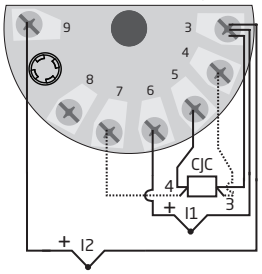


双输入

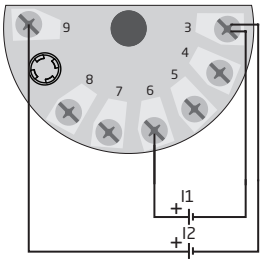
输入 1: 2 w / 3 w / 4 w RTD 或线性电阻
输入 2: 2 w / 3 w / 4 w RTD 或线性电阻



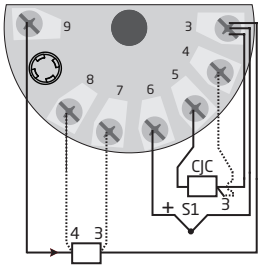
输入 1: TC (内部 CJC 或外部
2 w / 3 w / 4 w CJC)
输入 2: TC (内部 CJC 或外部
2 w / 3 w / 4 w CJC)



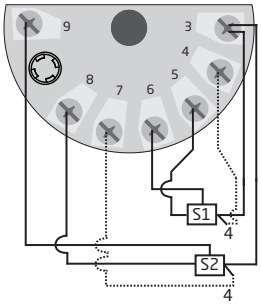
输入 1: mV
输入 2: mV



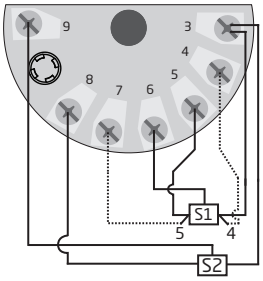
输入 1: TC (内部 CJC 或外部 2 w / 3 w CJC)
输入 2: 2 w / 3 w / 4 w RTD



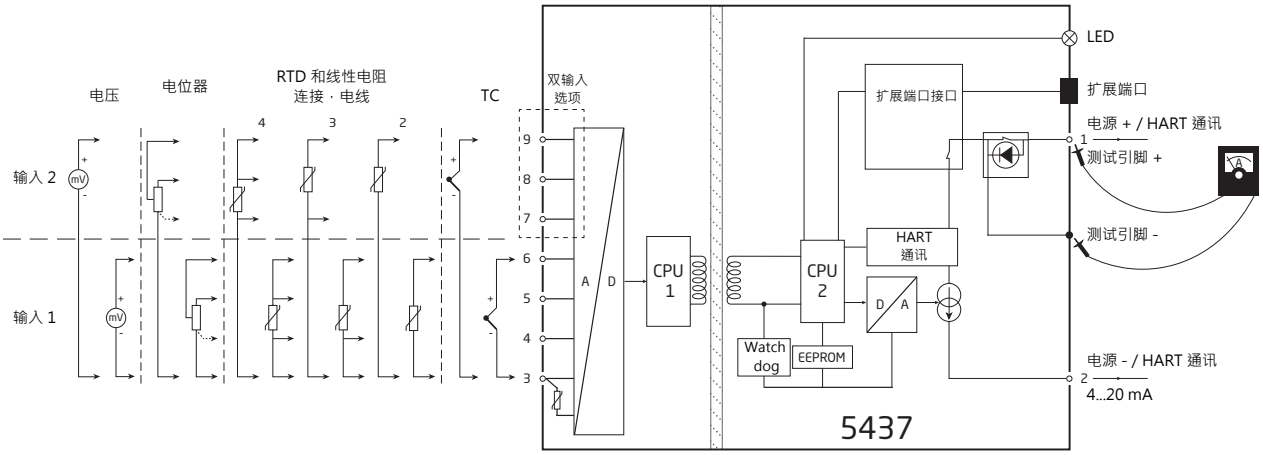
输入 1: 3 w / 4 w 电位器
输入 2: 3 w / 4 w 电位器



输入 1: 5 w 电位器
输入 2: 3 w 电位器



方框图



有关输入连接的完整概述，请参接线方式

规格

订购须知

产品型号

型号	版本		输入		SIL 认证		船舶认证	
5437	一般用途 / Zone 2 / DIV. 2	: A	单输入（4 端子）	: 1	SIL	: S	是	: M
	Zone 0, 1, 2, 21, 22, M1 (仅限 ATEX 和 PESO)	: B	双输入（7 端子）	: 2	No SIL	: -	否	: -
	Zone 0, 1, 2, 21, 22, M1 / DIV. 1, DIV. 2	: D						

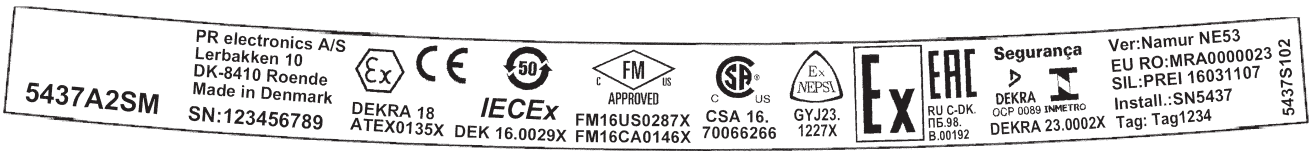
订购举例: 5437A2S- （一般用途, 双输入, SIL 认证, 未获船舶认证）

附件

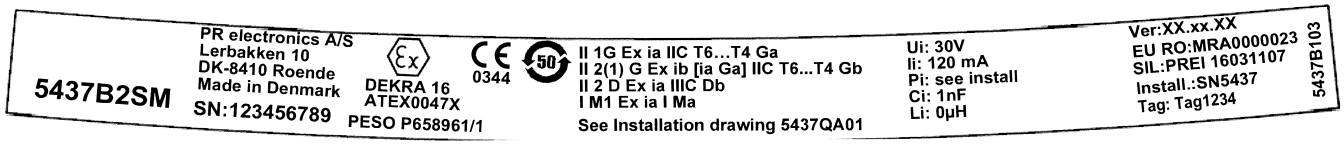
5909 = USB 接口回路通讯器用于Preset 软件
277 = USB 接口 HART 调制解调器
1125 = 认可的校准证书，单路输入，3 点
1126 = 认可的校准证书，双路输入，3 点
1127 = 认可的校准证书，单路输入，5 点
1128 = 认可的校准证书，双路输入，5 点

标签示例

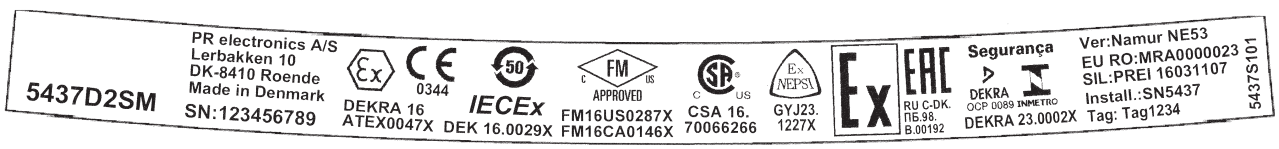
5437A2SM



5437B2SM



5437D2SM



技术规格

环境条件

工作环境温度范围，标准	-50...+85° C
工作环境温度范围，SIL	-40...+80° C
存储温度	-50...+85° C
标定温度	23...25° C
相对湿度	< 99% RH （无冷凝）
防护等级（外壳/端子）	IP68 / IP00

机械规格

结构尺寸	44 x 21.45 mm
中心孔直径	Ø 6.35 mm / ¼ in
重量	50 g
导线规格	1...1.5 mm2 绞线
剥线长度	7 mm
螺丝端子力矩	0.4 Nm
抗振规格，IEC 60068-2-6	2...25 Hz ± 1.6 mm, 25...100 Hz = ± 4 g

常用规格

电源电压， 5437A	7.5*...48** VDC
电源电压， 5437B 和 5437D	7.5*...30** VDC
电源电压， 5437 EU-RO	8.3...33.6 VDC ± 10%
使用测试端子时额外所需电源电压	0.8 V
内部功耗（最大）	≤ 850 mW
最小负载电阻（供电 > 37 V 时）	（电源电压 - 37）/ 23 mA

* 注意：	最小电源电压必须在 5437 的端子处测量，即必须考虑所有外部压降。
** 注意：	请确保使用合适的电源或安装过压保护装置来保护设备免受过电压损坏。

隔离电压 - 测试	2.5 kVAC
隔离电压 - 工作，5437A	55 VAC
隔离电压 - 工作，5437B 和 5437D	42 VAC
极性反接保护	所有输入和输入
写保护	跳线或软件
预热时间	< 5 分钟
启动时间	< 2.75 s
参数设置	Loop Link & HART
信噪比	至少 60 dB
长期稳定性	优于 ±0.05% 所设量程 / 年 优于 ±0.18% 所设量程 / 5年
响应时间	75 ms
可调阻尼	0...60 s
信号动态范围，输入	24 位
信号动态范围，输出	18 位
电源电压变化对精度的影响	< 0.005% 所设量程 / VDC

输入精度

基本精度		
输入类	基本精度	温度系数*
Pt10	≤ ±0.8° C	≤ ±0.020° C / ° C
Pt20	≤ ±0.4° C	≤ ±0.010° C / ° C
Pt50	≤ ±0.16° C	≤ ±0.004° C / ° C
Pt100	≤ ±0.04° C	≤ ±0.002° C / ° C
Pt200	≤ ±0.08° C	≤ ±0.002° C / ° C
Pt500	Tmax. ≤ 180° C: ≤ ±0.08° C Tmax. > 180° C: ≤ ±0.16° C	≤ ±0.002° C / ° C
Pt1000	≤ ±0.08° C	≤ ±0.002° C / ° C
Pt2000	Tmax. ≤ 300° C: ≤ ±0.08° C Tmax. > 300° C: ≤ ±0.40° C	≤ ±0.002° C / ° C
Pt10000	≤ ±0.16° C	≤ ±0.002° C / ° C
Pt x	邻近点的最高公差	邻近点的最高系数
Ni10	≤ ±1.6° C	≤ ± 0.020° C / ° C
Ni20	≤ ±0.8° C	≤ ± 0.010° C / ° C
Ni50	≤ ± 0.32° C	≤ ± 0.004° C / ° C
Ni100	≤ ±0.16° C	≤ ± 0.002° C / ° C
Ni120	≤ ±0.16° C	≤ ± 0.002° C / ° C
Ni200	≤ ±0.16° C	≤ ± 0.002° C / ° C
Ni500	≤ ±0.16° C	≤ ± 0.002° C / ° C
Ni1000	≤ ±0.16° C	≤ ± 0.002° C / ° C
Ni2000	≤ ±0.16° C	≤ ± 0.002° C / ° C
Ni10000	≤ ±0.32° C	≤ ± 0.002° C / ° C
Ni x	邻近点的最高公差	邻近点的最高系数
Cu5	≤ ±1.6° C	≤ ± 0.040° C / ° C
Cu10	≤ ±0.8° C	≤ ± 0.020° C / ° C
Cu20	≤ ± 0.4° C	≤ ± 0.010° C / ° C
Cu50	≤ ± 0.16° C	≤ ± 0.004° C / ° C
Cu100	≤ ±0.08° C	≤ ± 0.002° C / ° C
Cu200	≤ ±0.08° C	≤ ± 0.002° C / ° C
Cu500	≤ ±0.16° C	≤ ± 0.002° C / ° C
Cu1000	≤ ±0.08° C	≤ ± 0.002° C / ° C
Cu x	邻近点的最高公差	邻近点的最高系数
线性电阻： 0...400 Ω	≤ ±40 mΩ	≤ ±2 mΩ / ° C
线性电阻： 0...100 kΩ	≤ ±4 Ω	≤ ±0.2 Ω / ° C
电位器： 0...100%	<0.05%	<±0.005%
* 输入温度系数为列出的值或［0.002% 测量值］/ ° C，以较大值为准。		

mV: -20...100 mV	≤ ±5 µV ≤ ± 0.01% 测量值**	≤ ±0.2 µV / ° C
mV: -100...1700 mV	≤ ± 0.1 mV ≤ ± 0.01% 测量值**	≤ ±36 µV / ° C
mV: ±800 mV	≤ ± 0.1 mV ≤ ± 0.01% 测量值**	≤ ±32 µV / ° C
TC E	≤ ±0.2° C ≤ ± 0.01% 测量值**	≤ ±0.025° C / ° C
TC J	≤ ±0.25° C ≤ ± 0.01% 测量值**	≤ ±0.025° C / ° C
TJ K	≤ ±0.25° C ≤ ± 0.01% 测量值**	≤ ±0.025° C / ° C
TC L	≤ ±0.35° C ≤ ± 0.01% 测量值**	≤ ±0.025° C / ° C
TC N	≤ ±0.4° C ≤ ± 0.01% 测量值**	≤ ±0.025° C / ° C
TC T	≤ ±0.25° C ≤ ± 0.01% 测量值	≤ ±0.025° C / ° C
TC U	<0° C: ≤ ±0.8° C ≤ ± 0.01% 测量值** ≥0° C: ≤ ±0.4° C ≤ ± 0.01% 测量值**	≤ ±0.025° C / ° C
TC Lr	≤ ±0.2° C ≤ ± 0.01% 测量值**	≤ ±0.1° C / ° C
TC R	<200° C: ≤ ±0.5° C ≤ ± 0.01% 测量值** ≥200° C: ≤ ±1.0° C ≤ ± 0.01% 测量值**	≤ ±0.1° C / ° C
TC S	<200° C: ≤ ±0.5° C ≤ ± 0.01% 测量值** ≥200° C: ≤ ±1.0° C ≤ ± 0.01% 测量值**	≤ ±0.1° C / ° C
TC W3	≤ ±0.6° C ≤ ± 0.01% 测量值**	≤ ±0.1° C / ° C
TC W5	≤ ±0.4° C ≤ ± 0.01% 测量值**	≤ ±0.1° C / ° C
型号: B[1]	≤ ±1° C ≤ ± 0.01% 测量值**	≤ ±0.1° C / ° C
型号: B[2]	≤ ±3° C ≤ ± 0.01% 测量值**	≤ ±0.1° C / ° C
型号: B[3]	≤ ±8° C ≤ ± 0.01% 测量值**	≤ ±0.8° C / ° C
型号: B[4]	未指定	未指定
CJC（内部）	< ±0.5° C	包含在基本精度内
CJC（外部）	≤ ±0.08° C	≤ ±0.002° C / ° C
* 输入温度系数为列出的值或 [0.002% 测量值] / ° C，以较大值为准。 ** 增益偏差。		

TC B[1] 精度规格适用范围 . . . . . > 400° C
TC B[2] 精度规格适用范围 . . . . . > 160° C < 400° C
TC B[3] 精度规格适用范围 . . . . . > 85° C < 160° C
TC B[4] 精度规格适用范围 . . . . . < 85° C

输出精度：

基本精度		
输出类型	基本精度	温度系数
均值测量	输入 1 和 2 的 平均精度	输入 1 和 2 的 平均温度系数
差值测量	输入 1 和 2 的 精度和	输入 1 和 2 的 温度系数和
模拟量输出	≤ ±1.6 µA （满量程的 0.01%）	≤ ±0.48 µA / K （≤ ±0.003% 满量程 / K）

精度计算举例：
示例：Pt100 传感器，配置为 -200° C 至 + 850° C：

$$Pt100_{基本精度} = 0.04°C$$

$$输出_{模拟量精度} = 0.0016\ mA$$

$$总体_{精度\ (mA)} = \frac{基本_{精度}}{设定量程_{输入}} \times 16.0\ mA + 输出_{模拟量精度}$$

$$总体_{精度\ (mA)} = \frac{0.04°C}{850°C-(-200°C)} \times 16.0\ mA + 0.0016\ mA = \underline{0.0022\ mA}$$

$$总体_{精度\ (\%)} = \frac{总体_{精度\ (mA)}}{16.0\ mA} \times 100\%$$

$$总体_{精度\ (\%)} = \frac{0.0022\ mA}{16.0\ mA} \times 100\% = \underline{0.01381\%}$$

示例：型号 K TC，内部 CJC，测量读数为400℃，量程为0 ... 400℃：

$$型号\ K\ TC_{基本精度} = 0.25°C$$

$$输出_{模拟量精度} = 0.0016\ mA$$

$$总体_{精度\ (mA)} = \frac{基本_{精度} + 内部\ CJC + (增益偏差 \times 测量读数)}{设定量程_{输入}} \times 16.0\ mA + 输出_{模拟量精度}$$

$$总体_{精度\ (mA)} = \frac{0.25°C + 0.5°C + (0.0001 \times 400)}{400°C} \times 16.0\ mA + 0.0016\ mA = \underline{0.0332\ mA}$$

$$总体_{精度\ (\%)} = \frac{总体_{精度\ (mA)}}{16.0\ mA} \times 100\%$$

$$总体_{精度\ (\%)} = \frac{0.0332\ mA}{16.0\ mA} \times 100\% = \underline{0.2075\%}$$

