



流量计

SM-6, SM-6-V, S-SM 3-1

安装及使用说明书

原版使用说明书





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使用设备之前，请仔细阅读说明书。请特别注意警告及安全提示。否则可能导致人身伤害与财产损失。比勒科技有限公司不为不正当使用或擅自修改设备承担责任。 比勒科技有限公司不为不正当使用或擅自修改设备承担责任。

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目录

1	导言	2
1.1	合规应用	2
1.2	供货范围	2
1.3	订购提示	2
2	安全提示	3
2.1	重要提示	3
2.2	常规性危险提示	4
3	运输和储存	5
4	安装和连接	6
4.1	电气连接（本安型）	6
4.1.1	安装带支架的限位开关（仅适于SM-6 / SM-6-V型号）	6
4.1.2	安装和连接隔离开关放大器（仅适于SM-6/SM-6-V型号）	7
4.2	安装盖板（物品编号40158998）	8
5	运行和操作	10
5.1	读出流量计	10
5.2	设置针阀	10
6	保养	11
6.1	更换带支架的限位开关（仅在SM-6 / SM-6-V型号时）	12
6.2	更换测量管（仅针对SM-6/SM-6V型号）	13
6.2.1	不带限位开关	13
6.2.2	带限位开关	13
6.3	更换测量管 - 安全流量计 S-SM	13
7	服务和维修	14
7.1	故障诊断与排除	14
7.2	替换件	14
7.2.1	耗材和附件-SM-6, SM-6-V	14
7.2.2	耗材和附件- S-SM	14
7.2.3	耗材和附件- 隔离放大器	15
8	报废	16
9	附录	17
9.1	技术规格	17
9.2	尺寸	18
9.3	量程	20
10	随附文档	21

1 导言

1.1 合规应用

流量计可被用来显示测量气体或液体介质的流量。您可从铭牌上辨识其规格。在铭牌上，除了订单号，您还可找到产品编号和型号名称。若一流量计型号对应有特殊性，在使用说明书中将额外予以描述。请在连接时留意流量计的参数，在订购备件时留意正确的版本。

SM-6/SM-6-V系列的流量计也可以配备一个双稳态限位开关。在SM-6 V上，可通过针形阀调整流量。

在S-SM系列的安全流量计上，实际的测量锥体由一个第二个厚壁的玻璃圆筒保护。如若测量锥体破裂，外层玻璃圆筒提供保护，使无介质流出。此外玻璃圆筒也由不锈钢管保护，以防机械损伤。您能从数据表中看出各S-SM型号。

提示

于易爆区域使用



型号为SM-6, SM6-V和S-SM 3-1的流量计满足2014/34/EU指令的基本安全要求，因而适合在危险区域1区使用（**S-SM 3-1型号：防爆组别IIC组；Typ SM-6, SM-6-V型号：防爆组别IIB组**）；请务必注意危害提示）。通过流量计可运输非易燃气体和 **防爆组别IIB组**（SM-6和SM-6 V型号）或 **IIC组**（S-SM3-1型号）的可燃气体，后二者在正常条件下可能有爆炸性（**1区**）。然而，流量计的铭牌不带有防爆标志，因为该设备不具备自有的点火源且不属于2014/34/EU指令的应用范围。

1.2 供货范围

- 1 x 流量计
- 1 x 产品文档
- 1 x 支架（仅在SM-6 / SM-6-V型号时）

1.3 订购提示

商品货号将设备配置编号。为此，请使用以下型号代码：

4056	X X	X	99	X	量程*
	0 0				空气6 - 60 NL/h
	0 1				空气10 - 100 NL/h
	0 2				空气25 - 250 NL/h
	0 3				空气50 - 500 NL/h
	0 4				空气80 - 800 NL/h
	0 5				水0.5 - 5 l/h
	0 6				水1.2 - 12 l/h
	0 7				水2.5 - 25 l/h
	0 8				水4 - 40 l/h
	0 9				水6 - 60 l/h
	1 0				特殊测量范围
		0			不带针阀
		1			PVDF/氟橡胶阀
		2			PCTFE/全氟弹性材料阀
				S	带底座的限位开关
				-	不带限位开关

* 标准测量管；空气20 ° C 1.2 bar 绝对值；水20 ° C

限位开关的订货信息：产品编码的最后一位为“S”代表限位开关已在出厂前被安装好。若未标记“S”，流量计不带限位开关。为控制限位开关，可选择多个隔离放大器（参见数据表400003）。

2 安全提示

2.1 重要提示

只有在下列条件完全满足时允许使用该设备：

- 于操作和安装说明书所述条件下，依铭牌并为规定的应用使用本产品。若擅自改动设备，比勒科技有限公司不承担任何责任，
- 遵守铭牌上的说明和标记。
- 在数据表和说明书中给出的限值得以遵守，
- 监测设备/保护装置得以正确连接，
- 由比勒科技有限公司进行未于本说明书中描述的服务和维修，
- 使用原装备件。

本操作说明书是设备的一部分。制造商保留其在未事先声明的情况下修改性能、规格或设计的权利。请保管好本说明书，以供日后使用。

各种安全警告的定义

危险	提示有紧急危险情况的标识，如不可避免会引起重度身体损伤或者直接死亡。
警告	提示有中度风险的危险情况的标识，如不可避免可能会引起重度身体损伤或者死亡。
注意	提示有低风险的危险情况的标识，如不可避免可能会引起设备损伤或轻微至中度的身体损伤。
提示	提示设备或仪器重要信息的标识。

警告标志

在本手册中，使用以下警告标志：

	常规性警告标志		请使用呼吸保护器
	吸入有毒气体危险警告		请使用面部防护装置
	腐蚀性物质警告		请使用手套
	由爆炸导致的危险警告		

2.2 常规性危险提示

仅能由熟悉安全要求和风险的专业人员安装该设备。

请务必遵守安装地相关的安全法规和普遍适用的技术规则。请预防故障发生，避免人身伤害和财产损失。

设备操作员必须确保：

- 安全提示和操作说明书可供翻阅并予以遵守，
- 遵守国家有关事故预防条例，
- 不得超过允许的数据并遵循适用条件，
- 使用保护装置和进行规定的维护工作，
- 弃置处理时，遵守法例条文，
- 遵守有效的国家安装规定。

维护和修理

进行维护和修理工作时，须注意以下几点：

- 必须由比勒授权的人员进行设备维修工作。
- 仅进行在操作和安装说明书中描述的改造、维护与安装工作。
- 仅使用原装备件。
- 请勿安装已损坏的或有缺陷的备件。如有必要，请在安装前进行目视检查，以检查备件是否有明显损坏。

在进行任何类型的维护工作时，必须遵守使用国家相关的操作规程和安全指令。

危险



有毒和腐蚀性气体

样气可能有害健康。

- 进行保养前，关闭供气并在必要时以空气冲洗气体管线。
- 必要时，请确保安全地疏导气体。
- 进行保养时，避免接触有毒/腐蚀性气体。请穿戴适当的防护设备。



危险



使用于易爆性危险区域

易燃气体和灰尘可能被点燃或爆炸。请避免以下危害源：

因静电产生火花！

仅使用湿布清洁由塑料和标贴制成的机壳组件。

以对地电平 (PE) 导电连接金属外壳！

最高表面温度！

设备的最高表面温度 T_{surf} 取决于介质温度 T_{med} 。应 $T_{\text{surf}} \leq T_{\text{med}}$ 。

点火温度！

请注意依相关标准的爆炸性气体点火温度及最大允许表面温度 T_{surf} 。

可能有破碎危险 / 泄漏易爆或有毒气体。

请保护好设备，免其受到外部撞击或为其安装冲击保护装置。

气体泄露！

不当使用与维护时的气体泄漏引起的爆炸危险和生命危险。

3 运输和储存

只应在原包装或合适的替代包装中运输产品。

在不使用时，应对设备加以保护，防止其受潮受热。须将其储存于-10° C至+40° C下的封顶的、干燥且无尘的室内。

4 安装和连接

流量计的气体输入/输出端的连接螺纹：

流量计	螺纹
SM-6 / SM-6-V	G1/4
S-SM 3-1	NPT 1/4 “

安装图请参阅章节 [尺寸](#) [> 页 18]。均须以特氟龙胶带或密封剂及密封环密封拧紧管接头！

4.1 电气连接 (本安型)

警告



危险的电压

仅能由训练有素的专业人员执行线路连接。

注意



错误电压危险

错误的电压会毁坏设备。
正确的电压可以从铭牌上看到。

注意



因不被允许的电气连接值而导致爆炸危险

不被允许的电气连接值可能导致爆炸性气体混合物点燃。
在气体爆炸性环境中只能使用本安型电源运行该设备。电源必须适合相应的易爆区域。必须遵守这些操作说明中给出的限值，即使对于带有两个独立的本安型电源的版本，也不得超过这些限值。
必须确保即使在出现错误的情况下，例如在意外串联或并联的情况下，不会超出限值。
在安装和操作本安型设备时，请遵守相关的安全要求，例如 IEC/EN 60079-11和IEC/EN 60079-14。

4.1.1 安装带支架的限位开关 (仅适于SM-6 / SM-6-V型号)

危险



爆炸危险

于易爆区域使用
仅使用获相应许可的限位开关。

限位开关被预装配地提供。

- 第一次使用前，松开安装板上的塑料埋头螺钉，将限位开关置于所需的高度。
- 须重新加固该塑料埋头螺钉。
- 请将线缆连接到电源。

在易爆区域中使用限位开关：

请注意标注的PTB99ATEX2128X认证中的可选安装的RC10-14-N3或RC15-14-N3型限位传感器的接线参数，见章节 [随附文档](#) [> 页 21]。确切的型号可以在已安装的限位传感器的型号名称中找到。

4.1.2 安装和连接隔离开关放大器 (仅适于SM-6/SM-6-V型号)

MACX型号: 请注意标注的认证 (IECExIBE100002X和IBExU10ATEX1005X) 中的接线参数和附带的操作说明中的安装说明, 见章节 [随附文档](#) [> 页 21]。

KCD2-E2L型号: 如果使用机械触点作为脉冲发生器, 则必须在该触点上并联一个10 kOhm的电阻器, 以进行断线监控。

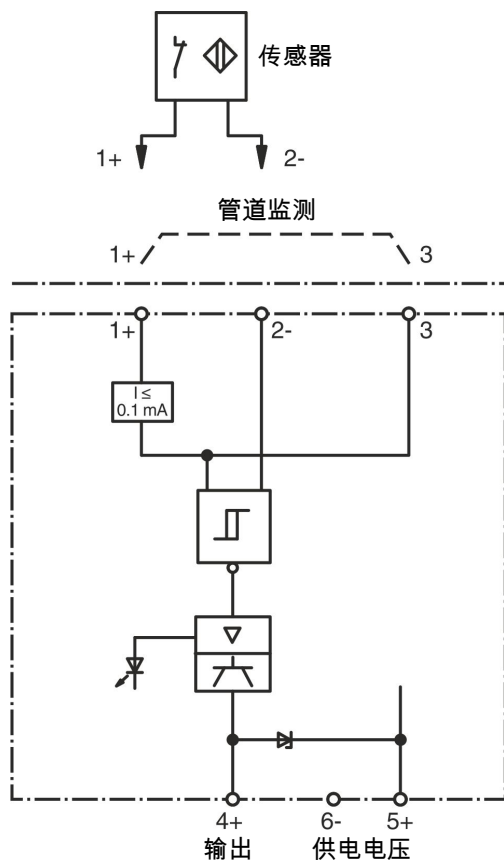
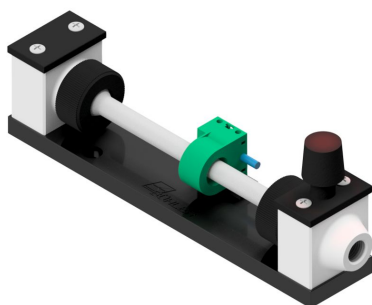
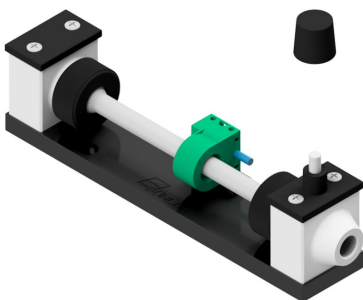


图1: 隔离放大器KCD2-E2L的接线图

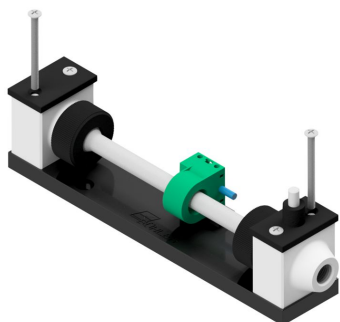
4.2 安装盖板 (物品编号40158998)



- 通过轻轻取下针阀盖板开始组装过程。



- 拆卸针阀的螺杆，确保在松开过程中握住旋钮，以防止阀门意外扭曲。



- 拆卸沉头螺钉。



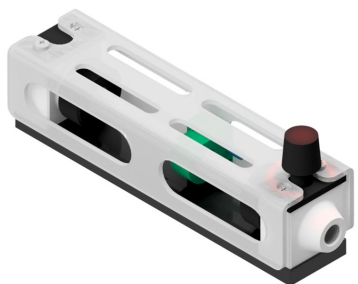
- 将盖板放置在指定位置。



- 使用供货范围内的镜头头螺钉牢固地固定盖板。



- 放上针阀并拧紧。同样重要的是，在拧紧过程中保持旋钮稳定以避免阀门意外扭曲。



- 通过重新安装针阀盖板来完成组装过程。

我们建议您认真执行上述步骤，以确保专业安装。

5 运行和操作

提示



禁止不合规操作设备！

带盖板流量计的操作注意事项：

- 该盖板仅作为改装套件被提供。未计划出厂安装。请按照随附的说明自行负责组装。
- 盖板不得被使用于易爆性危险区域（EX区域）。确保应用环境符合当地安全法规。
- 盖板将最高介质温度的最大限制设置为 120 ° C。检查使用的介质是否不超过此温度限制，以确保盖板正常工作。

5.1 读出流量计

于浮子的顶部边缘读出流量值。

请注意，仅当测量管中的压力符合上标的值时，流量值才正确。

5.2 设置针阀

提示! 请注意，针阀不是截流阀。请不要尝试，以极大的力量继续旋转该阀。

以顺时针方向旋转，该阀闭合。

6 保养

进行维护工作时，须注意以下几点：

- 仅能由熟悉安全要求和风险的专业人员维护设备。
- 请您仅执行于本操作和安装说明书中描述的维护。
- 进行保养工作时，请遵循所有相关的安全和管制信息。
- 请仅使用原厂备件。

危险



爆炸危险

流量计上的气体泄漏

若爆炸性、有毒或腐蚀性气体流经流量计，应定期检查流量计的密封性。

危险



有毒和腐蚀性气体

样气可能有害健康。

- 维修前（无压）关闭进程。为此，连接该截止阀（若配备）。
- 打开前，以空气冲洗流量计。
- 进行保养时，避免接触有毒/腐蚀性气体。请穿戴适当的防护设备。



注意



气体泄漏

请勿重复使用损坏的零件或密封件。
请仅使用原厂备件。

6.1 更换带支架的限位开关 (仅在SM-6 / SM-6-V型号时)

危险**爆炸危险**

于易爆区域使用
仅使用获相应许可的限位开关。

除去限位开关（见图1）的安装板上的塑料埋头螺钉（1）。同时，流量计背面上的夹持板松开。

松开测量管的两个锁紧螺母。以轻微压力推动测量管入顶部。现在可转出测量管（见图2）。于测量管的下侧拆下密封环（2），锁紧螺母（3）和限位开关（4）。如有需要，可清洗测量管。

以相反顺序装配带有一限位开关的测量管。须确保密封环的倒角指向相应的顶部。

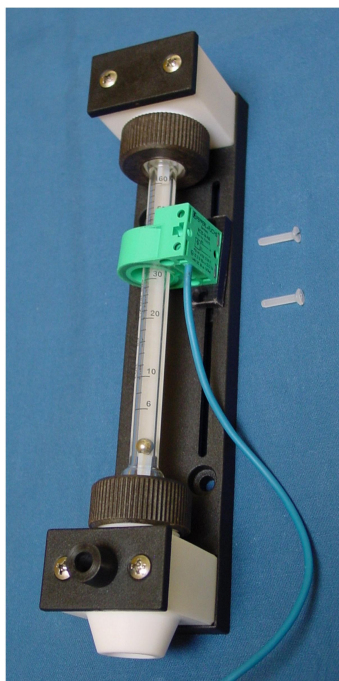


图1



图2

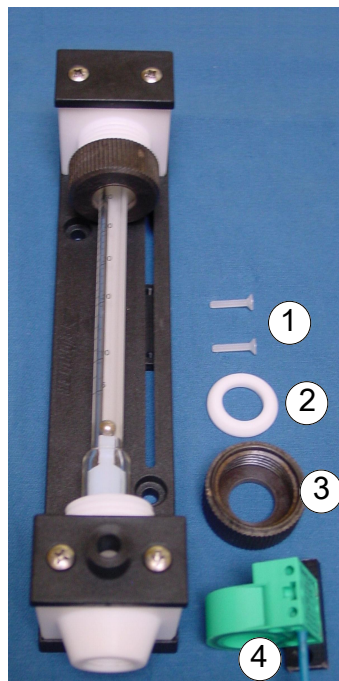


图3

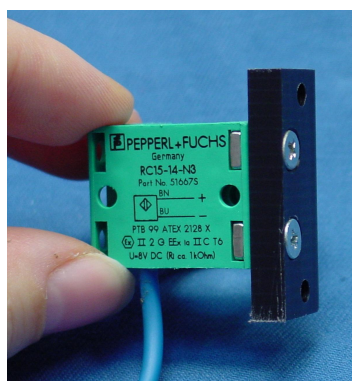


图4

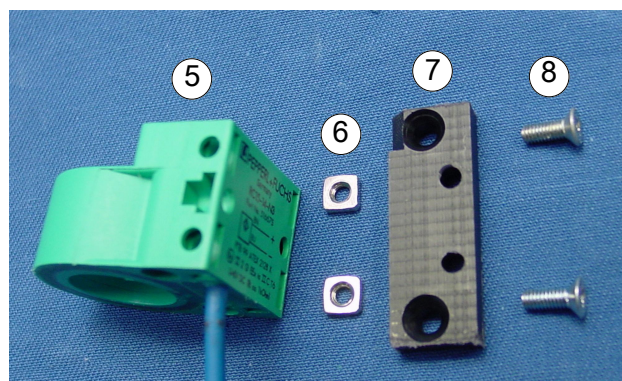


图5

1	塑料埋头螺钉	3	锁紧螺母
2	密封环	4	带安装板的限位开关
5	限位开关	7	经铣削的安装板
6	四方螺母 M3	8	十字螺丝

松开限位开关的安装板上的两个十字螺丝（8）（见图4）。取下安装板（7）。请确保限位开关的插槽中的两个四方螺母（6）未遗失！更换限位开关（5），并拧紧安装板。安装板（7）的经铣削的倒角必须指向左上方。

现在可将限位开关推回测量管上。请注意流向，即必须可读到刻度，须将限位开关的安装板螺丝孔置于长孔上，向下导出线缆。

然后，将锁紧螺母和密封环（密封锥指向支架）推向测量管上。请再次插入测量管并用手拧紧锁紧螺母。

借助于两个塑料埋头螺钉，现在，可穿过纵向槽将安装板连带嵌入底板背面的夹持板一同旋入流量计的底板中并加以调整。

6.2 更换测量管 (仅针对SM-6/SM-6V型号)

如果有盖板，有必要在更换玻璃之前将其拆卸。

6.2.1 不带限位开关

松开测量管的两个锁紧螺母。以轻微压力推动测量管入顶部。现在，您可将位于锁紧螺母下方的密封环推向测量管的锥部。现在可将测量管倾斜移出。

现在可从测量管上取出锁紧螺母和密封环，必要时推至新的测量管上。以相反顺序装配测量管。须确保密封环的倒角指向相应的顶部。

6.2.2 带限位开关

从限位开关的安装板上除去上方的塑料埋头螺钉 (1) (见图I) 并松开下方的塑料埋头螺钉 (1)，从而可自由移动限位开关。无需完整去除安装板。

松开测量管的两个锁紧螺母 (3)。以轻微压力推动测量管入顶部。当您从限位开关及锁紧螺母中拉出测量管后，将限位开关转到一侧 (见图6)。如有需要，请将限位开关移到一边。于测量管的下侧拆下密封环 (2) 和锁紧螺母 (3)。限位开关留在安装板上 (见图7)。

以相反顺序装配测量管。须确保密封环的倒角指向相应的顶部。



图6



图7

6.3 更换测量管 - 安全流量计 S-SM

提示! 必须很小心地更换! 若您确定可以，再自行更换。我们建议您将S-SM送回制造商。

从VA热电偶保护管上旋出底端。以如此方式持流量计，使得在去除底端时，防护玻璃和测量管不会自动滑出。现在可拉出测量管。

安装新的测量管时，必须注意测量管和保护管是否稳固地安于底端的O型圈座上。

7 服务和维修

若操作过程中发生错误，在此章节中，您可找到就故障诊断和消除的提示。

必须经由比勒授权人员进行设备维修。

若您有任何疑问，请联系我们的客服：

电话：+49-(0)2102-498955 或您当地的销售代表

有关我们的维护和调试个性化服务的更多信息，请访问 <https://www.buehler-technologies.com/service>。

若在消除故障并接通电源后仍不能正常工作，须由制造商检查该设备。为此，请以合适的包装将设备发送至：

Bühler Technologies GmbH

- Reparatur/Service -

Harkortstraße 29

40880 Ratingen

Deutschland

请将填写并签署好的 RMA 一去污声明附入包装。否则您的维修委托将不予处理。

该表格位于本手册的附录中，但也可通过e-mail另行索取：

service@buehler-technologies.com

7.1 故障诊断与排除

问题/故障	可能的原因	补救
浮子不上浮	- 针阀被关闭	- 打开针阀
	- 受到灰尘污染	- 清洁

表格 1: 故障诊断与排除

7.2 替换件

订购零配件时请注意设备型号和序列号。

附件及设备的升级见参数表或产品目录表。

建议随泵同时订购以下备件：

物品编号	名称
40158997	适于玻璃直径Ø 10 mm的密封环
4055050	适于玻璃直径Ø 15 mm的密封环

7.2.1 耗材和附件-SM-6, SM-6-V

物品编号	名称
40158998	盖板SM-6, SM-6-V

提示



使用盖板时的重要注意事项

- 盖板仅作为改装套件被提供。
- 不适用于易爆性危险区域。
- 最高介质温度被限于120 ° C。

7.2.2 耗材和附件- S-SM

物品编号	名称
4022999	流量计S-SM 3-1 端头 不锈钢1.4571
4023999	流量计S-SM 3-1 端头 钛

7.2.3 耗材和附件- 隔离放大器

物品编号	名称
9100070059	隔离放大器 MACX
9100070007	隔离放大器 KCD2-E2L, 24 V DC
4949021	带底座的限位开关Ø10
4949019	带底座的限位开关Ø15

8 报废

在废弃处理产品时，必须遵守适用的国家法律法规。请以对健康 and 环境不产生危害为原则进行废弃处理。

对于Bühler Technologies GmbH的产品，被划掉的带轮垃圾桶的符号指向欧盟（EU）内电气和电子产品的特殊废弃处理说明。



被划掉的垃圾桶的符号表示标有它的电器电子产品必须与生活垃圾分开处理。必须作为废弃的电气和电子设备妥善处理它们。

Bühler Technologies GmbH很乐意废弃处理带有此标签的设备。为此，请将设备寄送到以下地址。



我们在法律上有义务保护我们的员工免受受污染设备造成的危险。因此，我们恳请您理解，只有在设备不含任何刺激性、腐蚀性或其他对健康或环境有害的物料的情况下，我们才能废弃处理您的旧设备。对于每个废弃的电气和电子设备，必须填写“RMA——去污表格和声明”表格，它可在我们的网站上找到。填妥的表格必须贴于包装外部的明显位置。

如需退回废弃电气和电子设备，请使用以下地址：

Bühler Technologies GmbH
WEEE
Harkortstr. 29
40880 Ratingen
Germany

另请注意数据保护规则，您自己有责任确保您退回的旧设备上没有个人数据。因此，请确保在归还之前从旧设备中删除您的个人数据。

9 附录

9.1 技术规格

流量计	SM-6	SM-6-V
气体环境温度:	-20 ° C 至 +80 ° C *	-20 ° C 至 +80 ° C *
液体环境温度:	+5 ° C 至 +80 ° C *	+5 ° C 至 +80 ° C *
介质温度:	≤ 150 ° C, 在特殊测量范围内, 最高80 ° C	≤ 130 ° C, 在特殊测量范围内, 最高80 ° C
最高工作压力:	4 bar	4 bar
机械应力:	根据 DNV-GL CG0339 ** 进行测试振动等级 A (0.7 g) 2 Hz-13.2 Hz 振幅 ± 1.0 mm 13.2 Hz -100 Hz 0.7 g 加速度	基于 DNV-GL CG0339 ** 进行测试振动等级 A (0.7 g) 2 Hz-13.2 Hz 振幅 ± 1.0 mm 13.2 Hz -100 Hz 0.7 g 加速度
材质		
头:	PTFE	PTFE
密封件:	PTFE	PTFE
调节主轴:	-	聚氯乙烯/氟橡胶或聚氯乙烯/全氟橡胶
测量管:	硼硅玻璃	硼硅玻璃
浮子:	哈氏合金C4	哈氏合金C4
锁紧螺母:	经玻璃纤维增强的PPS	经玻璃纤维增强的PPS
底板:	PA	PA

* 配置时限位开关时, 请注意环境温度!

