Анализ газов

# Расходомер

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

## Руководство по эксплуатации и установке

Оригинальное руководство по эксплуатации

BR400001
10/2024

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Перед использованием прибора внимательно прочитайте руководство по эксплуатации. Обратите особое внимание на указания по безопасности и предупреждения. В противном случае не исключена возможность травм или материального ущерба. Компания Bühler Technologies GmbH не несет ответственность при самовольных изменениях оборудования или его ненадлежащем использовании.

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Документ №:..... BR400001
Версия..... 10/2024

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# 1 Введение

## 1.1 Применение по назначению

Расходомеры служат для показания объема потока анализируемого газа или жидких сред. Тип оборудования Вы найдете на типовой табличке. На ней указаны номер заказа и артикульный номер, а также типовое обозначение. Особенности того или иного типа расходомеров обозначены в руководстве отдельно. При подключении и заказе запасных частей учитывайте характеристики расходомера и соответствующую модель.

Расходомеры серии SM-6/SM-6-V могут быть дополнительно оснащены бистабильным пороговым выключателем. У типа SM-6-V объем потока может быть настроен при помощи игольчатого клапана.

У безопасных расходомеров серии S-SM измерительный конус защищен вторым толстостенным стеклянным цилиндром. При разрыве измерительного конуса внешний цилиндр обеспечивает дополнительную защиту, препятствующую утечке среды. Кроме того, такой стеклянный цилиндр защищен трубой из нержавеющей стали от механических повреждений. Различные типы S-SM указаны в техническом паспорте.

**УКАЗАНИЕ**

**При эксплуатации во взрывоопасных зонах**

Расходомеры типов SM-6, SM6-V и S-SM 3-1 отвечают основным требованиям безопасности Директивы ЕС 2014/34/EU и допущены к использованию во взрывоопасных зонах в зоне 1 (**Тип S-SM 3-1: группа взрывоопасности IIC, Тип SM-6, SM-6-V: группа взрывоопасности IIB;** обязательно соблюдать указания по безопасности). Через расходомеры можно пропускать негорючие и горючие газы **группы взрывоопасности IIB** (тип SM-6 и SM-6-V) **или IIC** (тип S-SM 3-1), которые при нормальном режиме работы иногда могут быть взрывоопасными (**Зона 1**). На типовой табличке расходомера не указан знак взрывозащиты, поскольку оборудование не имеет собственного источника возгорания и таким образом не относится к области применения Директивы 2014/34/EC.

## 1.2 Объем поставки

- 1 x расходомер
- 1 x документация
- 1 x крепление (только для типа SM-6 / SM-6-V)

## 1.3 Указания для заказа

Конфигурация Вашего прибора закодирована в артикульном номере. Используйте для этого следующий типовой ключ:

| 4056 | X X | X | 99 | X | Диапазон измерений* |
|---|---|---|---|---|---|
| | 0 0 | | | | Воздух 6 – 60 Нл/ч |
| | 0 1 | | | | Воздух 10 – 100 Нл/ч |
| | 0 2 | | | | Воздух 25 – 250 Нл/ч |
| | 0 3 | | | | Воздух 50 – 500 Нл/ч |
| | 0 4 | | | | Воздух 80 – 800 Нл/ч |
| | 0 5 | | | | Вода 0,5 - 5 л/ч |
| | 0 6 | | | | Вода 1,2 - 12 л/ч |
| | 0 7 | | | | Вода 2,5 - 25 л/ч |
| | 0 8 | | | | Вода 4 - 40 л/ч |
| | 0 9 | | | | Вода 6 - 60 л/ч |
| | 1 0 | | | | Специальный диапазон измерений |
| | | 0 | | | без игольчатого клапана |
| | | 1 | | | Клапан PVDF / Витон |
| | | 2 | | | Клапан PCTFE / Перфторэластомер |
| | | | | S | Пороговый выключатель с креплением |
| | | | | - | без порогового выключателя |

* Стандартная измерительная труба; воздух 20 °C 1,2 бар абс; вода 20 °C

**Указания по заказу порогового выключателя:** Пороговый выключатель устанавливается на заводе, если в конце артикульного номера будет указана буква “S”. Без такого обозначения расходомер будет поставлен без порогового выключателя. Для управления пороговым выключателем предлагаются различные типы усилителей с гальванической развязкой (см. технический паспорт № 400003).

# 2 Указания по безопасности

## 2.1 Важные указания

Использование прибора допускается только при соблюдении следующих условий:

- продукт используется при соблюдении условий, описанных в Руководстве по эксплуатации и установке, в соответствии с типовой табличкой и для предусмотренных эксплуатационных задач; Компания Bühler Technologies GmbH не несет ответственности за произвольные изменения оборудования или его ненадлежащее использование,
- соблюдение данных и обозначений на типовых табличках,
- соблюдение пограничных значений, указанных в спецификации и в руководстве,
- надлежащая установка устройств контроля и безопасности,
- сервисные и ремонтные работы, не описанные в данном руководстве проводятся Bühler Technologies GmbH,
- использование оригинальных запасных частей.

Настоящее руководство по эксплуатации является частью оборудования. Производитель оставляет за собой право на изменение технических и расчетных данных, а также данных мощности без предварительного уведомления. Сохраняйте настоящее руководство для дальнейшего использования.

### Сигнальные слова предупреждений

| | |
|---|---|
| ОПАСНОСТЬ | Сигнальное слово, указывающее на опасность с высоким риском, напрямую ведущую к смерти и к тяжелым телесным повреждениям. |
| ПРЕДУПРЕЖДЕНИЕ | Сигнал для обозначения опасности со средним риском, которая при его непредотвращении может привести к смертельным или тяжелым ранениям. |
| ОСТОРОЖНО | Сигнал для обозначения опасности с низким риском, которая при его непредотвращении может привести к материальному ущербу или травмам легкой или средней степени тяжести. |
| УКАЗАНИЕ | Сигнальное слово, указывающее на важную информацию о продукте, на которую следует обратить особое внимание. |

### Предупреждающие знаки

В данном руководстве используются следующие предупреждающие знаки:

| | |
|---|---|
| Общий предупреждающий знак | Использовать средства защиты органов дыхания |
| Предупреждение о вдыхании ядовитых газов | Использовать защитную маску |
| Предупреждение о едких жидкостях | Использовать защитные перчатки |
| Предупреждение об опасности взрыва | |

## 2.2 Общие указания об опасности

Прибор может устанавливаться только специалистами, знакомыми с требованиями безопасности и возможными рисками.