示例：型号 K TC，外部 CJC Pt1000，测量读数为400℃，量程为0 ... 400℃：

$$\text{型号 K TC}_{\textit{基本精度}} = 0.25°C$$

$$\text{输出}_{\textit{模拟量精度}} = 0.0016\ mA$$

$$\text{总体}_{\textit{精度 (mA)}} = \frac{\text{基本}_{\textit{精度}} + \text{外部 CJC} + (\text{增益偏差 x 测量读数})}{\text{设定量程}_{\textit{输入}}} \times 16.0\ mA + \text{输出}_{\textit{模拟量精度}}$$

$$\text{总体}_{\textit{精度 (mA)}} = \frac{0.25°C + 0.08°C + (0.0001 \times 400)}{400°C} \times 16.0\ mA + 0.0016\ mA = \underline{0.0164\ mA}$$

$$\text{总体}_{\textit{精度 (\%)}} = \frac{\text{总体}_{\textit{精度 (mA)}}}{16.0\ mA} \times 100\%$$

$$\text{总体}_{\textit{精度 (\%)}} = \frac{0.0164\ mA}{16.0\ mA} \times 100\% = \underline{0.1025\%}$$

示例精度计算基于工厂校准环境温度，并且不考虑其他潜在的不准确来源，例如电源影响，环境温度波动等。

EMC – 电磁兼容 . . . . . < ±0.1% 所设量程
扩展的 EMC 电磁兼容：
NAMUR NE 21, A criterion, burst . . . . . < ±1% 所设量程

输入规格

RTD 输入类型

RTD 类型	标准	最小值	最大值	α	最小量程
Pt10...10.000	IEC 60751	-200° C	+850° C	0.003851	10° C
	JIS C 1604-8	-200° C	+649 ° C	0.003916	10° C
	GOST 6651-2009	-200° C	+850° C	0.003910	10° C
	Callendar Van Dusen	-200° C	+850° C	-----	10° C
Ni10...10.000	DIN 43760-1987	-60° C	+250° C	0.006180	10° C
	GOST 6651-2009 / OIML R84:2003	-60° C	+180° C	0.006170	10° C
Cu5...1000	Edison Copper Winding No. 15	200° C	+260° C	0.004270	100° C
	GOST 6651-2009 / OIML R84:2003	-180° C	+200° C	0.004280	100° C
	GOST 6651-94	-50° C	+200° C	0.004260	100° C

连接类型 . . . . . 2-, 3- 和 4-线
每根电线允许的电缆电阻. . . . . ≤ 50
传感器电流 . . . . . < 0.15 mA
传感器电缆电阻的影响（3- / 4-线. . . . . < 0.002 Ω / Ω
传感器电缆，线-线电容 . . . . . 最大 30 nF (Pt1000 & Pt10000 IEC 和 JIS + Ni1000 & NI10000)
最大 50 nF（以上其它）
传感器故障检测，可设置. . . . . 无，短路，断线，短路或断线



注意：无论传感器故障检测如何配置，如果配置的传感器类型的下限低于传感器短路检测常数限值，则将禁用传感器短路故障检测。

传感器短路检测限值 . . . . . 15 Ω
传感器故障检测时间（RTD 元件） . . . . . ≤ 70 ms
传感器故障检测时间（第 3 线和第 4 线） . . . . . ≤ 2000 ms

TC 输入类型

型号	最低温度	最高温度	最小量程	标准
B	0 (85)° C	+1820° C	100° C	IEC 60584-1
E	-200° C	+1000° C	50° C	IEC 60584-1
J	-100° C	+1200° C	50° C	IEC 60584-1
K	-180° C	+1372° C	50° C	IEC 60584-1
L	-200° C	+900° C	50° C	DIN 43710
Lr	-200° C	+800° C	50° C	GOST 3044-84
N	-180° C	+1300° C	50° C	IEC 60584-1
R	-50° C	+1760° C	100° C	IEC 60584-1
S	-50° C	+1760° C	100° C	IEC 60584-1
T	-200° C	+400° C	50° C	IEC 60584-1
U	-200° C	+600° C	50° C	DIN 43710
W3	0° C	+2300° C	100° C	ASTM E988-96
W5	0° C	+2300° C	100° C	ASTM E988-96

冷端补偿（CJC）：
固定补偿，通过 Pt100 或 Ni100 传感器实现内部或外部补偿

内部 CJC 温度范围	-50° C 至 +100° C
外部 CJC 连接	2-, 3- 或 4-线（4-线仅适用于双输入）
外部 CJC 电缆电阻（单根导线；3-线和 4-线连接）	50 Ω
CJC 电缆电阻的影响（3-线和 4-线连接）	< 0.002 Ω / Ω
外部 CJC 传感器电流	< 0.15 mA
外部 CJC 温度范围	-50° C 至 +135° C
CJC 传感器电缆，线-线电容	最大 50 nF
最大总电缆电阻	最大 10 kΩ
传感器电缆，线-线电容	最大 50 nF
传感器故障检测，可设置	无，短路，断线，短路或断线



注意： 传感器短路检测仅适用于 CJC 传感器。

传感器故障检测时间（TC 元件）	≤ 70 ms
传感器故障检测时间，外部 CJC（第 3 线和第 4 线）	≤ 2000 ms

线性电阻输入

输入范围	0 Ω...100 kΩ
最小量程	25 Ω
连接类型	2-, 3- 或 4-线
每根电线允许的电缆电阻	≤ 50 Ω
传感器电流	< 0.15 mA
传感器电缆电阻的影响（3- / 4-线）	< 0.002 Ω / Ω
传感器电缆，线-线电容	最大 30 nF（线性电阻 > 400 Ω） 最大 50 nF（线性电阻 ≤ 400 Ω）
传感器故障检测，可设置	无，断线

电位器输入

电位器	10 Ω...100 kΩ
输入范围	0...100%
最小量程	10%
连接类型	3-, 4- 或 5-线（5-线仅适用于双输入设备）
每根电线允许的电缆电阻	≤ 50 Ω
传感器电流	< 0.15 mA

传感器电缆电阻的影响（4- / 5-线）	< 0.002 Ω / Ω
传感器电缆，线-线电容	最大 30 nF（电位器 > 400 Ω） 最大 50 nF（电位器 ≤ 400 Ω）
传感器故障检测，可设置	无，短路，断线，短路或断线



注意：无论传感器故障检测如何配置，如果配置的电位器阻值类型低于传感器短路检测常数限值，则将禁用传感器短路故障检测。

传感器短路检测限值	15 Ω
传感器故障检测时间（电位器检测臂）	≤ 70 ms （无传感器短路检测）
传感器故障检测时间，元件	≤ 2000 ms
传感器故障检测时间（第 4 线和第 5 线）	≤ 2000 ms

mV 输入

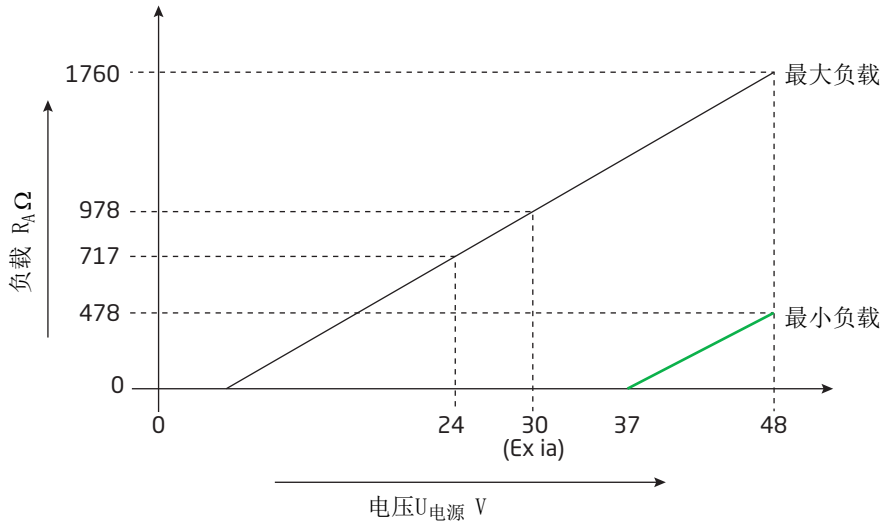
测量范围	-800...+800 mV（双极性） -100...1700 mV
最小量程	2.5 mV
输入电阻	10 MΩ
传感器电缆，线-线电容	最大 30 nF（输入范围: -100...1700 mV） 最大 50 nF（输入范围: -20...100 mV）
传感器故障检测，可设置	无，断线
传感器故障检测时间	≤ 70 ms

输出规格和 HART

正常范围，可设定	3.8...20.5 / 20.5...3.8 mA
扩展范围（输出限制），可设定	3.5...23 / 23...3.5 mA
更新时间	10 ms
负载（@电流输出）	≤ (V_{supply} - 7.5) / 0.023 [Ω]
负载稳定性	< 0.01% 所设量程 / 100 Ω

所设量程 = 当前选择的量程范围

输出负载



传感器故障指示，可设定

（在选择 TC 和 mV 输入时不检测传感器短路报警）	3.5...23 mA
NAMUR NE43 Upscale	> 21 mA
NAMUR NE43 Downscale	< 3.6 mA
HART 协议修订版本	HART 7 和 HART 5

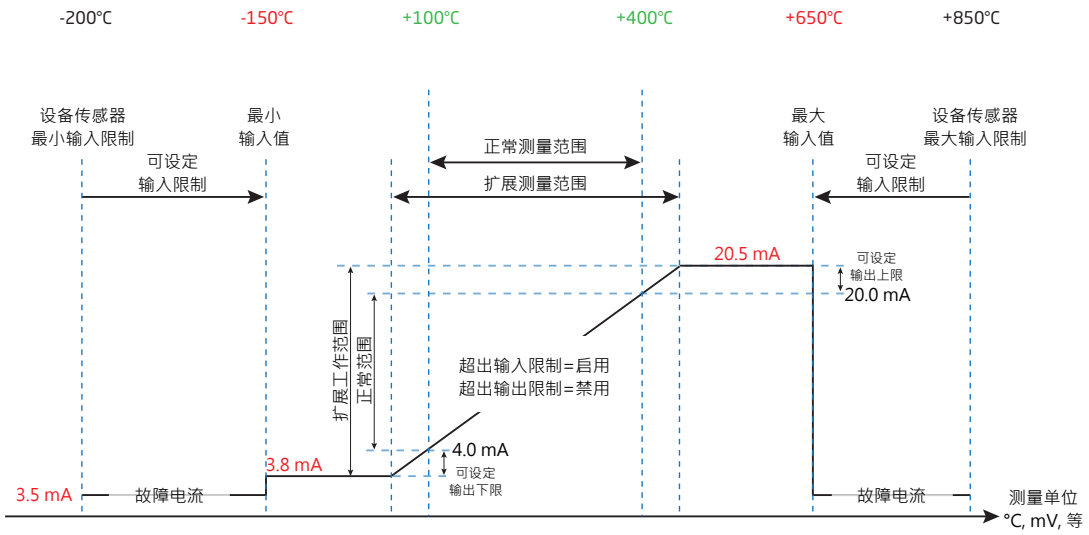
可设定输入 / 输出限

故障电流	启用 / 禁用
设置故障电流	3.5 mA...23 mA

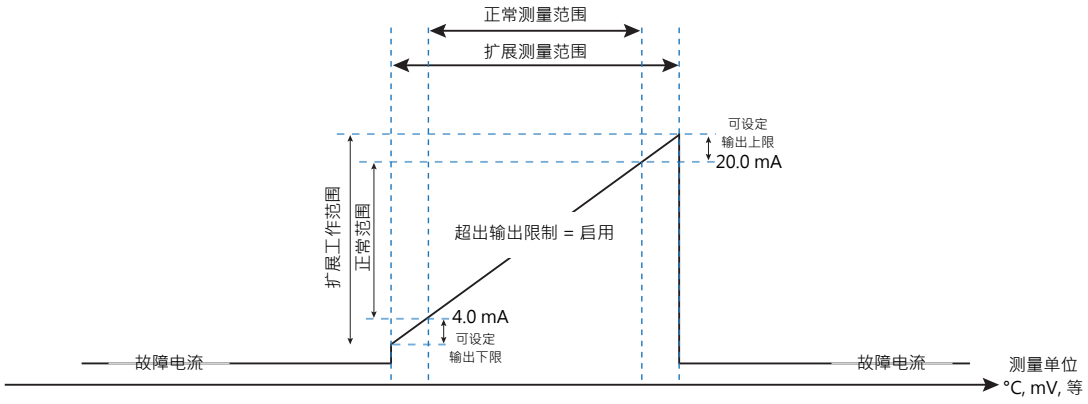
可设定的传感器输入和电流输出限制可用于提高系统安全性和完整性。

输入：
当输入信号超过可设定的下限或上限时，设备将输出用户定义的故障电流。设置输入限制可确保任何超出范围的测量值都可以通过变送器输出进行唯一识别和标记，从而改进资产和材料保护，例如可以缓解反应过程的热失控。

例如：
Pt100 输入范围 100° C 到 400° C
输入限制设置为上限 = +650° C，下限 = -150° C
故障电流设置为 3.5 mA
输出限制设置为上限 = 20.5 mA，下限 = 3.8 mA



输出：
当电流输出超过可设定的上限或下限时，设备将输出用户定义的故障电流。



认证和证书

符合标准

EMC	2014/30/EU
RoHS	2011/65/EU
ATEX	2014/34/EU
EAC	TR-CU 020/2011
EAC Ex	TR-CU 012/2011

认证

EU RO Mutual Recognition Type Approval	MRA0000023

Ex / I.S. 认证

5437A:

ATEX	DEKRA 18ATEX0135 X

5437B:

ATEX	DEKRA 16ATEX0047X
PESO	P658961/1

5437D:

ATEX	DEKRA 16ATEX0047X

5437A 和 5437D:

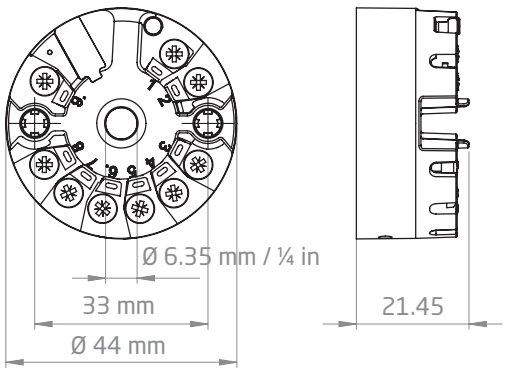
IECEx	IECEx DEK. 16.0029X
C FM us	FM16CA0146X / FM16US0287X
C CSA us	CSA 16.70066266
INMETRO	DEKRA 23.0002X
NEPSI	GYJ23.1227X
EAC Ex	EAEU KZ 7500361.01.01.08756

功能安全

SIL2 认证 & 符合 IEC 61508：2010 的全面评估
SFF> 93% - type B component
SIL3 适用于冗余结构（HFT = 0; 1oo2）
FMEDA 报告下载 - www.prelectronics.com