** 使用带盖板的流量计时则不然。

限位开关	Ø10*	Ø15
防护等级:	IP 67	IP 67
环境温度:	-20 ° C 至 +80 ° C	-20 ° C 至 +70 ° C
外壳材料:	PBT	PBT
运行:	双稳态	双稳态
电缆长度:	2 m	2 m
认证:	PTB 99 ATEX 2128X  II 2 G Ex ia II C T6...T1 Gb	PTB 99 ATEX 2128X  II 2 G Ex ia II C T6...T1 Gb

* 在某些情况下在特殊测量范围内使用。可应要求提供更多信息。

安全流量计S-SM 3-1

环境温度:	-20 ° C至80 ° C *
工作压力:	10 bar (最高20 ° C时) **
工作温度:	100 ° C (最高2 bar时) **
量程:	参见表格
重量:	0.9 kg
浮子:	玻璃、哈氏合金、不锈钢或PTFE
端头:	PTFE、不锈钢或钛
固定:	通过随附的管夹

* 订购时说明就固定的选择。

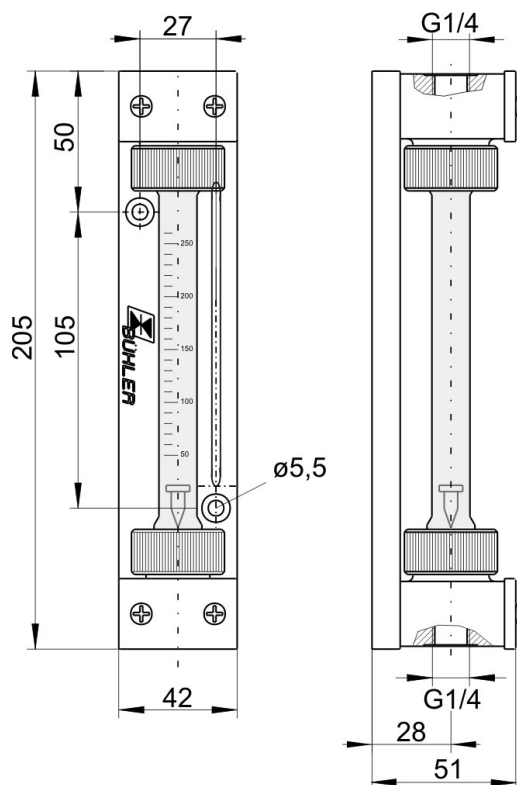
$$** \text{ 工作压力 最高[bar]} = 10 - \frac{\text{工作温度 最高[°C]} - 20}{10}$$

隔离放大器	MACX MCR-EX-SL-2NAM-R-UP	KCD2-E2L
电源电压:	24 ... 230 V AC/DC 50/60 Hz	10 - 30 V DC
本安型认证:	IEC/EN 60079-11	否
管道监测:	是	是
认证: (根据使用说明书)	ATEX:  II (1) G [Ex ia Ga] IIC IECEX:  II 3(1) G Ex ec [ia Ga] nC IIC T4 Gc [Ex ia Ga] IIC Ex ec [ia Ga] nC IIC T4 Gc	---
输出 (非本安型):	转换触头	常开接点 PNP晶体管
开关电流输出:	250 V AC (2 A, 60 Hz) 120 V DC (0.2 A) 30 V DC (2 A)	200 mA DC
环境温度:	-40 °C ... +60 °C	-25 °C ... +70 °C
防护等级:	IP20	IP20
尺寸:	17.5x112.5x114.5 mm (宽x高x深)	20x63x44 mm (宽x高x深)

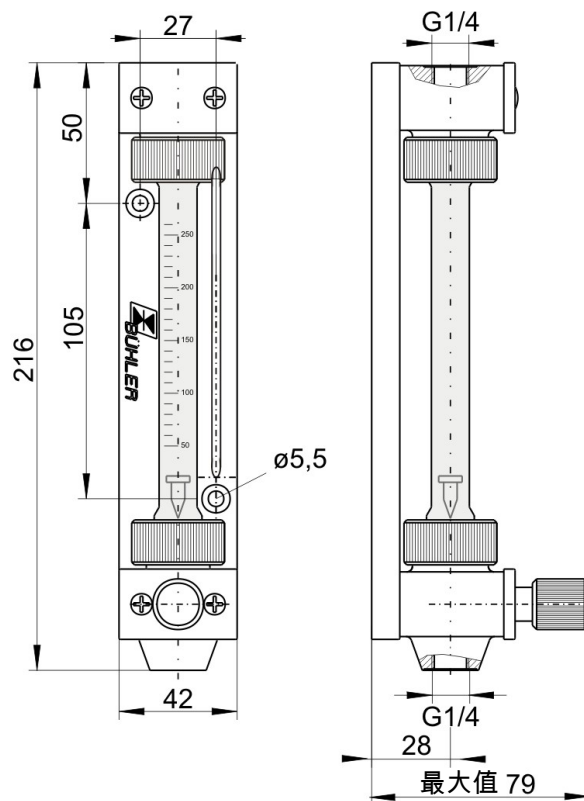
9.2 尺寸

流量计SM6/SM6-V:

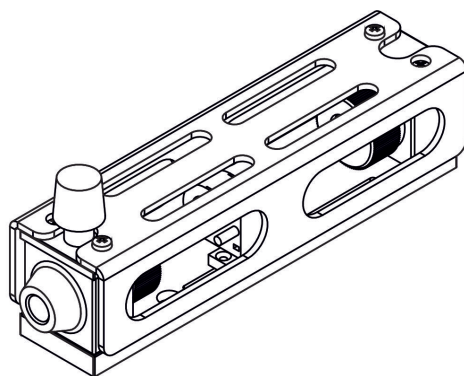
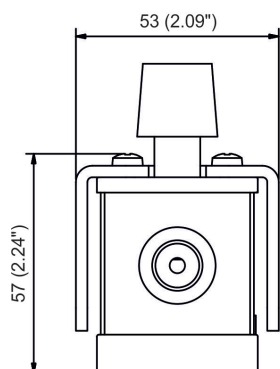
SM-6



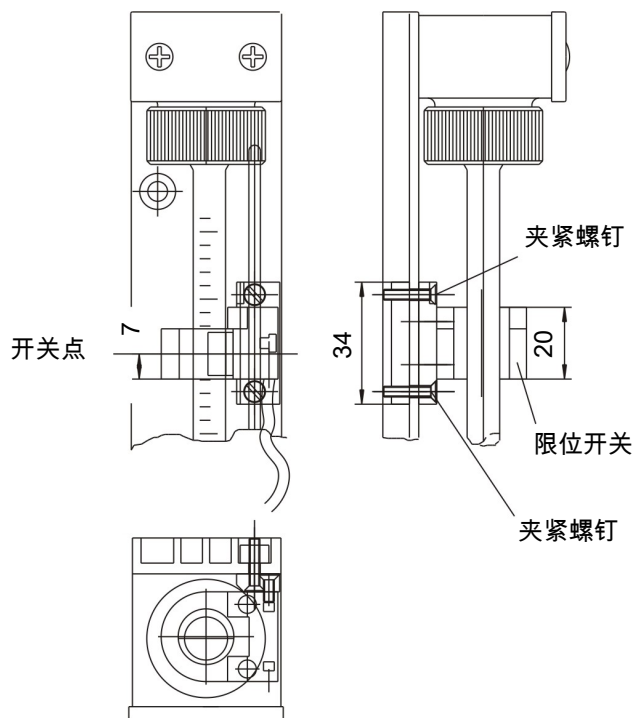
SM-6-V



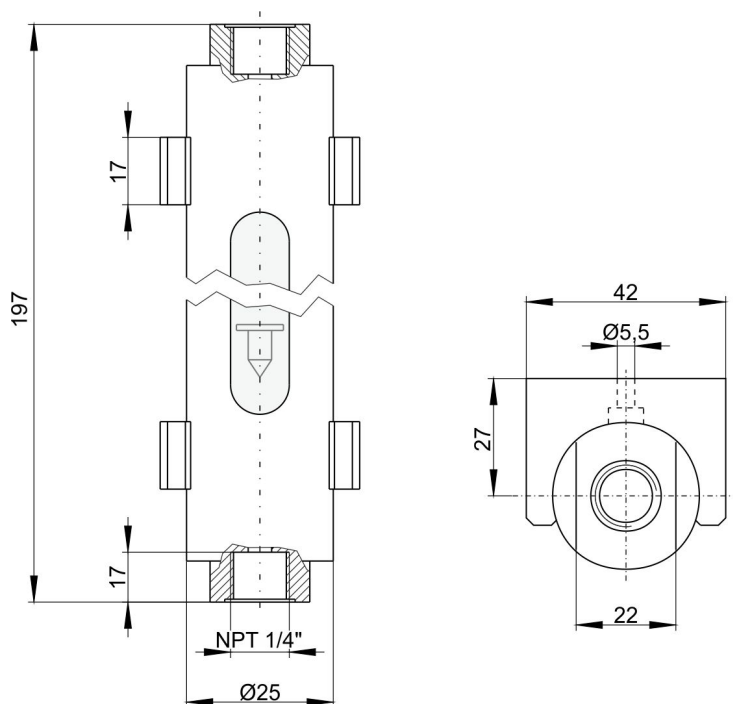
带盖板的流量计:



限位开关:



安全流量计S-SM:



9.3 量程

流量计SM-6

介质:	空气	水
压力:	+ 1.2 bar 绝对值	
温度:	+ 20 ° C	+ 20 ° C
	6 ... 60 NL/h	0.5 - 5 L/h
	10 ... 100 NL/h	1.2 - 12 L/h
	25 ... 250 NL/h	2.5 - 25 L/h
	50 ... 500 NL/h	4 ... 40 L/h
	80 ... 800 NL/h	6 ... 60 L/h

流量计S-SM 3-1

介质:	空气	水
压力:	+ 1.2 bar 绝对值	
温度:	+ 20 ° C	+ 20 ° C
	1.6 - 16 Nl/h	0.25 - 2.5 l/h
	4 - 40 Nl/h	0.5 - 5 l/h
	6 - 60 Nl/h	1.2 - 12 l/h
	10 - 100 Nl/h	2.5 - 25 l/h
	25 - 250 Nl/h	
	50 - 500 Nl/h	
	80 - 800 Nl/h	

10 随附文档

- 欧盟制造商声明 HX400001
- 英国制造商声明 HX400001UK
- 欧盟符合性声明 KCD2-E2L
- 用户手册 MACX
- 欧盟符合性声明 MACX
- 英国符合性声明 MACX
- 欧盟类型审核证书 MACX (IBExU10ATEX1005 X)
- IECEX符合性证书 MACX (IECEXIBE100002X)
- 欧盟符合性声明 RC10/RC15
- 英国符合性声明 RC10/RC15
- 类型审核证书 RC10/RC15 (PTB99ATEX2128X)
- 英国类型审核证书 RC10/RC15 (CML 21UKEX21274X)
- RMA -去污声明

Herstellererklärung Manufacturer Declaration



Hiermit erklärt Bühler Technologies GmbH, dass die nachfolgenden Produkte keine „Geräte“ im Sinne der Richtlinie **2014/34/EU (Atex)** sind und somit nicht mit einem CE-Zeichen versehen sind.

*Herewith Bühler Technologies GmbH declares that the following products are not „equipment“ for the purpose of Directive **2014/34/EU (Atex)**, respectively, and therefore are not labeled with the CE mark.*

Produkt / products: Strömungsmesser / Flow meter
Typ / type: SM-6, SM-6-V, S-SM 3-1

Die Produkte besitzen keine eigenen Zündquellen, wenn die Sicherheitsbestimmungen der zugehörigen Technischen Dokumentation, wie Betriebsanleitungen und Datenblätter, eingehalten und die einschlägigen Sicherheitsvorschriften des Explosionsschutzes gemäß ATEX-Richtlinie umgesetzt werden. Die Produkte dürfen nur von qualifizierten Fachpersonal installiert, betrieben, gewartet oder gereinigt werden.

The products do not have their own ignition sources if the safety regulations in the relevant technical documentation, such as instruction manuals and datasheets, and the relevant safety regulations of explosion protection per the ATEX directive are followed. The products may only be installed, operated, maintained or cleaned by qualified specialist personnel.

Die Produkte sind für den Einsatz in explosionsgefährdeten Bereichen der Zone 1, Explosionsgruppe IIC (Typ S-SM-3-1) bzw. Explosionsgruppe IIB (Typen SM-6, SM-6-V), geeignet.

Alle Typen können zur Anzeige der Durchflussmenge von Gasen oder flüssigen Medien verwendet werden. Durch die Strömungsmesser können nichtbrennbare Gase und brennbare Gase, die im Normalbetrieb gelegentlich explosiv sein können, geleitet werden (Zone 1, Explosionsgruppe IIC (Typ S-SM 3-1) oder Explosionsgruppe IIB (Typ SM-6, SM-6-V)).

The products are suitable for use in potentially explosive atmospheres of zone 1, explosion group IIC (type S-SM-3-1) or explosion group IIB (types SM-6, SM-6-V).

All types can be used to display the flow rate of gases or liquid media. Non-flammable gases and flammable gases, which can occasionally be explosive in normal operation, can be channelled through the flow meters (zone 1, explosion group IIC (type S-SM 3-1) or explosion group IIB (type SM-6, SM-6-V)).

Die im Produkt optional verbauten Grenzwertgeber sind eigensichere Komponenten mit separatem ATEX-Zertifikat (PTB 99 ATEX 2128X) und ATEX-Kennzeichnung.

Bezüglich der elektrischen Versorgung der Grenzwertgeber müssen die Grenzwerte der Beschaltungswerttabellen des zugehörigen ATEX-Zertifikats eingehalten werden. Die Eigensicherheit des Stromkreises kann andernfalls gefährdet sein. Lesen Sie dazu die exakte Typbezeichnung am jeweils verbauten Grenzwertgeber ab und entnehmen die zugehörigen Grenzwerte aus der Grenzwerttabelle des ATEX-Zertifikats.

Der im Datenblatt Nr. 400003 aufgeführte, für den Explosionsschutz zertifizierte Trennschaltverstärker hält den erforderlichen Grenzwertbereich der optionalen Grenzwertgeber ein.

The limit switches optionally installed in the product are intrinsically safe components with a separate ATEX certificate (PTB 99 ATEX 2128X) and ATEX labelling.

The limit values of the wiring value tables of the associated ATEX certificate must be observed with regard to the electrical supply of the limit switches. Otherwise, the intrinsic safety of the circuit may be jeopardised.

Read the exact type designation on the limit switch installed and take the corresponding limit values from the limit value table of the ATEX certificate.

The isolation switching amplifier listed in data sheet No. 400003, which is certified for explosion protection, complies with the required limit value range of the optional limit value transmitters.

Die Produkte dieser Herstellererklärung erfüllen die einschlägigen Harmonisierungsrechtsvorschriften der Union:
The products in this manufacturer's declaration comply with the relevant Union harmonisation legislation:

EN ISO 80079-36:2016

EN ISO 80079-37:2016

Zusätzlich wurden folgende nationale Normen, Richtlinien oder Spezifikationen berücksichtigt:
In addition, the following national standards, guidelines or specifications have been used:

TRGS 727

Die alleinige Verantwortung für die Ausstellung dieser Herstellererklärung trägt der Hersteller.

This declaration of manufacture is issued under the sole responsibility of the manufacturer.

Dokumentationsverantwortlicher für diese Herstellererklärung ist Herr Stefan Eschweiler mit Anschrift am Firmensitz.

The person authorised to compile the technical file is Mr. Stefan Eschweiler located at the company's address.

Ratingen, den 06.09.2024

Stefan Eschweiler
Geschäftsführer – Managing Director

Frank Pospiech
Geschäftsführer – Managing Director

HX 41 0001

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Tel. +49 (0) 21 02 / 49 89-0, Fax. +49 (0) 21 02 / 49 89-20
Internet: www.buehler-technologies.com

Manufacturer Declaration



Herewith Bühler Technologies GmbH declares that the following products are not „equipment” for the purpose of legislation **Equipment and Protective Systems Intended for Use in Potentially Explosive Atmospheres Regulations 2016** respectively, and therefore are not labelled with the UKCA mark.

Product: Flow meter
Types: SM-6
SM-6-V
S-SM 3-1

This declaration is valid for all devices manufactured in accordance with the manufacturing documents deposited with the manufacturer – which form an integral part of this declaration.

The products do not have their own ignition sources if the safety regulations in the relevant technical documentation, such as instruction manuals and datasheets, and the relevant safety regulations of explosion protection per the ATEX directive are followed. The products may only be installed, operated, maintained or cleaned by qualified specialist personnel.

The products are suitable for use in potentially explosive atmospheres of zone 1, explosion group IIC (type S-SM-3-1) or explosion group IIB (types SM-6, SM-6-V).

All types can be used to display the flow rate of gases or liquid media. Non-flammable gases and flammable gases, which can occasionally be explosive in normal operation, can be channelled through the flow meters (zone 1, explosion group IIC (type S-SM 3-1) or explosion group IIB (type SM-6, SM-6-V)).

The limit switches optionally installed in the product are intrinsically safe components with a separate ATEX certificate (PTB 99 ATEX 2128X) and ATEX labelling.

The limit values of the wiring value tables of the associated ATEX certificate must be observed with regard to the electrical supply of the limit switches. Otherwise, the intrinsic safety of the circuit may be jeopardised.

Read the exact type designation on the limit switch installed and take the corresponding limit values from the limit value table of the ATEX certificate.

The isolation switching amplifier listed in data sheet No. 400003, which is certified for explosion protection, complies with the required limit value range of the optional limit value transmitters.

The object of the declaration described above is in conformity with the relevant designated standards:

EN ISO 80079-36:2016

EN ISO 80079-37:2016

In addition, the following standards have been used:

TRGS 727

This declaration of manufacture is issued under the sole responsibility of the manufacturer.

Ratingen in Germany, 06.09.2024


Stefan Eschweiler
Managing Director


Frank Pospiech
Managing Director

HX 41 0001UK

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Fax +49 621 776-1000

No. / Nr.: DOC-1004C
Date / Datum: 2021-10-29

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■ Declaration of conformity / Konformitätserklärung

We, Pepperl+Fuchs SE declare under our sole responsibility that the **products** listed below are in conformity with the listed **European Directives** and **standards**.

*Die Pepperl+Fuchs SE erklärt hiermit in alleiniger Verantwortung, dass die unten gelisteten **Produkte** den genannten **Europäischen Richtlinien** und **Normen** entsprechen.*

■ Products / Produkte

Product / Produkt	Item number	Description / Beschreibung
KCD2-EL	018357	Sensor output interface terminal
KCD2-E2L	018358	Sensor output interface terminal
KCD2-R	019498	Sensor output interface terminal
KCD2-E1	269795	Sensor output interface terminal
KCD2-E3	268567	Sensor output interface terminal

■ Directives and Standards / Richtlinien und Normen

EU-Directive EU-Richtlinie	Standards Normen
2014/30/EU (EMC) (L96/79-106)	EN 61326-1:2013
2011/65/EU (RoHS) (L174/88-110)	EN IEC 63000:2018-12

■ Affixed CE Marking / Angebrachte CE-Kennzeichnung

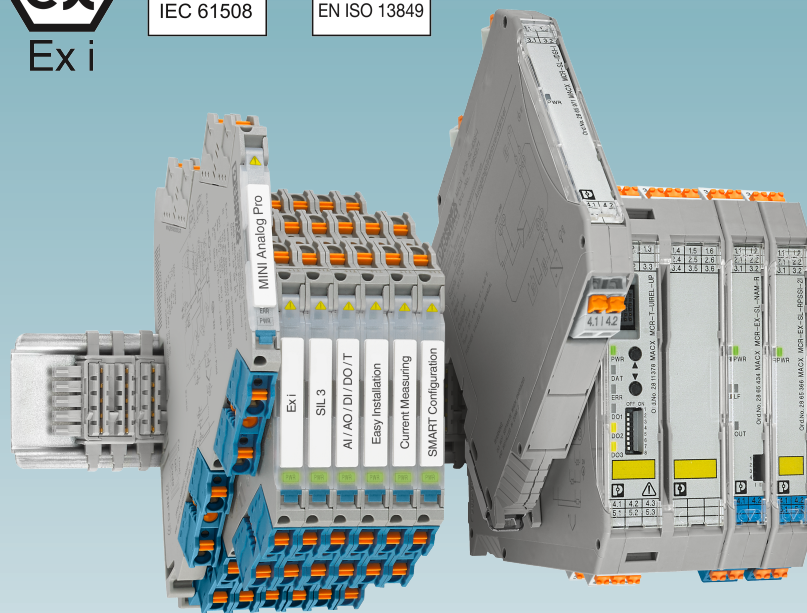


■ Signatures / Unterschriften

Mannheim, 2021-10-29

i.V. Sebastian Stöber
Director Business Unit SYSTEMS

i.V. Wolfram Warnecke
Approval Engineer



Power manual for signal conditioners and MINI Analog, MINI Analog Pro, MACX Analog measuring transducers

User manual

User manual

Power manual for signal conditioners and MINI Analog, MINI Analog Pro, MACX Analog measuring transducers

UM EN Power Manual, Revision 02

2024-07-29

This manual is valid for:

Designation

MINI Analog MINI MCR-... product family

MINI Analog Pro MINI MCR-2-... product family

MINI Analog Pro MINI MCR-EX... product family

MACX Analog MACX MCR-... product family

MACX Analog Ex MACX MCR-EX... product family

Accessories

Item No.

ME 6,2 TBUS-2 1,5/5-ST-3,81 GN

2869728

ME 6,2 TBUS-2 1,5/5-ST-3,81 GY

2695439

ME 17,5 TBUS 1,5/5-ST-3,81 KMGY

2713645

ME 17,5 TBUS

1090049

ME-TBUS-A-MC-1,5-2

1351974

ME-TBUS-A-IMC-1,5-2

1351982

MCR-DP

1430594

QUINT4-SYS-PS/1AC/24DC/2,5/SC

2904614

QUINT4-PS/1AC/24DC/3,8/SC

2904599

TC-MACX-MCR-PTB

2904673

Table of contents

1	For your safety	5
1.1	Identification of warning notes	5
1.2	Qualification of users	5
1.3	Safety notes	6
1.3.1	Installation notes	6
1.3.2	Use in potentially explosive areas (zone 2/Ex i)	6
1.3.3	Safety-related applications (SIL)	6
1.3.4	System power supplies	6
2	General notes on the supply of Phoenix Contact signal conditioners	7
2.1	Direct DC supply at any analog module in the group	8
2.2	Supply via any MINI Analog, MINI Analog Pro or MACX Analog power terminal	9
2.3	Supply via a system power supply with a wide range input of 85 V AC ... 264 V AC	10
3	MINI Analog supply options	11
3.1	Direct supply via a MINI Analog signal conditioner	12
3.2	Supply via MINI MCR-SL-PTB... power terminals	14
3.2.1	Supply via a MINI MCR-SL-PTB... power terminal	15
3.2.2	Supply via two MINI MCR-SL-PTB... power terminals	18
3.3	Supply via a system power supply	20
3.4	Monitoring the supply voltage using MINI MCR-SL-FM-RC... fault signaling modules	22
4	Supply options for MINI Analog Pro	25
4.1	Direct supply via a MINI Analog Pro signal conditioner	26
4.2	Supply via MINI MCR-2-PTB... power terminal	28
4.2.1	MINI MCR-2-PTB... power terminal in combination with intrinsically safe MINI Analog Pro versions	28
4.2.2	Supply via a MINI MCR-2-PTB... power terminal	28
4.2.3	Supply via two MINI MCR-2-PTB... power terminals	32
4.3	Supply via system power supply	34
4.4	Monitoring the supply voltage using MINI MCR-2-FM-RC... fault signaling modules	36
4.5	Using the MINI MCR-2-V8... gateways	38

- 5 Supply options for MACX Analog 41
 - 5.1 Direct supply via a MACX MCR(-EX) signal conditioner 42
 - 5.2 Supply via MACX MCR-PTB... power terminals 44
 - 5.2.1 Supply via a MACX MCR-PTB... power terminal 45
 - 5.2.2 Supply via two MACX MCR-PTB... power terminals 48
 - 5.3 Supply via MACX MCR(-EX)-AP power module with DIN rail connector 50
 - 5.4 Supply via system power supply..... 51

- A Appendix for document lists..... 53
 - A 1 List of figures 53

1 For your safety

Read this manual carefully and keep it for future reference.

1.1 Identification of warning notes



This symbol indicates hazards that could lead to personal injury.

There are three signal words indicating the severity of a potential injury.

DANGER

Indicates a hazard with a high risk level. If this hazardous situation is not avoided, it will result in death or serious injury.

WARNING

Indicates a hazard with a medium risk level. If this hazardous situation is not avoided, it could result in death or serious injury.

CAUTION

Indicates a hazard with a low risk level. If this hazardous situation is not avoided, it could result in minor or moderate injury.



This symbol together with the **NOTE** signal word warns the reader of actions that might cause property damage or a malfunction.



Here you will find additional information or detailed sources of information.

1.2 Qualification of users

The use of products described in this manual is oriented exclusively to:

- Electrically skilled persons or persons instructed by them. The users must be familiar with the relevant safety concepts of automation technology as well as applicable standards and other regulations.
- Qualified application programmers and software engineers. The users must be familiar with the relevant safety concepts of automation technology as well as applicable standards and other regulations.

1.3 Safety notes



You can download the latest documents from phoenixcontact.com/products



NOTE: Connection notes

When using the DIN rail connector, you may only connect one SELV or PELV circuit to the supply terminals of the modules.

1.3.1 Installation notes

Installation, operation, and maintenance may only be carried out by qualified electricians. When using the device, observe the installation notes in the data sheet at phoenixcontact.com/products.

1.3.2 Use in potentially explosive areas (zone 2/Ex i)

When using the device in applications in potentially explosive areas, observe the instructions in the data sheet at phoenixcontact.com/products, as the requirements may deviate under these circumstances.

1.3.3 Safety-related applications (SIL)

When using the device in safety-related applications, observe the instructions in the data sheet at phoenixcontact.com/products, as the requirements may differ for safety-related functions.

1.3.4 System power supplies

To ensure that the device is operated safely and all functions can be used, read this manual carefully. You will find further information in the corresponding data sheet at phoenixcontact.com/products.

2 General notes on the supply of Phoenix Contact signal conditioners



Observe the corresponding packing slip for the relevant products.



NOTE: Connection notes

When using the DIN rail connector, you may only connect one SELV or PELV circuit to the supply terminals of the modules.

All active signal conditioners from Phoenix Contact can either be supplied directly via terminal blocks on the module or wired individually. Wiring each individual module is very time-consuming and costly, especially when dealing with large quantities of signal conditioners that are mounted side by side on the DIN rail. This is why, depending on the signal conditioners used and the supply options, Phoenix Contact offers the option of supplying a complete standard DIN rail fitted with signal conditioners via a single power terminal by means of the TBUS DIN rail connector. Time-consuming and error-prone wiring of single-core wiring is thus eliminated. You can supply the DIN rail connector in the following ways:

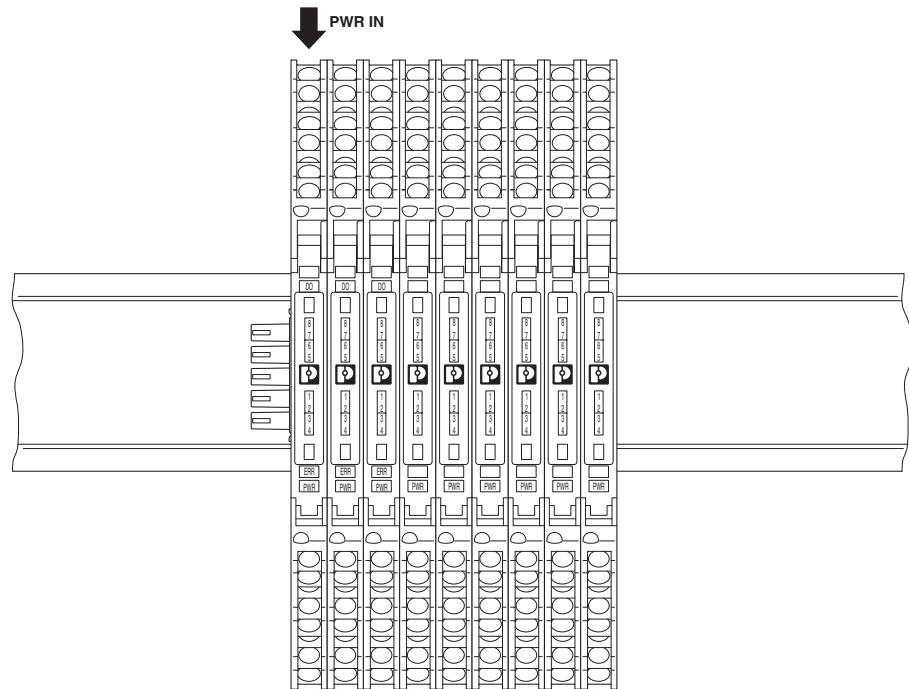
- Direct DC feed-in at any Analog module in the group
- Supply via a power terminal of the same shape
- Supply via any MINI Analog, MINI Analog Pro or MACX Analog power terminal
- Supply via a system power supply with a wide range input of 85 V AC ... 264 V AC

All of the power supply methods for MINI Analog, MINI Analog Pro, and MACX Analog (Ex) modules presented in this manual are compatible with one another. This means, for example, that as long as the marginal conditions presented in the individual sections are met, a MINI MCR-2-PTB power terminal can also be used to supply MACX Analog modules. In addition, if these conditions are met, a combination of different product ranges can be mounted on a DIN rail.