Обязательно соблюдайте соответствующие местные предписания техники безопасности и общие технические правила. Предотвращайте помехи - это поможет Вам избежать травм и материального ущерба.

### Эксплуатирующая фирма должна обеспечить следующее:

- указания по технике безопасности и руководство по эксплуатации находятся в доступном месте и соблюдаются персоналом;
- соблюдаются соответствующие национальные предписания по предотвращению несчастных случаев,
- соблюдаются допустимые условия эксплуатации и спецификации,
- используются средства защиты и выполняются предписанные работы по техобслуживанию,
- при утилизации соблюдаются нормативные предписания,
- соблюдение действующих национальных предписаний по установке оборудования.

### Техническое обслуживание, ремонт

При проведении работ по ремонту и техническому обслуживанию необходимо учитывать следующее:

- Ремонт оборудования может производиться только персоналом, получившим разрешение от фирмы Bühler.
- Допускается проведение только тех работ по перестройке, монтажу и обслуживанию, которые описаны в настоящем Руководстве по эксплуатации и установке.
- Допускается использование только оригинальных запасных частей.
- Не устанавливать поврежденные или неисправные запасные части. Перед установкой необходимо осуществить визуальный контроль на видимые повреждения запасных частей.

При проведении любых работ по техническому обслуживанию должны учитываться все соответствующие местные правила безопасности и эксплуатации.

**ОПАСНОСТЬ** **Ядовитые, едкие газы**

Анализируемый газ может нанести вред здоровью.

a) Перед проведением работ по техническому обслуживанию отключите подачу газа и при необходимости прочистите газопровод воздухом.

b) Обеспечьте при необходимости надежный отвод газа.

c) Перед работами по техобслуживанию примите меры по защите от ядовитых, едких газов. Используйте соответствующие средства защиты.

**ОПАСНОСТЬ** **Эксплуатация во взрывоопасной среде**

Горючие газы и пыль могут воспламеняться или взрываться. Берегитесь следующих источников опасности:

**Электростатический заряд (искрообразование)!**

Части корпуса из пластмассы и наклейки очищать только влажной тканью.

Соедините металлический корпус с потенциалом земли (PE)!

**Макс. температура поверхности!**

Макс. температура поверхности $T_{surf}$ оборудования зависит от температуры среды $T_{med}$. Здесь действует следующее правило $T_{surf} \leq T_{med}$.

**Температура воспламенения!**

Учитывайте температуры воспламенения взрывоопасных газов, а также максимально допустимые температуры поверхности $T_{surf}$ согласно соответствующим положениям и нормам.

**Возможная опасность пробоя / утечки взрывоопасных или ядовитых газов.**

Защитите оборудование от внешних ударов или устанавливайте его в защищенном от ударов положении.

**Утечка газа!**

Опасность взрыва и опасность для жизни из-за утечки газа при техническом обслуживании и использовании прибора не по назначению.

# 3 Транспортировка и хранение

Оборудование может транспортироваться только в оригинальной упаковке или ее подходящей замене.

При длительном неиспользовании оборудование необходимо защитить от воздействия влаги и тепла. Оно должно храниться в закрытом, сухом помещении без пыли при температуре от -10°C до +40°C.

# 4 Монтаж и подключение

Соединительная резьба для газовых входов и выходов расходомера:

| Расходомеры | Резьба |
|---|---|
| SM-6 / SM-6-V | G1/4 |
| S-SM 3-1 | NPT 1/4” |

Монтажная схема приводится в разделе Размеры [> Стр. 19]. Фитинги должны быть плотно закручены при помощи тефлоновой ленты или уплотнения/уплотнительного кольца!

## 4.1 Электрические подключения (искробезопасные)

**ПРЕДУПРЕЖДЕНИЕ**

**Опасное напряжение**

Электрическое подключение разрешается проводить только обученным специалистам.

**ОСТОРОЖНО**

**Неправильное напряжение сети**

Неправильное напряжение сети может разрушить прибор.
При подключении следите за правильным напряжением сети в соотв. с типовой табличкой.

**ОСТОРОЖНО**

**Опасность взрыва вследствие недопустимых значений электроподключения**

Недопустимые значения электроподключения могут привести к возгоранию взрывоопасных газовых смесей.
Прибор во взрывоопасных зонах может эксплуатироваться только при искробезопасной подаче напряжения. Питающее напряжение должно быть допустимым для соответствующей зоны. Указанные в данном руководстве по эксплуатации граничные значения подлежат обязательному соблюдению и не могут превышаться также и для вариантов с двумя раздельными искробезопасными подачами напряжения.
Необходимо обеспечить соблюдение граничных значений также и в случае ошибки, например, при случайном линейном или параллельном подключении.
При установке и эксплуатации искробезопасного оборудования соблюдайте соответствующие требования по безопасности, например, IEC/EN 60079-11 и IEC/EN 60079-14.

### 4.1.1 Монтаж порогового выключателя с держателем (только для типа SM-6/ SM-6-V)

**ОПАСНОСТЬ**

**Опасность взрыва**

**При эксплуатации во взрывоопасных зонах**
Используйте только пороговые выключатели с соответствующим разрешением.

Пороговый выключатель поставляется в собранном виде.

- Перед первым применением открутите вертикальные пластиковые винты на крепежной пластине и разместите пороговый выключатель на требуемой высоте.
- Снова закрутите вертикальные пластиковые винты.
- Подключите кабель к источнику питания.