NE95报道	请联系我们

机械规格



设置参数

5437 可以通过以下 4 种方式进行配置：

1 通过 PR electronics A/S 的回路通讯器和 PReset 电脑配置软件。

2 通过 HART 调制解调器和 PReset 电脑配置软件。

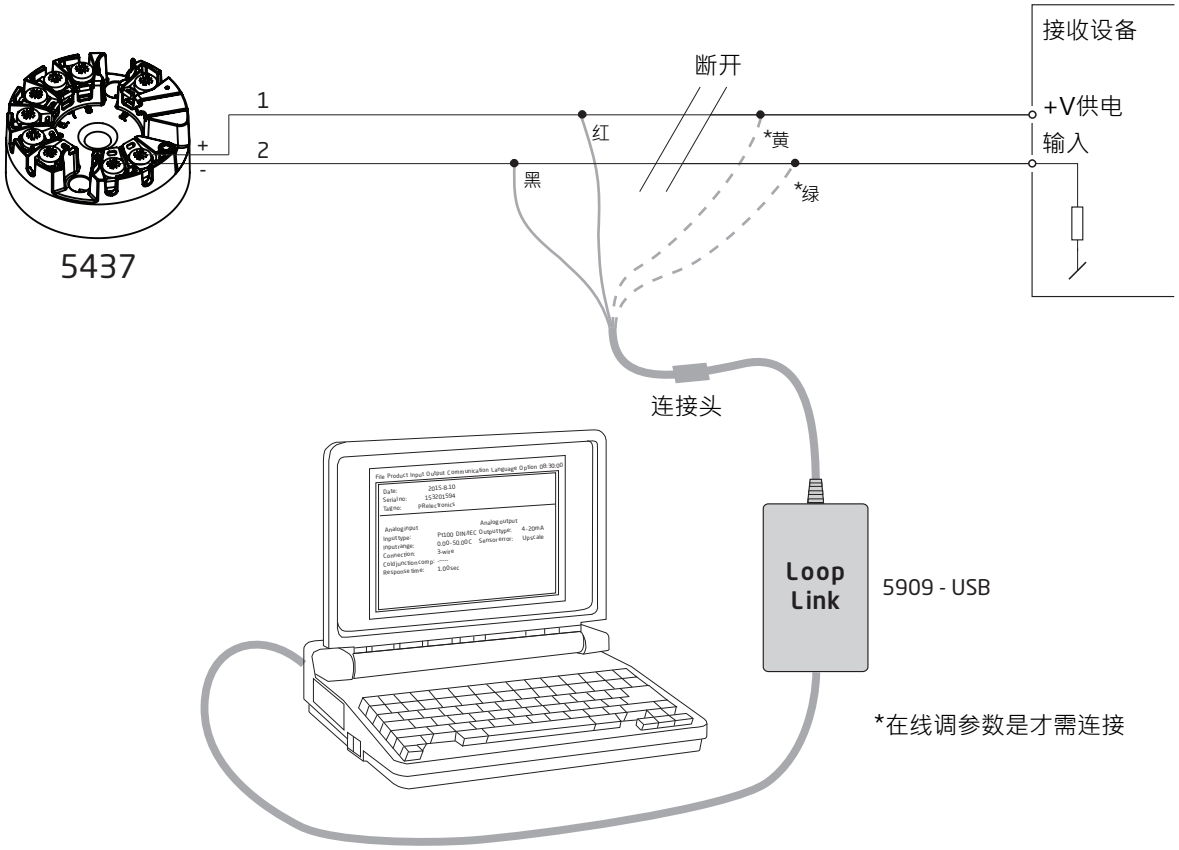
3 通过具备 PR electronics A/S DDL 驱动的 HART 通讯器。

4 通过通用软件，例如 DCS，PACTWare等。

1：回路通讯器

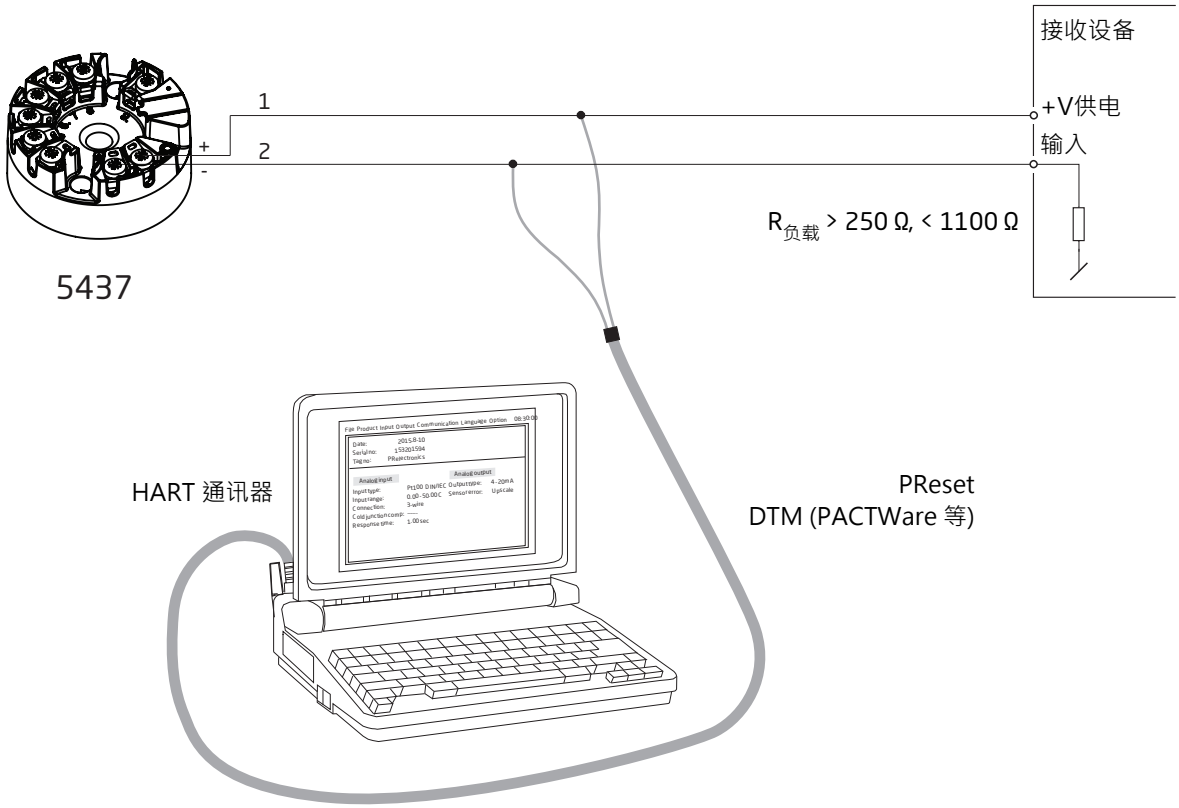
有关参数设置，请参阅下图和 PReset 软件中的帮助功能。

回路通讯器不允许与危险（Ex）区域中安装的设备进行通信。



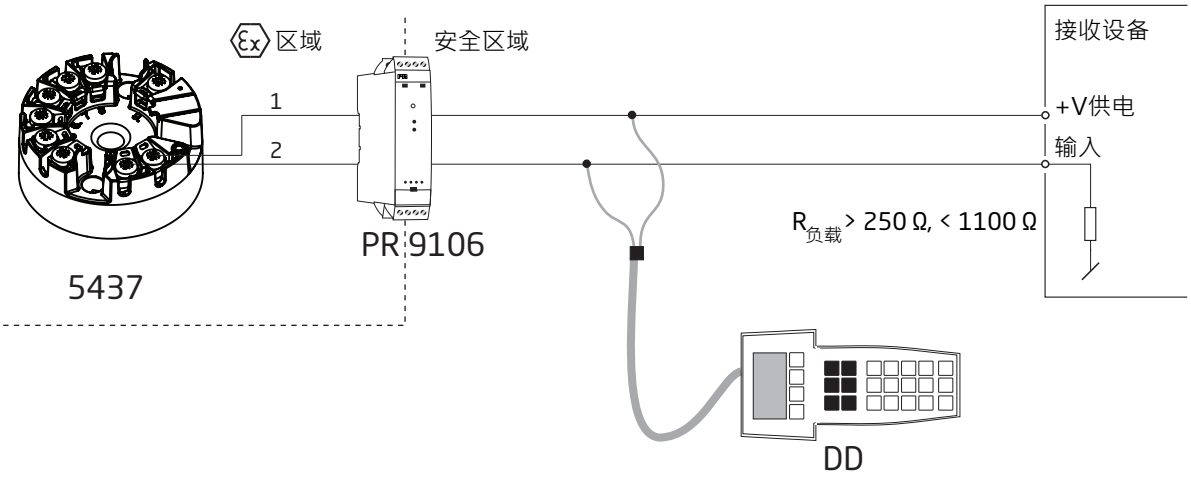
2: HART 调制解调器

有关参数设置，请参阅下图和 PReset 软件中的帮助功能。



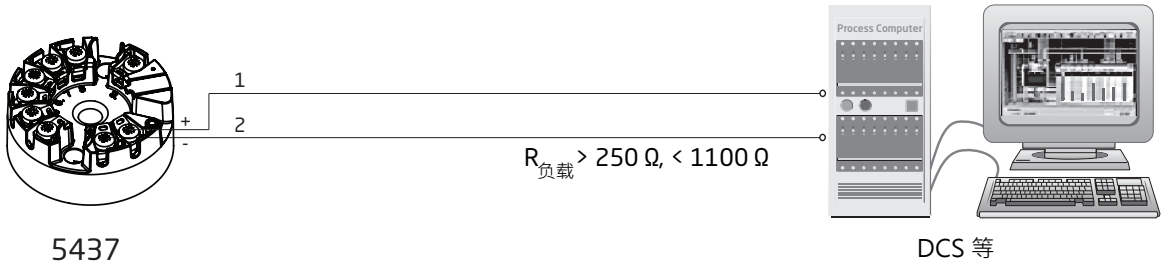
3: HART 通讯器

请参考下图。要访问特定产品菜单，HART 通信器必须装有 5437 DD 驱动文件。可以从 HART Communication Foundation 或PR electronics 下载它们。

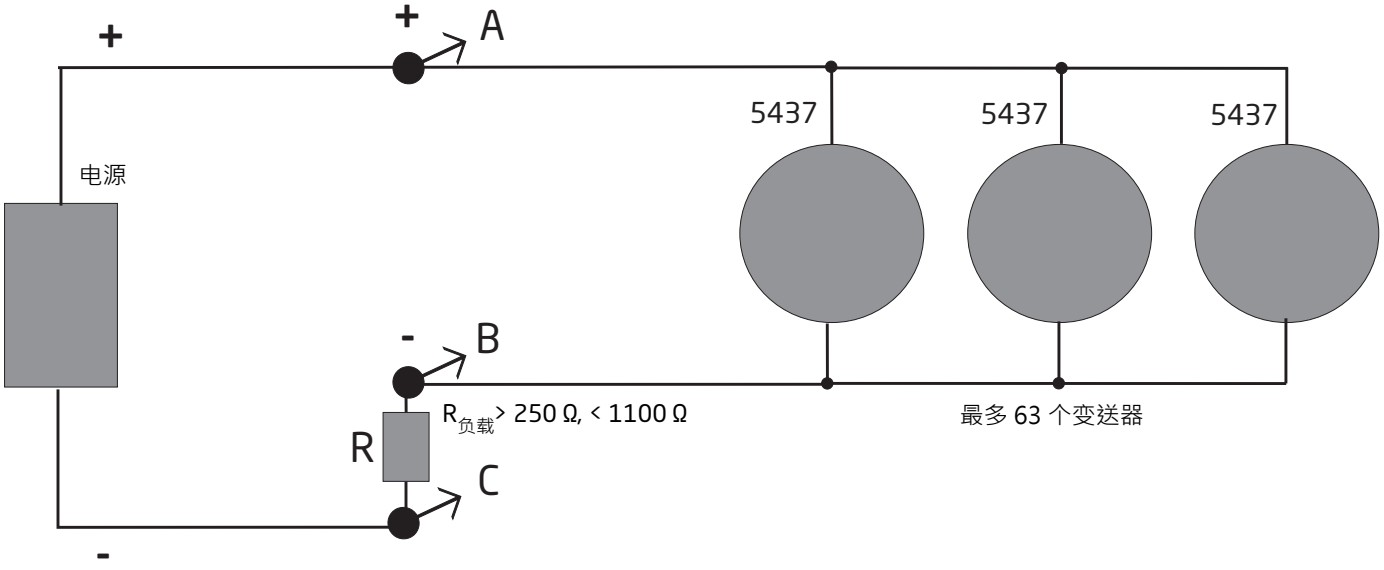


4: 通用配置软件

支持 EDD 和 FDT / DTM 技术，通过相关 DCS / 资产管理系统提供配置和监控，并支持管理软件包，例如 PACTware。



变送器多点模式连接



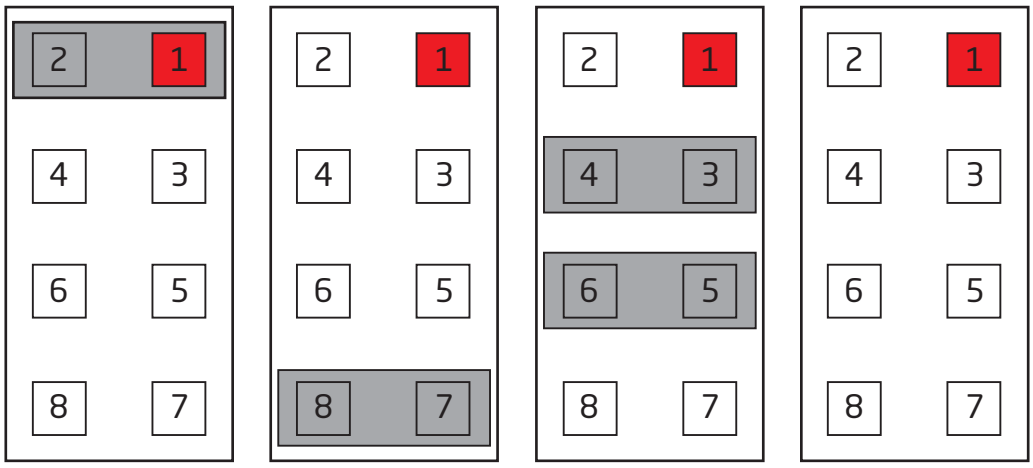
- 通过 HART 通信器或 HART 调制解调器进行通信。
- HART 通讯器或 HART 调制解调器可以连接 AB 或 BC。
- 二线 HART 数字通讯，可以并联连接最多 63 个变送器。
- 在连接之前，每个变送器必须配置一个唯一的轮询地址，范围从 1 到 63。如果两个变送器配置了相同的 地址，则两者都将被排除。变送器必须配置为多点模式（固定输出 4 mA 不变）。因此，回路中的最大电流为 252 mA。
- Preset 配置软件可以将单个变送器配置为多点模式，并为其提供唯一的轮询地址。

HART 命令

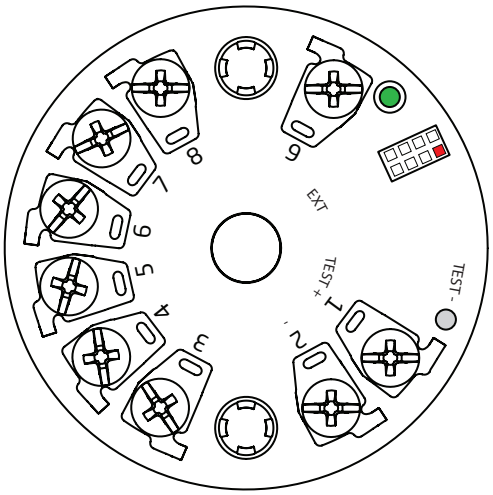
有关 5437 HART 命令的定义和更多信息，请参阅现场设备规范。

安全功能

设备拥有两个内部跳线 – 一个跳线用于启用写保护，另一个跳线用于选择安全状态下的输出电流到 21 mA 以上，如 NAMUR NE43 中规定的那样。
如果未插入跳线，则安全状态下的输出电流将低于 3.6 mA，如 NAMUR NE43 中规定的那样。