2.1 Direct DC supply at any analog module in the group

This method of supply is particularly suitable when you only need to supply a small number of signal conditioners (two to eight) and fault monitoring is not required.

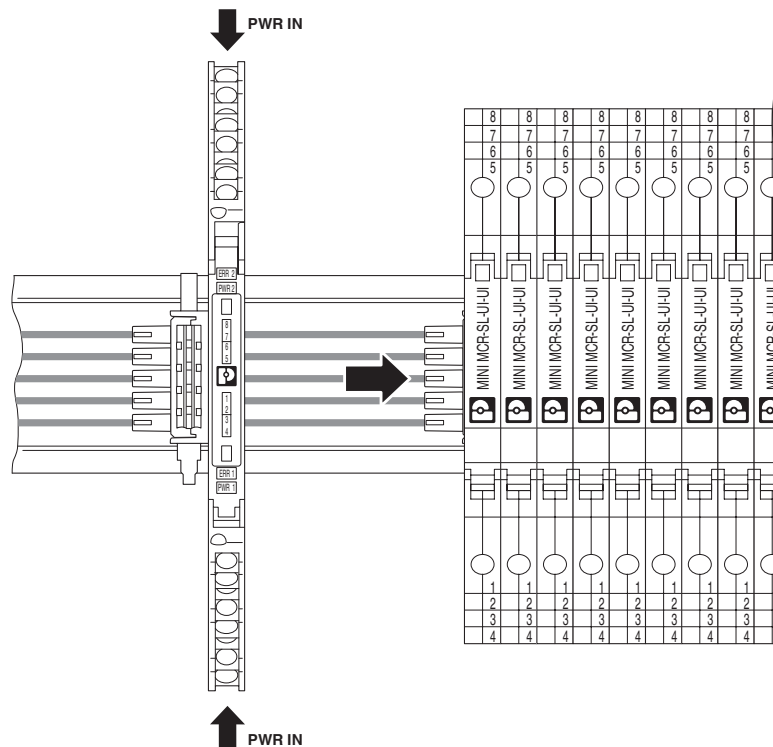
Figure 2-1 Direct supply via any module, e.g., MINI Analog Pro



2.2 Supply via any MINI Analog, MINI Analog Pro or MACX Analog power terminal

This version is particularly suitable if a relatively large number of connected signal conditioners is to be used or existing systems are to be extended and, for example, the newer MINI Analog Pro signal conditioners are to be installed in addition to existing MINI Analog signal conditioners, and the use of a power terminal is required. This option also supports fault monitoring.

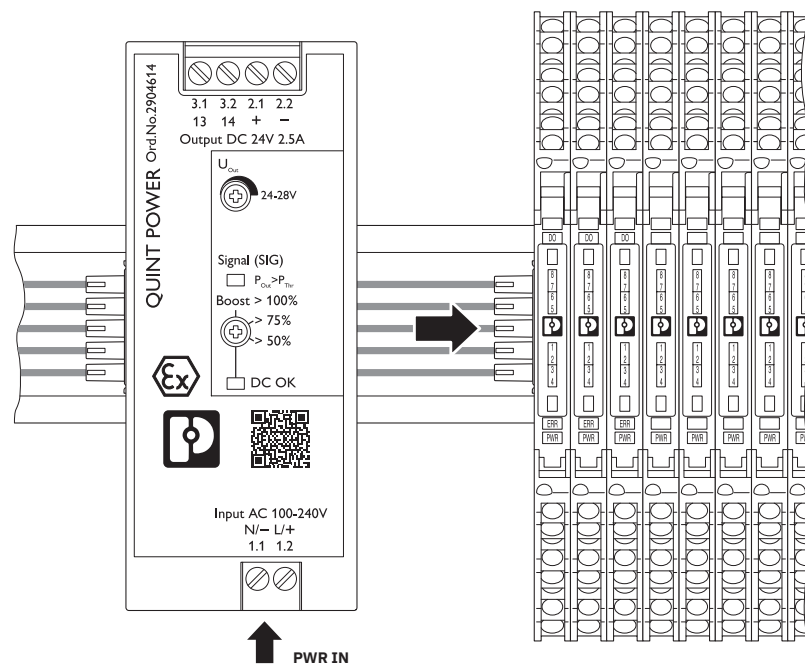
Figure 2-2 Supply via any MINI Analog, MINI Analog Pro or MACX Analog power terminal



2.3 Supply via a system power supply with a wide range input of 85 V AC ... 264 V AC

The advantage of this option for supplying the DIN rail connector is that a 24 V DC supply does not have to be available in the control cabinet or control box. For distributed applications in particular, where only 230 V AC is available, this method of supply is the best solution.

Figure 2-3 Supply via a system power supply with a wide range input of 85 V AC ... 264 V AC



3 MINI Analog supply options

The MINI Analog signal conditioners require a supply with 24 V DC (19.2 V DC ... 30 V DC). In addition to supplying individual modules via the corresponding terminal blocks on the device, various methods for supplying power to several modules in the MINI Analog product family can be implemented using a DIN rail connector (ME 6,2 TBUS-2 1,5/5-ST-3,81 GN, item no. 2869728 or ME 6,2 TBUS-21,5/5-ST-3,81 KMGY, item no. 2969401). It is supplied with 24 V DC and supplies all connected signal conditioners. This eliminates the need for time-consuming and costly single-core wiring.

When there are only a few modules mounted side by side, the ideal solution is to supply the DIN rail connector directly and therefore the connected modules via a signal conditioner, see Section 3.1 on page 12. One way to supply several modules, with or without short-circuit and cable break detection (see Section 3.4 on page 22), is to use MINI MCR-SL-PTB... devices (see Section 3.2 on page 14). These devices also support redundant supply. If a particularly large number of MINI Analog modules need to be supplied via the DIN rail connector, the MACX MCR-PTB... power and fault signaling module offers sufficient reserves (see Section 4.2 on page 28).

If there is no 24 V DC supply, the QUINT4-SYS-PS/1AC/24DC/2.5/SC system power supply presented in Section 3.3 on page 20 (item no. 2904614) can be used. It is suitable for connection to 230 V AC and is specifically tailored to the requirements of MCR technology (measurement and control). Use in a potentially explosive area is also possible.



NOTE: Risk of property damage

Never connect the supply voltage directly to the DIN rail connector.

3.1 Direct supply via a MINI Analog signal conditioner

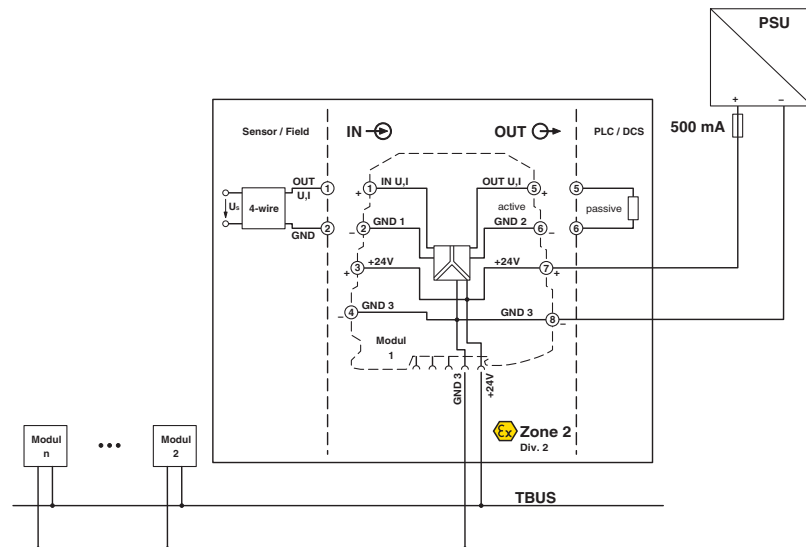
In the case of direct supply, all modules connected to the TBUS DIN rail connector are supplied via the supply at a signal conditioner. Please note that the maximum total current consumption of $I_{\max} = 400 \text{ mA}$ must not be exceeded and the maximum number of modules is therefore restricted to a few devices. For the respective current consumption of the individual signal conditioners, please refer to specifications on the Phoenix Contact homepage, the packing slips or the data sheets. The maximum number of devices can be calculated using the formula below:

$$n_{\text{modules}} = \frac{I_{\max}}{I_N} = \frac{400 \text{ mA}}{I_N}$$

$$I_N = n_1 * I_{\text{module1}} + n_2 * I_{\text{module2}} + n_3 * I_{\text{module3}} + \dots$$

A 500 mA fuse should be connected upstream as protection. In addition, you must make sure that with the 24 V DC supply used the fuse will definitely trip in the event of an error.

Figure 3-1 Direct supply via a MINI Analog signal conditioner



Example for direct supply via a module

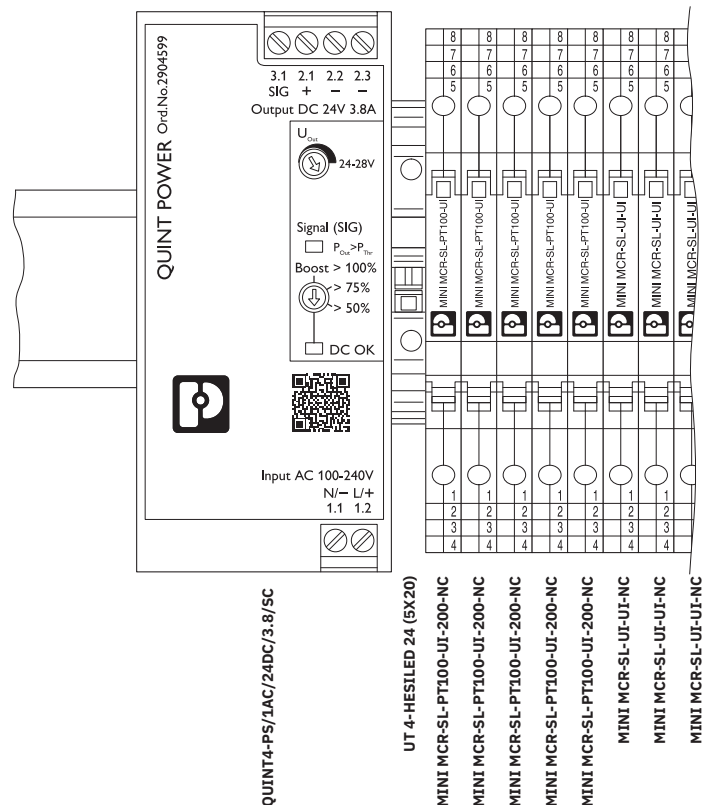
The goal is to supply five MINI MCR-SL-PT100-UI-200-NC temperature measuring transducers (item no. 2864370) and three configurable MINI MCR-SL-UI-UI-NC signal conditioners (item no. 2864150), with 4 mA ... 20 mA current output at an operating voltage of 24 V DC.

First determine the current consumption of the modules from the packing slips. For the temperature measuring transducers it is 21 mA per module and for the configurable transducers it is 19 mA at the desired current output.

$$I = n_1 * I_{\text{module1}} + n_2 * I_{\text{module2}} + n_3 * I_{\text{module3}} + \dots$$

The total current consumption of 158 mA is less than the maximum permissible current for supply via a module. The fuse to be connected upstream of the supply signal conditioner should have a nominal current of 500 mA. To ensure that the fuse definitely trips in the event of a short circuit, the 24 V DC supply in this example is provided by a QUINT4-PS/1AC/24DC/3.8/SC (item no. 2904599). The structure is shown in [Figure 3-2 on page 13](#). The wiring is as shown in [Figure 3-1 on page 12](#).

In addition to the low maximum number of modules, another disadvantage of this method of supply is that fault monitoring is not possible. However, this function is provided by the method of supply described in the next section.



3.2 Supply via MINI MCR-SL-PTB... power terminals

For supplying power to MINI Analog modules, a particularly suitable method involves MINI MCR-SL-PTB... power terminals. They have the familiar 6.2 mm housing and can be seamlessly integrated into the MINI Analog range. Redundant supply is supported. The decoupling of power supplies used for supply is ensured by the diodes integrated in the module. Moreover, it is possible to extend mechanical redundancy by using two power terminals. A 2.5 A fuse should be used to protect the power terminal(s). It is important to make sure here that tripping is guaranteed in the event of a short circuit by the power supply/supplies used. You can calculate the maximum number of modules, regardless of whether you are using one or two MINI MCR-SL-PTB... modules, with the aid of the product documents using the formula below.

$$n_{\text{modules}} = \frac{I_{\text{max}}}{I_{\text{N}}} = \frac{2 \text{ A (4 A)}}{I_{\text{N}}}$$

$$I_{\text{N}} = n_1 * I_{\text{module1}} + n_2 * I_{\text{module2}} + n_3 * I_{\text{module3}} + \dots$$



Recommended fuse for power terminal:

Fuse according to IEC 60127-2/V

Nominal current: 2.5 A

Characteristic: slow-blow

(e.g., Wickmann 5 x 20 mm/No. 195 - glass fuse)

3.2.1 Supply via a MINI MCR-SL-PTB... power terminal

In the case of supply via the power terminal, all MINI Analog modules connected via the TBUS DIN rail connector are supplied. Both supply inputs can be supplied by one power supply, see [Figure 3-3 on page 15](#), or redundant supply by means of two different power supplies is implemented, see [Figure 3-4 on page 16](#). It is important here that both supply circuits have separate protection. In this way a maximum current of 2 A can be fed into the DIN rail connector.

Figure 3-3 Supply by means of one power supply

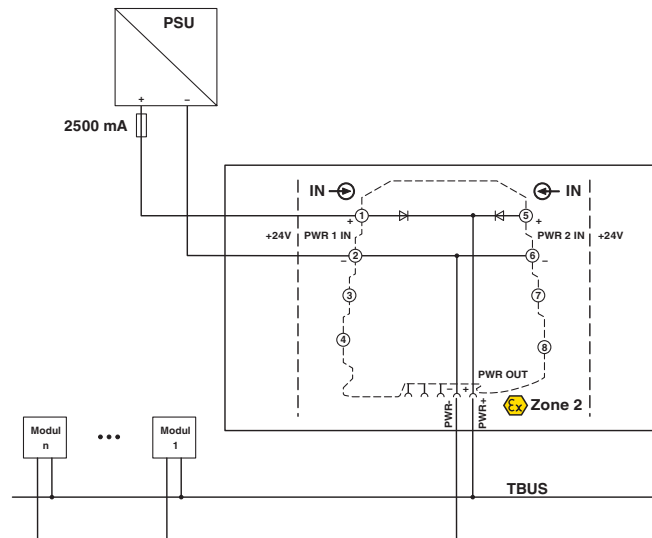
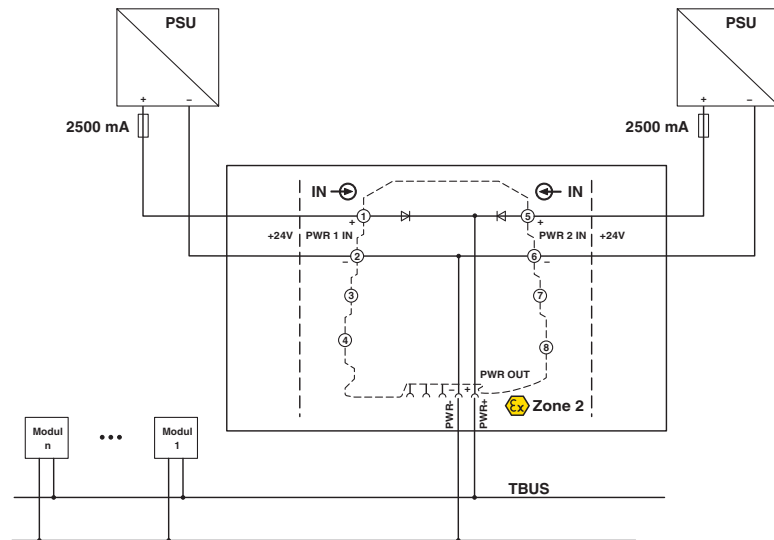


Figure 3-4 Supply by means of redundant power supply



Example for supply via a MINI MCR-SL-PTB... power terminal

The goal is to supply 32 MINI MCR-RTD-UI-NC temperature measuring transducers (item no. 2902849), ten configurable MINI MCR-SL-UI-UI-NC signal conditioners (item no. 2864150), with 4 mA ... 20 mA current output and 40 MINI MCR-SL-UI-F frequency converters (item no. 2864082) at an operating voltage of 24 V DC.

First determine the current consumption of the modules from the packing slips. For the temperature measuring transducers it is 27 mA per module and for the configurable transducers it is 21 mA at the desired current output. The frequency converters require 10 mA each.

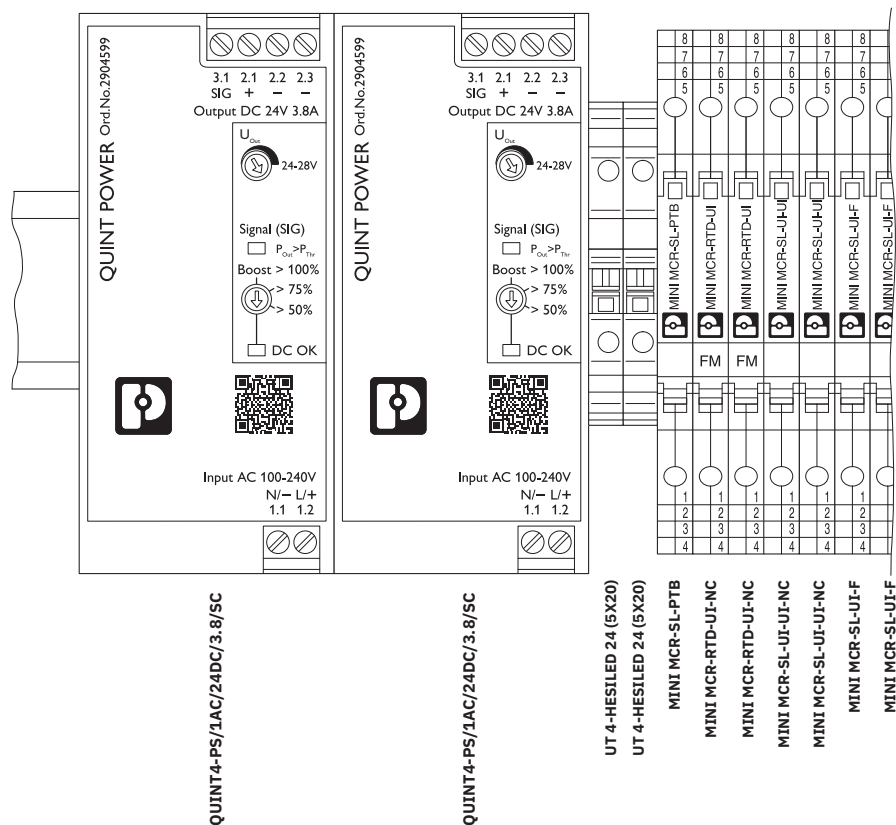
Then determine the maximum total current consumption of all 82 modules.

$$I = n_1 \cdot I_{\text{module1}} + n_2 \cdot I_{\text{module2}} + n_3 \cdot I_{\text{module3}} + \dots$$

$$I = 32 \cdot 27 \text{ mA} + 10 \cdot 21 \text{ mA} + 40 \cdot 10 \text{ mA} = 1914 \text{ mA} < 2000 \text{ mA}$$

The total current consumption of 1914 mA is less than the maximum permissible current for supply via the MINI MCR-SL-PTB.... The fuses connected upstream of both power terminals should each have a nominal current of 2.5 A. To ensure that the fuses definitely trip in the event of a short circuit, the 24 V DC supply in this example is provided by a QUINT4-PS/1AC/24DC/3.8/SC (item no. 2904599). The structure is shown in [Figure 3-5 on page 17](#). The wiring is as shown in [Figure 3-4 on page 16](#).

Figure 3-5 Example for supply via a MINI MCR-SL-PTB... power terminal

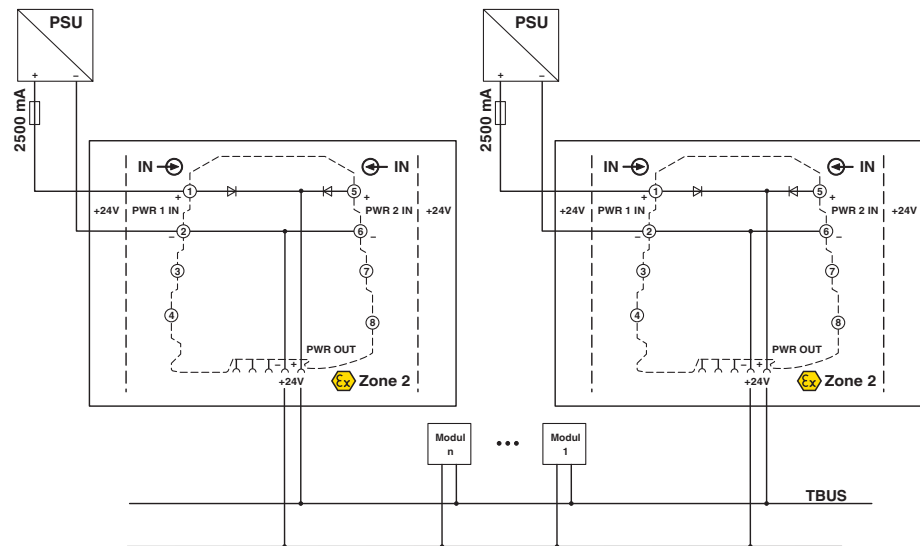


The disadvantage here is that in the event that the power terminal fails, the supply of all signal conditioners is interrupted. However, this can be indicated in this example by means of an N/C contact by using a MINI MCR-SL-FM-RC-NC(-SP) fault signaling module and the MINI MCR-SL-PTB-FM(-SP) power terminal, see Section 3.4 on page 22.

3.2.2 Supply via two MINI MCR-SL-PTB... power terminals

If you are using two MINI MCR-SL-PTB... for supplying the connected MINI Analog modules, you are only allowed to connect one power supply per power terminal. Likewise, you should position the two modules at either end of the DIN rail in order to limit the maximum short-circuit current in the event of an error, see [Figure 3-6 on page 18](#). Please also observe the maximum permissible total current here of 2 A if redundant power supply is desired. To increase the total number of signal conditioners, a maximum current of 4 A can be supplied via both power terminals (NOTE, no redundancy). The maximum number of MINI Analog devices is therefore equivalent to the calculation in [Section 3.2 on page 14](#).

Figure 3-6 Supply via two MINI MCR-SL-PTB... power terminals



Example for the supply via two MINI MCR-SL-PTB... power terminals

As in the previous example, the goal is to provide a redundant supply to 32 MINI MCR-RTD-UI-NC temperature measuring transducers (item no. 2902849), ten configurable MINI MCR-SL-UI-UI-NC signal conditioners (item no. 2864150), with 4 mA ... 20 mA current output and 40 MINI MCR-SL-UI-F frequency converters (item no. 2864082) at an operating voltage of 24 V DC.

First determine the current consumption of the modules from the packing slips again. For the temperature measuring transducers it is 27 mA per module and for the configurable transducers it is 21 mA at the desired current output. The frequency converters require 10 mA each.

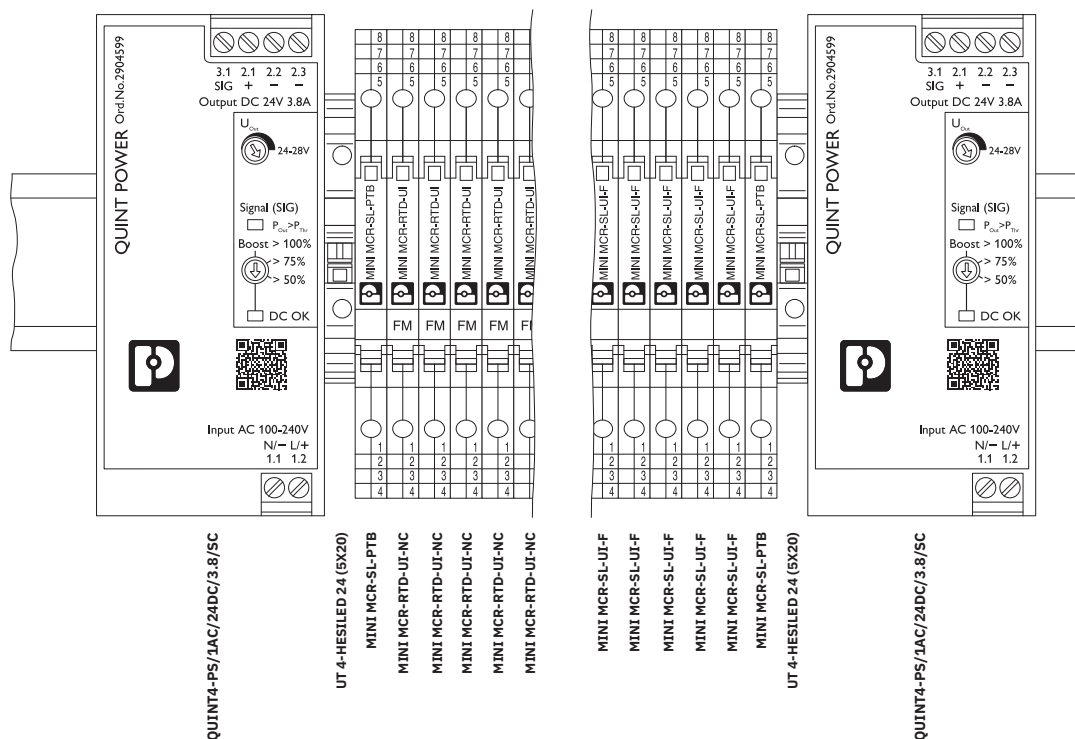
Then determine the maximum total current consumption of all 82 modules.

$$I = n_1 * I_{\text{module1}} + n_2 * I_{\text{module2}} + n_3 * I_{\text{module3}} + \dots$$

$$I = 32 * 27 \text{ mA} + 10 * 21 \text{ mA} + 40 * 10 \text{ mA} = 1914 \text{ mA} < 2000 \text{ mA}$$

The total current consumption of 1914 mA is less than the maximum permissible current for supply via the MINI MCR-SL-PTB.... The fuses connected upstream of both power terminals should each have a nominal current of 2.5 A. In order to ensure the guaranteed tripping of the fuses in the event of a short circuit, the supply with 24 V DC in this example is provided by two QUINT4-PS/1AC/24DC/3.8/SC (item no. 2904599). The structure is shown in Figure 3-7 on page 19. The wiring is as shown in Figure 3-6 on page 18.