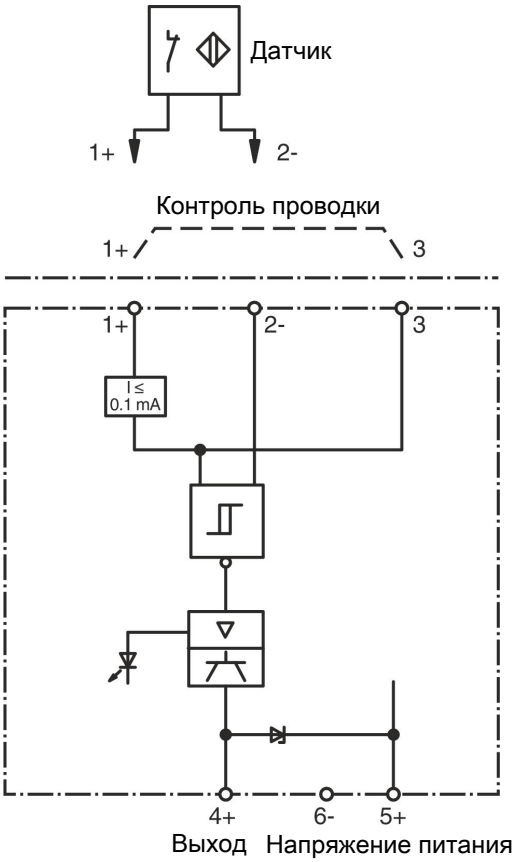
#### Применение порогового выключателя во взрывоопасных зонах:

Соблюдайте параметры подключения установленных по заказу датчиков предельного значения типов RC10-14-N3 или RC15-14-N3, указанные в сертификате PTB99ATEX2128X в разделе Прилагаемые документы [> Стр. 22]. Точный тип можно определить по типовому обозначению соответствующего установленного датчика предельного значения.

## 4.1.2 Монтаж и подключение переключающего усилителя (только для типа SM-6/SM-6-V)

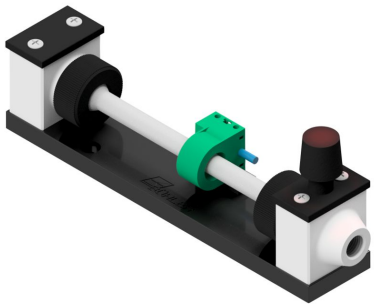
**Тип MACX:** Соблюдайте параметры подключения, указанные в сертификатах (IECExIBE100002X и IBExU10ATEX1005X), а также указания по монтажу в прилагаемых руководствах по эксплуатации в разделе Прилагаемые документы [> Стр. 22].

**Тип KCD2-E2L:** Если в качестве датчика импульсов вы используете механический контакт, то для контроля обрыва провода к этому контакту вы должны на месте подключить параллельно сопротивление 10 кОм.

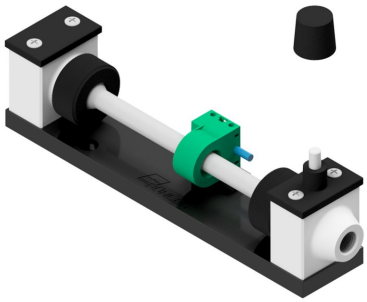



*Изображение 1: Схема подключения усилителя с гальванической развязкой, KCD2-E2L*

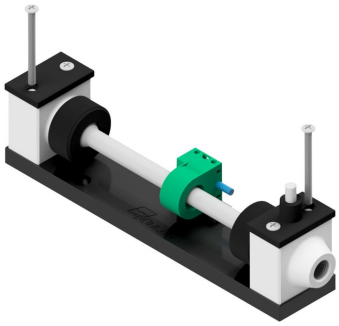
## 4.2 Установка крышки (арт. номер: 40158998)



– Начните процесс установки, осторожно сняв заглушку игольчатого клапана.



– Снимите винт игольчатого клапана, при этом обязательно следите и крепко удерживайте поворотную ручку во время снятия, чтобы не допустить никакого непроизвольного поворота клапана.



– Демонтируйте винты с потайной головкой.

– Установите крышку на предусмотренное место.

– Для надежного крепления крышки используйте входящие в комплект винты со сферо-цилиндрической головкой.

– Установите игольчатый клапан и прочно его затяните. При этом снова очень важно прочное удержание поворотной ручки во время затягивания, чтобы предотвратить непроизвольное вращение клапана.

– Завершите процесс установки, снова смонтировав заглушку игольчатого клапана.

Мы рекомендуем добросовестно произвести все вышеназванные операции, чтобы гарантировать надлежащую установку.

# 5 Эксплуатация и обслуживание

**УКАЗАНИЕ**

Не используйте прибор вне пределов, обозначенных в его спецификации!

**Указания по эксплуатации расходомера с крышкой:**

- Крышку можно приобрести исключительно в виде набора для дооснащения. Установка на предприятии-изготовителе не планируется. Просим производить монтаж согласно прилагаемым руководствам под собственную ответственность.
- Запрещается использовать крышку во взрывоопасных зонах (зона EX). Убедитесь в том, что ситуация возле места использования соответствует местным нормам безопасности.
- Крышка устанавливает верхнюю границу в 120 °C для максимальной температуры среды. Убедитесь, что используемые среды не превышают данное температурное ограничение, чтобы обеспечить надежную работу крышки.

## 5.1 Считывание расходомера

Значение расхода считывается на верхнем крае поплавка.

Обращаем Ваше внимание на то, что значения верны только при соответствии давления в измерительной трубке указанному значению.

## 5.2 Настройка игольчатого клапана

**УКАЗАНИЕ! Обращаем Ваше внимание на то, что игольчатый клапан не является запорным клапаном. Не пытайтесь откручивать клапан с применением силы.**

Клапан закрывается поворотом по часовой стрелке.