跳线引脚 1 在图中以红色标示。



高级功能

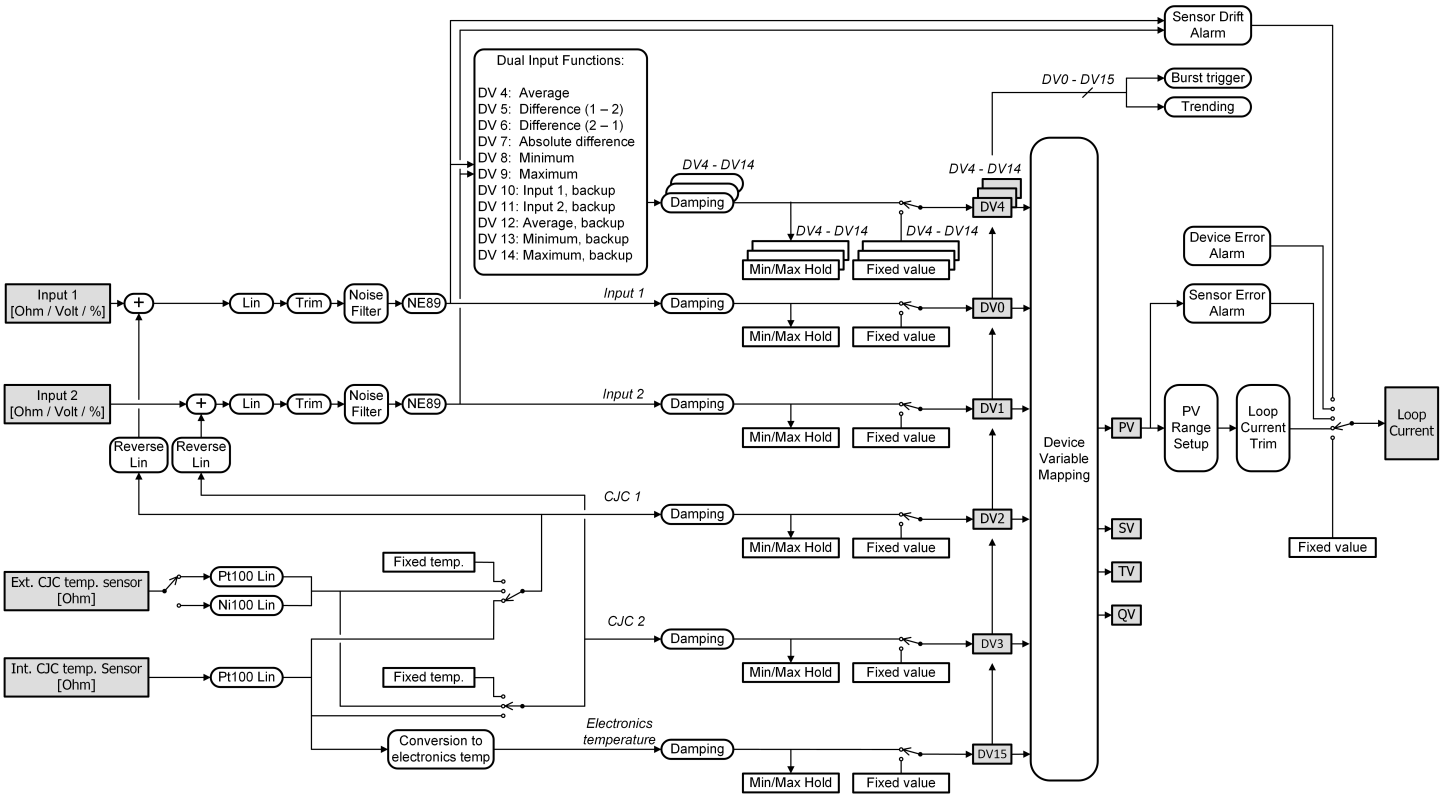
功能	描述
差值	模拟量输出信号与输入 1 和输入 2 之间的差值成比例。 *模拟量输出 = 输入 1 - 输入 2 或输入 2 - 输入 1 或 | 输入 2 - 输入 1 |*
均值	模拟量输出信号与输入 1 和输入 2 测量的平均值成比例。 *模拟量输出 = 0.5 * (输入 1 + 输入 2)*
最大值	模拟量输出与具有最高值的输入成比例。 *如果 (输入 1 > 输入 2) 则 模拟量输出 = 输入 1 否则 模拟量输出 = 输入 2*
最小值	最小值模拟量输出与具有最高低值的输入成比例。 *如果 (输入 1 < 输入 2) 则 模拟量输出 = 输入 1 否则 模拟量输出 = 输入 2*
传感器漂移	如果输入 1 和输入 2 之间的测量值差值超过预定义的极限值，则会指示传感器漂移故障。 *IF ABS 输入 1 - 输入 2 > 传感器漂移限制 则 指示传感器漂移故障*
冗余（热备份）	只要未检测到故障并且输入未超出用户定义限值，模拟量输出与输入 1 成比例。如果检测到输入 1 故障或传感器 1 的值超出用户定义限值，则模拟量输出就自动切换到与输入 2 成比例，并生成一条警告指示。 *如果（输入 1 无传感器故障 以及 输入 1 无内部超限值报警）则 模拟量输出 = 输入 1 否则如果（输入 2 无传感器故障 和 输入 2 无内部超限值报警） 则 模拟量输出 = 输入 2*
自定义线性化 - 多项式类型	支持最多 5 段多项式线性化，每段支持高达 4 阶多项式。
自定义线性化 - Callendar Van Dusen	支持直接输入 CVD 常数。
自定义线性化 - 线性化表	支持多达 60 个输入 / 输出对应值的线性化表格。
定制线性化 - 二次样条线性化	支持多达 40 个输出值的二次样条线性化。
运行时间统计 - 变送器电	统计记录变送器运行期间其内部温度和相关时间，数据通过 9 个固定温度区间记录。 < -50° C -50...-30° C -30...-10° C -10...+10° C +10...+30° C +30...+50° C +50...+70° C +70...+85° C >85° C
运行时间统计 - 输入	记录设备运行过程中的输入测量值，数据以时间统计的方式分类记录在 9 个固定输入子区间内。 每种输入类型有单独定义的子范围。
从指针 - 变送器电路	记录变送器完整生命周期内最小 / 最大内部温度值。
从指针 - 输入	记录最小 / 最大输入测量值。 当测量配置更改时，此值会被重置。

动态变量映射

支持四个动态变量 PV，SV，TV 和 QV。
使用 HART 命令，可以任意组合分配给任何设备变量（DV 0 - 15）。映射到 PV 的设备变量控制着回路电流。

设备变量	
DV0	输入 1（温度，电压，电阻...）
DV1	输入 2（温度，电压，电阻...）
DV2	CJC 1，输入 1 CJC 温度，只有输入 1 是 TC 时有效
DV3	CJC 2，输入 2 CJC 温度，只有输入 2 是 TC 时有效
DV4	均值（输入 1 和 输入 2）
DV5	差值（输入 1 - 输入 2）
DV6	差值（输入 2 - 输入 1）
DV7	差值绝对值（输入 1 - 输入 2）
DV8	最小值（输入 1，输入 2）
DV9	最大值（输入 1，输入 2）
DV10	输入 1 带输入 2 作为备份
DV11	输入 2 带输入 1 作为备份
DV12	均值带输入 1 或 2 作为备份
DV13	最小值带输入 1 或 2 作为备份
DV14	最大值带输入 1 或 2 作为备份
DV15	电路温度

设备变量概述



写保护

软件写保护

设备离开工厂时的默认密码为“********”；该值用户可以更改。
如果忘记了当初当前密码，请联系 PR electronics 支持人员 - www.prelectronics.com/cn/contact.
更改密码时，只能使用可以输入和显示在任何终端的 Latin-1 字符。
当启用写保护时，无论“写保护”硬件跳线位置如何，都不会接受“写入”命令。

跳线写保护

如果硬件跳线设置在“写保护”位置，则无论是否被软件禁用，都不会接受“写入”命令。

更改 HART 协议版本

可以使用 PReset 软件和 PR 5909 回路通讯器或 HART 接口来更改本机的 HART 协议版本。
还可以使用其他 HART 配置工具，如手持式 HART 终端。

使用 HART 手持终端将 5437 从 HART 7 更改为 HART 5 的步骤，反之亦然：

将 5437 从 HART 7 更改为 HART 5：

1 进入设备菜单（或按 home 键）后，显示在线菜单
2 选择设备设置并按向右箭头键（或直接按数字 7 键）
3 选择诊断 / 服务，然后按向右箭头键（或直接按数字 3 键）
4 选择写保护，然后按向右箭头键（或直接按数字 6 键）
5 选择更改为 HART 5，然后按向右箭头键（或直接按数字 3 键）
6 当显示屏显示“您确定要将协议更改为 HART 5 ?”时，按 OK

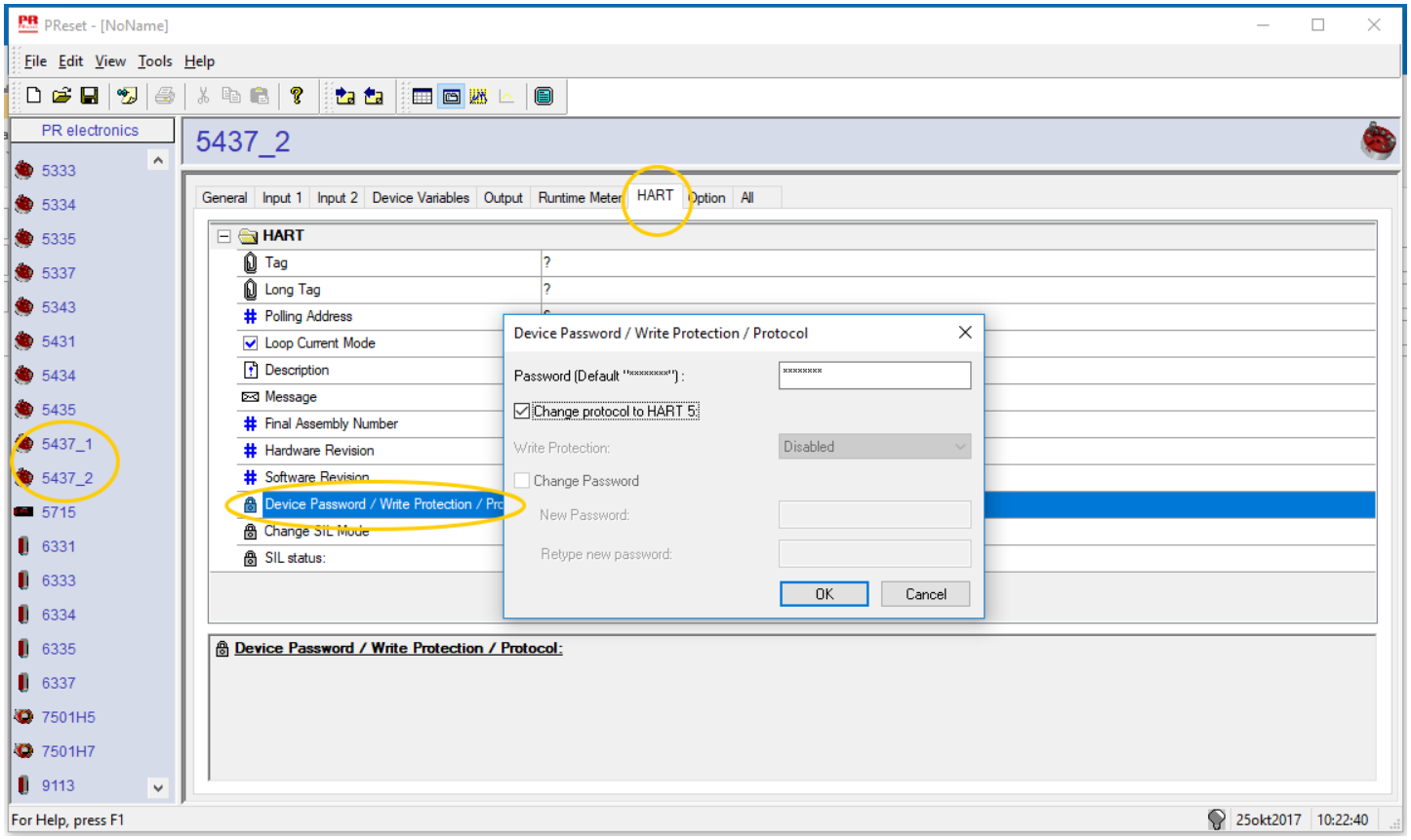
7　输入正确的活动密码，默认为“********”（八颗星），然后按 OK
8　当显示器显示“设备现在处于 HART 5 模式”时，按 OK，然后退出，进入离线模式，并重新扫描新设备。
9　设备现在将显示为 5437 (HART5) 设备，选择它，并再次进入在线菜单

注意！　更改为 HART 5 后，配置将重置为出厂默认值。

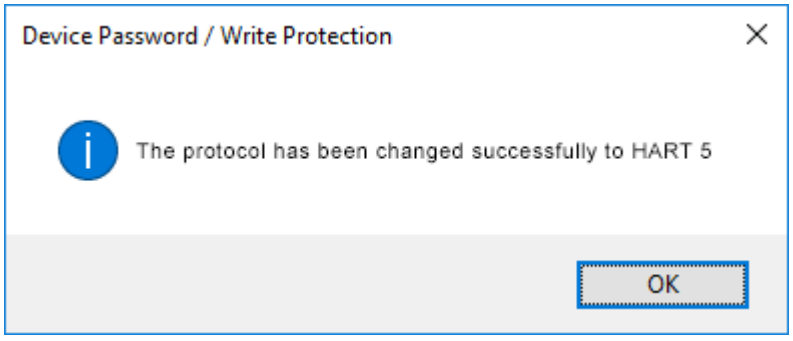
在线菜单中的快捷键顺序为： 7, 3, 6, 3, OK, OK, OK, Exit.
要将设备更改回 HART 7，请按照与上述相同的步骤进行操作，但必须在步骤 5 中选择“更换为 HART 7 ”。
但改回 HART 7 时，配置保持不变。

使用 PReset 软件和 5909 回路通讯器或 HART 通讯接口端将 5437 从 HART 7 更改为 HART 5 的步骤，反之亦然：

从 HART 7 切换到 HART 5:
选择 5437 产品，然后单击“ HART ”选项卡。
单击“设备密码 / 写保护 / 协议...”，在弹出的窗口中选择“更改 HART 5 协议”，然后按 OK 确认。



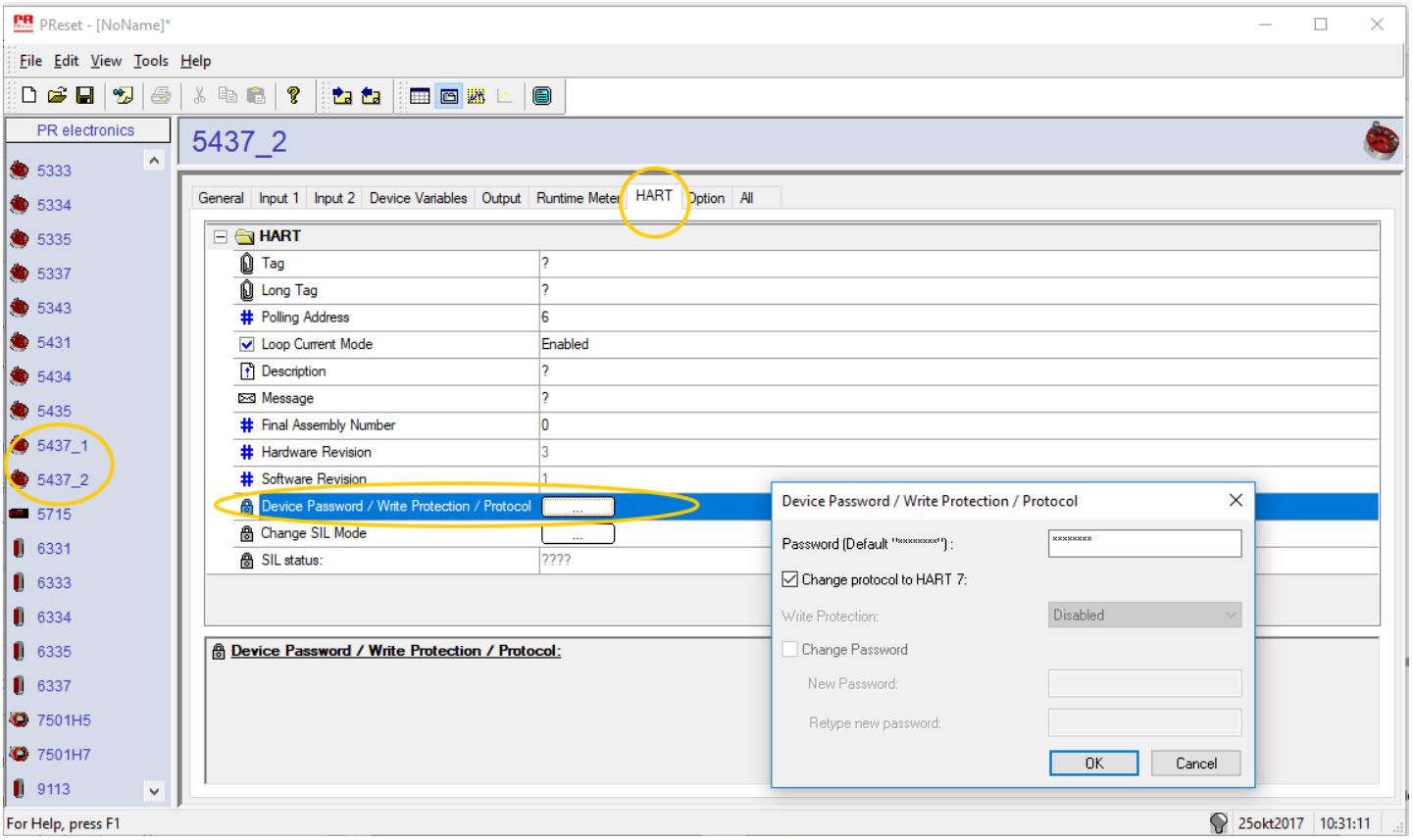
然后将出现以下消息：



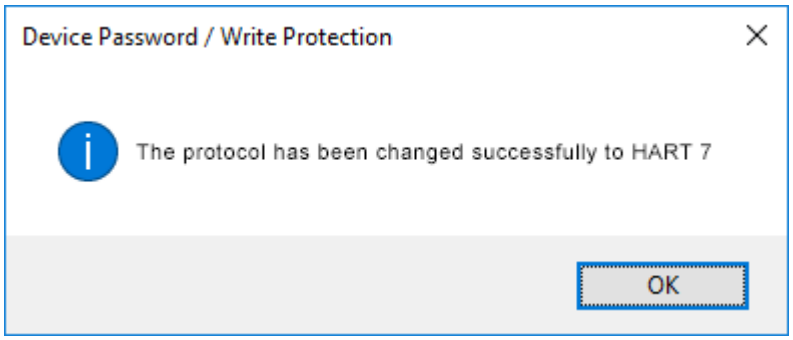
注意！ 更改为 HART 5 后，配置将重置为出厂默认值。

从 HART 5 切换到 HART 7

选择 5437 产品，然后单击“ HART ”选项卡。
单击“设备密码 / 写保护 / 协议...”，在弹出的窗口中选择“更改协议到 HART 7 ”，然后按 OK 确认。