Figure 3-7 Example for the supply via two MINI MCR-SL-PTB... power terminals



The failure of either or both of the power terminals can be indicated by means of an N/C contact by using a MINI MCR-SL-FM-RC-NC(-SP) fault signaling module and the MINI MCR-SL-PTB-FM(-SP) power terminals.

3.3 Supply via a system power supply

If there is no 24 V DC supply in the control cabinet or in the terminal box for supplying the MINI Analog signal conditioners, you can use a QUINT4-SYS-PS/1AC/24DC/2.5/SC (item no. 2904614). These power supplies, which have been developed specifically for measurement and control technology, enable the signal conditioners to be supplied directly from a 230 V AC supply via the TBUS DIN rail connector. These power supplies are simply snapped onto the TBUS and deliver a maximum current of 2.5 A. To increase performance, up to two QUINT4-SYS-PS/1AC/24DC/2.5/SC can also be snapped on. This means that a total current of 5 A can be supplied. Please note, however, that redundant supply is not possible for currents greater than 2.5 A. A 6 A, 10 A or 16 A characteristic B miniature circuit breaker should be used to protect the primary side.

Calculate the maximum number of modules with the aid of the relevant packing slips using the formula below.

$$n_{\text{modules}} = \frac{I_{\text{max}}}{I_N} = \frac{1,5 \text{ A (3 A)}}{I_N}$$

$$I_N = n_1 * I_{\text{module1}} + n_2 * I_{\text{module2}} + n_3 * I_{\text{module3}} + \dots$$

Example for supply via a system power supply

The goal is to supply 65 MINI MCR-SL-PT100-UI-200-NC temperature measuring transducers (item no. 2864370).

First determine the current consumption of the modules from the packing slips. For this temperature measuring transducer it is 21 mA per module.

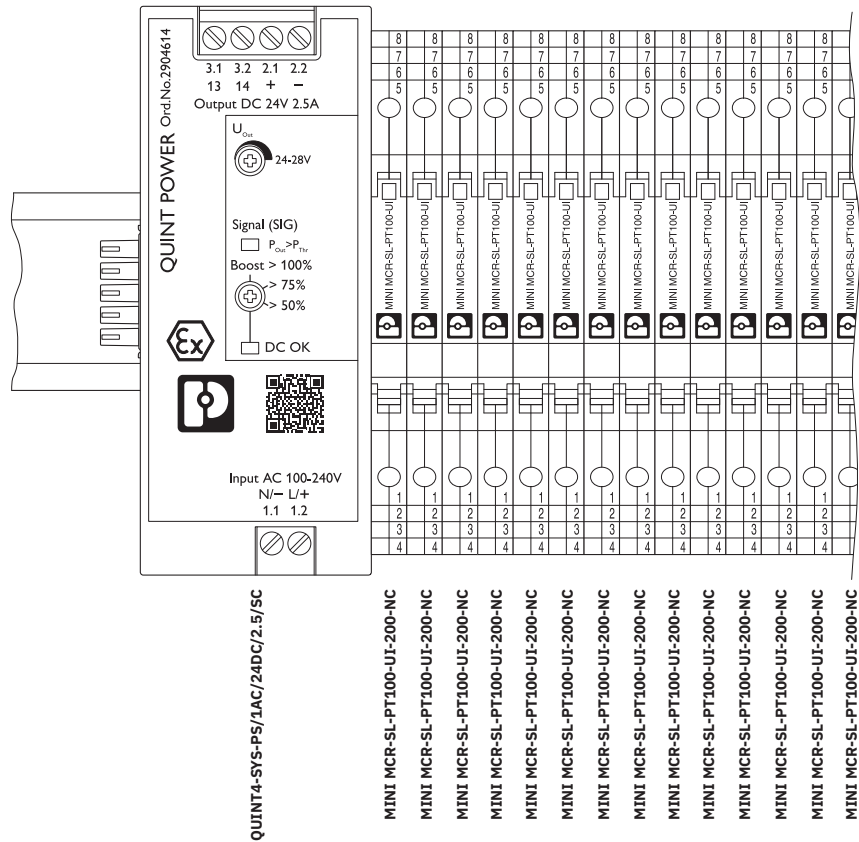
Then determine the maximum total current consumption of all 65 modules.

$$I = n_1 * I_{\text{module1}} + n_2 * I_{\text{module2}} + n_3 * I_{\text{module3}} + \dots$$

$$I = 65 * 21 \text{ mA} = 1365 \text{ mA} < 1500 \text{ mA}$$

The total current consumption of 1365 mA is less than the maximum permissible current for supply via the QUINT4-SYS-PS/1AC/24DC/2.5/SC (item no. 2904614). The structure is shown in [Figure 3-8 on page 21](#).

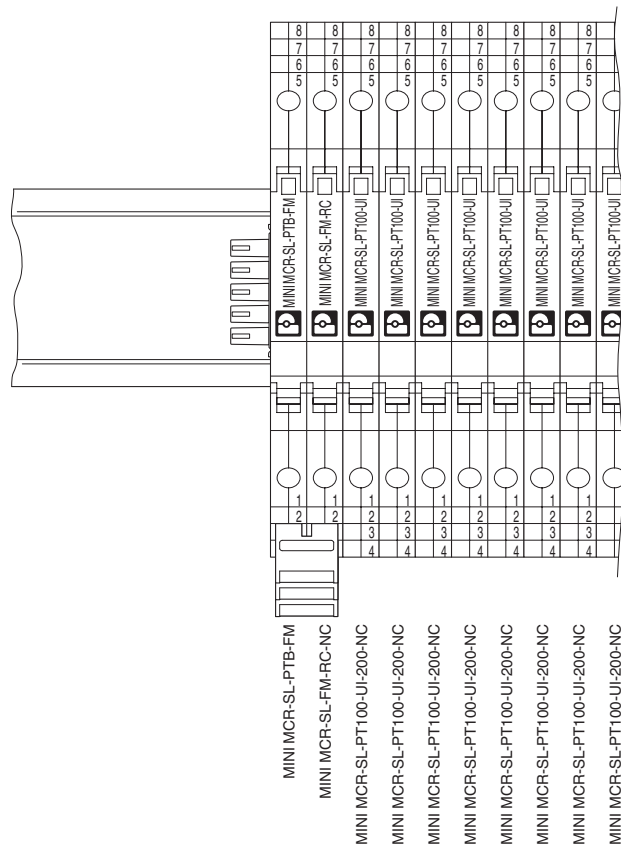
Figure 3-8 Supply via a system power supply



3.4 Monitoring the supply voltage using MINI MCR-SL-FM-RC... fault signaling modules

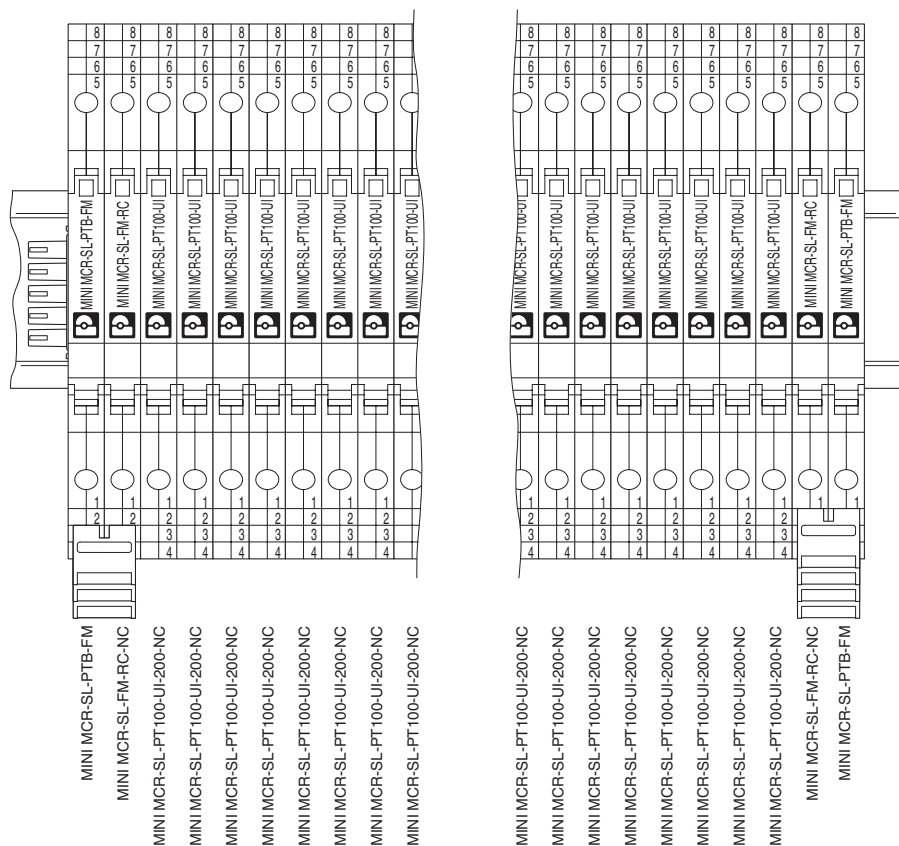
As described in Section 3.2 on page 14, the MINI Analog modules can be supplied with power via a MINI MCR-SL-PTB power terminal. If the MINI MCR-SL-PTB-FM... modules (item no. 2864134) and the MINI MCR-SL-FM-RC... error message modules (item no. 2902961) are used, it is possible to establish redundant monitoring of the supply voltage. Mount a power terminal and a fault signaling module of the same shape side by side without spacing, see Figure 3-9 on page 22.

Figure 3-9 Redundancy monitoring of the supply voltage



Then bridge terminal blocks 1 to 4 of the power terminal with terminals 1 to 4 of the fault signaling module. Use the FBSR 2-6 plug-in bridges supplied with the fault signaling module (plug-in bridge item no. 3033715) or normal cables. Now if one of the power supplies fails, this is indicated via an N/C contact. For additional mechanical redundancy, as shown in Section 3.2.2 on page 18, two power terminals and two fault signaling modules can be used, see Figure 3-10 on page 23. Again only one supply may be connected to each power terminal here. In the second fault signaling module, fault monitoring of external measuring transducers must be deactivated because evaluation can only take place via one module in a group.

Phoenix Contact 23 / 56



4 Supply options for MINI Analog Pro

MINI Analog Pro signal conditioners require a DC supply in the range from 9.6 V ... 30 V. The MINI Analog Pro versions with intrinsic safety and functional safety require a DC supply in the range between 19.2 V ... 30 V. In addition to supplying individual modules via the corresponding terminal blocks on the device, various methods for supplying power to several modules in the MINI Analog Pro product family can be implemented using the ME 6,2 TBUS-2 1,5/5-ST-3,81 GY DIN rail connector (item no. 2695439). It supplies all connected signal conditioners. This eliminates the need for time-consuming and costly single-core wiring.

When there are only a small number of modules mounted side by side, the ideal solution is to supply the DIN rail connector directly and therefore the connected modules via a signal conditioner, see [Section 4.1 on page 26](#). One way to supply several modules, with additional monitoring for module errors and the supply (see [Section 4.4 on page 36](#)), is to use MINI MCR-2-PTB... devices (see [Section 4.2 on page 28](#)). These devices also support redundant supply.

If the DC supply is not present in the range between 9.6 V ... 30 V, the QUINT4-SYS-PS/1AC/24DC/2.5/SC system power supply presented in [Section 4.3 on page 34](#) (item no. 2904614) can be used. It is suitable for connection to 230 V AC and is specifically tailored to the requirements of measurement and control technology. Use in a potentially explosive area is also possible.



NOTE: Risk of property damage

Never connect the supply voltage directly to the DIN rail connector.

4.1 Direct supply via a MINI Analog Pro signal conditioner

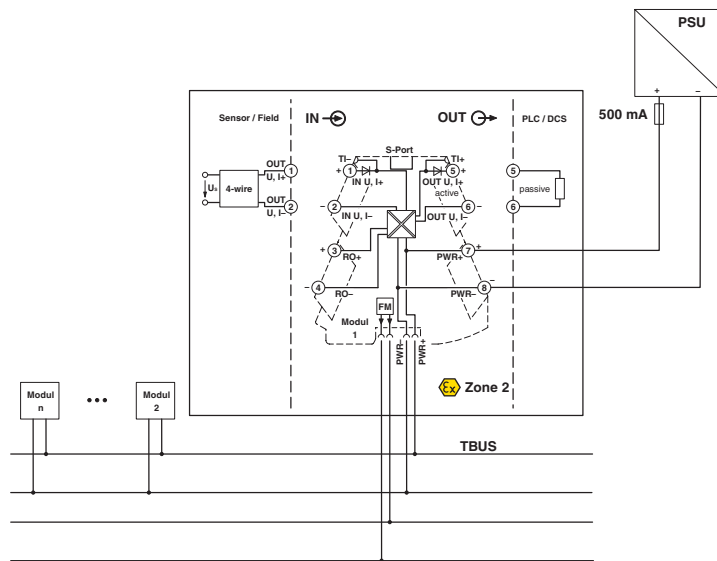
In the case of direct supply, all modules connected to the TBUS DIN rail connector are supplied via the supply at a signal conditioner. Please note that the maximum total current consumption of $I_{\max} = 400 \text{ mA}$ must not be exceeded and the maximum number of modules is therefore restricted to a few devices. For the respective current consumption of the individual signal conditioners, please refer to specifications on the Phoenix Contact homepage, in the packing slips or the data sheets. The maximum number of devices can be calculated using the formula below:

$$n_{\text{modules}} = \frac{I_{\max}}{I_N} = \frac{400 \text{ mA}}{I_N}$$

$$I_N = n_1 \cdot I_{\text{module1}} + n_2 \cdot I_{\text{module2}} + n_3 \cdot I_{\text{module3}} + \dots$$

A 500 mA fuse should be connected upstream as protection. In addition, you must make sure that with the 24 V DC supply used the fuse will definitely trip in the event of an error.

Figure 4-1 Direct supply via a MINI Analog Pro signal conditioner



Example for direct supply via a module

The goal is to supply five MINI MCR-2-TC-UI temperature measuring transducers (item no. 2902055) and three configurable MINI MCR-2-UI-UI signal conditioners (item no. 2902037), with 4 mA ... 20 mA current output, at an operating voltage of 24 V DC.

First determine the current consumption of the modules from the packing slips. For the temperature measuring transducers it is 31.5 mA per module and for the configurable transducers it is 25 mA at the desired current output.

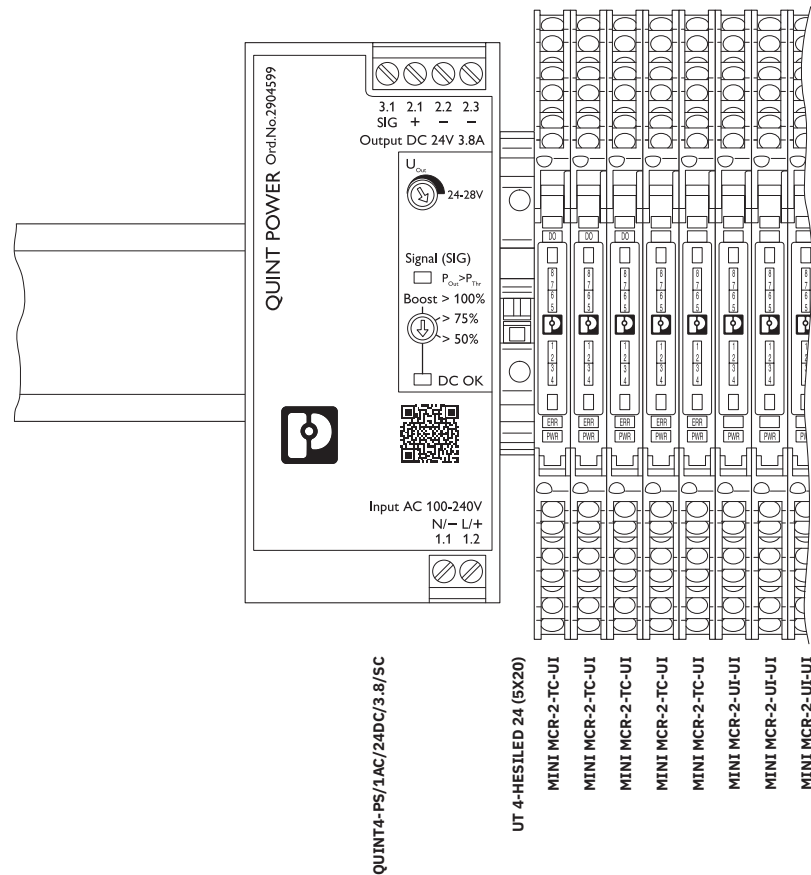
Then determine the maximum total current consumption of all eight modules.

$$I = n_1 * I_{\text{module1}} + n_2 * I_{\text{module2}} + n_3 * I_{\text{module3}} + \dots$$

$$I = 5 * 31,5 \text{ mA} + 3 * 25 \text{ mA} = 201 \text{ mA} < 400 \text{ mA}$$

The total current consumption of 201 mA is less than the maximum permissible current for supply via a module. The fuse to be connected upstream of the supply signal conditioner should have a nominal current of 500 mA. To ensure that the fuse definitely trips in the event of a short circuit, the 24 V DC supply in this example is provided by a QUINT4-PS/1AC/24DC/3.8/SC (item no. 2904599). The structure is shown in [Figure 4-2 on page 27](#). The wiring is as shown in [Figure 4-1 on page 26](#).

Figure 4-2 Example for direct supply via a module



In addition to the low maximum number of modules, a disadvantage of this method of supply is that fault monitoring is not possible. However, this function is provided by the method of supply described in the next section.

4.2 Supply via MINI MCR-2-PTB... power terminal

MINI MCR-2-PTB... power terminals are particularly suitable for supplying power to MINI Analog Pro modules. They have the familiar 6.2 mm housing and can be seamlessly integrated into the MINI Analog Pro range. Redundant supply is supported. The decoupling of power supplies used for supply is ensured by the diodes integrated in the module. Moreover, it is possible to extend mechanical redundancy by using two power terminals. A 4 A fuse should be used to protect the power terminal(s). It is important to make sure here that tripping is guaranteed in the event of a short circuit by the power supply/supplies used. You can calculate the maximum number of modules, regardless of whether you are using one or two MINI MCR-2-PTB... modules, with the aid of the product documents using the formula below.

$$n_{\text{modules}} = \frac{I_{\text{max}}}{I_N} = \frac{3,2 \text{ A}}{I_N}$$

$$I_N = n_1 * I_{\text{module1}} + n_2 * I_{\text{module2}} + n_3 * I_{\text{module3}} + \dots$$



Recommended fuse for power terminal:

Fuse according to IEC 60127-2/V

Nominal current: 2.5 A

Characteristic: slow-blow

(e.g., Wickmann 5 x 20 mm/No. 195 - glass fuse)

4.2.1 MINI MCR-2-PTB... power terminal in combination with intrinsically safe MINI Analog Pro versions

For direct connection of the MINI MCR-2-PTB... power terminal to the intrinsically safe and functionally safe versions of the MINI Analog Pro product family, plug the blind plug provided with the MINI MCR-2-PTB... power terminal into connector position 4 (terminal points 1/2 and 3/4) and 5 of the module. Thus, direct connection is possible.

4.2.2 Supply via a MINI MCR-2-PTB... power terminal

In the case of supply via the power terminal, all MINI Analog Pro modules connected via the TBUS DIN rail connector are supplied. Both supply inputs can be supplied by one power supply, see [Figure 4-3 on page 29](#), or redundant supply by means of two different power supplies is implemented, see [Figure 4-4 on page 29](#). It is important here that both supply circuits have separate protection. In this way, a maximum current of 3.2 A can be fed into the DIN rail connector.



For intrinsically safe and functionally safe MINI Analog Pro versions, you must observe [Section 4.2.1](#).

Figure 4-3 Supply by means of one power supply

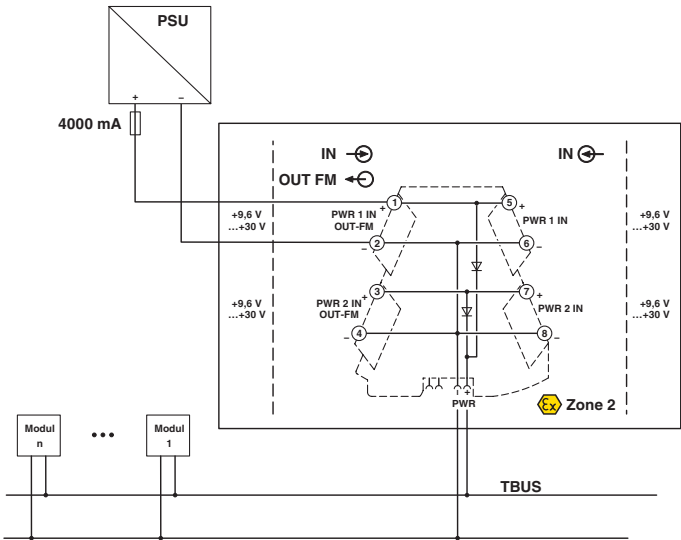
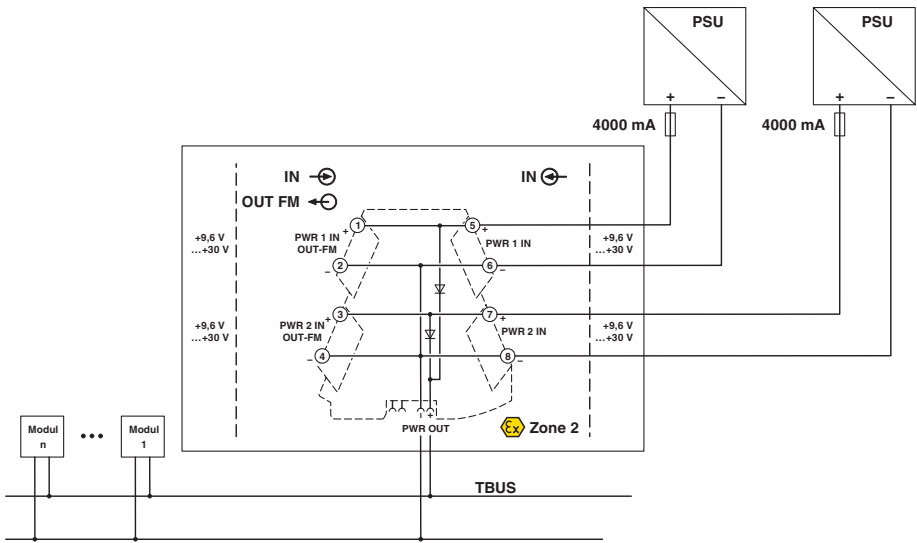


Figure 4-4 Supply by means of redundant power supplies



Example for supply via a MINI MCR-2-PTB... power terminal

The goal is to supply 32 MINI MCR-2-RTD-UI temperature measuring transducers (item no. 2902049), ten configurable MINI MCR-2-UI-UI signal conditioners (item no. 2902037), with 4 mA ... 20 mA current output and 40 universal MINI MCR-2-UNI-UI-UIRO signal conditioners with switching output (item no. 2902026) at an operating voltage of 24 V DC.

First determine the current consumption of the modules from the packing slips. For the temperature measuring transducers it is 31.5 mA per module and for the configurable transducers it is 25 mA at the desired current output. The universal signal conditioners with switching output require 31.5 mA each.

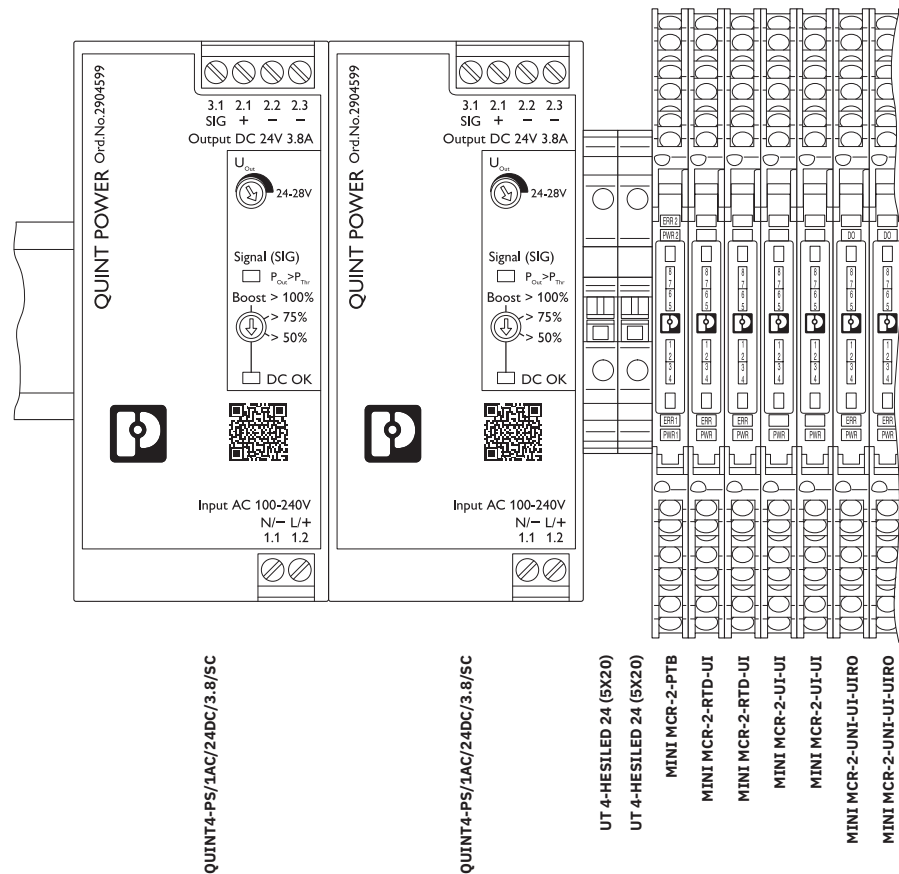
Then determine the maximum total current consumption of all 82 modules.

$$I = n_1 * I_{\text{module1}} + n_2 * I_{\text{module2}} + n_3 * I_{\text{module3}} + \dots$$

$$I = 32 * 31,5 \text{ mA} + 10 * 25 \text{ mA} + 40 * 31,5 \text{ mA} = 2518 \text{ mA} < 3200 \text{ mA}$$

The total current consumption of 2518 mA is less than the maximum permissible current for supply via the MINI MCR-2-PTB.... The fuses connected upstream of both power modules should each have a nominal current of 4000 mA. To ensure that the fuses definitely trip in the event of a short circuit, the 24 V DC supply in this example is provided by a QUINT4-PS/1AC/24DC/3.8/SC (item no. 2904599). The structure is shown in [Figure 4-5 on page 31](#). The wiring is as shown in [Figure 4-4 on page 29](#).