# 6 Техническое обслуживание

При проведении работ по техническому обслуживанию необходимо учитывать следующее:

- Прибор может обслуживаться только специалистами, знакомыми с требованиями безопасности и возможными рисками.
- Допускается проведение только тех работ по техническому обслуживанию, которые описаны в настоящем Руководстве по эксплуатации и установке.
- При проведении любых работ по техническому обслуживанию должны учитываться все соответствующие правила безопасности и эксплуатации.
- Применяйте только оригинальные запасные части.

**ОПАСНОСТЬ** **Опасность взрыва**

**Выход газа на расходомере**
При работе расходомера с взрывоопасными, ядовитыми, едкими газами, необходимо регулярно проверять расходомер на герметичность.

**ОПАСНОСТЬ** **Ядовитые, едкие газы**

Анализируемый газ может нанести вред здоровью.

a) Перед началом работ техосмотра остановите процесс (отключить напор). Закройте для этого запорный вентиль (при наличии).

b) Перед открытием расходомера провентилируйте его воздухом.

c) Защитите себя перед работами техобслуживания от ядовитых, едких газов. Используйте соответствующие средства защиты.

**ОСТОРОЖНО** **Утечка газа**

Не используйте поврежденные детали или уплотнители.
Применяйте только оригинальные запасные части.

## 6.1 Замена порогового выключателя с держателем (только для типа SM-6 / SM-6-V)

**ОПАСНОСТЬ** **Опасность взрыва**

**При эксплуатации во взрывоопасных зонах**
Используйте только пороговые выключатели с соответствующим разрешением.

Удалите вертикальные пластиковые винты (1) с крепежной платы порогового выключателя (см. Рис. 1). Одновременно освобождается крепежная плата на задней стороне измерителя протока.

Снимите обе накидные гайки измерительной трубки. Подвиньте легким нажатием измерительную трубку в верхнюю головку. Теперь измерительную трубку можно повернуть наружу (см. Рис. 2). Удалите с нижней стороны измерительной трубки уплотнительное кольцо (2), накидную гайку (3) и пороговый выключатель (4). При необходимости измерительную трубку можно прочистить.

Установка измерительной трубки следует в обратном порядке. Необходимо следить за тем, чтобы фаска уплотнительного кольца показывала в направлении соответствующей головки.

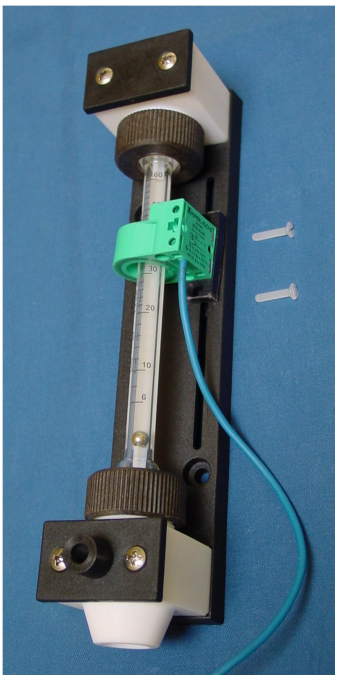


Рис. 1

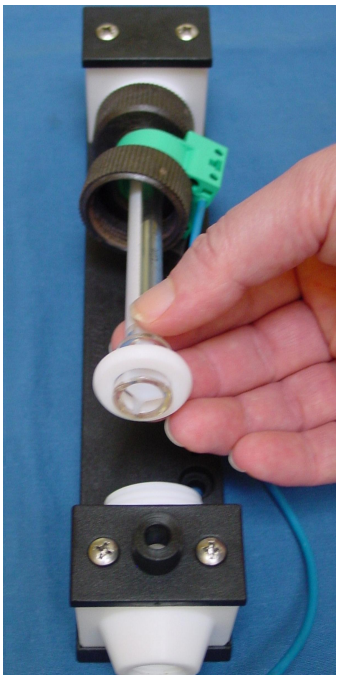


Рис. 2

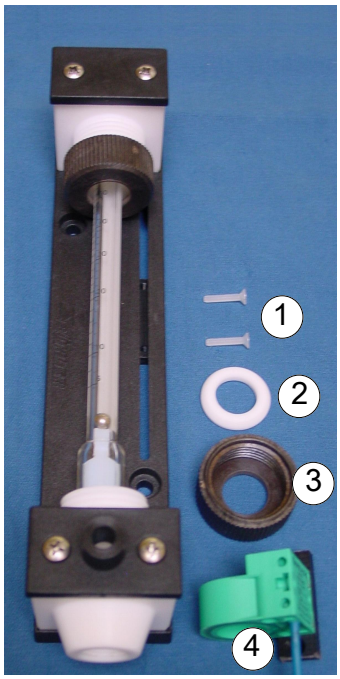



Рис. 3

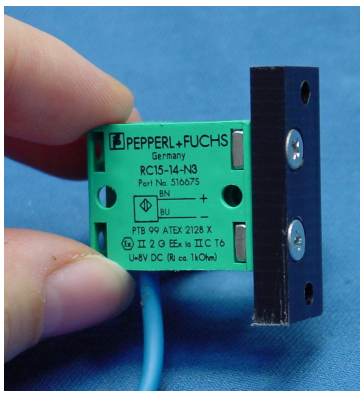



Рис. 4

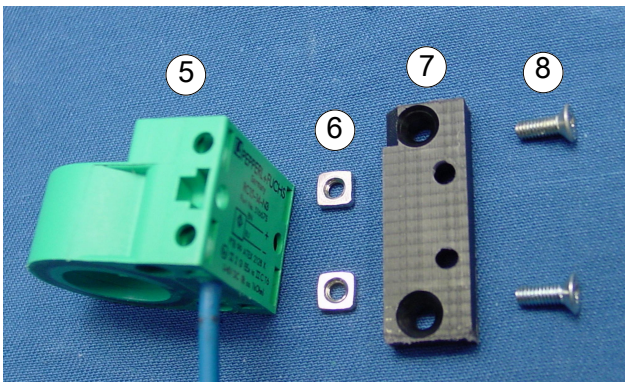



Рис. 5

| | | | |
|---|---|---|---|
| 1 | Вертикальные пластиковые винты | 3 | Накидная гайка |
| 2 | Уплотнительное кольцо | 4 | Пороговый выключатель с крепежной платой |
| 5 | Пороговый выключатель | 7 | Фрезерованная крепежная плата |
| 6 | Четырехгранные гайки M3 | 8 | Винты с крестовым шлицем |

Удалите оба винта с крестовым шлицем (8) с крепежной платы порогового выключателя (см. Рис. 4). Снимите крепежную плату (7). Проследите, чтобы обе четырехгранные гайки (6) не потерялись в щелях порогового выключателя. Замените пороговый выключатель (5) и плотно завинтите крепежную плату. Фрезерованные фаски крепежной платы (7) должны показывать налево вверх.