然后将出现以下消息：



SIL 功能

有关如何在 5437 上启用 SIL 模式的说明和进一步信息，请参阅“安全手册”。

操作和故障排除

LED 功能

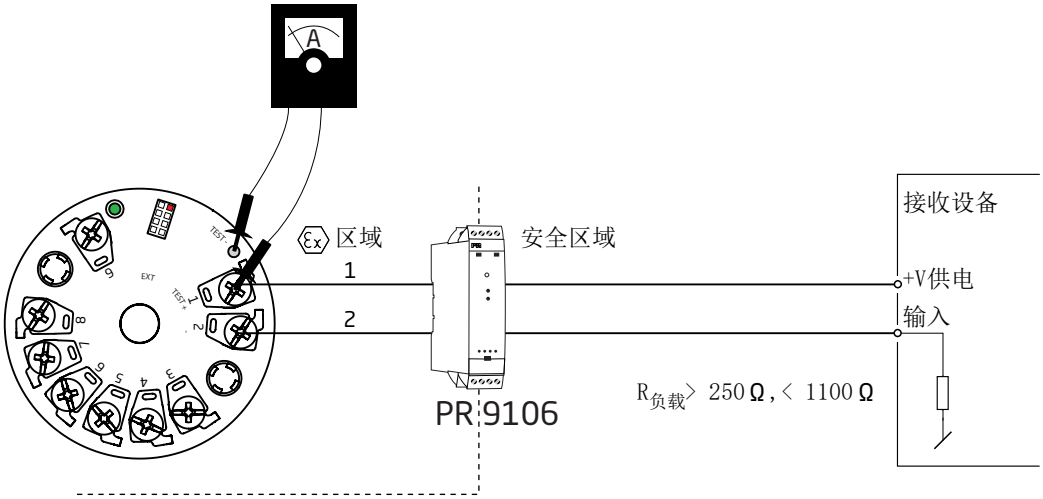
产品 LED 根据 NAMUR NE44 和 NE107 指示故障状态。

状态	绿色 / 红色 LED
设备正常	常亮
无电源	OFF
指示与设备无关的故障，例如断线，传感器短路，超输入或输出限制等	闪烁
设备故障	常亮

有关详细的设备诊断行为和 NE107 信息，请参阅第Appendix A: Diagnostics overview.

测试引脚

测试引脚可以直接测量回路电流，并同时保持工作回路不中断。使用测试引脚时，变送器必须连接电源。



警告　对于危险区域安装，只能使用认证的测试设备。

ATEX 安装图

ATEX 安装图 5437QA01-V8R0

ATEX 证书	DEKRA 16ATEX 0047X
标准：	EN 60079-0:2018, EN 60079-11:2012, EN 60079-15:2010, EN 60079-7:2015 + A1:2018

Ex ia 安装

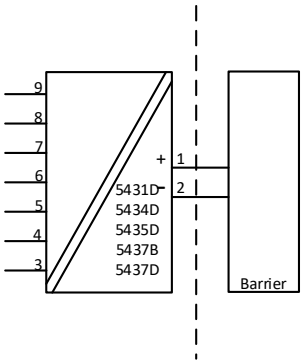
为了 5431D.., 5434D.., 5435D.., 5437B.. 和 5437D.. 安全安装，必须遵守以下规定。

标志 

II 1 G Ex ia IIC T6...T4 Ga 或
II 2(1) G Ex ib [ia Ga] IIC T6...T4 Gb
II 2 D Ex ia IIIC Db
I M1 Ex ia I Ma

危险区域
Zone 0, 1, 2, 21, 22 和 M1

未分类区域



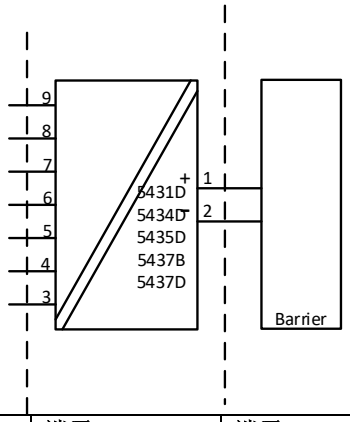
	端子 3,4,5,6	端子 3,7,8,9	端子 3,4,5,6,7,8,9
Uo	7.2 VDC	7.2 VDC	7.2 VDC
Io:	7.3 mA	7.3 mA	12.9 mA
Po	13.2 mW	13.2 mW	23.3 mW
Lo:	667 mH	667 mH	200 mH
Co	13.5 µF	13.5 µF	13.5 µF

Ex ib 安装

危险区域
Zone 0, 1, 2,
21, 22 和 M1

危险区域
Zone 1

未分类区域



	端子 3,4,5,6	**端子** 3,7,8,9	**端子** 3,4,5,6,7,8,9
Uo	7.2 VDC	7.2 VDC	7.2 VDC
Io:	7.3 mA	7.3 mA	12.9 mA
Po	13.2 mW	13.2 mW	23.3 mW
Lo:	667 mH	667 mH	200 mH
Co	13.5 µF	13.5 µF	13.5 µF

端子 1,2 **Ex ia 和 Ex ib 安装** Ui: 30 VDC; Ii: 120 mA; Li: 0 µH; Ci: 1.0 nF	**温度范围**
Pi: 900 mW	T4: -50 ≤ Ta ≤ 85ºC T5: -50 ≤ Ta ≤ 65ºC T6: -50 ≤ Ta ≤ 50ºC
Pi: 750 mW	T4: -50 ≤ Ta ≤ 85ºC T5: -50 ≤ Ta ≤ 70ºC T6: -50 ≤ Ta ≤ 55ºC
Pi: 610 mW	T4: -50 ≤ Ta ≤ 85ºC T5: -50 ≤ Ta ≤ 75ºC T6: -50 ≤ Ta ≤ 60ºC

一般安装说明

产品制造年份可以从序列号的前两位数字中获取。

如果外壳由非金属塑料材料制成，应避免变送器外壳上的静电荷。

对于 EPL Ga，若外壳由铝材质制成，则必须保证安装后由于冲击和摩擦引起的点火源不会产生火花。

端子之间的距离（包括裸线部分）应距离任何接地金属至少 3 mm。

测试引脚允许直接测量回路电流，同时保持回路完整性。使用测试引脚时，变送器必须连接电源。对于危险区域安装，只能使用经过认证的测试设备。

如果变送器采用防护等级为 Ex nA 或 Ex ec，则可能不适用于本质安全。

对于安装在潜在爆炸性气体环境中，必须遵循以下说明：

变送器应安装于符合 DIN 43729 标准的 B 型外壳中，或同等级别符合 EN 60529 标准至少具备 IP20 防护等级的外壳。

外壳应适用于应用并正确安装。

对于安装在潜在爆炸性粉尘环境中，必须遵循以下说明：

如果变送器安装在需要使用设备保护等级 Db 的爆炸性环境中，则变送器应安装在的外壳中，该外壳可根据 EN 60079-0 提供至少 IP5X 的防护等级，并且适合应用并正确安装。

电缆入口设备和盲塞元件应符合相同的要求。

对于 EPL Db，外壳的表面温度比环境温度高 +20 K，确定没有灰尘层。

对于矿井安装，必须遵循以下说明：

变送器应安装于符合 EN 60529 标准至少具备 IP54 防护等级的金属材质外壳中。

铝材质外壳不允许用于矿井。

外壳应适用于应用并正确安装。

电缆入口设备和盲塞元件应符合相同的要求。

Ex nA / Ex ec / Ex ic 安装

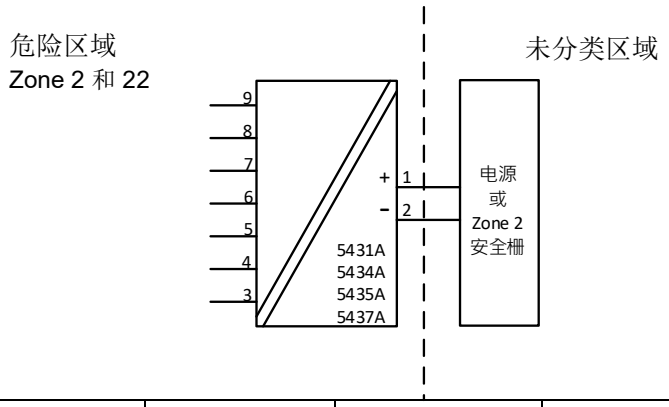
ATEX 证书　　DEKRA 18ATEX0135X

为了 5431A.., 5434A.., 5435A.. 和 5437A.. 安全安装，必须遵守以下规定。

标志



II 3 G Ex nA IIC T6...T4 Gc
II 3 G Ex ec IIC T6...T4 Gc
II 3 G Ex ic IIC T6…T4 Gc
II 3 D Ex ic IIIC Dc



端子 1,2 **Ex nA & ec**	**端子 1,2** **Ex ic**	**端子 1,2** **Ex ic**	**温度范围**
V_{max}= 37 VDC	Ui = 37 VDC Li = 0 µH Ci = 1.0 nF	Ui = 48 VDC Pi = 851 mW Li = 0 µH Ci = 1.0 nF	T4: -50 ≤ Ta ≤ 85°C T5: -50 ≤ Ta ≤ 70°C T6: -50 ≤ Ta ≤ 55°C
V_{max}= 30 VDC	Ui = 30 VDC Li = 0 µH Ci = 1.0 nF		T4: -50 ≤ Ta ≤ 85°C T5: -50 ≤ Ta ≤ 75°C T6: -50 ≤ Ta ≤ 60°C

端子 **3,4,5,6,7,8,9** **Ex nA & Ex ec**	**端子** **3, 4, 5, 6** **Ex ic**	**端子** **3, 7, 8, 9** **Ex ic**	**端子** **3,4,5,6,7,8,9** **Ex ic**
Vmax = 7.2 VDC	Uo: 7.2 VDC Io: 7.3 mA Po: 13.2 mW Lo: 667 mH Co: 13.5 µF	Uo: 7.2 VDC Io: 7.3 mA Po: 13.2 mW Lo: 667 mH Co: 13.5 µF	Uo: 7.2 VDC Io: 12.9 mA Po: 23.3 mW Lo: 200 mH Co: 13.5 µF

一般安装说明

如果外壳由非金属塑料材料制成，应避免变送器外壳上的静电荷。

对于环境温度 ≥ 60°C，必须使用耐高温电缆，且其允许使用温度应至少高于环境温度 20K。

外壳应适用于应用并正确安装。

端子之间的距离（包括裸线部分）应距离任何接地金属至少 3 mm。

“测试”连接只能在安全区域下使用，或者电源/输出电路和加载的电流表是本质安全的。

对于安装在潜在爆炸性气体环境中，必须遵循以下说明：

变送器应安装于符合 EN 60079-0 标准至少具备 IP54 防护等级的外壳中。

此外，外壳应符合 EN 60664-1 标准规定的内部污染等级 2 或更高。

电缆入口设备和盲塞元件应符合相同的要求。

对于安装在潜在爆炸性粉尘环境中，必须遵循以下说明：

对于 EPL Dc，外壳的表面温度比环境温度高 +20 K，确定没有灰尘层。

如果变送器连接本质安全信号“ic”，并且作为本质安全信号“ic”的接口界面（例如无源设备），则变送器应安装于符合 DIN 43729 标准的 B 型金属外壳中，或同等级别符合 EN 60079-0 标准至少具备 IP54 防护等级的外壳。

电缆入口设备和盲塞元件应符合相同的要求。

如果变送器安装在需要使用设备保护级别 Gc 的爆炸性环境中并应用 Ex nA 或 Ex ec 保护类型，则变送器应安装在的外壳中，该外壳可根据 EN 60079-0 提供至少 IP54 的防护等级。

电缆入口设备和盲塞元件应符合相同的要求。

IECEx installation drawing

IECEx Installation drawing 5437QI01-V8R0

IECEx Certificate IECEx DEK 16.0029X

Standards: IEC 60079-0:2017, IEC 60079-11:2011,
IEC 60079-15:2010, IEC 60079-7:2017

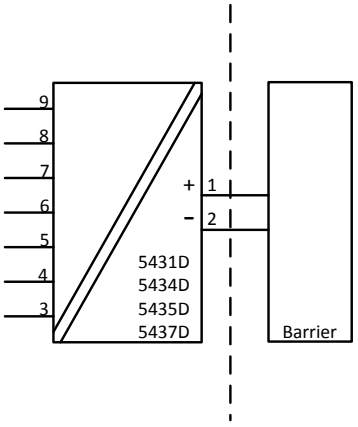
For safe installation of the 5431D..,5434D.., 5435D.. and 5437D.. the following must be observed.

Marking Ex ia IIC T6...T4 Ga or
Ex ib [ia Ga] IIC T6...T4 Gb
Ex ia IIIC Db
Ex ia I Ma

Ex ia Installation

Hazardous Area
Zone 0, 1, 2, 21, 22 and M1

Unclassified Area



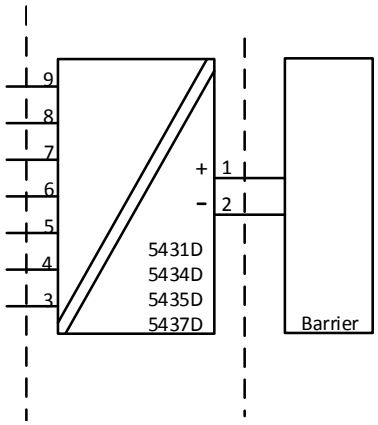
	Terminal 3,4,5,6	**Terminal 3,7,8,9**	**Terminal 3,4,5,6,7,8,9**
Uo	7.2 VDC	7.2 VDC	7.2 VDC
Io:	7.3 mA	7.3 mA	12.9 mA
Po	13.2 mW	13.2 mW	23.3 mW
Lo:	667 mH	667 mH	200 mH
Co	13.5 µF	13.5 µF	13.5 µF

Ex ib Installation

Hazardous Area
Zone 0, 1, 2,
21, 22 and M1

Hazardous Area
Zone 1

Unclassified Area



	Terminal 3,4,5,6	**Terminal 3,7,8,9**	**Terminal 3,4,5,6,7,8,9**
Uo	7.2 VDC	7.2 VDC	7.2 VDC
Io:	7.3 mA	7.3 mA	12.9 mA
Po	13.2 mW	13.2 mW	23.3 mW
Lo:	667 mH	667 mH	200 mH
Co	13.5 µF	13.5 µF	13.5 µF

Terminal 1,2 **Ex ia and Ex ib installation** Ui: 30 VDC; Ii: 120 mA; Li: 0 µH; Ci: 1 nF	**Temperature Range**
Pi: 900 mW	T4: -50 ≤ Ta ≤ 85ºC T5: -50 ≤ Ta ≤ 65ºC T6: -50 ≤ Ta ≤ 50ºC
Pi: 750 mW	T4: -50 ≤ Ta ≤ 85ºC T5: -50 ≤ Ta ≤ 70ºC T6: -50 ≤ Ta ≤ 55ºC
Pi: 610 mW	T4: -50 ≤ Ta ≤ 85ºC T5: -50 ≤ Ta ≤ 75ºC T6: -50 ≤ Ta ≤ 60ºC

General installation instructions

If the enclosure is made of non-metallic plastic materials, electrostatic charges on the transmitter enclosure shall be avoided.

For EPL Ga, if the enclosure is made of aluminum, it must be installed such, that ignition sources due to impact and friction sparks are excluded

The distance between terminals, inclusive the wires bare part, shall be at least 3 mm separated from any earthed metal.
The test pins allow measurement of loop current directly while maintaining loop integrity. Power must be connected to the transmitter when using the test pins. For hazardous area installation, only certified test equipment may be used.
If the transmitter was applied in type of protection Ex nA or Ex ec, it may afterwards not be applied for intrinsic safety.

For installation in a potentially explosive gas atmosphere, the following instructions apply:
The transmitter shall be mounted in an enclosure form B according to DIN43729 or equivalent that is providing a degree of protection of at least IP20 according to IEC60529.
The enclosure shall be suitable for the application and correctly installed.