Figure 4-5 Example for supply via a MINI MCR-2-PTB... power terminal

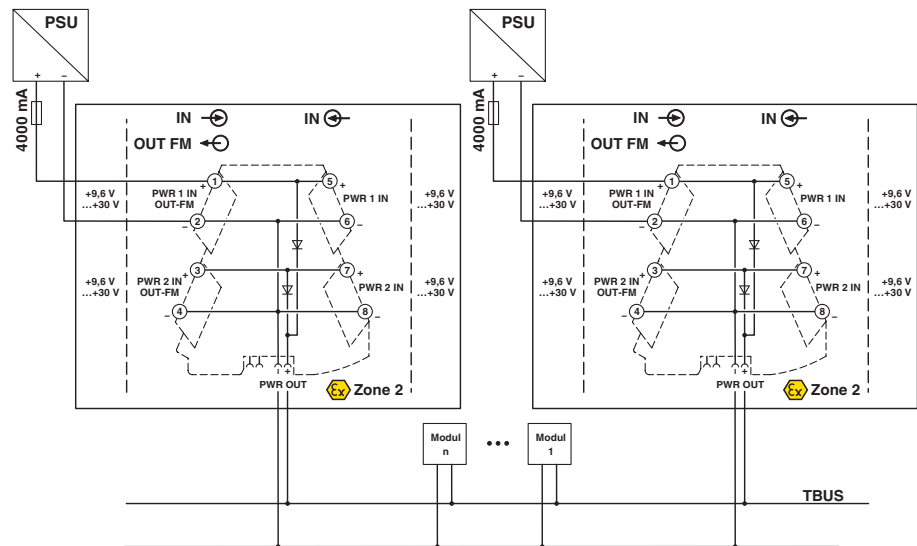


The disadvantage here is that in the event that the power terminal fails, the supply of all signal conditioners is interrupted. However, this can be indicated in this example by means of an N/C contact by using a MINI MCR-2-FM-RC fault signaling module and the MINI MCR-2-PTB power terminal.

4.2.3 Supply via two MINI MCR-2-PTB... power terminals

If you are using two MINI MCR-2-PTB... to supply the connected MINI Analog modules, only one power supply may be connected per power terminal. Likewise, you should position the two modules at either end of the DIN rail in order to limit the maximum short-circuit current in the event of an error, see [Figure 4-6 on page 32](#). Please also observe the maximum permissible total current here of 3.2 A if redundant power supply is desired. To increase the total number of signal conditioners, a maximum current of 6 A can be supplied via both power terminals (NOTE, no redundancy). The maximum number of MINI Analog Pro devices is therefore equivalent to the calculation in [Section 4.2 on page 28](#).

Figure 4-6 Supply via two MINI MCR-2-PTB... power terminals



i For intrinsically safe and functionally safe MINI Analog Pro versions, you must observe [Section 4.2.1](#).

Example for the supply via two MINI MCR-2-PTB... power terminals

The goal is to provide a redundant supply to 16 MINI MCR-2-RTD-UI temperature measuring transducers (item no. 2902049), ten configurable MINI MCR-2-UI-UI signal conditioners (item no. 2902037), with 4 mA ... 20 mA current output and 25 universal MINI MCR-2-UNI-UI-UIRO signal conditioners with switching output (item no. 2902026). Only an operating voltage of 12 V DC is available in this example.

First determine the current consumption of the modules from the packing slips. For the temperature measuring transducers it is 62.50 mA per module and for the configurable transducers it is 54 mA at the desired current output. The universal signal conditioners with switching output require 62.50 mA each.

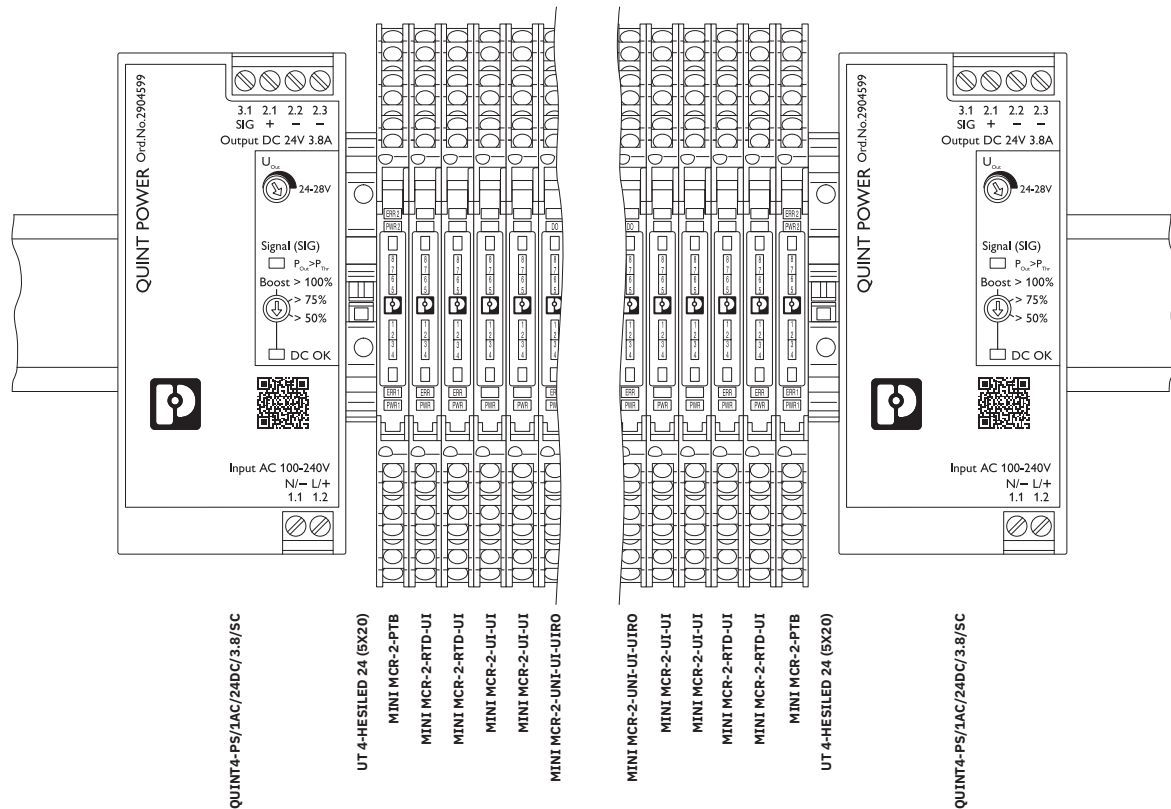
Then determine the maximum total current consumption of all 51 modules.

$$I = n_1 \cdot I_{\text{module1}} + n_2 \cdot I_{\text{module2}} + n_3 \cdot I_{\text{module3}} + \dots$$

$$I = 16 \cdot 62,5 \text{ mA} + 10 \cdot 54 \text{ mA} + 25 \cdot 62,5 \text{ mA} = 3102,5 \text{ mA} < 3200 \text{ mA}$$

The total current consumption of 3102.5 mA is less than the maximum permissible current for supply via the MINI MCR-2-PTB.... The fuses connected upstream of both power terminals should each have a nominal current of 4000 mA. In order to ensure the guaranteed tripping of the fuses in the event of a short circuit, the 12 V DC supply is implemented by two QUINT4-PS/1AC/24DC/3.8/SC power supplies in this example (item no. 2904599), which provide a short-circuit current of 90 A. The structure is shown in Figure 4-7 on page 33. The wiring is as shown in Figure 4-6 on page 32.

Figure 4-7 Example for the supply via two MINI MCR-2-PTB... power terminals



The disadvantage here is that in the event that the power terminal fails, the supply of all signal conditioners is interrupted. However, this can be indicated in this example by means of an N/C contact by using a MINI MCR-2-FM-RC fault signaling module and the MINI MCR-2-PTB power terminal.

4.3 Supply via system power supply

If there is no 24 V DC supply in the control cabinet or in the terminal box for supplying the MINI Analog Pro signal conditioners, you can use a QUINT4-SYS-PS/1AC/24DC/2.5/SC (item no. 2904614). These power supplies, which have been developed specifically for measurement and control technology, enable the signal conditioners to be supplied directly from a 230 V AC supply via the TBUS DIN rail connector. These power supplies are simply snapped onto the TBUS and deliver a maximum current of 2.5 A. To increase performance, up to two QUINT4-SYS-PS/1AC/24DC/2.5/SC (item no. 2904614) can be snapped on. This means that a total current of 5 A can be supplied. Please note, however, that redundant supply is not possible for currents greater than 2.5 A. A 6 A, 10 A or 16 A characteristic B miniature circuit breaker should be used to protect the primary side.

Calculate the maximum number of modules with the aid of the relevant packing slips using the formula below.

$$n_{\text{modules}} = \frac{I_{\text{max}}}{I_N} = \frac{1,5 \text{ A (3 A)}}{I_N}$$

$$I_N = n_1 * I_{\text{module1}} + n_2 * I_{\text{module2}} + n_3 * I_{\text{module3}} + \dots$$

The goal is to supply 40 MINI MCR-2-TC-UI temperature measuring transducers (item no. 2902055).

First determine the current consumption of the modules from the packing slips. For this temperature measuring transducer it is 32.5 mA per module.

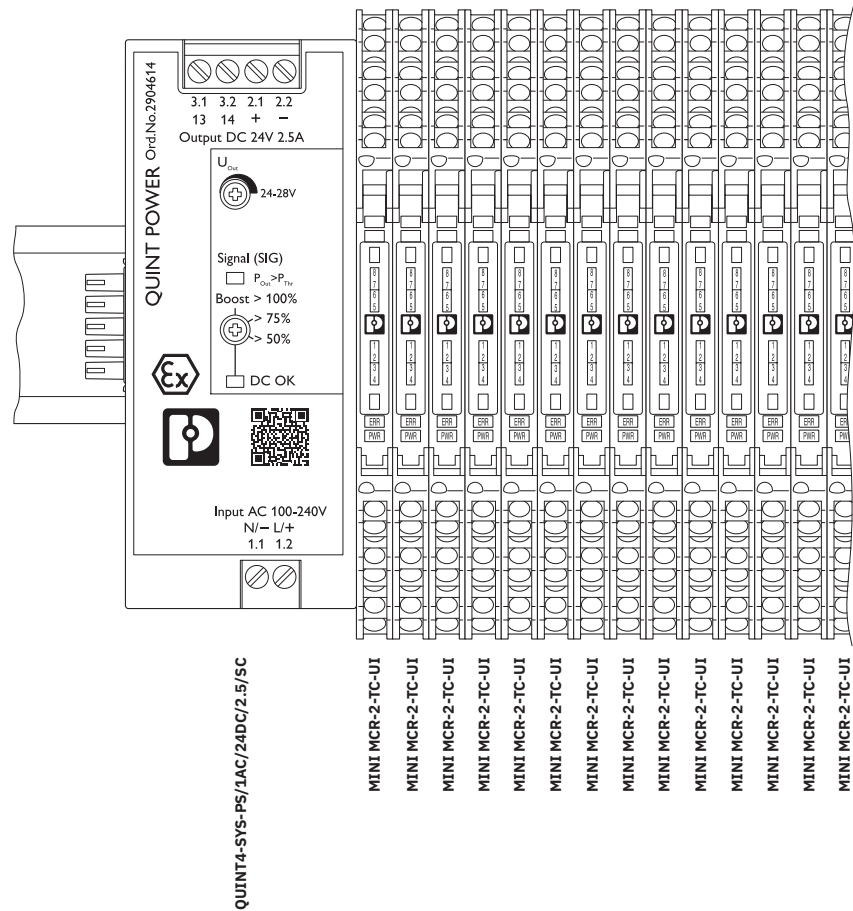
Then determine the maximum total current consumption of the 40 modules.

$$I = n_1 * I_{\text{module1}} + n_2 * I_{\text{module2}} + n_3 * I_{\text{module3}} + \dots$$

$$I = 40 * 32,5 \text{ mA} = 1300 \text{ mA} < 1500 \text{ mA}$$

The total current consumption of 1300 mA is less than the maximum permissible current for supply via the QUINT4-SYS-PS/1AC/24DC/2.5/SC (item no. 2904614). The structure is shown in [Figure 4-8 on page 35](#).

Figure 4-8 Supply via system power supply.

**DANGER: Explosion hazard**

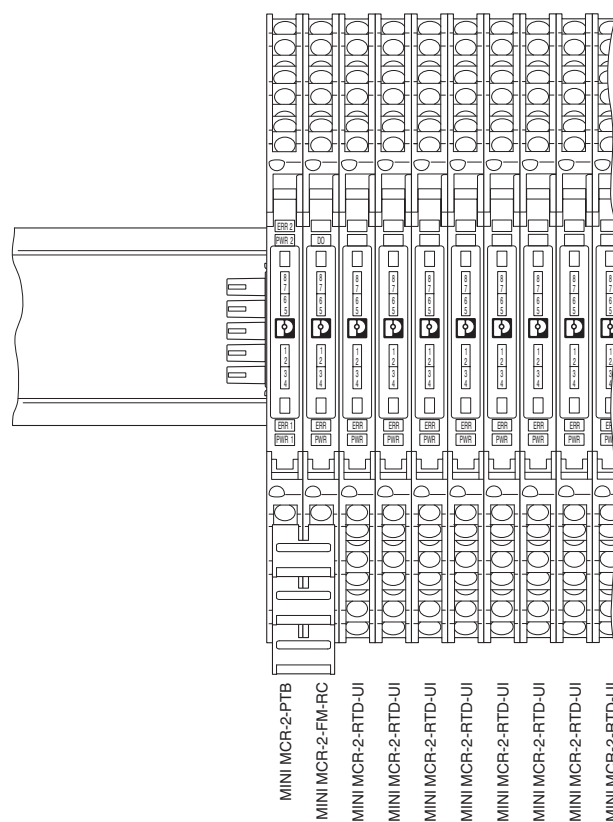
You must observe a 50 mm clearance between the intrinsically safe versions of the MINI Analog Pro product family and the system power supply.

Alternatively, you can install the MCR-DP partition plate (item no. 1430594) between the system power supply and the intrinsically safe versions of the MINI Analog Pro product family. The system power supply can thus be positioned directly adjacent.

4.4 Monitoring the supply voltage using MINI MCR-2-FM-RC-... fault signaling modules

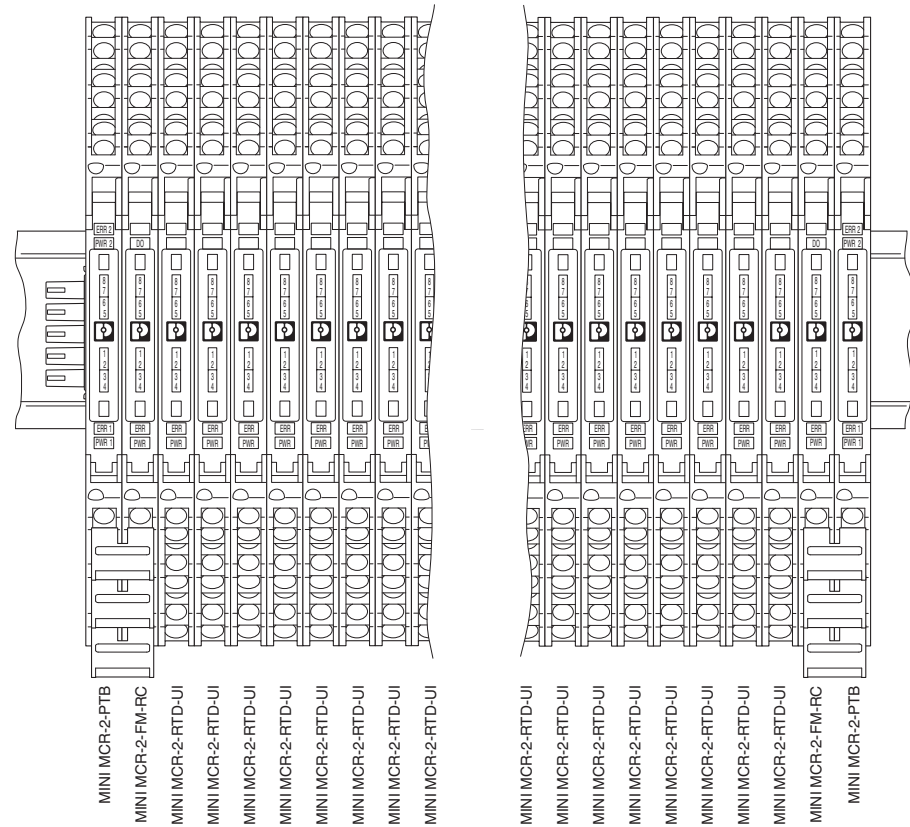
As described in Section 4.2 on page 28, the MINI Analog Pro modules can be supplied with power via a MINI MCR-2-PTB... power terminal (item no. 2902066). By using the MINI MCR-2-FM-RC-... fault signaling modules (item no. 2904504), it is then possible to establish redundancy monitoring of the supply voltage. Mount a power terminal and a fault signaling module of the same shape side by side without spacing, see Figure 4-9 on page 36.

Figure 4-9 Redundancy monitoring of the supply voltage



Then bridge terminal blocks 1 to 4 of the power terminal with terminals 1 to 4 of the fault signaling module. Use the FBSR 2-6 plug-in bridges supplied with the fault signaling module (plug-in bridge item no. 3033715) or normal cables. Now if one of the power supplies fails, this is indicated via an N/C contact. For additional mechanical redundancy, as shown in Section 4.2.3 on page 32, two power terminals and two fault signaling modules can be used, see Figure 4-10 on page 37. Again only one supply may be connected to each power terminal here. In the second fault signaling module, fault monitoring of external measuring transducers must be deactivated because evaluation can only take place via one module in a group.

Figure 4-10 Additional mechanical redundancy

**DANGER: Explosion hazard**

You must observe a 50 mm clearance between the intrinsically safe versions of the MINI Analog Pro product family and the system power supply.

Alternatively, you can install the MCR-DP partition plate (item no. 1430594) between the system power supply and the intrinsically safe versions of the MINI Analog Pro product family. The system power supply can thus be positioned directly adjacent.

4.5 Using the MINI MCR-2-V8... gateways

If you are using a MINI Analog Pro gateway V8 (MINI MCR-2-V8...), it is supplied via the MINI Analog Pro signal conditioner. This means that you have to take the current consumption of the gateway into consideration in every calculation. To illustrate this, [“Example for direct supply via a module” on page 38](#) is repeated with the MINI MCR-2-V8-MOD-TCP module connected.

Example for direct supply via a module

The goal is to supply five MINI MCR-2-TC-UI-2-TC-UI temperature measuring transducers (item no. 2902055), three configurable MINI MCR-2-UI-UI signal conditioners (item no. 2902037) and also the MINI MCR-2-V8-MOD-TCP module (item no. 2905635), with 4 mA ... 20 mA current output, at an operating voltage of 24 V DC.

First determine the current consumption of the modules from the packing slips. For the temperature measuring transducers it is 31.5 mA per module and for the configurable transducers it is 25 mA at the desired current output. For the Modbus/TCP gateway it is 24 V 50 mA.

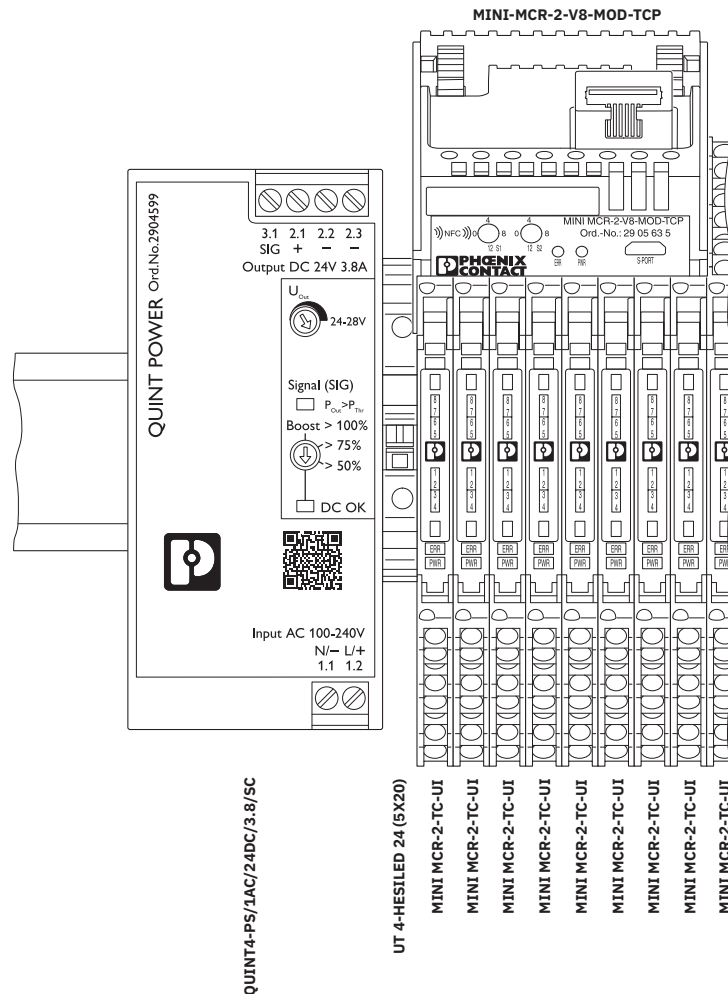
Then determine the maximum total current consumption of all nine modules.

$$I = n_1 \cdot I_{\text{module1}} + n_2 \cdot I_{\text{module2}} + n_3 \cdot I_{\text{module3}} + \dots$$

$$I = 5 \cdot 31,5 \text{ mA} + 3 \cdot 25 \text{ mA} + 1 \cdot 50 \text{ mA} = 282 \text{ mA} < 400 \text{ mA}$$

The total current consumption of 331 mA is less than the maximum permissible current for supply via a module. The fuse to be connected upstream of the supply signal conditioner should have a nominal current of 500 mA. To ensure that the fuse definitely trips in the event of a short circuit, the 24 V DC supply in this example is provided by a QUINT4-PS/1AC/24DC/3.8/SC (item no. 2904599). The structure is shown in [Figure 4-11 on page 39](#). The wiring is as shown in [Figure 4-1 on page 26](#).

Phoenix Contact 39 / 56



In addition to the low maximum number of modules, a disadvantage of this method of supply is that fault monitoring is not possible. However, this function is provided by the method of supply described in the next section.

 DANGER: Explosion hazard
You must observe a 50 mm c

You must observe a 50 mm clearance between the intrinsically safe versions of the MINI Analog Pro product family and the system power supply.

Alternatively, you can install the MCR-DP partition plate (item no. 1430594) between the system power supply and the intrinsically safe versions of the MINI Analog Pro product family. The system power supply can thus be positioned directly adjacent.

5 Supply options for MACX Analog

MACX Analog (Ex) signal conditioners, which are compatible with the DIN rail connector, require a 24 V DC supply. MACX Analog (Ex) modules are also available with an extended supply voltage range of 24 V ... 230 V AC/DC. However, these modules are only ever supplied individually via the terminal blocks on the device and are not suitable for supply by means of the TBUS DIN rail connector. When supplying individual devices directly via the terminal blocks, various methods for supplying power to several modules in the MACX Analog (Ex) product family can be implemented using the DIN rail connector (ME 6,2 TBUS-2 1,5/5-ST-3,81KMGY, item no. 2969401). It is supplied with 24 V DC and supplies all connected signal conditioners. This eliminates the need for time-consuming and costly single-core wiring.

When there are only a few modules mounted side by side, the ideal solution is to supply the DIN rail connector directly and therefore the connected modules via a signal conditioner, see Section [5.1 on page 42](#). One way to supply several modules, with short-circuit and cable break detection, is to use MACX MCR-PTB... or TC-MACX-MCR-PTB devices, see Section [5.2 on page 44](#). These devices also support redundant supply.

If there is no 24 V DC supply, the system power supply presented in Section [5.4 on page 51](#), QUINT4-SYS-PS/1AC/24DC/2.5/SC (item no. 2904614) can be used. It is suitable for connection to 230 V AC and is specifically tailored to the requirements of measurement and control technology. Use in potentially explosive areas is also possible.



NOTE: Risk of property damage

Never connect the supply voltage directly to the DIN rail connector.

5.1 Direct supply via a MACX MCR(-EX) signal conditioner

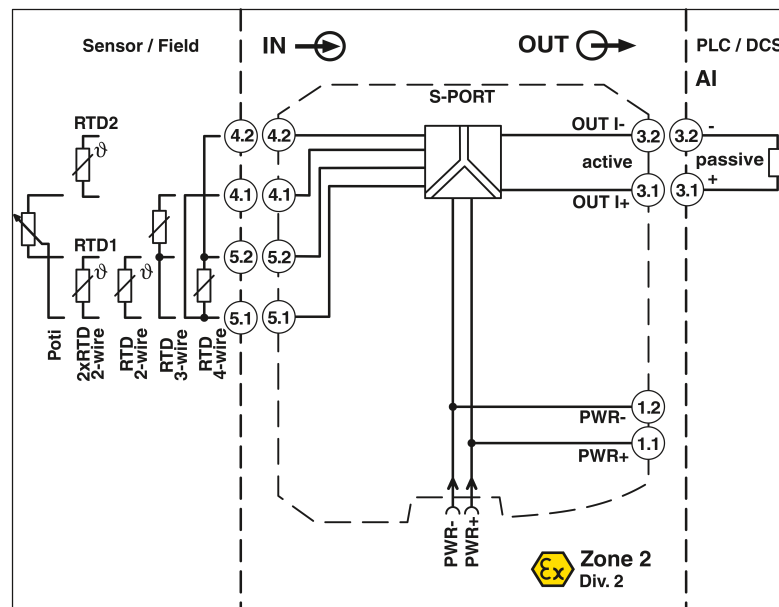
In the case of direct supply, all modules connected to the TBUS DIN rail connector are supplied via the supply at a signal conditioner. Please note that the maximum total current consumption of $I_{\max} = 400 \text{ mA}$ must not be exceeded and the maximum number of modules is therefore restricted to a few devices. For the respective current consumption of the individual signal conditioners, please refer to specifications on the Phoenix Contact homepage, in the packing slips or the data sheets. The maximum number of devices can be calculated using the formula below:

$$n_{\text{modules}} = \frac{I_{\max}}{I_N} = \frac{400 \text{ mA}}{I_N}$$

$$I_N = n_1 * I_{\text{module1}} + n_2 * I_{\text{module2}} + n_3 * I_{\text{module3}} + \dots$$

A 500 mA fuse should be connected upstream as protection. In addition, you must make sure that with the 24 V DC supply used the fuse will definitely trip in the event of an error.