Пороговый выключатель теперь можно задвинуть обратно в измерительную трубку. Обратите при этом внимание на направление течения, это значит, что градуировка должна быть читабельна, крепежная плата порогового выключателя с винтовыми отверстиями должна находиться над продольным пазом, а кабель должен быть протянут вниз наружу.

В заключение задвиньте накидные гайки и уплотнительное кольцо (с уплотнительным конусом для держателя) на измерительную трубку. Снова установите измерительную трубку и рукой затяните накидные гайки.

При помощи двух вертикальных пластиковых винтов можно теперь, через продольную щель на основной плате расходомера, закрепить и выровнять крепежную плату с прижимной планкой, установленной на задней стороне основной платы.

## 6.2 Замена измерительного стакана (только для типа SM-6/SM-6-V)

Для замены измерительного стакана необходимо предварительно демонтировать крышку, если она имеется.

### 6.2.1 Без порогового выключателя

Снимите обе накидные гайки измерительной трубки. Подвиньте легким нажатием измерительный стакан в верхнюю головку. Затем Вы можете подвинуть уплотнительные кольца, лежащие под накидными гайками, на появившуюся часть измерительного стакана. Теперь измерительную трубку можно повернуть наружу.

После чего можно снять накидные гайки и уплотнительные кольца с измерительной трубки и при необходимости установить на новую измерительную трубку. Установка измерительного стакана следует в обратном порядке. Необходимо следить за тем, чтобы фаска уплотнительного кольца показывала в направлении соответствующей головки.

### 6.2.2 С пороговым выключателем

Удалите верхние вертикальные пластиковые винты (1) с крепежной платы порогового выключателя (см. Рис. I) и ослабьте нижние вертикальные пластиковые винты (1) так, чтобы можно было свободно двигать пороговый выключатель. При этом не требуется полный демонтаж с крепежной платы.

Снимите обе накидные гайки (3) измерительной трубки. Подвиньте легким нажатием измерительный стакан в верхнюю головку. При вытаскивании измерительного стакана из порогового выключателя и накидных гаек, отверните пороговый выключатель в сторону (см. Рис. 6). При необходимости подвиньте пороговый выключатель. Удалите с нижней стороны измерительного стакана уплотнительное кольцо (2) и накидные гайки (3). Пороговый выключатель остается на крепежной плате (см. Рис. 7).

Установка измерительной трубки следует в обратном порядке. Необходимо следить за тем, чтобы фаска уплотнительного кольца показывала в направлении соответствующей головки.

Рис. 6

Рис. 7

## 6.3 Замена измерительного стакана - защитный расходомер S-SM

**УКАЗАНИЕ! Такую замену необходимо проводить с крайней осторожностью! Производить замену может только обученный персонал. Мы рекомендуем отсылать S-SM производителю.**

Выкрутите наконечник из защитной трубы VA. При этом удерживайте расходомер в таком положении, чтобы при удалении наконечника защитное стекло и измерительная трубка не выпали случайно наружу. Теперь измерительную трубку можно вынуть наружу.

При установке новой измерительной трубки необходимо следить за правильной установкой измерительной трубки и защитной трубы в приемнике уплотнительного кольца наконечника.

# 7 Сервис и ремонт

В случае появления сбоев в работе в этом разделе Вы найдете указания по поиску неисправностей и их устранению.

Ремонт оборудования может производиться только персоналом, получившим разрешение от фирмы Bühler.

За дополнительной информацией обращайтесь в нашу сервисную службу

**Тел.: +49-(0)2102-498955** или в соответствующее представительство.

Дополнительную информацию о наших отдельных услугах по техническому обслуживанию и вводу в эксплуатацию можно найти на сайте https://www.buehler-technologies.com/service.

Если после устранения возможных помех и включения напряжения сети прибор не работает должным образом, он должен быть проверен производителем. В этих целях мы просим прислать нам прибор в соответствующей упаковке по адресу:

**Bühler Technologies GmbH**

**- Reparatur/Service -**

**Harkortstraße 29**

**40880 Ratingen**

**Deutschland**

Кроме того, на упаковке необходимо разместить заполненное и подписанное заявление об обеззараживании RMA. В противном случае обработка Вашего заказа на ремонт невозможна!

Соответствующий формуляр находится в Приложении к настоящему Руководству. Вы также можете отправить запрос по электронной почте:

**service@buehler-technologies.com**.

## 7.1 Поиск неисправностей и устранение

| Проблема / неисправность | Возможная причина | Устранение |
|---|---|---|
| Поплавок не всплывает | – Закручен игольчатый клапан | – Открыть игольчатый клапан |
| | – Загрязнение пылью | – очистить |

*Таблица 1:* Поиск неисправностей и устранение

## 7.2 Запасные части

При заказе запасных частей просим Вас указывать тип прибора и его серийный номер.

Детали для дооборудования и расширения оборудования Вы найдете в прилагаемом каталоге.

В наличии имеются следующие запасные детали:

| Арт. номер | Наименование |
|---|---|
| 40158997 | Уплотнительное кольцо для диаметра стакана Ø 10 мм |
| 4055050 | Уплотнительное кольцо для диаметра стакана Ø 15 мм |

### 7.2.1 Расходный материал и комплектующие - SM-6, SM-6-V

| Арт. номер | Наименование |
|---|---|
| 40158998 | Для SM-6, SM-6-V |

**УКАЗАНИЕ**

**Важные указания для использования крышки**

- Крышка доступна только в виде набора для дооснащения.
- Не пригодна для взрывоопасных зон.
- Максимальная температура среды ограничена 120 °C.