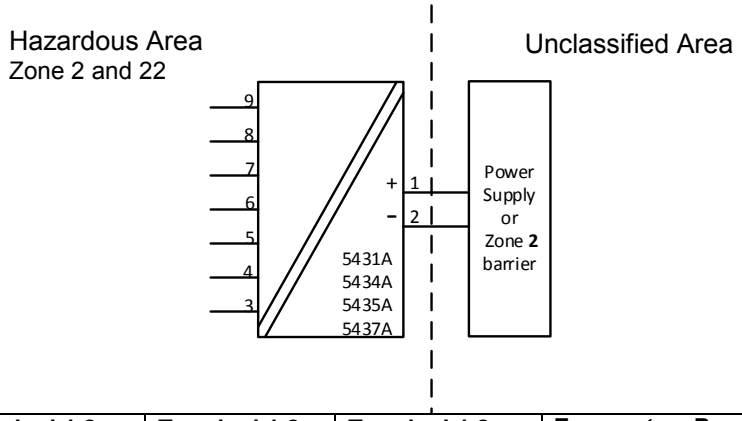
For installation in a potentially explosive dust atmosphere, the following instructions apply:
If the transmitter is installed in an explosive atmosphere requiring the use of equipment protection level Db or Dc and applied in type of protection Ex ia or Ex ic, the transmitter shall be mounted in enclosure that provides a degree of protection of at least IP5X according to IEC 60079-0, and that is suitable for the application and correctly installed.
Cable entry devices and blanking elements shall fulfill the same requirements.
The surface temperature of the outer enclosure is +20 K above the ambient temperature, determined without a dust layer.

For installation in mines the following instructions apply:
The transmitter shall be mounted in a metal enclosure that is providing a degree of protection of at least IP54 according to IEC60529.
Aluminum enclosures are not allowed for mines.
The enclosure shall be suitable for the application and correctly installed.
Cable entry devices and blanking elements shall fulfill the same requirements.

Ex nA / Ex ec / Ex ic Installation

For safe installation of the 5431A.., 5434A.., 5435A.. and 5437A.. the following must be observed.

Marking	Ex nA IIC T6...T4 Gc Ex ec IIC T6...T4 Gc Ex ic IIC T6…T4 Gc Ex ic IIIC Dc



Terminal 1,2 **Ex nA & ec**	**Terminal 1,2** **Ex ic**	**Terminal 1,2** **Ex ic**	**Temperature Range**
Vmax= 37 VDC	Ui = 37 VDC Li = 0 µH Ci = 1.0 nF	Ui = 48 VDC Pi = 851 mW Li = 0 µH Ci = 1.0 nF	T4: -50 ≤ Ta ≤ 85ºC T5: -50 ≤ Ta ≤ 70ºC T6: -50 ≤ Ta ≤ 55ºC
Vmax= 30 VDC	Ui = 30 VDC Li = 0 µH Ci = 1.0 nF		T4: -50 ≤ Ta ≤ 85ºC T5: -50 ≤ Ta ≤ 75ºC T6: -50 ≤ Ta ≤ 60ºC

Terminal **3,4,5,6,7,8,9** **Ex nA & Ex ec**	**Terminal** **3, 7, 8, 9** **Ex ic**	**Terminal** **3, 7, 8, 9** **Ex ic**	**Terminal** **3,4,5,6,7,8,9** **Ex ic**
Vmax = 7.2VDC	Uo: 7.2 VDC Io: 7.3 mA Po: 13.2 mW Lo: 667 mH Co: 13.5µF	Uo: 7.2 VDC Io: 7.3 mA Po: 13.2 mW Lo: 667 mH Co: 13.5µF	Uo: 7.2 VDC Io: 12.9 mA Po: 23.3 mW Lo: 200 mH Co: 13.5µF

General installation instructions
If the enclosure is made of non-metallic plastic materials, electrostatic charges on the transmitter enclosure shall be avoided.
For an ambient temperature ≥ 60ºC, heat resistant cables shall be used with a rating of at least 20 K above the ambient temperature.
The enclosure shall be suitable for the application and correctly installed
The distance between terminals, inclusive the wires bare part, shall be at least 3 mm separated from any earthed metal.

'TEST' connection, may only be applied when the area is safe, or if supply / output circuit and the applied current meter are intrinsically safe.

For installation in a potentially explosive gas atmosphere, the following instructions apply:
The transmitter shall be installed in an enclosure providing a degree of protection of not less than IP54 in accordance with IEC 60079-0, which is suitable for the application and correctly installed e.g. in an enclosure that is in type of protection Ex n or Ex e. Additionally, the area inside the enclosure shall be pollution degree 2 or better as defined in IEC 60664-1.
Cable entry devices and blanking elements shall fulfill the same requirements.

For installation in a potentially explosive dust atmosphere, the following instructions apply:
For EPL Dc, the surface temperature of the outer enclosure is +20 K above the ambient temperature, determined without a dust layer.
If the transmitter is supplied with an intrinsically safe signal "ic" and interfaces an intrinsically safe signal "ic" (e.g. a passive device) , the transmitter shall be mounted in a metal enclosure form B according to DIN 43729 or equivalent that provides a degree of protection of at least IP54 according to IEC 60079-0.
Cable entry devices and blanking elements shall fulfill the same requirements.

If the transmitter is installed in an explosive atmosphere requiring the use of equipment protection level Gc and applied in type of protection Ex nA or Ex ec, the transmitter shall be mounted in enclosure that provides a degree of protection of at least IP54 according to IEC 60079-0, and that is suitable for the application and correctly installed.
Cable entry devices and blanking elements shall fulfill the same requirements.

CSA installation drawing

CSA Installation drawing 5437QC01-V7R0

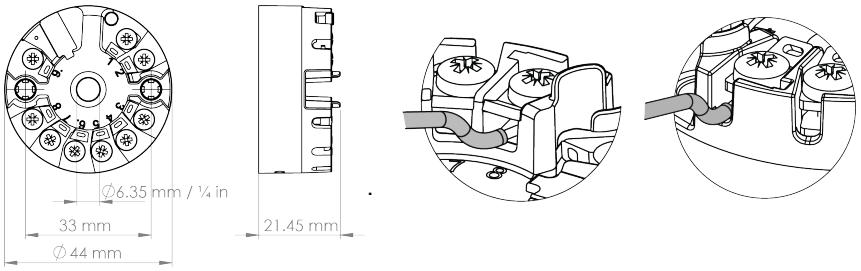
CSA Certificate 16CA70066266

General installation instructions:
The device shall only be installed by qualified personnel who are familiar with the national and international laws, directives and standards that apply to this area.

Check at the receipt of the device whether the type corresponds to the one ordered. Installation, connection and disconnection of wires should only be carried out on a disconnected device and under ESD safe conditions.

For hazardous area installation, only certified test equipment may be used and
- the device must be installed according to the appropriate installation drawings.

Loop Link programming interface may be used only to program the device outside the classified area or when the area is known to be safe.



Wires must be mounted between the metal plates.
Max. wire size 1 x 1.5 mm2 stranded wire.
Screw terminal torque 0.4 Nm

Repair of the device must be done by PR electronics A/S only.

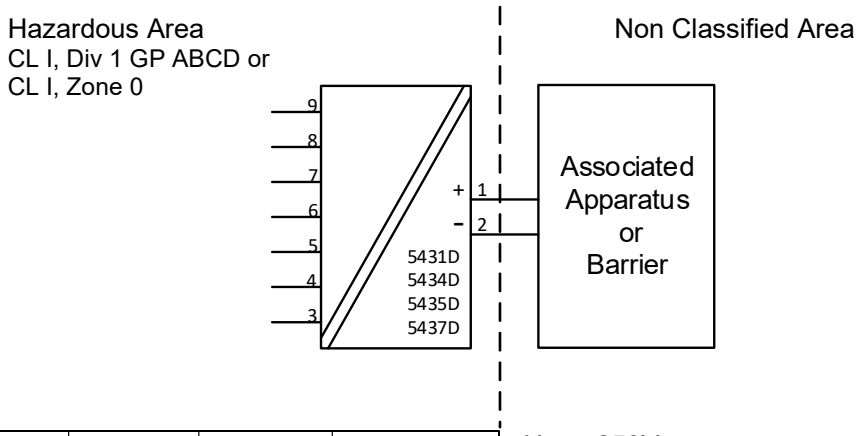
Should there be any doubt as to the correct handling of the device please contact your local distributor or alternatively:

PR electronics A/S, Lerbakken 10, 8410 Roende, Denmark.
Phone : +45 86372677, www.prelectronics.com.

Division1 / Ex ia, Intrinsic Safe Installation

For safe installation of the 5431D..,5434D.., 5435D.. and 5437D.. the following must be Observed.

Marking
Class I Division 1, Group A,B,C,D
Ex ia IIC T6…T4 Ga
Class I, Zone 0: AEx ia IIC T6…T4 Ga
Ex ib [ia Ga] IIC T6…T4 Gb
Class I Zone 1 AEx ib [ia Ga] IIC T6…T4 Gb



	Terminal 3,4,5,6	**Terminal** 3,7,8,9	**Terminal** 3,4,5,6,7,8,9
Uo	7.2 VDC	7.2 VDC	7.2 VDC
Io:	7.3 mA	7.3 mA	12.9 mA
Po	13.2 mW	13.2 mW	23.3 mW
Lo:	667 mH	667 mH	200 mH
Co	13.5 µF	13.5 µF	13.5 µF

Um ≤ 250V
Voc or Uo ≤ Vmax or Ui
Isc or Io ≤ Imax or Ii
Po ≤ Pmax or Pi
Ca or Co ≥ Ci + Ccable
La or Lo ≥ Li + Lcable

Terminal 1,2 Ex ia, Div1	**Temperature Range**
Pi: 900 mW Ui: 30 VDC; Ii: 120 mA Li:0 µH; Ci:1.0nF	T4: -50 ≤ Ta ≤ 85ºC T5: -50 ≤ Ta ≤ 70ºC T6: -50 ≤ Ta ≤ 55ºC
Pi: 750 mW Ui: 30 VDC; Ii: 100 mA Li:0 µH; Ci:1.0nF	T4: -50 ≤ Ta ≤ 85ºC T5: -50 ≤ Ta ≤ 75ºC T6: -50 ≤ Ta ≤ 60ºC

IS Installation instructions
• Install in accordance with the US the National Electrical Code (NEC) or for Canada the Canadian Electrical Code (CEC).
• The transmitter must be installed in a suitable enclosure to meet installation codes stipulated in the Canadian Electrical Code (CEC) or for US the National Electrical Code (NEC).
• To establish Class II and Class III, Division 1 or IIIC ratings, the equipment shall be installed in an enclosure that is approved for use in Class II and Class III hazardous (classified) locations.
• If the enclosure is made of non-metallic materials or of painted metal, electrostatic charging shall be avoided.

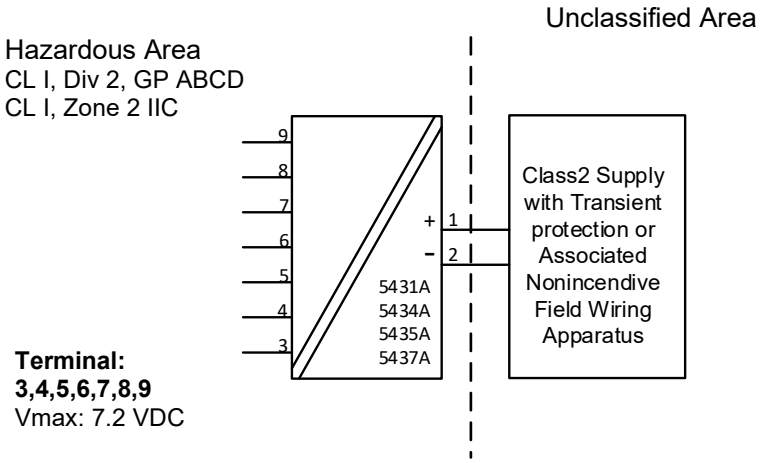
• Use supply wires with a rating of at least 5 K above the ambient temperature.

WARNING: Substitution of components may impair intrinsic safety
AVERTISSEMENT: la substitution de composants peut nuire à la sécurité intrinsèque

Division 2 / Ex ec, Installation

For safe installation of the 5431A.., 5434A.., 5435A.. and 5437A.. the following must be observed.

Marking
Class I, Division 2, Groups A, B, C, D
Ex ec IIC T6…T4 Gc
Class I, Zone 2: AEx ec IIC T6…T4 Gc



Terminal 1,2 **Ex ec**	**Temperature Range**
Supply voltage: max 37 VDC	T4: -50 ≤ Ta ≤ 85ºC T5: -50 ≤ Ta ≤ 70ºC T6: -50 ≤ Ta ≤ 55ºC
Supply voltage: max 30 VDC	T4: -50 ≤ Ta ≤ 85ºC T5: -50 ≤ Ta ≤ 75ºC T6: -50 ≤ Ta ≤ 60ºC

NI Installation instructions
• The transmitter must be installed in an enclosure providing a degree of protection of at least IP54 according to IEC60529 that is suitable for the application and is correctly installed. Cable entry devices and blanking elements shall fulfill the same requirements.
• Additionally, the area inside the enclosure shall be pollution degree 2 or better as defined in IEC 60664-1.
• If the enclosure is made of non-metallic materials or of painted metal, electrostatic charging shall be avoided.
• Use supply wires with a rating of at least 5 K above the ambient temperature.
• For an ambient temperature ≥ 60ºC, heat resistant cables shall be used with a rating of at least 20 K above the ambient temperature.

WARNING: Substitution of components may impair suitability for Class I, Division 2
AVERTISSEMENT: la substitution de composants peut nuire à l'aptitude à la Classe I, Division 2

WARNING: Do not connect or disconnect equipment unless power has been switched off or the area is known to be safe.
AVERTISSEMENT: Ne connectez ou ne débranchez pas l'équipement sauf si l'alimentation a été coupée ou si la zone est connue pour être sûre.

Non Incendive field wiring installation
The non incendive field Wiring Circuit concept allows interconnection of Nonincendive Field wiring Apparatus with Associated Nonincendive Field Wiring Apparatus or Assosicated Intrinsically Safe Apparatus or Associated Apparatus not specially examined in combination as a syatem using any of the wiring methods permitted for unclassified locations, Voc < Vmax, Ca ≥ Ci + Ccable , La ≥ Li + Lcable.

Terminal 1,2 **Non Incendive Field wiring parameters**	**Temperature Range**
Vmax= 30 VDC, Ci=1nF, Li=0	T4: -50 ≤ Ta ≤ 85ºC T5: -50 ≤ Ta ≤ 75ºC T6: -50 ≤ Ta ≤ 60ºC

Functional Ratings: Unom ≤ 30 VDC; Inom ≤ 3.5 - 23 mA

FM installation drawing

FM Installation drawing 5437QF01-V6R0

FM Certificates FM16CA0146X and FM16US0287X

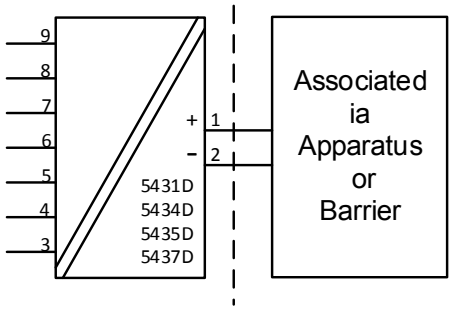
Division1 / Zone 0, Intrinsic Safe Installation

For safe installation of the 5431D..,5434D.., 5435D.. and 5437D.. the following must be observed.