Figure 5-1 Direct supply via a module



Example for direct supply via a module

The goal is to supply five MACX MCR-RTD-I temperature measuring transducers (item no. 1050201) and three NAMUR signal conditioners MACX MCR-SL-NAM-R (item no. 2865997) at an operating voltage of 24 V DC.

First determine the current consumption of the modules from the packing slips. For the temperature measuring transducers it is 40 mA per module and for the NAMUR signal conditioners it is 21 mA at the desired current output.

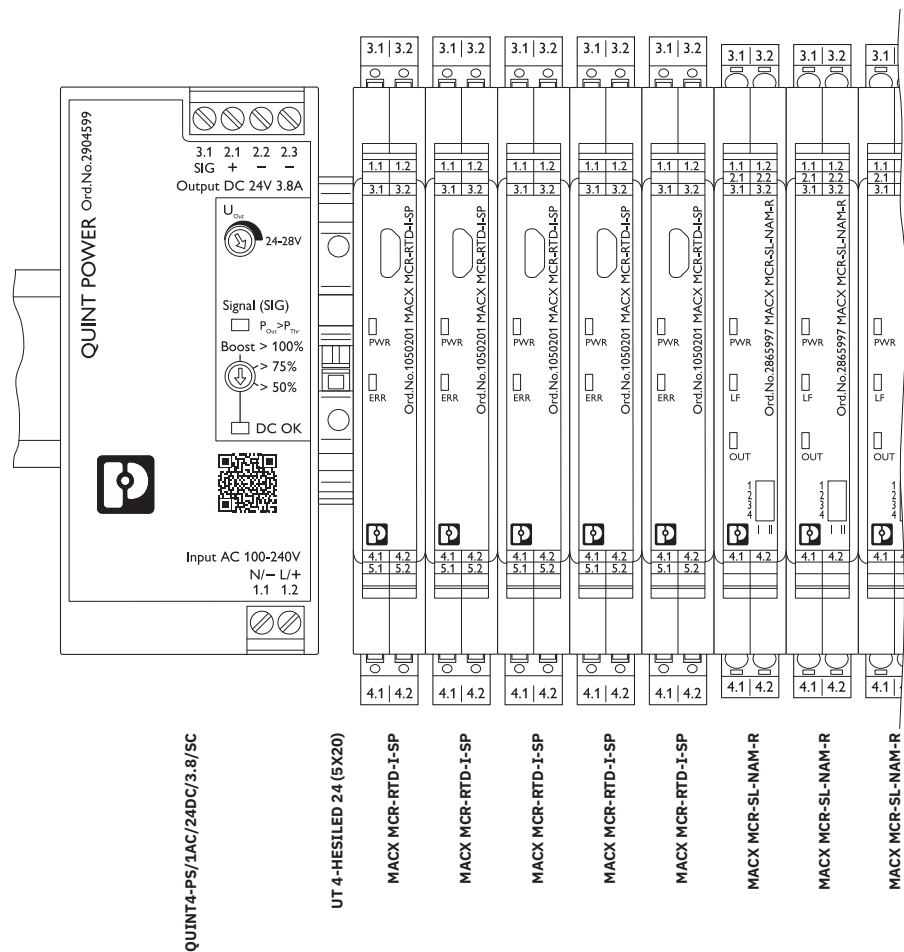
Then determine the maximum total current consumption of all eight modules.

$$I = n_1 * I_{\text{module1}} + n_2 * I_{\text{module2}} + n_3 * I_{\text{module3}} + \dots$$

$$I = 5 * 40 \text{ mA} + 3 * 21 \text{ mA} = 263 \text{ mA} < 400 \text{ mA}$$

The total current consumption of 263 mA is less than the maximum permissible current for supply via a module. The fuse to be connected upstream of the supply signal conditioner should have a nominal current of 500 mA. To ensure that the fuse definitely trips in the event of a short circuit, the 24 V DC supply in this example is provided by a QUINT4-PS/1AC/24DC/3.8/SC (item no. 2904599). The structure is shown in [Figure 5-2 on page 43](#). The wiring is as shown in [Figure 5-1 on page 42](#).

Figure 5-2 Example for direct supply via a module



In addition to the low maximum number of modules, a disadvantage of this method of supply is that short-circuit and cable break detection is not possible. However, this function is provided by the method of supply described in the next section.

5.2 Supply via MACX MCR-PTB... power terminals

For supplying power to MACX Analog modules, a particularly suitable method involves MACX MCR-PTB... power terminals (item no. 2865625). This means that a total current of 3.75 A can be supplied. Integrated error evaluation is an additional advantage here. An auxiliary supply failure or fuse fault is indicated by a relay contact and displayed via a flashing LED. Redundant supply is supported as an option. The decoupling of power supplies used for supply is ensured by the diodes integrated in the module. Moreover, it is possible to extend mechanical redundancy by using two power terminals. Each power terminal is protected by an integrated 5 A fuse. It is important to make sure here that tripping is guaranteed in the event of a short circuit by the power supply/supplies used. You can calculate the maximum number of modules, regardless of whether you are using one or two MACX MCR-PTB... modules, with the aid of the product documents using the formula below.

$$n_{\text{modules}} = \frac{I_{\text{max}}}{I_N} = \frac{3,75 \text{ A}}{I_N}$$

$$I_N = n_1 * I_{\text{module1}} + n_2 * I_{\text{module2}} + n_3 * I_{\text{module3}} + \dots$$



If a power terminal without an integrated fuse is required, the power terminal (TC-MACX-MCR-PTB, item no. 2904673) can be used. In this case, a corresponding backup fuse must be ensured in the power supply.

5.2.1 Supply via a MACX MCR-PTB... power terminal

For supply via a power terminal, simple supply can be implemented by means of one power supply, see [Figure 5-3 on page 45](#), or redundant supply by means of two different power supplies is implemented, see [Figure 5-4 on page 45](#)

Figure 5-3 Supply by means of one power supply

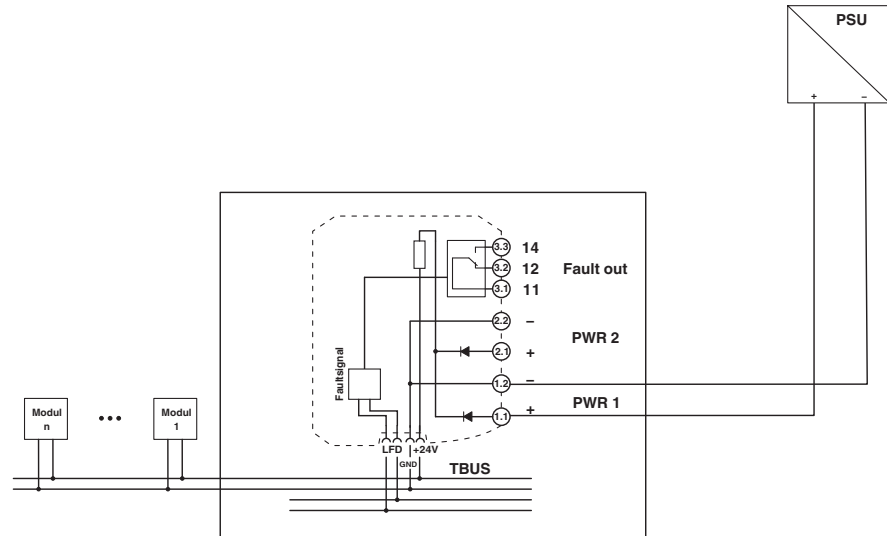
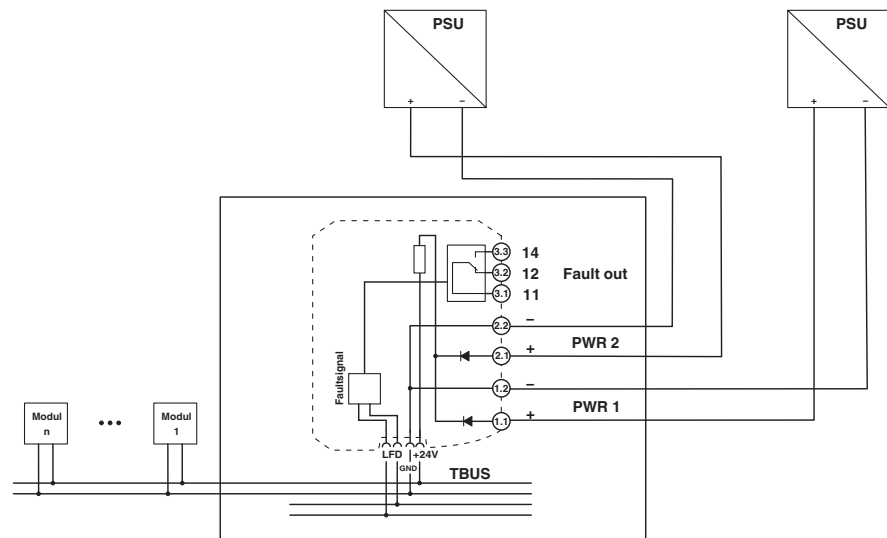


Figure 5-4 Supply by means of redundant power supplies



Example for supply via a MACX MCR-PTB... power terminal

The goal is to supply 32 MACX MCR-RTD-I-SP temperature measuring transducers (item no. 1050201), 40 MACX MCR-SL-NAM-R NAMUR signal conditioners (item no. 2865997) and 20 MACX MCR-SL-RPSSI-I repeater power supplies (item no. 2924207), at an operating voltage of 24 V DC.

First determine the current consumption of the modules from the packing slips. For the temperature measuring transducer, this is 40 mA per module and for the NAMUR signal conditioners, this is 21 mA. The intrinsically safe repeater power supplies require 76 mA each.

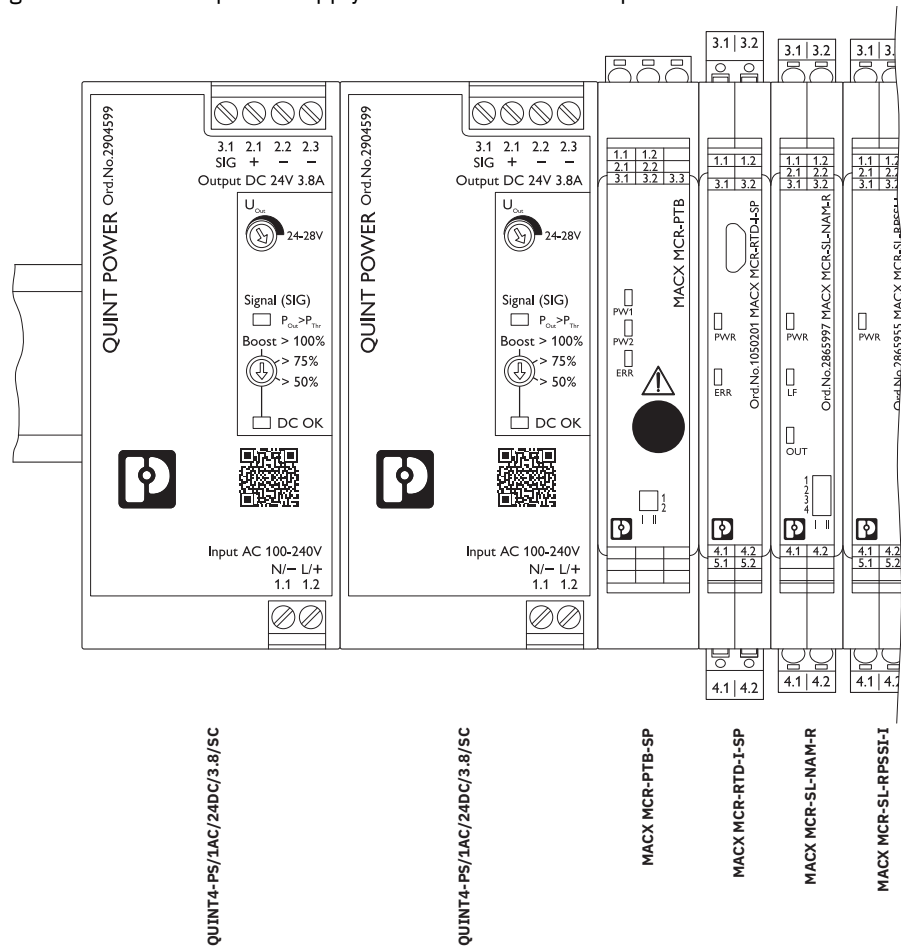
Then determine the maximum total current consumption of all 92 modules.

$$I = n_1 * I_{\text{module1}} + n_2 * I_{\text{module2}} + n_3 * I_{\text{module3}} + \dots$$

$$I = 32 * 40 \text{ mA} + 40 * 21 \text{ mA} + 20 * 76 \text{ mA} = 3640 \text{ mA} < 3750 \text{ mA}$$

The total current consumption of 3640 mA is less than the maximum permissible current for supply via the MACX MCR-PTB.... To ensure that the fuse installed in the MACX MCR-PTB definitely trips in the event of a short circuit, the 24 V DC supply in this example is provided by two QUINT4-PS/1AC/24DC/3.8/SC power supplies (item no. 2904599). The structure is shown in [Figure 5-5 on page 47](#). The wiring is as shown in [Figure 5-4 on page 45](#).

Figure 5-5 Example for supply via a MACX MCR-PTB... power terminal



The disadvantage here is that in the event that the power terminal fails, the supply of all signal conditioners is interrupted.

5.2.2 Supply via two MACX MCR-PTB... power terminals

If redundant supply via two MACX MCR-PTB... power terminals is desired, the supply for each module must be provided by a separate voltage source, see [Figure 5-3 on page 45](#). Likewise, you should also position the two modules at either end of the DIN rail in order to limit the maximum short-circuit current in the event of an error, see [Figure 5-6 on page 49](#). A maximum current of 3.75 A must not be exceeded here. Redundant supply is thereby ensured. However, to increase the total number of signal conditioners, a maximum current of 6 A can be supplied via both power terminals (NOTE, no redundancy).



NOTE: Functional limitation

When supplying to the DIN rail connector via two MACX MCR-PTB(-SP) modules, the group error message must be deactivated.

Example for the supply via two MACX MCR-PTB... power terminals

As in the previous example, the goal is to provide a redundant supply to 32 MACX MCR-RTD-I-SP temperature measuring transducers (item no. 1050201), 40 MACX MCR-SL-NAM-R NAMUR signal conditioners (item no. 2865997) and 20 MACX MCR-SL-RPSSI-I repeater power supplies (item no. 2924207), at an operating voltage of 24 V DC.

First determine the current consumption of the modules from the packing slips. For the temperature measuring transducer, this is 40 mA per module and for the NAMUR signal conditioners, this is 21 mA. The intrinsically safe repeater power supplies also require 76 mA each.

Then determine the maximum total current consumption of all 92 modules.

$$I = n_1 * I_{\text{module1}} + n_2 * I_{\text{module2}} + n_3 * I_{\text{module3}} + \dots$$

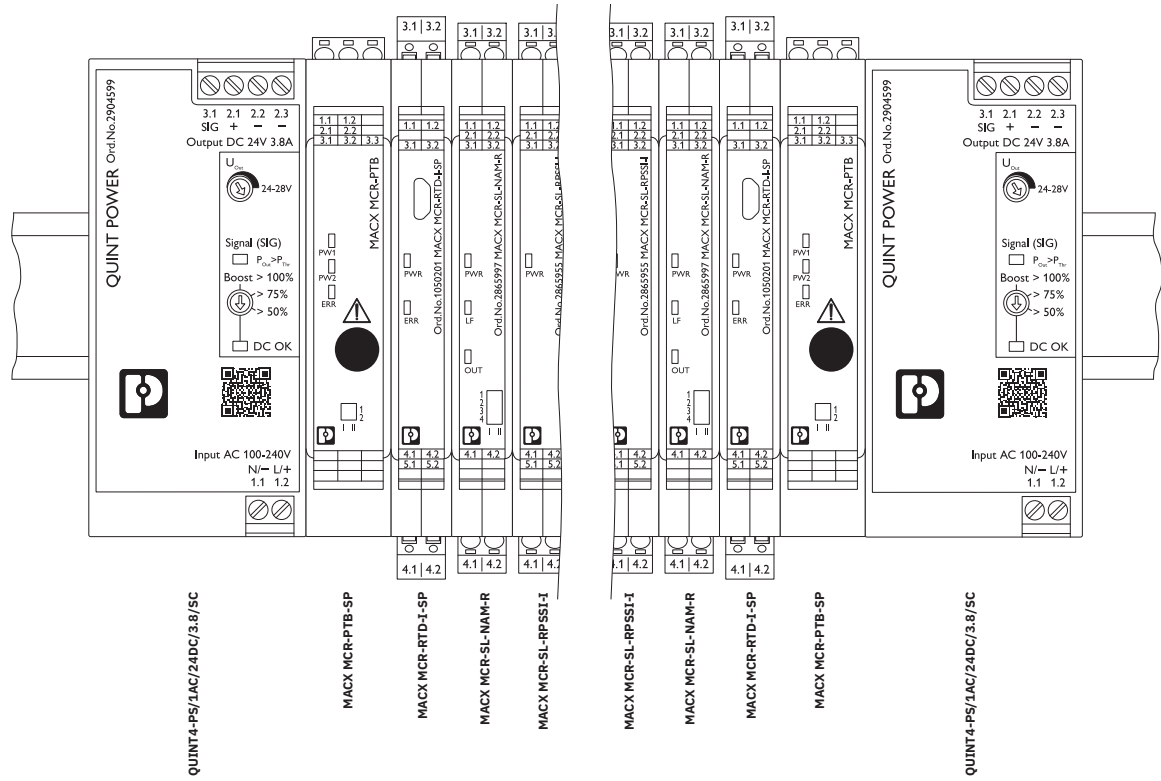
$$I = 32 * 40 \text{ mA} + 40 * 21 \text{ mA} + 20 * 76 \text{ mA} = 3640 \text{ mA} < 3750 \text{ mA}$$

The total current consumption of 3640 mA is less than the maximum permissible current for supply via the MACX MCR-PTB.... To ensure that the fuse installed in the MACX MCR-PTB definitely trips in the event of a short circuit, the 24 V DC supply in this example is provided by two QUINT4-PS/1AC/24DC/3.8/SC power supplies (item no. 2904599). The structure is shown in [Figure 5-6 on page 49](#). The wiring is as shown in [Figure 5-3 on page 45](#).



If a power terminal without an integrated fuse is required, the power terminal (TC-MACX-MCR-PTB, item no. 2904673) can be used. In this case, a corresponding backup fuse must be ensured in the power supply.

Figure 5-6 Example for the supply via two MACX MCR-PTB... power terminals

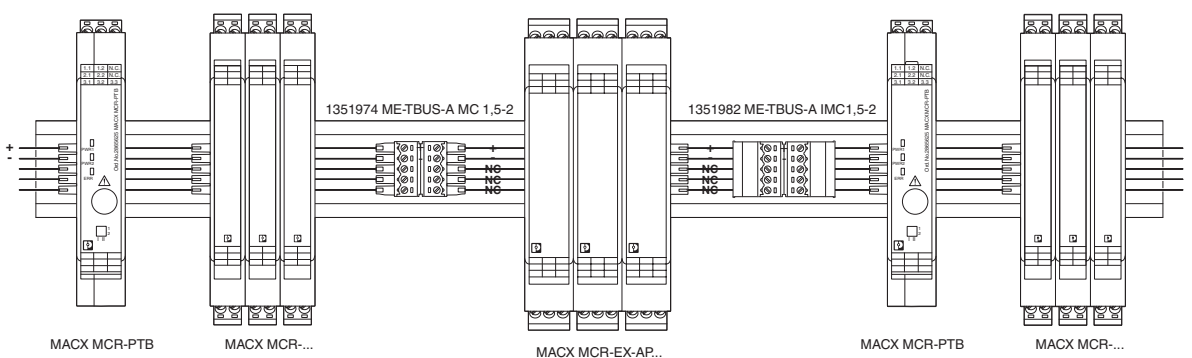


5.3 Supply via MACX MCR(-EX)-AP power module with DIN rail connector

The power and fault signaling module MACX MCR-PTB (item no. 2865625) or MACX MCR-PTB-SP (item no. 2924184) is used to supply the supply voltage to the DIN rail connector.

You also need the ME 17,5 TBUS DIN rail connector (item no. 1090049) and one ME-TBUS-A-MC 1,5-2 (item no. 1351974) or ME-TBUS-A-IMC1,5-2 (item no. 1351982).

Figure 5-7 Example of supply via power module MACX MCR(-EX)-AP with DIN rail connector



i The DIN rail connectors ME-TBUS-A-MC 1,5-2 (item no. 1351974) and ME-TBUS-A-IMC1,5-2 (item no. 1351982) do not support the transfer of group error messages.

5.4 Supply via system power supply

If there is no 24 V DC supply in the control cabinet or terminal box to supply the MACX Analog signal conditioners, it is recommended that you use MACX signal conditioners with wide-range power supply. However, if you want to avoid the complex single-core wiring, you can use a QUINT4-SYS-PS/1AC/24DC/2.5/SC (item no. 2904614). These power supplies, which have been developed specifically for measurement and control technology, enable the signal conditioners to be supplied directly from a 230 V AC supply via the TBUS DIN rail connector. These power supplies are simply snapped onto the TBUS and deliver a maximum current of 2.5 A. To increase performance, up to two QUINT4-SYS-PS/1AC/24DC/2.5/SC (item no. 2904614) can be snapped on. This means that a total current of 5 A can be supplied. Please note, however, that redundant supply is not possible for currents greater than 2.5 A. A 6 A, 10 A or 16 A characteristic B miniature circuit breaker should be used to protect the primary side.

Calculate the maximum number of modules with the aid of the relevant packing slips using the formula below:

$$n_{\text{modules}} = \frac{I_{\text{max}}}{I_N} = \frac{1,5 \text{ A (3 A)}}{I_N}$$

$$I_N = n_1 * I_{\text{module1}} + n_2 * I_{\text{module2}} + n_3 * I_{\text{module3}} + \dots$$

Example for supply via a system power supply

The goal is to supply 35 MACX MCR-RTD-I-SP temperature measuring transducers (item no. 1050201).

First determine the current consumption of the modules from the packing slips. For this temperature measuring transducer it is 40 mA per module.

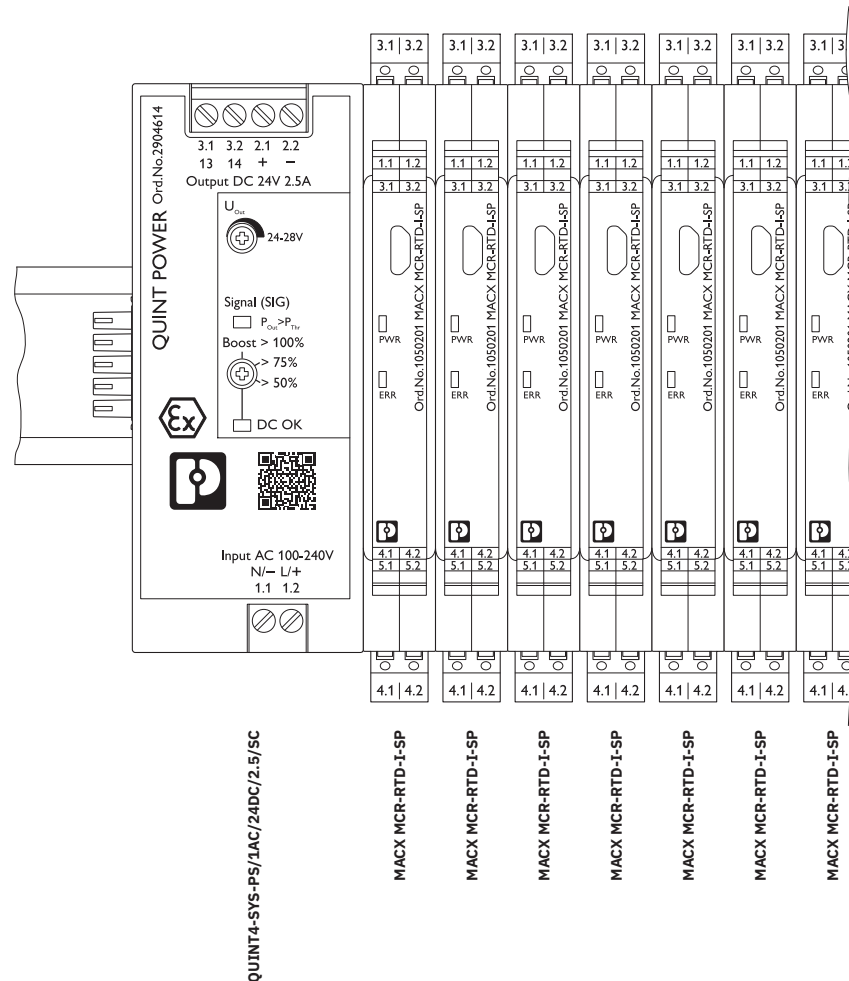
Then determine the maximum total current consumption of the 35 modules.

$$I = n_1 \cdot I_{\text{module1}} + n_2 \cdot I_{\text{module2}} + n_3 \cdot I_{\text{module3}} + \dots$$

$$I = 35 \cdot 40 \text{ mA} = 1400 \text{ mA} < 1500 \text{ mA}$$

The total current consumption of 1400 mA is less than the maximum permissible current for supply via the QUINT4-SYS-PS/1AC/24DC/2.5/SC (item no. 2904614). The structure is shown in [Figure 5-8 on page 52](#).