## 7.2.2 Расходный материал и комплектующие - S-SM

| Арт. номер | Наименование | |
|---|---|---|
| 4022999 | Расходомер S-SM 3-1 | Концевые элементы нерж. сталь 1.4571 |
| 4023999 | Расходомер S-SM 3-1 | Концевые элементы титан |

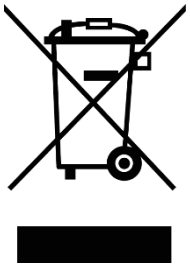
## 7.2.3 Расходный материал и комплектующие - Усилитель с гальванической развязкой

| Арт. номер | Наименование |
|---|---|
| 9100070059 | Усилитель с гальванической развязкой MACX |
| 9100070007 | Усилитель с гальванической развязкой, KCD2-E2L, 24 В DC |
| 4949021 | Пороговый выключатель с креплением Ø10 |
| 4949019 | Пороговый выключатель с креплением Ø15 |

# 8 Утилизация

При утилизации продуктов необходимо учитывать и соблюдать применимые национальные правовые нормы. При утилизации не должно возникать опасности для здоровья и окружающей среды.

Символ перечеркнутого мусорного контейнера на колесах для продуктов Bühler Technologies GmbH указывает на особые инструкции по утилизации электрических и электронных продуктов в Европейском Союзе (ЕС).



Символ перечеркнутого мусорного бака указывает на то, что отмеченные им электрические и электронные изделия должны утилизироваться отдельно от бытовых отходов. Они должны быть надлежащим образом утилизированы как электрическое и электронное оборудование.

Компания Bühler Technologies GmbH будет рада утилизировать ваше устройство с таким знаком. Для этого отправьте устройство по указанному ниже адресу.

По закону мы обязаны защищать наших сотрудников от опасностей, связанных с зараженным оборудованием. Поэтому мы надеемся на ваше понимание, что мы можем утилизировать ваше старое устройство только в том случае, если оно не содержит каких-либо агрессивных, едких или других рабочих материалов, вредных для здоровья или окружающей среды. **Для каждого электрического и электронного устройства необходимо заполнить форму «Форма RMA и декларация об обеззараживании», которую можно скачать на нашем сайте. Заполненная форма должна быть прикреплена снаружи к упаковке так, чтобы ее было хорошо видно.**

Возврат старого электрического и электронного оборудования просим осуществлять по адресу:

Bühler Technologies GmbH
WEEE
Harkortstr. 29
40880 Ratingen
Germany

Также обратите внимание на правила защиты данных и на то, что вы несете ответственность за удаление личных данных на старых устройствах, которые вы возвращаете. Поэтому убедитесь в том, что вы удалили свои личные данные со старых устройств перед их возвратом.

# 9 Приложение

## 9.1 Технические данные

| Расходомер | SM-6 | SM-6-V |
|---|---|---|
| Температура окружающей среды газ: | от -20 °C до +80 °C * | от -20 °C до +80 °C * |
| Температура окружающей среды жидкости: | от +5 °C до +80 °C | от +5 °C до +80 °C |
| Температура среды: | ≤ 150 °C, в специальных диапазонах измерений макс. 80 °C | ≤ 130 °C, в специальных диапазонах измерений макс. 80 °C |
| Рабочее давление макс.: | 4 бар | 4 бар |
| Механическая нагрузка: | Проверено согласно DNV-GL CG0339 ** класс вибрации A (0,7 g) 2 Гц-13,2 Гц амплитуда ± 1,0 мм 13,2 Гц -100 Гц 0,7g ускорение | Проверено согласно DNV-GL CG0339 ** класс вибрации A (0,7 g) 2 Гц-13,2 Гц амплитуда ± 1,0 мм 13,2 Гц -100 Гц 0,7g ускорение |
| **Материал** | | |
| Головки: | ПТФЭ | ПТФЭ |
| Уплотнение: | ПТФЭ | ПТФЭ |
| Ходовой винт: | - | PVDF/Viton или PCTFE/перфторэластомер |
| Измерительная труба: | Боросиликатное стекло | Боросиликатное стекло |
| Поплавок: | Хастеллой C 4 | Хастеллой C 4 |
| Накидная гайка: | PPS с усилением из стекловолокна | PPS с усилением из стекловолокна |
| Основная плита: | Полиамид | Полиамид |

* При конфигурации порогового выключателя учитывайте температуру окружающей среды!
** кроме использования расходомера с крышкой.

| Пороговый выключатель | Ø10* | Ø15 |
|---|---|---|
| Тип защиты: | IP 67 | IP 67 |
| Температура окружающей среды: | от -20 °C до +80 °C | от -20 °C до +70 °C |
| Материал корпуса: | ПБТ | ПБТ |
| Эксплуатация: | бистабильный | бистабильный |
| Длина кабеля: | 2 м | 2 м |
| Допуск: | PTB 99 ATEX 2128X ⟨Ex⟩ II 2 G Ex ia II C T6...T1 Gb | PTB 99 ATEX 2128X ⟨Ex⟩ II 2 G Ex ia II C T6...T1 Gb |

* Применение при необходимости в специальном диапазоне измерений. Дополнительная информация по запросу

| Защитный потокомер S-SM 3-1 | |
|---|---|
| Температура окружающей среды: | от -20 °C до 80 °C |
| Рабочее давление: | 10 бар (при макс. 20 °C)** |
| Рабочая температура: | 100 °C (при макс. 2 бар)** |
| Диапазон измерений: | см. таблицу |
| Вес: | 0,9 кг |
| Поплавок: | Стекло, хастеллой, нержавеющая сталь или ПТФЭ |
| Концевые элементы: | ПТФЭ, нержавеющая сталь или титан |
| Крепление: | при помощи прилагающихся трубных зажимов |

*указывать при заказе, выбор крепления.