Marking: CL I, Div 1, Gp A,B,C,D
CL I, Zone 0 AEx ia IIC, T6…T4
CL I, Zone 1 [0] AEx ib [ia] IIC,T6…T4
Ex ia IIC, T6…T4 Ga
Ex ib [ia Ga] IIC, T6…T4 Gb

Hazardous Area
CL I, Div 1, GP ABCD
CL I, Zone 0 IIC

Non Classified Area

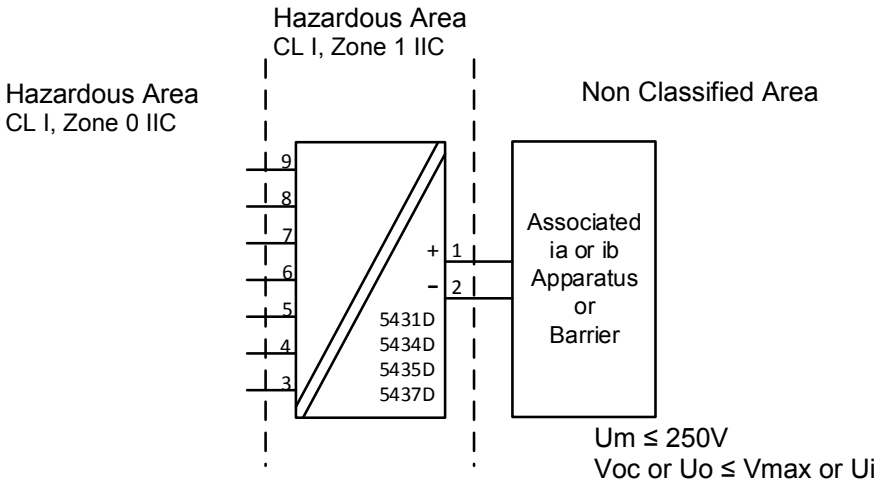


Um ≤ 250V
Voc or Uo ≤ Vmax or Ui
Isc or Io ≤ Imax or Ii
Po ≤ Pi
Ca or Co ≥ Ci + Ccable
La or Lo ≥ Li + Lcable

	Terminal 3,4,5,6	**Terminal 3,7,8,9**	**Terminal 3,4,5,6,7,8,9**
Uo	7.2 VDC	7.2 VDC	7.2 VDC
Io:	7.3 mA	7.3 mA	12.9 mA
Po	13.2 mW	13.2 mW	23.3 mW
Lo:	667 mH	667 mH	200 mH
Co	13.5 µF	13.5 µF	13.5 µF

Terminal 1,2 AEx/Ex ia IIC, T6…T4 Ga; CL I, Div 1, Gp ABCD, T6…T4;	**Temperature Range**
Ui: 30 VDC; Ii: 120 mA Pi: 900 mW Li:0 µH; Ci:1.0nF	T4: -50 ≤ Ta ≤ 85ºC T5: -50 ≤ Ta ≤ 70ºC T6: -50 ≤ Ta ≤ 55ºC
Ui: 30 VDC; Ii: 100 mA Pi: 750 mW Li:0 µH; Ci:1.0nF	T4: -50 ≤ Ta ≤ 85ºC T5: -50 ≤ Ta ≤ 75ºC T6: -50 ≤ Ta ≤ 60ºC

Zone 0 / Zone 1, Intrinsic Safe Installation



Um ≤ 250V
Voc or Uo ≤ Vmax or Ui
Isc or Io ≤ Imax or Ii
Po ≤ Pi
Ca or Co ≥ Ci + Ccable
La or Lo ≥ Li + Lcable

	Terminal 3,4,5,6	**Terminal 3,7,8,9**	**Terminal 3,4,5,6,7,8,9**
Uo	7.2 VDC	7.2 VDC	7.2 VDC
Io:	7.3 mA	7.3 mA	12.9 mA
Po	13.2 mW	13.2 mW	23.3 mW
Lo:	667 mH	667 mH	200 mH
Co	13.5 µF	13.5 µF	13.5 µF

Terminal 1,2 Ex ib [ia Ga] IIC T6…T4 Gb;	**Temperature Range**
Ui: 30 VDC; Ii: 120 mA Pi: 900 mW Li:0 µH; Ci:1.0nF	T4: -50 ≤ Ta ≤ 85ºC T5: -50 ≤ Ta ≤ 70ºC T6: -50 ≤ Ta ≤ 55ºC
Ui: 30 VDC; Ii: 100 mA Pi: 750 mW Li:0 µH; Ci:1.0nF	T4: -50 ≤ Ta ≤ 85ºC T5: -50 ≤ Ta ≤ 75ºC T6: -50 ≤ Ta ≤ 60ºC

IS installation instructions

• Install in accordance with the US the National Electrical Code (NEC) or for Canada the Canadian Electrical Code (CEC).

• Equipment that is FM-approved for intrinsic safety may be connected to barriers based on the ENTITY CONCEPT. This concept permits interconnection of approved transmitters, meters and other devices in combinations which have not been specifically examined by FM, provided that the agency's criteria are met. The combination is then intrinsically safe, if the entity concept is acceptable to the authority having jurisdiction over the installation.

• The entity concept criteria are as follows:
The intrinsically safe devices, other than barriers, must not be a source of power. The maximum voltage Ui (Vmax) and current Ii (Imax), and maximum power Pi (Pmax), which the device can receive and remain intrinsically safe, must be equal to or greater than the voltage (Uo or Voc or Vt) and current (Io or Isc or It) and the power Po which can be delivered by the barrier.

• The sum of the maximum unprotected capacitance (Ci) for each intrinsically device and the interconnect-ing wiring must be less than the capacitance (Ca) which can be safely connected to the barrier.

• The sum of the maximum unprotected inductance (Li) for each intrinsically device and the interconnecting wiring must be less than the inductance (La) which can be safely connected to the barrier.

• The entity parameters Uo,Voc or Vt and Io,Isc or It, and Ca and La for barriers are provided by the barrier manufacturer.

• The transmitter must be installed in a suitable enclosure to meet installation codes stipulated in the Canadian Electrical Code (CEC) or for US the National Electrical Code (NEC).
• If the enclosure is made of non-metallic materials or of painted metal, electrostatic charging shall be avoided.

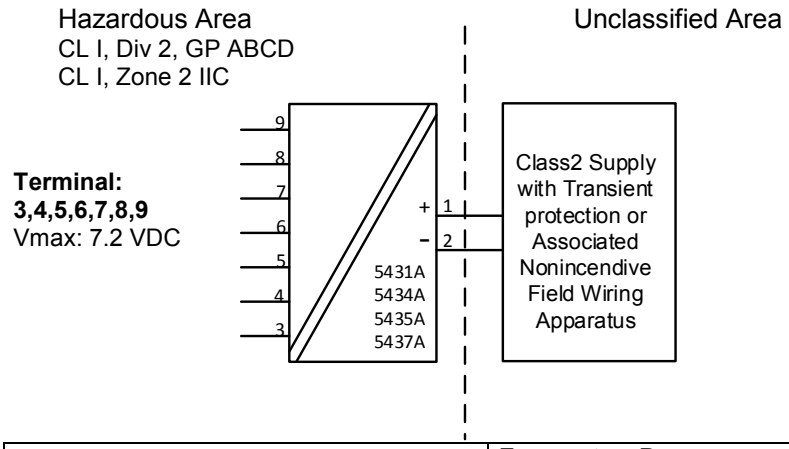
• Use supply wires with a rating of at least 5 K above the ambient temperature.

WARNING: Substitution of components may impair intrinsic safety
AVERTISSEMENT: la substitution de composants peut nuire à la sécurité intrinsèque

Division 2 / Zone 2, Non Sparking Installation

For safe installation of the 5431A.., 5434A.., 5435A.. and 5437A.. the following must be observed.

Marking	Class I, Division 2, GP A,B,C,D T6...T4
	Class I, Zone 2 AEx nA IIC, T6...T4 Gc
	Class I, Zone 2 Ex nA IIC, T6...T4 Gc
	NIFW, CL I, Div 2, GP A,B,C,D



Terminal 1,2 **AEx/Ex nA IIC T6..T4 Gc**	**Temperature Range**
Supply voltage: max 37 VDC	T4: -50 ≤ Ta ≤ 85ºC T5: -50 ≤ Ta ≤ 70ºC T6: -50 ≤ Ta ≤ 55ºC
Supply voltage: max 30 VDC	T4: -50 ≤ Ta ≤ 85ºC T5: -50 ≤ Ta ≤ 75ºC T6: -50 ≤ Ta ≤ 60ºC

NI Installation instructions
• The transmitter must be installed in an enclosure providing a degree of protection of at least IP54 according to IEC60529 that is suitable for the application and is correctly installed.Cable entry devices and blanking elements shall fulfill the same requirements.
• If the enclosure is made of non-metallic materials or of painted metal, electrostatic charging shall be avoided.
• Use supply wires with a rating of at least 5 K above the ambient temperature.

WARNING: Substitution of components may impair suitability for Class I, Division 2
AVERTISSEMENT: la substitution de composants peut nuire à la sécurité intrinsèque

WARNING: Do not disconnect equipment unless power has been switched off or the area is known to be safe.
AVERTISSEMENT: Ne débranchez pas l'équipement sauf si l'alimentation a été coupée ou si la zone est connue pour être sûre.

Non Incendive Field Wiring installation

The non incendive field Wiring Circuit concept allows interconnection of Nonincendive Field wiring Apparatus with Associated Nonincendive Field Wiring Apparatus or Assosicated Intrinsically Safe Apparatus or Associated Apparatus not specially examined in combination as a syatem using any of the wiring methods permitted for unclassified locations, Voc < Vmax, Ca ≥ Ci + Ccable , La ≥ Li + Lcable.

Terminal 1,2 **Non Incendive Field Wiring parameters**	**Temperature Range**
Vmax= 30 VDC, Ci=1nF, Li=0	T4: -50 ≤ Ta ≤ 85ºC T5: -50 ≤ Ta ≤ 75ºC T6: -50 ≤ Ta ≤ 60ºC

Functional Ratings:
Unom ≤ 30 VDC; Inom ≤ 3.5 - 23 mA

Instalação INMETRO

Instalação INMETRO 5437QB01-V4R1

INMETRO Certificado DEKRA 23.0002X

Normas: **ABNT NBR IEC 60079-0:2020 Versão Corrigida:2023**
ABNT NBR IEC 60079-7:2018 Versão Corrigida:2022
ABNT NBR IEC 60079-11:2013 Versão Corrigida:2017

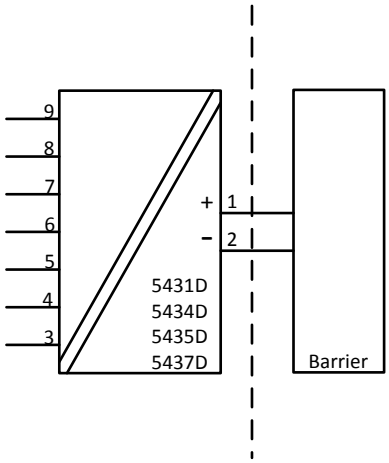
Para a instalação segura do 5431D..,5434D.., 5435D.. e 5437D.. os seguintes pontos devem ser observados:

NOTAS
Ex ia IIC T6...T4 Ga ou
Ex ib [ia Ga] IIC T6...T4 Gb
Ex ia IIIC Db
Ex ia I Ma

Instalação Ex ia

Área Classificada
Zone 0, 1, 2, 21, 22 e M1

Área Não classificada



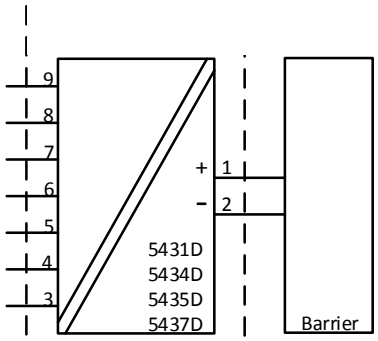
	Terminais 3,4,5,6 e 3,7,8,9	**Terminais** 3,4,5,6,7,8,9
Uo	7,2 VDC	7,2 VDC
Io:	7,3 mA	12,9 mA
Po	13,2 mW	23,3 mW
Lo:	667 mH	200 mH
Co	13,5 µF	13,5 µF

Instalação Ex ib

Área Classificada
Zonas 0, 1, 2,
21, 22 e M1

Área Classificada
Zona 1

Área Não Classificada



	Terminais 3,4,5,6 e 3,7,8,9	**Terminais** 3,4,5,6,7,8,9
Uo	7,2 VDC	7,2 VDC
Io:	7,3 mA	12,9 mA
Po	13,2 mW	23,3 mW
Lo:	667 mH	200 mH
Co	13,5 µF	13,5 µF

Terminais 1,2 **Instalações Ex ia e Ex ib** Ui: 30 VDC; Ii: 120 mA; Li: 0 µH; Ci: 1.0nF	**Faixas de Temperaturas**
Pi: 900 mW	T4: -50 ≤ Ta ≤ 85ºC T5: -50 ≤ Ta ≤ 65ºC T6: -50 ≤ Ta ≤ 50ºC
Pi: 750 mW	T4: -50 ≤ Ta ≤ 85ºC T5: -50 ≤ Ta ≤ 70ºC T6: -50 ≤ Ta ≤ 55ºC
Pi: 610 mW	T4: -50 ≤ Ta ≤ 85ºC T5: -50 ≤ Ta ≤ 75ºC T6: -50 ≤ Ta ≤ 60ºC

Instruções Gerais de Instalação
Se o invólucro for feito de materiais não metálicos ou de metal com uma camada de tinta mais espessa que 0,2 mm (grupo IIC) ou 2 mm (grupo IIB, IIA, I) ou qualquer espessura (grupo III), cargas eletrostáticas devem ser evitadas.

Para EPL Ga, se o invólucro for de alumínio, ele deve ser instalado de forma que as fontes de ignição devido a faíscas de impacto e fricção sejam excluídas.

A distância entre terminais, fios inclusivos não isolados, deve ser separada por pelo menos 3 mm de qualquer metal aterrado.
Os pinos de testes para medição devem permitir os destes de *loop* de corrente mantendo a integridade do *loop*. A energia deve estará conectada ao transmissor quando for usado os pinos de teste. Para instalações em áreas classificadas deve ser utilizado somente equipamentos certificados.
Se o transmissor foi aplicado no tipo de proteção Ex ec, não pode ser aplicado para segurança intrínseca.

Para instalações com uma atmosfera de gás potencialmente explosiva, a seguinte instrução se aplicará:
O transmissor deverá ser montado em um gabinete de formato tipo B de acordo com a norma DIN43729 ou equivalente que possibilita um grau mínimo de proteção IP20 de acordo com a ABNT NBR IEC60529.
O gabinete deve ser adequado para a aplicação e instalado corretamente.

Para instalação em uma atmosfera de poeira potencialmente explosiva, as seguintes instruções se aplicarão:
Se o transmissor for instalado em uma atmosfera explosiva que exija o uso de nível de proteção de equipamento Db ou Dc e aplicado no tipo de proteção Ex ia ou Ex ic, o transmissor deverá ser montado em gabinete que forneça um grau de proteção de pelo menos IP5X de acordo com IEC 60079-0, e que seja adequado à aplicação e instalado corretamente. Os dispositivos de entrada de cabos e os elementos de obturação devem cumprir os mesmos requisitos. A temperatura da superfície do invólucro externo é +20 K acima da temperatura ambiente, determinada sem camada de poeira.

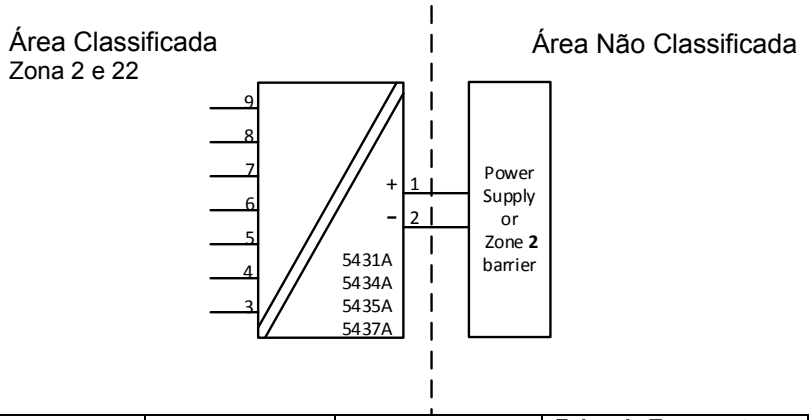
Para instalações em Minas, as instruções abaixo se aplicam:
O transmissor deverá ser montado em um gabinete de metal que possibilita um grau mínimo de proteção IP54 de acordo com a ABNT NBR IEC60529
Gabinetes de Alumínio não são permitidos para instalações em Minas.
O gabinete deve ser adequado para a aplicação e instalado corretamente.
Os dispositivos de entrada de cabos e os elementos espaçadores devem satisfazer os mesmos requisitos

Instalações Ex ec / Ex ic

Para instalações seguras do 5431A.., 5434A.., 5435A.. e 5437A.. as seguintes instruções devem ser observadas

Notas

Ex ec IIC T6...T4 Gc
Ex ic IIC T6…T4 Gc
Ex ic IIIC Dc



Terminais 1,2 **Ex ec**	**Terminais 1,2** **Ex ic**	**Terminais 1,2** **Ex ic**	**Faixa de Temperatura**
Vmax= 37 VDC	Ui = 37 VDC Li = 0 µH Ci = 1,0 nF	Ui = 48 VDC Pi = 851 mW Li = 0 µH Ci = 1,0 nF	T4: -50 ≤ Ta ≤ 85ºC T5: -50 ≤ Ta ≤ 70ºC T6: -50 ≤ Ta ≤ 55ºC
Vmax= 30 VDC	Ui = 30 VDC Li = 0 µH Ci = 1,0 nF		T4: -50 ≤ Ta ≤ 85ºC T5: -50 ≤ Ta ≤ 75ºC T6: -50 ≤ Ta ≤ 60ºC

Terminais **3,4,5,6,7,8,9** **Ex ec**	**Terminais** **3, 4, 5, 6 and** **3, 7, 8, 9** **Ex ic**	**Terminais** **3,4,5,6,7,8,9** **Ex ic**
Vmax = 7,2VDC	Uo: 7,2 VDC Io: 7,3 mA Po: 13,2 mW Lo: 667 mH Co: 13,5µF	Uo: 7,2 VDC Io: 12,9 mA Po: 23,3 mW Lo: 200 mH Co: 13,5µF

Instruções gerais de instalação:
Se o invólucro for feito de materiais não metálicos, ou se for feito de metal com uma camada de tinta mais espessa que 0,2 mm (grupo IIC), ou 2 mm (grupo IIB, IIA, I) ou qualquer espessura (grupo III), cargas eletrostáticas devem ser evitadas.
Para uma temperatura ambiente ≥ 60ºC, cabos resistentes a aquecimento deverão ser usados com classificação de no mínimo 20 K acima da temperatura ambiente.
O gabinete deve ser adequado para a aplicação e instalado corretamente.
A distância entre terminais, fios inclusivos não isolados, deve ser separada por pelo menos 3 mm de qualquer metal aterrado.
A conexão TESTE, deve ser utilizado somente quando a área é segura, ou quando a fonte / circuito de saída e o medidor de corrente aplicado seja do tipo intrinsicamente seguro.