Figure 5-8 Example for supply via a system power supply



A Appendix for document lists

A 1 List of figures

Section 2

Figure 2-1:	Direct supply via any module, e.g., MINI Analog Pro	8
Figure 2-2:	Supply via any MINI Analog, MINI Analog Pro or MACX Analog power terminal	9
Figure 2-3:	Supply via a system power supply with a wide range input of 85 V AC ... 264 V AC	10

Section 3

Figure 3-1:	Direct supply via a MINI Analog signal conditioner	12
Figure 3-2:	Example for direct supply via a module	13
Figure 3-3:	Supply by means of one power supply	15
Figure 3-4:	Supply by means of redundant power supply	16
Figure 3-5:	Example for supply via a MINI MCR-SL-PTB... power terminal	17
Figure 3-6:	Supply via two MINI MCR-SL-PTB... power terminals	18
Figure 3-7:	Example for the supply via two MINI MCR-SL-PTB... power terminals	19
Figure 3-8:	Supply via a system power supply	21
Figure 3-9:	Redundancy monitoring of the supply voltage	22
Figure 3-10:	Additional mechanical redundancy	23

Section 4

Figure 4-1:	Direct supply via a MINI Analog Pro signal conditioner	26
Figure 4-2:	Example for direct supply via a module	27
Figure 4-3:	Supply by means of one power supply	29
Figure 4-4:	Supply by means of redundant power supplies	29
Figure 4-5:	Example for supply via a MINI MCR-2-PTB... power terminal	31
Figure 4-6:	Supply via two MINI MCR-2-PTB... power terminals	32
Figure 4-7:	Example for the supply via two MINI MCR-2-PTB... power terminals	33
Figure 4-8:	Supply via system power supply.	35
Figure 4-9:	Redundancy monitoring of the supply voltage	36
Figure 4-10:	Additional mechanical redundancy	37
Figure 4-11:	Example for direct supply via a module	39

Section 5

Figure 5-1:	Direct supply via a module	42
Figure 5-2:	Example for direct supply via a module	43
Figure 5-3:	Supply by means of one power supply	45
Figure 5-4:	Supply by means of redundant power supplies	45
Figure 5-5:	Example for supply via a MACX MCR-PTB... power terminal	47
Figure 5-6:	Example for the supply via two MACX MCR-PTB... power terminals	49
Figure 5-7:	Example of supply via power module MACX MCR(-EX)-AP with DIN rail connector	50
Figure 5-8:	Example for supply via a system power supply	52

Please observe the following notes

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32825 Blomberg

GERMANY

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EU-Konformitätserklärung

EU Declaration of Conformity

Nr. / No. 083113343_07_DoC_EU



Hersteller / Manufacturer:

Anschrift / Address:

Produktbezeichnung / Product designation:

Artikel-Nr. / Order No.:

Phoenix Contact GmbH & Co. KG

Flachsmarktstraße 8, 32825 Blomberg, Germany

MACX MCR-EX-SL-2NAM-R-UP

2865984

Die alleinige Verantwortung für die Ausstellung dieser Konformitätserklärung trägt der Hersteller. Die in dieser Erklärung bezeichneten Produkte stimmen mit den einschlägigen Anforderungen der folgenden Harmonisierungsrechtsvorschriften überein:

This declaration of conformity is issued under the sole responsibility of the manufacturer. The products specified in this declaration are in conformity with the following relevant harmonization legislation:

2011/65/EU

(OJ L 174, 1 July 2011)

Beschränkung der Verwendung bestimmter gefährlicher Stoffe

Restriction of the use of certain hazardous substances (RoHS)

2014/30/EU

(OJ L 96, 29 March 2014)

EMV-Richtlinie (Elektromagnetische Verträglichkeit)

Electromagnetic Compatibility Directive (EMC)

2014/34/EU

(OJ L 96, 29 March 2014)

Geräte in explosionsgefährdeten Bereichen

Equipment for explosive atmospheres (ATEX)

Für die Beurteilung der Übereinstimmung wurden folgende einschlägige Normen herangezogen:

The following pertinent standards have been applied for the assessment of conformity:

EN 60079-11:2012

EN IEC 60079-0:2018

EN IEC 60079-7:2015 + A1:2018

EN IEC 61000-6-4:2019

EN 61326-1:2013

EN IEC 60079-15:2019

EN IEC 61000-6-2:2019

EN IEC 63000:2018

Ergänzende Informationen (z. B. Anmerkungen, Einschränkungen, etc.) zur Konformitätsbewertung:

Supplementary information (e.g., comments, restrictions, etc.) for conformity assessment:

IECEx IBE 10.0002X: IEC 60079-0:2017, IEC 60079-7:2017, IEC 60079-15:2017

Warnung: Dies ist ein Klasse A-Erzeugnis. In Wohngebieten kann es zu Störungen des Funkempfanges kommen. Der Betreiber soll entsprechende Schutzmaßnahmen treffen.

Warning: This is a Class A product. In a domestic environment it may cause radio interference, in which case the user may be required to take adequate measures.

Zertifikate einer benannten Stelle:

Certificates of a notified body:

IBExU Institut für Sicherheitstechnik GmbH, Fuchsmühlenweg 7, 09599, Freiberg, DE

Nr. / No.: 0637

Referenz / Reference: IBExU10ATEX1005X

Die nachfolgend aufgeführten Produkte sind ebenfalls Bestandteil dieser EU-Konformitätserklärung:

The products listed below are also part of this EU declaration of conformity:

Artikel-Nr. / Order No.

Produktbezeichnung / Product designation

2924249

MACX MCR-EX-SL-2NAM-R-UP-SP

Blomberg, 2023-08-29

Lars-Peter Wimmer

Lars-Peter Wimmer
Business Unit Interface Components
Development MCR/EX Digital IF

Ansprechpartner / Contact person

Carsten Thörner

Carsten Thörner
Business Unit Interface Components
Vice President

Zeichnungsberechtigter / Authorized signatory

UK Declaration of Conformity

UK-Konformitätserklärung

No. / Nr. 097106924_00_DoC_UK



Manufacturer / Hersteller:

PHOENIX CONTACT GmbH & Co. KG

Address / Anschrift:

Flachsmarktstraße 8, 32825 Blomberg, Germany

Product designation / Produktbezeichnung:

MACX MCR-EX-SL-2NAM-R-UP

Order No. / Artikel-Nr.:

2865984

This declaration of conformity is issued under the sole responsibility of the manufacturer above. The product(s) specified in this declaration is/are in conformity with the following relevant legislation:

Die alleinige Verantwortung für die Ausstellung dieser Konformitätserklärung trägt der Hersteller. Die in dieser Erklärung bezeichneten Produkte stimmen mit den einschlägigen Anforderungen der folgenden Rechtsvorschriften überein:

S.I. 2012/3032

The Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment Regulations 2012

Verordnung zur Beschränkung der Verwendung bestimmter gefährlicher Stoffe in Elektro- und Elektronikgeräten 2012

S.I. 2016/1091

Electromagnetic Compatibility Regulations 2016

Verordnung über elektromagnetische Verträglichkeit 2016

S.I. 2016/1107

Equipment and Protective Systems Intended for use in Potentially Explosive Atmospheres Regulations 2016

Verordnung für Geräte und Schutzsysteme zur Verwendung in explosionsgefährdeten Bereichen 2016

The following pertinent standards have been applied for the assessment of conformity:

Für die Beurteilung der Übereinstimmung wurden folgende einschlägige Normen herangezogen:

EN 60079-11:2012

EN 61326-1:2013

EN IEC 60079-0:2018

EN IEC 60079-15:2019

EN IEC 60079-7:2015 + A1:2018

EN IEC 61000-6-2:2019

EN IEC 61000-6-4:2019

EN IEC 63000:2018

Supplementary information (e.g., comments, restrictions, etc.) for conformity assessment:

Ergänzende Informationen (z. B. Anmerkungen, Einschränkungen, etc.) zur Konformitätsbewertung:

Warning: This is a Class A product. In a domestic environment it may cause radio interference, in which case the user may be required to take adequate measures.

Warnung: Dies ist ein Klasse A-Erzeugnis. In Wohngebieten kann es zu Störungen des Funkempfanges kommen. Der Betreiber soll entsprechende Schutzmaßnahmen treffen.

Certificates of an approved body:

Zertifikate einer zugelassenen Stelle:

Eurofins E+E CML Limited, New Port Road, CH65 4LZ, Ellesmere Port, GB

No. / Nr.: 2503

Reference / Referenz: CML 22UKEX3528X

The products listed below are also part of this UK declaration of conformity:

Die nachfolgend aufgeführten Produkte sind ebenfalls Bestandteil dieser UK-Konformitätserklärung:

Order No. / Artikel-Nr.

Product designation / Produktbezeichnung

2924249

MACX MCR-EX-SL-2NAM-R-UP-SP

Blomberg, 2023-01-05

Pascal Schnelle
Business Unit Interface Components
Manager MCR/Ex Development

Contact person / Ansprechpartner

Carsten Thörner
Business Unit Interface Components
Vice President

Authorized signatory / Zeichnungsberechtigter

[1] EU-TYPE EXAMINATION CERTIFICATE - Translation

- [2] Equipment or protective systems intended for use in potentially explosive atmospheres, Directive 2014/34/EU
- [3] EU-type examination certificate number **IBExU10ATEX1005 X** | Issue 2
- [4] Product: **NAMUR Switch Isolating Amplifier**
Type: MACX ****-EX-SL-xNAM-yR-UP(-SP)***
- [5] Manufacturer: PHOENIX CONTACT GmbH & Co. KG
- [6] Address: Flachsmarktstraße 8
32825 Blomberg
GERMANY
- [7] This product and any acceptable variation thereto is specified in the schedule to this certificate and the documents therein referred to.
- [8] IBExU Institut für Sicherheitstechnik GmbH, notified body number 0637 in accordance with Article 17 of Directive 2014/34/EU of the European Parliament and of the Council, dated 26 February 2014, certifies that this product has been found to comply with the essential health and safety requirements relating to the design and construction of products intended for use in potentially explosive atmospheres given in Annex II to the Directive.
- The examination and test results are recorded in the confidential test report IB-21-3-0210/2.
- [9] Compliance with the essential health and safety requirements has been assured by compliance with:
EN IEC 60079-0:2018, EN IEC 60079-7:2015/A1:2018, EN 60079-11:2012 and
EN IEC 60079-15:2019
except in respect of those requirements listed at item [18] of the schedule.
- [10] If the sign "X" is placed after the certificate number, it indicates that the product is subject to the specific conditions of use specified in the schedule to this certificate.
- [11] This EU-type examination certificate relates only to the design and construction of the specified product. Further requirements of the Directive apply to the manufacturing process and supply of this product. These are not covered by this certificate.
- [12] The marking of the product shall include the following:

I (M1) [Ex ia Ma] I
 II (1) G [Ex ia Ga] IIC
 II (1) D [Ex ia Da] IIC
 II 3(1) G Ex ec [ia Ga] nC IIC T4 Gc
-40 °C ≤ T_{amb} ≤ +60 °C / +70 °C

IBExU Institut für Sicherheitstechnik GmbH
Fuchsmühlenweg 7
09599 Freiberg, GERMANY

By order

Dipl.-Ing.(FH) A. Henker



(notified body number 0637)

Tel: + 49 (0) 37 31 / 38 05 0
Fax: + 49 (0) 37 31 / 38 05 10

Certificates without signature and seal are not valid. Certificates may only be duplicated completely and unchanged. In case of dispute, the German text shall prevail.

Freiberg, 2021-12-21

[13]

Schedule

[14]

Certificate number IBExU10ATEX1005 X | Issue 2

[15]

Description of product

The NAMUR Switch Isolating Amplifiers MACX ***-EX-SL-xNAM-yR-UP(-SP)*** are used for the intrinsically safe and galvanically isolated operation of proximity switches with NAMUR behaviour or potential-free switches and resistance-connected switches. They are equipped with a wide voltage range supply. The equipment is provided for installation in zone 2 or in the safe area as associated apparatus. The intrinsically safe signal circuits may be routed into areas that require EPL Ma, Ga (Zone 0) or Da (Zone 20).

The voltage difference between input and output circuit or supply can be up to 375 V peak. The modules are equipped with a circuit for the detection of line faults.

Technical data:

Environmental conditions

Ambient temperature range

-40 °C up to +60 °C
-40 °C up to +70 °C
(with ≥ 6 mm distance to other devices)
≥ IP20 (acc. to EN 60529)

Degree of protection

Electrical data

1. Power Supply (1.1 and 1.2) and TBUS

rated voltage range

U_n 24 ... 230 V DC or AC

supply current

I_n < 42 mA (24 V DC);
max. < 80 mA (20 V AC)

power consumption

P_n < 1.1 W

maximum r.m.s. or d.c. voltage

U_m 253 V AC / 125 V DC

galvanically separated up to a peak voltage

U_p 375 V

2. Intrinsically safe sensor circuit (4.1 and 4.3/ 5.1 and 5.3)

maximum output voltage

U_o 9.56 V

maximum output current

I_o 10.3 mA

maximum output power

P_o 25 mW

characteristic

linear (928 Ω)

effective internal capacity

C_i negligible

effective internal inductivity

L_i negligible

3. Relay output (2.1 and 2.3 / 3.1 and 3.3)

maximum Switching voltage

U_s 250 V AC (2 A) /
120 V DC (0.2 A) /
30 V DC (2 A)

maximum switching power

P_s 500 VA

Safety instructions:

For circuits including inductances and capacitances the following has to be observed:
The values for L_o and C_o , mentioned in the EU-Type Examination certificate are allowed for:

- distributed inductance and capacitance e.g. as in a cable or
- if the total L_i of the external circuit (excluding the cable) is < 1 % of the L_o value or
- if the total C_i of the external circuit (excluding the cable) is < 1 % of the C_o value.

	Ex ia IIC	Ex ia IIB/IIIC	Ex ia IIA
C_o	3.6 µF	26 µF	210 µF
L_o	300 mH	1000 mH	1000 mH

The values of L_o and C_o determined in the EU-Type Examination shall be reduced to 50 % or taken from the following table if both of the following conditions are met:

- the total L_i of the external circuit (excluding the cable) ≥ 1 % of the L_o value and
- the total C_i of the external circuit (excluding the cable) ≥ 1 % of the C_o value.

The reduced capacitance of the external circuit (including cable) shall not be greater than 1 μ F for Groups I, IIA, and IIB and 600 nF for Group IIC.

	Ex ia IIC					Ex ia IIB/IIA, Ex ia IIIC			
C_o	510 nF	580 nF	600 nF	600 nF	600 nF	1 μ F	1 μ F	1 μ F	1 μ F
L_o	100 mH	50 mH	5 mH	1 mH	10 μ H	100 mH	5 mH	1 mH	10 μ H

When using the device at altitudes between 2000 and 5000 m above sea level, the instructions in the operating manual must be observed.

Derating T_{amb} , U_m and $U_{isolation, "ec"}$ as elevation above sea level increases:

Height:	T_{amb} :	T_{amb} with Derating*:	U_m :	$U_{isolation, "ec"}:$
≤ 2000 m	-40 °C...+60 °C	-40 °C...+70 °C	253 V AC / 125 V DC	265 V
>2000 m ... ≤ 3000 m	-40 °C...+54 °C	-40 °C...+63 °C	190 V AC / 110 V DC	190 V
>3000 m ... ≤ 4000 m	-40 °C...+48 °C	-40 °C...+56 °C	60 V	60 V
>4000 m ... ≤ 5000 m	-40 °C...+42 °C	-40 °C...+49 °C	60 V	60 V

* T_{amb} with derating: With 6mm distance around all sides of the housing and only when mounted vertically (DIN rail horizontally).

Variations compared to issue 1 of this certificate:

Variation 1

The ambient temperature range has been extended to +70 °C.

[16] Test report

The test results are recorded in the confidential test report IB-21-3-0210/2 of 2021-12-13.
The test documents are part of the test report and they are listed there.

Summary of the test results

The NAMUR Switch Isolating Amplifiers type MACX ***-EX-SL-xNAM-yR-UP(-SP)*** mentioned under [4] further fulfil the requirements of explosion protection on an associated apparatus for Group I and II and Category M1 and 1G or 1D in type of protection intrinsic safety.

Additionally the NAMUR Switch Isolating Amplifiers fulfil the requirements of explosion protection of an electrical equipment for Equipment Group II and Category 3G in type of protection increased safety in combination with type of protection "n", sealed device "nc" and intrinsic safety.

[17] Specific conditions of use

- The NAMUR Switch Isolating Amplifiers MACX ***-EX-SL-xNAM-yR-UP(-SP)*** have to be installed in a certified housing fulfilling the requirements of EN IEC 60079-0 (min. IP54) or another recognized type of protection when installed in Zone 2 (category 3).
- Connecting and disconnecting of non-intrinsically safe circuits are not allowed in energized state in Zone 2.
- The DIP Switches may only be used if no explosive atmosphere is present.

[18] Essential health and safety requirements

In addition to the essential health and safety requirements (EHSRs) covered by the standards listed at item [9], the following are considered relevant to this product, and conformity is demonstrated in the test report:

None

- [19] **Drawings and Documents**
The documents are listed in the test report.

IBExU Institut für Sicherheitstechnik GmbH
Fuchsmühlenweg 7
09599 Freiberg, GERMANY

By order



Dipl.-Ing.(FH) A. Henker

Freiberg, 2021-12-21



IECEx Certificate of Conformity

INTERNATIONAL ELECTROTECHNICAL COMMISSION IEC Certification System for Explosive Atmospheres

for rules and details of the IECEx Scheme visit www.iecex.com

Certificate No.:	IECEx IBE 10.0002X	Page 1 of 4	Certificate history:
Status:	Current	Issue No: 4	Issue 3 (2020-10-07)
Date of Issue:	2021-12-21		Issue 2 (2016-04-14)
			Issue 1 (2012-07-27)
			Issue 0 (2010-04-06)
Applicant:	PHOENIX CONTACT GmbH & Co. KG Flachmarktstraße 8 32825 Blomberg Germany		
Equipment:	NAMUR Switch Isolating Amplifier (Ex i and Non Ex i) type MACX *** (-EX)-SL-xNAM-yR-UP(-SP)...		
Optional accessory:			
Type of Protection:	Intrinsic safety or increased safety in combination with intrinsic safety and type of protection "n"		
Marking:	type MACX ***-EX-SL-xNAM-yR-UP(-SP).... [Ex ia Ma] I [Ex ia Ga] IIC [Ex ia Da] IIIC Ex ec [ia Ga] nC IIC T4 Gc -40 °C ≤ T _{amb} ≤ +60 °C / +70 °C type MACX ***-SL-xNAM-yR-UP(-SP).... Ex ec nC IIC T4 Gc -40 °C ≤ T _{amb} ≤ +60 °C / +70 °C		

Approved for issue on behalf of the IECEx
Certification Body:

Alexander Henker

Position:

Deputy Head of department Certification Body

Signature:
(for printed version)

A. Henker
2021-12-21

Date:

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Certificate issued by:

IBExU Institut für Sicherheitstechnik GmbH
Fuchsmühlenweg 7
09599 Freiberg
Germany





IECEx Certificate of Conformity

Certificate No.: **IECEx IBE 10.0002X**

Page 2 of 4

Date of issue: 2021-12-21

Issue No: 4

Manufacturer: **PHOENIX CONTACT GmbH & Co. KG**
Flachsmarktstr. 8
32825 Blomberg
Germany

Additional
manufacturing
locations:

This certificate is issued as verification that a sample(s), representative of production, was assessed and tested and found to comply with the IEC Standard list below and that the manufacturer's quality system, relating to the Ex products covered by this certificate, was assessed and found to comply with the IECEx Quality system requirements. This certificate is granted subject to the conditions as set out in IECEx Scheme Rules, IECEx 02 and Operational Documents as amended

STANDARDS :

The equipment and any acceptable variations to it specified in the schedule of this certificate and the identified documents, was found to comply with the following standards

IEC 60079-0:2017 Explosive atmospheres - Part 0: Equipment - General requirements
Edition:7.0

IEC 60079-11:2011 Explosive atmospheres - Part 11: Equipment protection by intrinsic safety "i"
Edition:6.0

IEC 60079-15:2017 Explosive atmospheres - Part 15: Equipment protection by type of protection "n"
Edition:5.0

IEC 60079-7:2017 Explosive atmospheres - Part 7: Equipment protection by increased safety "e"
Edition:5.1

This Certificate **does not** indicate compliance with safety and performance requirements other than those expressly included in the Standards listed above.

TEST & ASSESSMENT REPORTS:

A sample(s) of the equipment listed has successfully met the examination and test requirements as recorded in:

Test Reports:

DE/IBE/ExTR10.0002/00
DE/IBE/ExTR10.0002/03

DE/IBE/ExTR10.0002/01
DE/IBE/ExTR10.0002/04

DE/IBE/ExTR10.0002/02

Quality Assessment Report:

NL/DEK/QAR11.0009/08



IECEx Certificate of Conformity

Certificate No.: **IECEx IBE 10.0002X**

Page 3 of 4

Date of issue: 2021-12-21

Issue No: 4

EQUIPMENT:

Equipment and systems covered by this Certificate are as follows:

The NAMUR Switch Isolating Amplifiers MACX ***-EX-SL-xNAM-yR-UP(-SP)... are used for the intrinsically safe and galvanically isolated operation of proximity switches with NAMUR behaviour or potential-free switches and resistance-connected switches. They are equipped with a wide voltage range supply. The equipment is provided for installation in zone 2 or in the safe area as associated apparatus. The intrinsically safe signal circuits may be routed into areas that require EPL Ma, Ga (Zone 0) or Da (Zone 20).

The NAMUR Switch Isolating Amplifiers MACX ***-SL-xNAM-yR-UP(-SP)... are used for galvanically isolated operation of proximity switches with NAMUR behaviour or potential-free switches and resistance-connected switches. They are intended for the use in zone 2.

The voltage difference between input and output circuit or supply can be up to 375 V peak. The modules are equipped with a circuit for the detection of line faults.

The technical data are mentioned in the Annex.

SPECIFIC CONDITIONS OF USE: YES as shown below:

Special conditions for safe use in zone 2:

- The NAMUR Switch Isolating Amplifiers MACX ***(-EX)-SL-xNAM-yR-UP(-SP)... have to be installed in a certified housing fulfilling the requirements of IEC 60079-0 or another recognized type of protection for operation in zone 2.
- Connecting and disconnecting of non-intrinsically safe circuits are not allowed in energized state in Zone 2.
- The DIP Switches may only be used if no explosive atmosphere is present.



IECEx Certificate of Conformity

Certificate No.: **IECEx IBE 10.0002X**

Page 4 of 4

Date of issue: 2021-12-21

Issue No: 4

DETAILS OF CERTIFICATE CHANGES (for issues 1 and above)

The ambient temperature range is extended to +70 °C.

Annex:

[Annex_IBE10.0002_04.pdf](#)



IECEX Certificate of Conformity - Annex



Certificate No: IECEx IBE 10.0002X

Issue No: 4

Date of Issue: 2021-12-21

Page 1 of 2

Technical data:

The following values apply for types: MACX ***-EX-SL-xNAM-yR-UP(-SP)...

Environmental data	
Ambient temperature range	-40 °C up to + 60 °C -40 °C up to + 70 °C (with ≥ 6 mm distance to other devices)
Degree of protection of the enclosure	$\geq$ IP20

Electrical data			
1.	Power Supply (1.1 and 1.2)		
	rated voltage range	U_n	24 ... 230 V DC or AC
	supply current	I_n	< 42 mA (24 V DC); max. < 80 mA (20 V AC)
	power consumption	P_n	< 1.1 W
	maximum r.m.s. or d.c. voltage	U_m	253 V AC / 125 DC
	galvanically separated up to a peak voltage	U_p	375 V
2.	Intrinsically safe sensor circuit (4.1 and 4.3/5.1 and 5.3)		
	maximum output voltage	U_o	9.56 V
	maximum output current	I_o	10.3 mA
	maximum output power	P_o	25 mW
	characteristic		linear (928 Ω)
	internal capacitance, inductance	$C_i; L_i$	negligible
3.	Relay output (2.1 ... 2.3 / 3.1 ... 3.3)		
	maximum switching voltage	U_s	250 V AC (2 A) / 120 V DC (0.2 A) / 30 V DC (2 A)
	maximum switching power	P_s	500 VA

For circuits including inductances and capacitances the following has to be observed:

The values for L_o and C_o , mentioned in this certificate are allowed for:

- distributed inductances and capacitances, e.g. as in a cable or
- if the total L_i of the external circuit (excluding the cable) is < 1 % of the L_o value or
- if the total C_i of the external circuit (excluding the cable) is < 1 % of the C_o value.

	Ex ia IIC	Ex ia IIB/IIIC	Ex ia IIA, Ex ia I
C_o	3.6 μ F	26 μ F	210 μ F
L_o	300 mH	1000 mH	1000 mH

The values of L_o and C_o , mentioned in this certificate shall be reduced to 50 % or taken from the following table if both of the following conditions are met:

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

	Ex ia IIC					Ex ia I, Ex ia IIB/IIA, Ex ia			
C_o	510 nF	580 nF	600 nF	600 nF	600 nF	1 μ F	1 μ F	1 μ F	1 μ F
L_o	100 mH	50 mH	5 mH	1 mH	10 μ H	100 mH	5 mH	1 mH	10 μ H



IECEX Certificate of Conformity - Annex



Certificate No: IECEx IBE 10.0002X

Issue No: 4

Date of Issue: 2021-12-21

Page 2 of 2

The reduced capacitance of the external circuit (including cable) shall not be greater than 1 μ F for Groups I, IIA and IIB and 600 nF for Group IIC.

The following values apply for types: MACX ***-SL-xNAM-yR-UP-...

Environmental data	
Ambient temperature range	-40 °C up to + 60 °C -40 °C up to + 70 °C (with ≥ 6 mm distance to other devices)
Degree of protection of the enclosure	$\geq$ IP 20

Electrical data			
1.	Power Supply (1.1 and 1.2)		
	rated voltage range	U_n	24 ... 230 V DC or AC
	supply current	I_n	< 42 mA (24 V DC); max. < 80 mA (20 V AC)
	power consumption	P_n	< 1.1 W
	galvanically separated up to	U	300 V_{eff} according to IEC 61010
2.	NAMUR sensor circuit (4.1 and 4.3/5.1 and 5.3)		
	rated output voltage	U	8 V $\pm$ 10 %
	nominal output current	I	8 mA $\pm$ 10 %
3.	Relay output (2.1 ... 2.3 / 3.1 ... 3.3)		
	maximum switching voltage	U_s	250 V AC (2 A) / 120 V DC (0.2 A) / 30 V DC (2 A)
	maximum switching power	P_s	500 VA

If using the device in altitudes between 2000 and 5000 m above sea level the advices for derating from the instructions have to be taken into account.

Derating T_{amb} , U_m and $U_{isolation,ec}$ as elevation above sea level increases:

Height:	T_{amb} :	T_{amb} with Derating*:	U_m :	$U_{isolation,ec}$:
≤ 2000 m	-40 °C...+60 °C	-40 °C...+70 °C	253 V AC / 125 V DC	265 V
>2000 m ... ≤ 3000 m	-40 °C...+54 °C	-40 °C...+63 °C	190 V AC / 110 V DC	190 V
>3000 m ... ≤ 4000 m	-40 °C...+48 °C	-40 °C...+56 °C	60 V	60 V
>4000 m ... ≤ 5000 m	-40 °C...+42 °C	-40 °C...+49 °C	60 V	60 V

* T_{amb} with derating: With 6mm distance around all sides of the housing and only when mounted vertically (DIN rail horizontally).

EU-Konformitätserklärung

Pepperl+Fuchs SE
Lilienthalstraße 200
68307 Mannheim
Germany
Phone +49 621 776-0
Fax +49 621 776-1000

No. / Nr.: DOC-5088A
Date / Datum: 2022-09-22

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www.pepperl-fuchs.com



Declaration of conformity / Konformitätserklärung

We, Pepperl+Fuchs SE declare under our sole responsibility that the **products** listed below are in conformity with the listed **European Directives** and **standards**.