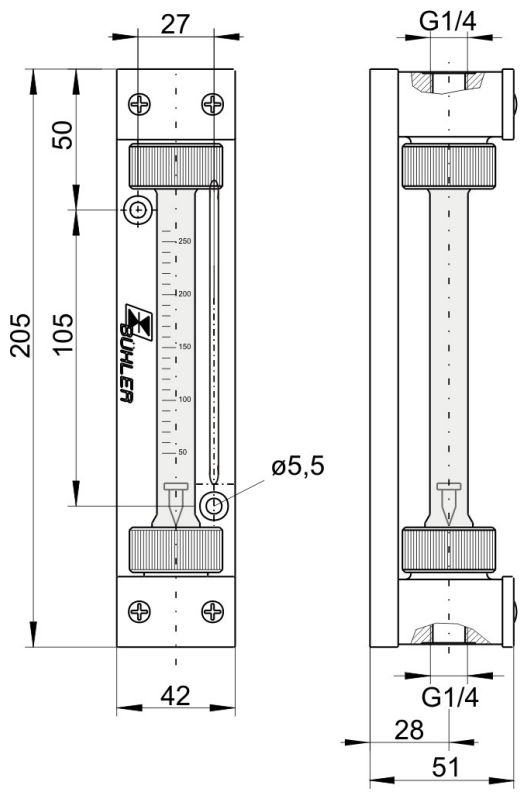
** Рабочее давление макс. [bar] = $10 - \frac{\text{Рабочая температура макс. [°C]} - 20}{10}$

| Усилитель с гальванической развязкой | MACX MCR-EX-SL-2NAM-R-UP | KCD2-E2L |
|---|---|---|
| Питающее напряжение: | 24 ... 230 В перем. тока/пост. тока 50/60 Гц | 10 - 30 В пост. тока |
| Искробезопасность согласно: | IEC/EN 60079-11 | нет |
| Контроль проводки: | да | да |
| Допуски:<br>*(согласно руководству по эксплуатации)* | **ATEX:** Ex II(1) G [Ex ia Ga] IIC<br>Ex II 3(1) G Ex ec [ia Ga] nC IIC T4 Gc<br>**IECEx:** [Ex ia Ga] IIC<br>Ex ec [ia Ga] nC IIC T4 Gc | --- |
| Выход (без искробезопасности): | Переключающий контакт | Замыкающий контакт<br>Транзистор PNP |
| Выход переключающего тока: | 250 В AC (2 A, 60 Гц)<br>120 В DC (0,2 A)<br>30 В DC (2 A) | 200 мА DC |
| Температура окружающей среды: | -40 °C ...+60 °C | -25 °C ...+70 °C |
| Степень защиты: | IP20 | IP20 |
| Размеры: | 17,5x112,5x114,5 мм<br>(ШxВxГ) | 20x63x44 мм<br>(ШxВxГ) |