Para instalações em uma atmosfera de gás potencialmente explosiva, as instruções abaixo e aplicarão:
O transmissor deverá ser instalado em um gabinete que possibilita um grau de proteção de no mínimo IP54 de acordo com a ABNT NBR IEC 60079-0.
Em adição, o gabinete deverá possibilitar um grau de poluição interna de 2 ou melhor, como definido na ABNT NBR IEC60664-1.
Os dispositivos de entrada de cabos e os elementos espaçadores devem satisfazer os mesmos requisitos

Para a instalação em uma atmosfera de poeira potencialmente explosiva, as seguintes instruções se aplicarão:
Para EPL Dc, a temperatura da superfície do invólucro externo é +20 K acima da temperatura ambiente, determinada sem camada de poeira. Se o transmissor for fornecido com um sinal intrinsecamente seguro "ic" e fizer interface com um sinal intrinsecamente seguro "ic" (por exemplo, um dispositivo passivo), o transmissor deverá ser montado em um invólucro metálico forma B de acordo com DIN 43729 ou equivalente que forneça um grau de proteção de pelo menos IP54 conforme IEC 60079-0. Os dispositivos de entrada de cabos e os elementos de obturação devem cumprir os mesmos requisitos.

Se o transmissor for instalado em uma atmosfera explosiva que exija o uso de nível de proteção de equipamento Gc e aplicado no tipo de proteção Ex ec, o transmissor deverá ser montado em gabinete que forneça um grau de proteção de pelo menos IP54 de acordo com IEC 60079 -0, e isso é adequado para o aplicativo e instalado corretamente. Os dispositivos de entrada de cabos e os elementos de obturação devem cumprir os mesmos requisitos.

NEPSI installation drawing

NEPSI Installation drawing 5437QN01-V2R0

NEPSI 证书　　GYJ23.1227X

防爆标志为　　Ex ia IIC T4…T6 Ga
Ex ib [ia Ga] IIC T4…T6 Gb
Ex ic IIC T4…T6 Gc
Ex ec [ic Gc] IIC T4…T6 Gc
Ex ia IIIC T80°C/T95°C/T130°C Db
Ex ib [ia Da] IIIC T80°C/T95°C/T130°C Db

二、产品使用注意事项

2.1 变送器的使用环境温度范围、温度组别与安全参数的关系如下表所示:

接线端子	防爆等级	环境温度	温度组别	安全参数
1 ~ 2	ia, ib iaDb ibDb	(-50~+50)°C	T6/T80°C	U_i=30 V　I_i=120 mV　P_i=900 mW　L_i≈0 C_i=1 nF
		(-50~+65)°C	T5/T95°C	
		(-50~+85)°C	T4/T130°C	
		(-50~+55)°C	T6/T80°C	U_i=30 V　I_i=120 mV　P_i=750 mW　L_i≈0 C_i=1 nF
		(-50~+70)°C	T5/T95°C	
		(-50~+85)°C	T4/T130°C	
		(-50~+60)°C	T6/T80°C	U_i=30 V　I_i=120 mV　P_i=610 mW　L_i≈0 C_i=1 nF
		(-50~+75)°C	T5/T95°C	
		(-50~+85)°C	T4/T130°C	
	ic	(-50~+55)°C	T6	U_i=37 V　L_i≈0　C_i=1 nF U_i=48 V　P_i=851 mW　L_i≈0　C_i=1 nF
		(-50~+70)°C	T5	
		(-50~+85)°C	T4	
		(-50~+60)°C	T6	U_i=30 V　L_i≈0　C_i=1 nF
		(-50~+75)°C	T5	
		(-50~+85)°C	T4	
1 ~ 2	ec	(-50~+55)°C	T6	U_{max}=37 V
		(-50~+70)°C	T5	
		(-50~+85)°C	T4	
		(-50~+60)°C	T6	U_{max}=30 V
		(-50~+75)°C	T5	
		(-50~+85)°C	T4	
3 - 4 ~ 9	ia, ib, ic	(-50~+85)°C	T4 ~ T6	U_o=7.2 V　I_o=12.9 mA　Po=23.3 mW L_o=200 mH　C_o=13.5 μF
3 - 4 ~ 6 3 - 7 ~ 9				U_o=7.2 V　I_o=12.9 mA　Po=13.2 mW L_o=667 mH　C_o=13.5 μF

2.2 变送器必须与已经通过防爆认证的关联设备配套/传感器共同组成本安防爆系统方可使用于爆炸性危险场所。其系统接线必须同时遵守本产品、所配关联设备和传感器的使用说明书要求，接线端子不得接错。
2.3 用户不得自行更换该产品的零部件，应会同产品制造商共同解决运行中出现的故障，以杜绝损坏现象的发生。
2.4 用户在安装、使用和维护变送器时，须同时严格遵守产品使用说明书和下列标准:

GB 3836.13-2021 爆炸性环境 第 13 部分: 设备的修理、检修、修复和改造

GB 3836.15-2017 爆炸性气体环境用电气设备 第 15 部分: 危险场所电气安装 (煤矿除外)

GB 3836.16-2022 爆炸性气体环境用电气设备 第 16 部分: 电气装置的检查和维护 (煤矿除外)

GB 3836.18-2017 爆炸性环境第 18 部分: 本质安全系统

GB 50257-2014 电气装置安装工程爆炸和火灾危险环境电气装置施工及验收规范

GB 12476.2-2010 可燃性粉尘环境用电气设备 第 2 部分: 选型和安装

GB 15577-2007 粉尘防爆安全规程

Appendix A: Diagnostics overview

Diagnostics overview

Incident description	Description	LED action	Analog Output Reaction	NE-107 Class	User action	Error #
The device variable mapped to PV (and analog output current) is beyond its operating limits.	Primary Value Out Of Limits	Flashing Red	Enters configured value	Maintenance required	Reconnect or repair sensor	0
Any other device variable is beyond its operating limits.	Non-Primary Value Out Of Limits	Flashing Red	No Impact	Maintenance required	Reconnect or repair sensor	1
The loop current has reached the Current Output Upper Limit (UL) or Output Lower Limit (LL) as configured with command #147, and is no longer corresponding to the PV value.	Loop Current Saturated	Flashing Red	Enters configured value	If output range check is enabled: Failure otherwise Maintenance required	Reconnect or repair sensor	2
The analog output current is being simulated or disabled.	Loop Current Fixed	Flashing Red	Enters configured value	Function check	N.A	3
The configuration has changed since this bit was last cleared (seen from same master type, Primary- or Secondary Master).	Configuration Changed	No impact	No Impact	N.A	N.A	6
A sensor error (broken/ shorted sensor) is detected on Input 1.	Primary Input 1 error	Flashing Red	Enters configured value	If no backup input is available and mapped to PV, then failure otherwise maintenance required.	Reconnect or repair sensor	10
A sensor error (broken / shorted sensor) is detected on Input 2. This is only possible if Input type 2 is <> “None”.	Primary Input 2 error (only if Input 2 is enabled)	Flashing Red	Enters configured value	If no backup input is available and mapped to PV, then failure otherwise maintenance required.	Reconnect or repair sensor	11
A sensor error (broken / shorted sensor) is detected on the CJC measurement used for Input 1.	CJC for Input 1 error (only if used)	Flashing Red	Enters configured value	If no backup input is available and mapped to PV, then failure otherwise maintenance required.	Reconnect or repair sensor	12
A sensor error (broken / shorted sensor) is detected on the CJC measurement used for Input 2.	CJC for Input 2 error (only if used)	Flashing Red	Enters configured value	If no backup input is available and mapped to PV, then failure	Reconnect or repair sensor	13

Incident description	Description	LED action	Analog Output Reaction	NE-107 Class	User action	Error #
				otherwise maintenance required.		
The difference between measurements on Input 1 and Input 2 is outside the configured sensor drift limit.	Dual Input: Sensor drift alarm (only if enabled)	Flashing Red	Enters configured value	if sensor drift = error => failure otherwise maintenance required.	Reconnect or repair sensor	14
A sensor error (broken / shorted) is detected on the primary sensor, backup sensor is in use.	Dual Input: Backup sensor OK, main sensor error	No Impact	No Impact	Maintenance required	Reconnect or repair sensor	15
A sensor error (broken / shorted) is detected on the backup sensor, primary sensor only is available.	Dual Input: Backup sensor error, main sensor OK	No Impact	No Impact	Maintenance required	Reconnect or repair sensor	16
Configuration is temporarily invalid < 3 seconds, e.g. while downloading parameters.	Configuration not supported by device	Flashing Red	Flashing Red	Failure	N.A.	17
Configuration is temporary invalid > 3 seconds, e.g. if download is paused.	Configuration not supported by device	Lights Red	Safe State	Failure	Correct and/or re-send the configuration	18
The device is operated outside its specified temperature range.	Internal electronics temperature alarm	Flashing Red	No Impact	Out of Specification	Check operating temperature	19
The device is operated outside its specified temperature range in SIL mode.	Internal electronics temperature alarm	Lights Red	Safe State	Failure	Check operating temperature	20
Power is applied but still too low.	Minimum supply voltage not reached	OFF	Safe State	Function check	Check power supply (at output terminals). If the error is persistent, send in the device for repair	21
The device is transitioning to SIL mode, or has failed to do so.	Attempting or failed to enter SIL mode	Lights Red	Safe State	Function check	The SIL configuration must be validated or normal operation must be re-selected.	22
An unrecoverable error occurred in the internal communication to the Input CPU.	Error in communication with Input CPU	Lights Red	Safe State	Failure	Reset or re-power the device. If the error is persistent, send in the device for repair.	23
An unrecoverable error occurred in the Input CPU.	Input CPU reconfiguration failed	Lights Red	Safe State	Failure	Reset or re-power the device. If the error is persistent, send in the device for repair.	24

Incident description	Description	LED action	Analog Output Reaction	NE-107 Class	User action	Error #
The device is operated below its specified voltage supply range.	Supply voltage too low	Lights Red	Safe State	Failure	Check power supply (at output terminals). Reset or re-power the device. If the error is persistent, send in the device for repair.	25
The read back loop current differs from the calculated output current.	Loop current read back error	Lights Red	Safe State	Failure	Check power supply (at output terminals). Reset or re-power the device. If the error is persistent, send in the device for repair.	26
The device is operated above its specified voltage supply range.	Supply voltage too high	Lights Red	Safe State	Failure	Check power supply (at output terminals). Reset or re-power the device. If the error is persistent, send in the device for repair.	27
The configuration in the NVM has become inconsistent.	Error in data verification after writing to EEPROM	Lights Red	Safe State	Failure	Correct and/or re-send the configuration. If the error is persistent, send in the device for repair.	28
The configuration in the NVM has become inconsistent.	CRC16 error in cyclic test of EEPROM	Lights Red	Safe State	Failure	Correct and/or re-send the configuration. If the error is persistent, send in the device for repair.	29
An unrecoverable error occurred in the internal communication to the EEPROM.	Error in EEPROM communication	Lights Red	Safe State	Failure	Reset or re-power the device. If the error is persistent, send in the device for repair.	30
An unrecoverable memory error occurred in the internal main CPU.	CRC16 error in cyclic test of program code in FLASH	Lights Red	Safe State	Failure	Reset or re-power the device. If the error is persistent, send in the device for repair.	31
An exception error occurred in the main CPU program execution.	Exception error during code execution	Lights Red	Safe State	Failure	Reset or re-power the device. If the error is persistent, send in the device for repair.	32

Incident description	Description	LED action	Analog Output Reaction	NE-107 Class	User action	Error #
The main program was reset unintentionally due to a stuck up.	Watchdog Reset Executed	Lights Red	Safe State	Failure	Correct and/or re-send the configuration. If the error is persistent, send in the device for repair.	33
Sensor error is detected on the internal temperature sensor.	Internal RTD sensor error	Lights Red	Safe State	Failure	Reset or re-power the device. If the error is persistent, send in the device for repair.	34
An unrecoverable memory error occurred in the internal main CPU.	CRC16 error in cyclic test of safe-domain RAM contents	Lights Red	Safe State	Failure	Reset or re-power the device. If the error is persistent, send in the device for repair.	35
An exception error occurred in the main CPU program execution.	Stack integrity error	Lights Red	Safe State	Failure	Reset or re-power the device. If the error is persistent, send in the device for repair.	36
An unrecoverable memory error occurred in the internal main CPU.	CRC16 error in factory data in FLASH	Lights Red	Safe State	Failure	Reset or re-power the device. If the error is persistent, send in the device for repair.	37
An unrecoverable memory error occurred in the internal main CPU.	RAM cell error	Lights Red	Safe State	Failure	Reset or re-power the device. If the error is persistent, send in the device for repair.	38
An unrecoverable memory error occurred in the internal main CPU.	Safe domain RAM integrity error	Lights Red	Safe State	Failure	Reset or re-power the device. If the error is persistent, send in the device for repair.	39
An unrecoverable memory error occurred in the internal input CPU.	CRC16 error in input CPU configuration	Lights Red	Safe State	Failure	Reset or re-power the device. If the error is persistent, send in the device for repair.	40
A critical measurement error is detected on internal voltage reference.	Drift error, reference voltage FVR	Flashing Red	Safe State	Failure	Reconnect or repair sensor. If the error is persistent, send in the device for repair.	41
A critical measurement error is detected on internal voltage reference.	Drift error, reference voltage VREF	Flashing Red	Safe State	Failure	Reconnect or repair sensor. If the error is	42

Incident description	Description	LED action	Analog Output Reaction	NE-107 Class	User action	Error #
					persistent, send in the device for repair.	
A critical measurement error is detected on Input 1.	Drift error, primary Input 1	Flashing Red	Safe State	Failure	Reconnect or repair sensor. If the error is persistent, send in the device for repair.	43
A critical measurement error is detected on Input 2.	Drift error, primary Input 2	Flashing Red	Safe State	Failure	Reconnect or repair sensor. If the error is persistent, send in the device for repair.	44
A critical measurement error is detected on the ground measurement.	Drift error, ground voltage offset to terminal 3	Flashing Red	Safe State	Failure	Reconnect or repair sensor. If the error is persistent, send in the device for repair.	45
The device is in simulation mode and one or more of its Device Variables are not representative of the process.	Device Variable Simulation Active	No Impact	No Impact	N.A.	N.A.	46

文档更新记录

以下列表提供了有关本文档修订的说明。

版本号	日期	备注
101	1817	初次发布产品。
102	1908	EU RO 互认型式认证收到。 Appendix A 更新。
103	1924	版本5437B添加。 ATEX 安装图更新。
104	2004	ATEX，IECEx，CSA和INMETRO证书和安装图已更新。
105	2018	TC 和 mV 输入的精度表已更新。 TC 示例的精度计算已更新。
106	2240	ATEX 和 IECEX 安装图更新。 添加了 UKCA。
107	2409	INMETRO 和 NEPSI 认证已更新 - Ex nA 更改为 Ex ec。. 响应时间从 70 毫秒修正为 75 毫秒。
108	2503	新 EAC Ex 证书。
109	2535	ATEX，IECEX，CSA 和 FM 安装图更新。
110	2607	CSA 安装图更新。 UKCA标志已停用。
111	2638	5437B 增加了 PESO 认证。

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