Die Pepperl+Fuchs SE erklärt hiermit in alleiniger Verantwortung, dass die unten gelisteten **Produkte** den genannten **Europäischen Richtlinien** und **Normen** entsprechen.

Products / Produkte

Product / Produkt	Item number	Description / Beschreibung
RC10-14-N3-Y95216	106545	Inductive ring sensor
RJ15-N	106556	Inductive ring sensor
RC15-14-N0	095910	Inductive ring sensor
RJ15-14-N	106555	Inductive ring sensor
RC15-14-N0-Y187459	187459	Inductive ring sensor
RJ15-14-N-5M	120803	Inductive ring sensor
RC15-14-N0-Y54559	106546	Inductive ring sensor
RC15-14-N0-Y95903	095903	Inductive ring sensor
RC15-14-N3	051667	Inductive ring sensor
RC15-14-N3-Y115615	115615	Inductive ring sensor
RC15-14-N3-Y187457	187457	Inductive ring sensor
RC15-14-N3-Y187458	187458	Inductive ring sensor
RC10-14-N0	095912	Inductive ring sensor
RC10-14-N0-Y180779	180779	Inductive ring sensor
RC10-14-N0-Y187456	187456	Inductive ring sensor
RC10-14-N0-Y95902	095902	Inductive ring sensor
RC10-14-N3	051666	Inductive ring sensor
RC10-14-N3-Y110970	110970	Inductive ring sensor
RC10-14-N3-Y115614	115614	Inductive ring sensor
RC10-14-N3-Y187454	187454	Inductive ring sensor
RC10-14-N3-Y187455	187455	Inductive ring sensor
RC15-14-N3-Y49839	106549	Inductive ring sensor
RC10-14-N3-Y53478	106544	Inductive ring sensor
RC15-14-N3-Y53479	106550	Inductive ring sensor

Directives and Standards / Richtlinien und Normen

EU-Directive EU-Richtlinie	Standards Normen
ATEX 2014/34/EU (L96/309-356)	EN 60079-11:2012-01 EN IEC 60079-0:2018-07
EMC 2014/30/EU (L96/79-106)	EN 60947-5-6:2000-01 EN IEC 60947-5-2:2020-03
RoHS 2011/65/EU (L174/88-110)	EN IEC 63000:2018-12

Affixed CE Marking / Angebrachte CE-Kennzeichnung



Signatures / Unterschriften

Mannheim, 2022-09-22

ppa. J. Helm

ppa. Wolfgang Helm
Director
Business Unit Sensors

i.V. U. Ehrenfried

i.V. Ulrich Ehrenfried
Head of Innovation Unit
Electromagnetic Sensors

ANNEX ATEX

Notified Body QM-System / Notifizierte Stelle des QM-Systems
Physikalisch Technische Bundesanstalt (0102)
Bundesallee 100
38116 Braunschweig
Germany

Marking and Certificates / Kennzeichnung und Zertifikate

Marking Kennzeichnung	Certificate Zertifikat	Issuer ID Aussteller ID
Ex II 2 G	PTB 99 ATEX 2128 X	0102

Key for Issuer ID / Schlüssel zur Aussteller ID

ID	Issuer / Aussteller
0102	Physikalisch Technische Bundesanstalt Bundesallee 100 38116 Braunschweig Germany

Pepperl+Fuchs SE
Lilienthalstrasse 200
68307 Mannheim
Germany
Phone +49 621 776-0
Fax +49 621 776-1000

No: DOC-6565A
Date: 2022-09-22

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www.pepperl-fuchs.com



Declaration of conformity

We, Pepperl+Fuchs SE declare under our sole responsibility that the **products** listed below are in conformity with the listed **UK Regulations** as indicated below and amended by **UK SI 2019 No. 696**, and **standards**.

Products

Product	Item number	Description
RC10-14-N3-Y95216	106545	Inductive ring sensor
RJ15-N	106556	Inductive ring sensor
RC15-14-N0	095910	Inductive ring sensor
RJ15-14-N	106555	Inductive ring sensor
RC15-14-N0-Y187459	187459	Inductive ring sensor
RJ15-14-N-5M	120803	Inductive ring sensor
RC15-14-N0-Y54559	106546	Inductive ring sensor
RC15-14-N0-Y95903	095903	Inductive ring sensor
RC15-14-N3	051667	Inductive ring sensor
RC15-14-N3-Y115615	115615	Inductive ring sensor
RC15-14-N3-Y187457	187457	Inductive ring sensor
RC15-14-N3-Y187458	187458	Inductive ring sensor
RC10-14-N0	095912	Inductive ring sensor
RC10-14-N0-Y180779	180779	Inductive ring sensor
RC10-14-N0-Y187456	187456	Inductive ring sensor
RC10-14-N0-Y95902	095902	Inductive ring sensor
RC10-14-N3	051666	Inductive ring sensor
RC10-14-N3-Y110970	110970	Inductive ring sensor
RC10-14-N3-Y115614	115614	Inductive ring sensor
RC10-14-N3-Y187454	187454	Inductive ring sensor
RC10-14-N3-Y187455	187455	Inductive ring sensor
RC15-14-N3-Y49839	106549	Inductive ring sensor
RC10-14-N3-Y53478	106544	Inductive ring sensor
RC15-14-N3-Y53479	106550	Inductive ring sensor

Regulations and Standards

UK Regulation	Standards
UK SI 2012 No. 3032 (RoHS)	EN IEC 63000:2018-12
UK SI 2016 No. 1091 (EMC)	EN 60947-5-6:2000-01 EN IEC 60947-5-2:2020-03
UK SI 2016 No. 1107 (EX)	EN 60079-11:2012-01 EN IEC 60079-0:2018-07

Affixed UKCA Marking



Signatures

Mannheim, 2022-09-22

ppa. Wolfgang Helm
Director
Business Unit Sensors

i.V. Ulrich Ehrenfried
Head of Innovation Unit
Electromagnetic Sensors

ANNEX UK SI 2016 No. 1107 (EX)

Approved Body QM-System:
Eurofins E&E CML Limited (2503)
Newport Business Park - New Port Road
CH65 4LZ Ellesmere Port
United Kingdom

Marking and Certificates

Marking	Certificate	ID
Ex II 2 G	CML 21UKEX21274X	2503

Key for ID

ID	Responsible Body
2503	Eurofins E&E CML Limited Newport Business Park - New Port Road CH65 4LZ Ellesmere Port United Kingdom



(1) EC-TYPE-EXAMINATION CERTIFICATE (Translation)

- (2) Equipment and Protective Systems Intended for Use in
Potentially Explosive Atmospheres - **Directive 94/9/EC**
- (3) EC-type-examination Certificate Number:



PTB 99 ATEX 2128 X

- (4) Equipment: Ring initiator types RJ..., RC... and TG...
- (5) Manufacturer: Pepperl + Fuchs GmbH
- (6) Address: D-68307 Mannheim
- (7) This equipment and any acceptable variation thereto are specified in the schedule to this certificate and the documents therein referred to.
- (8) The Physikalisch-Technische Bundesanstalt, notified body No. 0102 in accordance with Article 9 of the Council Directive 94/9/EC of 23 March 1994, certifies that this equipment has been found to comply with the Essential Health and Safety Requirements relating to the design and construction of equipment and protective systems intended for use in potentially explosive atmospheres, given in Annex II to the Directive.
- The examination and test results are recorded in the confidential report PTB Ex 99-29058.
- (9) Compliance with the Essential Health and Safety Requirements has been assured by compliance with:
EN 50014:1997 **EN 50020:1994**
- (10) If the sign "X" is placed after the certificate number, it indicates that the equipment is subject to special conditions for safe use specified in the schedule to this certificate.
- (11) This EC-type-examination Certificate relates only to the design and construction of the specified equipment in accordance with Directive 94/9/EC. Further requirements of this Directive apply to the manufacture and supply of this equipment.
- (12) The marking of the equipment shall include the following:

 **II 2 G EEx ia IIC T6**

Zertifizierungsstelle Explosionsschutz
By order:

Braunschweig, August 10, 1999

In the absence of Dr.-Ing. U. Jermannsmeier
Regierungsdirektor



sheet 1/4

EC-type-examination Certificates without signature and official stamp shall not be valid. The certificates may be circulated only without alteration. Extracts or alterations are subject to approval by the Physikalisch-Technische Bundesanstalt. In case of dispute, the German text shall prevail.

(13)

SCHEDULE

(14)

EC-TYPE-EXAMINATION CERTIFICATE PTB 99 ATEX 2128 X

(15) Description of equipment

The ring initiators of types RJ..., RC... and TG... are used to convert displacements into electrical signals.

The ring initiators may be operated with intrinsically safe circuits certified for categories and explosion groups [EEx ia] IIC or IIB resp. [EEx ib] IIC or IIB. The category as well as the explosion group of the intrinsically safe ring initiators depends on the connected supplying intrinsically safe circuit.

Electrical data

Evaluation and

supply circuit..... type of protection Intrinsic Safety EEx ia IIC/IIB

..... resp. EEx ib IIC/IIB

only for connection to certified intrinsically safe circuits

Maximum values:

type 1	type 2	type 3
$U_i = 16 \text{ V}$	$U_i = 16 \text{ V}$	$U_i = 16 \text{ V}$
$I_i = 25 \text{ mA}$	$I_i = 25 \text{ mA}$	$I_i = 52 \text{ mA}$
$P_i = 34 \text{ mW}$	$P_i = 64 \text{ mW}$	$P_i = 169 \text{ mW}$

The assignment of the type of the connected circuit to the maximum permissible ambient temperature and the temperature class as well as the effective internal reactances for the individual types of ring initiators are shown in the table:

types	L _i [μH]	C _i [nF]	type 1			type 2			type 3		
			maximum permissible ambient temperature in °C for application in temperature class								
			T6	T5	T4-T1	T6	T5	T4-T1	T6	T5	T4-T1
RJ10-N...	20	30	75	90	100	70	85	100	55	70	90
RJ10-...-N...	20	30	75	90	100	70	85	100	55	70	90
RJ10-Bi...	20	90	75	90	100	70	85	100	55	70	90
RJ10-...-Bi...	20	90	75	90	100	70	85	100	55	70	90
RC10-...-N0...	100	150	75	90	100	70	85	100	55	70	90
RC10-...-N3...	120	90	75	90	100	70	85	100	55	70	90
TG10	20	30	75	90	100	70	85	100	55	70	90
TG10-1	100	150	75	90	100	70	85	100	55	70	90
TG10-bi	20	90	75	90	100	70	85	100	55	70	90
TG10-1bi	120	90	75	90	100	70	85	100	55	70	90
RJ15-N...	20	130	75	90	100	70	85	100	55	70	90
RJ15-...-N...	20	130	75	90	100	70	85	100	55	70	90
RJ15-Bi...	50	90	75	90	100	70	85	100	55	70	90
RJ15-...-Bi...	50	90	75	90	100	70	85	100	55	70	90
RC15-...-N0...	100	150	75	90	100	70	85	100	55	70	90
RC15-...-N3...	70	90	75	90	100	70	85	100	55	70	90
TG15	20	130	75	90	100	70	85	100	55	70	90
TG15-1	100	150	75	90	100	70	85	100	55	70	90
TG15-bi	50	90	75	90	100	70	85	100	55	70	90
TG15-1bi	70	90	75	90	100	70	85	100	55	70	90
RJ21-N...	25	30	75	90	100	70	85	100	55	70	90
RJ21-Bi...	50	70	75	90	100	70	85	100	55	70	90
RJ43-N...	50	40	75	90	100	70	85	100	55	70	90

(16) Test report PTB Ex 99-29058

(17) Special conditions for safe use

1. For the application within a temperature range of -60°C to -20 °C the ring initiators of types RJ..., RC... and TG... must be protected against damage due to impact by mounting into an additional housing.
2. The connection facilities of the ring initiators of types RJ..., RC... and TG... shall be installed as such that at least a degree of protection of IP20 according to IEC-publication 60529:1989 is met.

3. The assignment of the type of the connected circuit to the maximum permissible ambient temperature and the temperature class as well as the effective internal reactances for the individual types of ring initiators is shown in the table given under item (15) of this EC-type-examination certificate..
4. Inadmissible electrostatic charge of the plastic housing of the ring initiators of types RJ43-...-N..., RJ21-...-N... and RJ21-...-Bi... has to be avoided. A warning label on the device shall point to this danger.

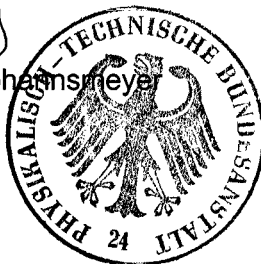
(18) Essential health and safety requirements

Met by the standards mentioned above

Zertifizierungsstelle Explosionsschutz
By order:

Braunschweig, August 10, 1999


In the absence of Dr.-Ing. U. Johansmeyer
Regierungsdirektor



1. SUPPLEMENT

according to Directive 94/9/EC Annex III.6

to EC-TYPE-EXAMINATION CERTIFICATE PTB 99 ATEX 2128 X (Translation)

Equipment: Ring initiator, types RJ..., RC... and TG...

Marking:  II 2 G EEx ia IIC T6

Manufacturer: Pepperl+Fuchs GmbH

Address: Lilienthalstraße 200, 68307 Mannheim, Germany

Description of supplements and modifications

The modifications concern the consideration of the current state of the applied standards and – resulting from this – the marking of the ring initiators, types RJ..., RC... and TG..., the way how to affix the marking on the equipment as well as the internal construction (inclusion of further alternative casting resin materials, wrapping PCB's with PTFE-tape). The "Electrical Data", the "Special Conditions" as well as all other specifications apply without changes.

In the future the marking will read:

 II 2 G Ex ia IIC T6...T1 Gb

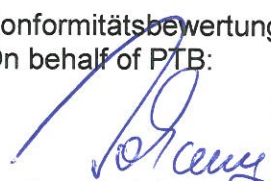
Applied standards

EN 60079-0:2012, EN 60079-11:2012

Test report: PTB Ex 15-24246

Konformitätsbewertungsstelle, Sektor Explosionsschutz
On behalf of PTB:

Braunschweig, April 28, 2015


Dr.-Ing. U. Johannsmeyer
Direktor und Professor



Sheet 1/1

EC-type-examination Certificates without signature and official stamp shall not be valid. The certificates may be circulated only without alteration. Extracts or alterations are subject to approval by the Physikalisch-Technische Bundesanstalt. In case of dispute, the German text shall prevail.

UK Type Examination Certificate CML 21UKEX21274X Issue 0**United Kingdom Conformity Assessment**

- 1 Product or Protective System Intended for use in Potentially Explosive Atmospheres UKSI 2016:1107 (as amended) – Schedule 3A, Part 1
- 2 Equipment **Ring Initiators Types RJ... and RC...**
- 3 Manufacturer **Pepperl+Fuchs SE**
- 4 Address **Lilienthalstrasse 200
68307 Mannheim
Germany**
- 5 The equipment is specified in the description of this certificate and the documents to which it refers.
- 6 Eurofins E&E CML Limited, Newport Business Park, New Port Road, Ellesmere Port, CH65 4LZ, United Kingdom, Approved Body Number 2503, in accordance with Regulation 43 of the Equipment and Protective Systems Intended for Use in Potentially Explosive Atmospheres Regulations 2016, UKSI 2016:1107 (as amended), certifies that this equipment has been found to comply with the Essential Health and Safety Requirements relating to the design and construction of equipment intended for use in potentially explosive atmospheres given in Schedule 1 of the Regulations.

The examination and test results are recorded in the confidential reports listed in Section 12.
- 7 If an 'X' suffix appears after the certificate number, it indicates that the equipment is subject to specific conditions of use (affecting correct installation or safe use). These are specified in Section 14.
- 8 This UK Type Examination certificate relates only to the design and construction of the specified equipment. Further requirements of the Regulations apply to the manufacturing process and supply of the product. These are not covered by this certificate.
- 9 Compliance with the Essential Health and Safety Requirements, with the exception of those listed in the confidential report, has been demonstrated through compliance with the following documents:

EN IEC 60079-0:2018 EN 60079-11:2012
- 10 The equipment shall be marked with the following:



II 2 G

Ex ia IIC T6...T1 Gb





CML 21UKEX21274X
Issue 0

11 Description

The ring initiators of types RJ... and RC ... are used to convert displacements into electrical signals.

The level of protection as well as the explosion group of the intrinsically safe ring initiators depend on the intrinsically safe supply circuit connected to the initiators.

The changes concern the application of the state of the standard EN IEC 60079-0:2018, the reduction of the scope of the EU-Type Examination Certificate to the types listed in table 2 as well as the legal form of the manufacturing company.

Electrical data

Evaluation and
supply circuit..

only for connection to certified intrinsically safe circuits
Ex ia IIC/IIB or Ex ib IIC/IIB for EPL Gb

Maximum values:

Type 1	Type 2	Type 3
Ui =16V	Ui =16V	Ui =16V
Ii= 25 mA	Ii= 25 mA	Ii = 52 mA
Pi = 34mW	Pi =64mW	Pi = 169 mW

Table 1

For relationship between type of connected circuit, maximum permissible ambient temperature for the application as EPL Gb-equipment and temperature class as well as the effective internal reactances for the individual types of ring initiators, reference is made to the following table 2.

			Type 1			Type 2			Type 3		
Types	Li [μH]	Ci [nF]	Maximum permissible ambient temperature in °C for the application in temperature class								
			T6	T5	T4-T1	T6	T5	T4-T1	T6	T5	T4-T1
RC10-...-N0...	100	150	75	90	100	70	85	100	55	70	90
RC10-...-N3...	120	90	75	90	100	70	85	100	55	70	90
RJ15-N...	20	130	75	90	100	70	85	100	55	70	90
RJ15-...-N...	20	130	75	90	100	70	85	100	55	70	90
RC15-...-N0...	100	150	75	90	100	70	85	100	55	70	90
RC15-...-N3...	70	90	75	90	100	70	85	100	55	70	90

Table 2



CML 21UKEX21274X
Issue 0

12 Certificate history and evaluation reports

Issue	Date	Associated report	Notes
0	05 Nov 2021	R14112BU/00	Prime Certificate issued.

Note: Drawings that describe the equipment are listed or referred to in the Annex.

13 Conditions of Manufacture

None.

14 Specific Conditions of Use

The following conditions relate to safe installation and/or use of the equipment.

- i. The relationship between type of the connected circuit, maximum permissible ambient temperature for adherence to the temperature class as well as the effective internal reactance for the individual types of ring initiators is specified in tables 1 and 2 of this certificate or in the operating instructions manual.
- ii. The ring initiators shall be protected against mechanical damage due to impact if they are applied within an ambient temperature range of -60°C to -20 °C. An ambient temperature below -60 °C is not permitted.
- iii. The connection facilities of the ring initiators shall be installed as such that a minimum degree of protection of IP20 according to IEC 60529 is met.
- iv. For the application of the following ring initiators in hazardous areas of group II appropriate measures shall be taken to protect the free surface of the encapsulation against mechanical damage if the encapsulation surface is freely accessible after installation.
 - a. Types
 - b. RC10-...-N0...
 - c. RC10- ...-N3...
 - d. RJ15-N...
 - e. RJ15-... -N ...
 - f. RC15- ...-N0...
 - g. RC15- ...-N3...

Certificate Annex

Certificate Number CML 21UKEX21274X
Equipment Ring Initiators Types RJ... and RC...
Manufacturer Pepperl+Fuchs SE



The following documents describe the equipment defined in this certificate:

Issue 0

For drawings describing the equipment, refer to attached certificate PTB 99ATEX2128X. In addition to the drawings listed on PTB 99ATEX2128X the following drawings include the additional marking required for this UK Type Examination certification:

Drawing No	Sheets	Rev	Approved date	Title
16-1555CM-10	1 to 2	0	05 Nov 2021	Additional Marking Requirements for UKCA

RMA-Formular und Erklärung über Dekontaminierung

RMA-去污表格和声明



RMA-Nr./ 商品退货 授权号码

Die RMA-Nr. bekommen Sie von Ihrem Ansprechpartner im Vertrieb oder Service. Bei Rücksendung eines Altgeräts zur Entsorgung tragen Sie bitte in das Feld der RMA-Nr. "WEEE" ein./ 从销售或服务处的联系人那里可获得商品退货授权 (RMA) 号码。当寄还旧设备以废弃处理时, 请于RMA号码栏中输入"WEEE"。

Zu diesem Rücksendeschein gehört eine Dekontaminierungserklärung. Die gesetzlichen Vorschriften schreiben vor, dass Sie uns diese Dekontaminierungserklärung ausgefüllt und unterschrieben zurücksenden müssen. Bitte füllen Sie auch diese im Sinne der Gesundheit unserer Mitarbeiter vollständig aus./ 请将退货单, 去污声明和货运单一同装在透明套中, 粘在包装外。否则您的维修委托将不予处理。

Firma/ 公司

Firma/ 公司

Straße/ 街道

PLZ, Ort/ 邮政编码, 地点

Land/ 国家

Gerät/ 设备

Anzahl/ 数量

Auftragsnr./ 订单号码

Ansprechpartner/ 联系人

Name/ 姓名

Abt./ 部门

Tel./ 电话

E-Mail

Serien-Nr./ 序列号

Artikel-Nr./ 商品编号

Grund der Rücksendung/ 寄回原因

- ☐ Kalibrierung/ 校准 ☐ Modifikation/ 修改
☐ Reklamation/ 投诉 ☐ Reparatur/ 修复
☐ Elektroaltgerät/ 废旧电子设备 (WEEE)
☐ andere/ 其他的

bitte spezifizieren/ 请注明

Ist das Gerät möglicherweise kontaminiert?/ 设备是否具有污染性?

- ☐ Nein, da das Gerät nicht mit gesundheitsgefährdenden Stoffen betrieben wurde./ 否, 因为该设备已被正确清洁和消毒。
☐ Nein, da das Gerät ordnungsgemäß gereinigt und dekontaminiert wurde./ 否, 因为未以有损健康的物质运行该设备。
☐ Ja, kontaminiert mit:/ 是, 污染物为:



☐
explosiv/
易爆的



☐
entzündlich/
易燃的



☐
brandfördernd/
助燃的



☐
komprimierte
Gase/
压缩气体



☐
ätzend/
腐蚀性的



☐
giftig,
Lebensgefahr/
有毒的, 致命危
险



☐
gesundheitsge-
fährdend/
危害健康的



☐
gesund-
heitsschädlich/
对人体有害的



☐
umweltge-
fährdend/
对环境有害的

Bitte Sicherheitsdatenblatt beilegen!/ 请附上《安全数据表》!

Das Gerät wurde gespült mit:/ 该设备已被冲洗:

Diese Erklärung wurde korrekt und vollständig ausgefüllt und von einer dazu befugten Person unterschrieben. Der Versand der (dekontaminierten) Geräte und Komponenten erfolgt gemäß den gesetzlichen Bestimmungen.

按法律规定寄回 (已去污的) 设备和组件

Falls die Ware nicht gereinigt, also kontaminiert bei uns eintrifft, muss die Firma Bühler sich vorbehalten, diese durch einen externen Dienstleister reinigen zu lassen und Ihnen dies in Rechnung zu stellen.

如果产品没有被清洁, 即我们收到时受了污染, 比勒公司保留委托一外部的服务提供商清理的权利并向您收取费用。

Firmenstempel/ 公司印章

Datum/ 日期

rechtsverbindliche Unterschrift/ 具法律约束力的签名

DC000011

12/2022

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Vermeiden von Veränderung und Beschädigung der einzusendenden Baugruppe

Die Analyse defekter Baugruppen ist ein wesentlicher Bestandteil der Qualitätssicherung der Firma Bühler Technologies GmbH. Um eine aussagekräftige Analyse zu gewährleisten muss die Ware möglichst unverändert untersucht werden. Es dürfen keine Veränderungen oder weitere Beschädigungen auftreten, die Ursachen verdecken oder eine Analyse unmöglich machen.

Umgang mit elektrostatisch sensiblen Baugruppen

Bei elektronischen Baugruppen kann es sich um elektrostatisch sensible Baugruppen handeln. Es ist darauf zu achten, diese Baugruppen ESD-gerecht zu behandeln. Nach Möglichkeit sollten die Baugruppen an einem ESD-gerechten Arbeitsplatz getauscht werden. Ist dies nicht möglich sollten ESD-gerechte Maßnahmen beim Austausch getroffen werden. Der Transport darf nur in ESD-gerechten Behältnissen durchgeführt werden. Die Verpackung der Baugruppen muss ESD-konform sein. Verwenden Sie nach Möglichkeit die Verpackung des Ersatzteils oder wählen Sie selber eine ESD-gerechte Verpackung.

Einbau von Ersatzteilen

Beachten Sie beim Einbau des Ersatzteils die gleichen Vorgaben wie oben beschrieben. Achten Sie auf die ordnungsgemäße Montage des Bauteils und aller Komponenten. Versetzen Sie vor der Inbetriebnahme die Verkabelung wieder in den ursprünglichen Zustand. Fragen Sie im Zweifel beim Hersteller nach weiteren Informationen.

Einsenden von Elektroaltgeräten zur Entsorgung

Wollen Sie ein von Bühler Technologies GmbH stammendes Elektroprodukt zur fachgerechten Entsorgung einsenden, dann tragen Sie bitte in das Feld der RMA-Nr. „WEEE“ ein. Legen Sie dem Altgerät die vollständig ausgefüllte Dekontaminierungserklärung für den Transport von außen sichtbar bei. Weitere Informationen zur Entsorgung von Elektroaltgeräten finden Sie auf der Webseite unseres Unternehmens.

避免修改和损坏要寄送的组件

对有缺陷的组件的分析是比勒科技有限公司的质量保证的一个重要组成部分。为了确保分析有说服力，必须尽可能地保持原样来检查产品。不能发生任何改变或进一步的损害，这样可能会掩盖原因或阻碍分析。

处理静电敏感组件

若有电子组件，则可能是静电敏感组件。必须注意以符合ESD标准的方式处理这些组件。如果可能，应在符合ESD标准的工作场所更换组件。如果不可能，在更换过程中应采取符合ESD标准的措施。只能在符合ESD标准的容器中运输。组件的封装必须符合ESD标准。如果可能，请使用备件的包装或自选一符合ESD标准的包装。

安装替换件

在安装备件时，请遵守上述说明。确保配件和所有组件的正确组装。调试前将电缆移回原来状态。如有疑问，请访问制造商了解更多信息。

将废旧电子设备寄送废弃处理

如果您想寄送来自Bühler Technologies GmbH的电子产品以进行妥善废弃处理，请于RMA号码栏中输入"WEEE"。将完整填写的去污声明附于废旧设备上，以便运输时从外部即可见。有关废弃电气和电子设备废弃处理的更多信息，请访问我司的网站。