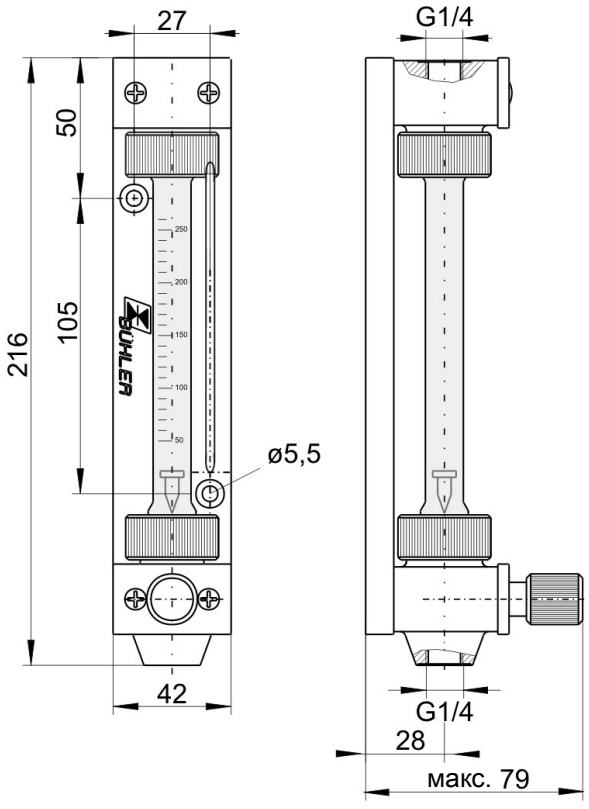
## 9.2 Размеры

**Расходомер SM6/SM6-V:**

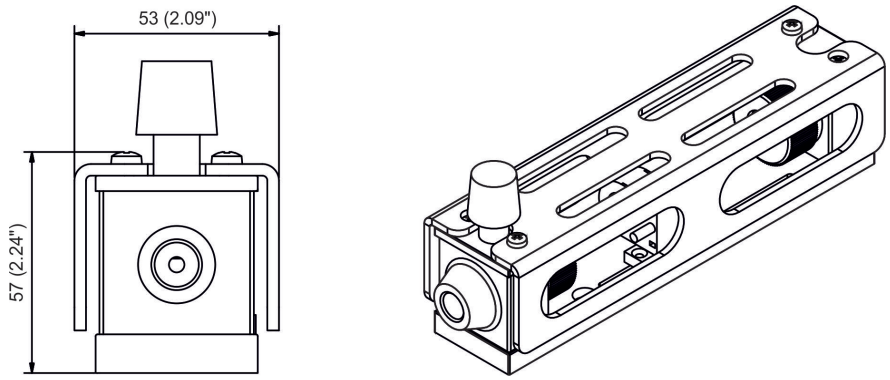
SM-6



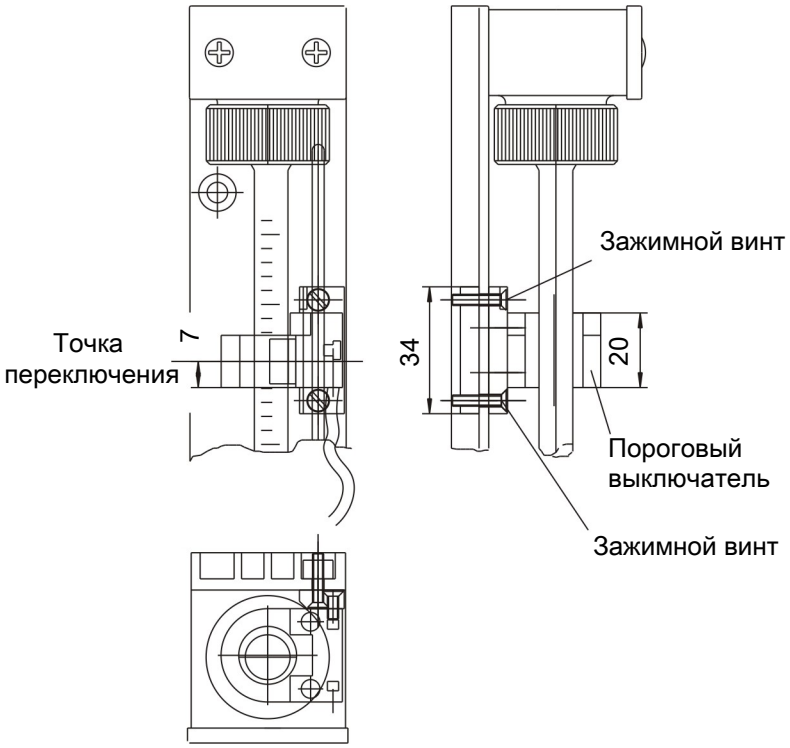

SM-6-V



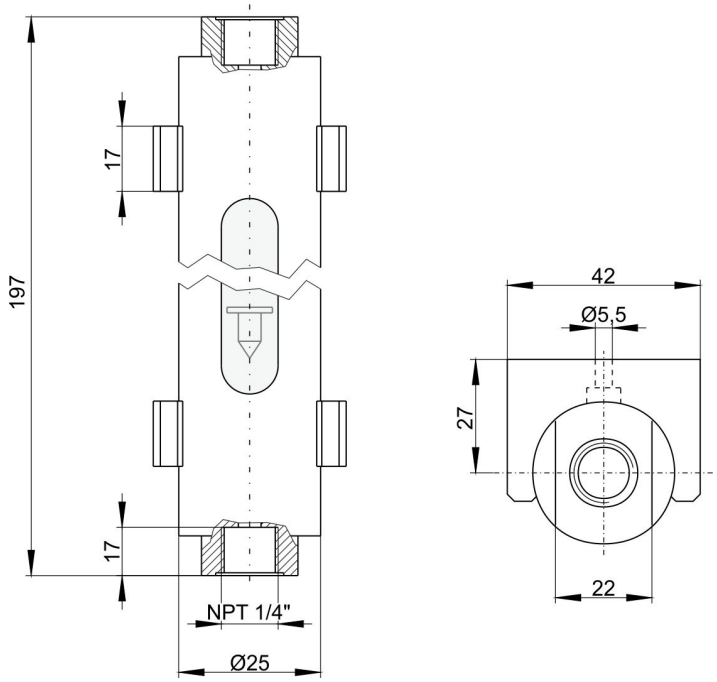
**Расходомер с крышкой:**




**Пороговый выключатель:**




**Безопасный расходомер S-SM:**



## 9.3 Диапазоны измерений

| | Расходомер SM-6 | |
|---|---|---|
| Среда: | Воздух | Вода |
| Давление: | + 1,2 бар абс. | |
| Температура: | + 20 °C | + 20 °C |
| | 6 – 60 Нл/ч | 0,5 - 5 л/ч |
| | 10 – 100 Нл/ч | 1,2 - 12 л/ч |
| | 25 – 250 Нл/ч | 2,5 - 25 л/ч |
| | 50 – 500 Нл/ч | 4 - 40 л/ч |
| | 80 – 800 Нл/ч | 6 - 60 л/ч |

| | Потокомер S-SM 3-1 | |
|---|---|---|
| Среда: | Воздух | Вода |
| Давление: | + 1,2 бар абс. | |
| Температура: | + 20 °C | + 20 °C |
| | 1,6 – 16 Нл/ч | 0,25 - 2,5 л/ч |
| | 4 – 40 Нл/ч | 0,5 - 5 л/ч |
| | 6 – 60 Нл/ч | 1,2 - 12 л/ч |
| | 10 – 100 Нл/ч | 2,5 - 25 л/ч |
| | 25 – 250 Нл/ч | |
| | 50 – 500 Нл/ч | |
| | 80 – 800 Нл/ч | |

# 10 Прилагаемые документы

- Заявление производителя ЕС HX400001
- Декларация производителя Великобритании HX400001UK
- Сертификат соответствия ЕС KCD2-E2L
- Руководство пользователя MACX
- Сертификат соответствия нормативам ЕС MACX
- Декларация Великобритании о соответствии MACX
- ЕС Сертификат испытания типа MACX (IBExU10ATEX1005 X)
- Сертификат соответствия IECEx MACX (IECExIBE100002X)
- Сертификат соответствия ЕС RC10/RC15
- Декларация Великобритании о соответствии RC10/RC15
- Сертификат об утверждении типа оборудования RC10/RC15 (PTB99ATEX2128X
- Сертификат Великобритании об утверждении типа оборудования RC10/RC15 (CML 21UKEX21274X)
- Заявление об обеззараживании RMA

# *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*



Bühler Technologies GmbH, Harkortstr. 29, D-40880 Ratingen,
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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



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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

# EU-Declaration of conformity

**en**/de

*EU-Konformitätserklärung*

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Phone +49 621 776-0
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No. / *Nr.*: DOC-1004C
Date / *Datum*: 2021-10-29

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**www.pepperl-fuchs.com**

PEPPERL+FUCHS

## 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*

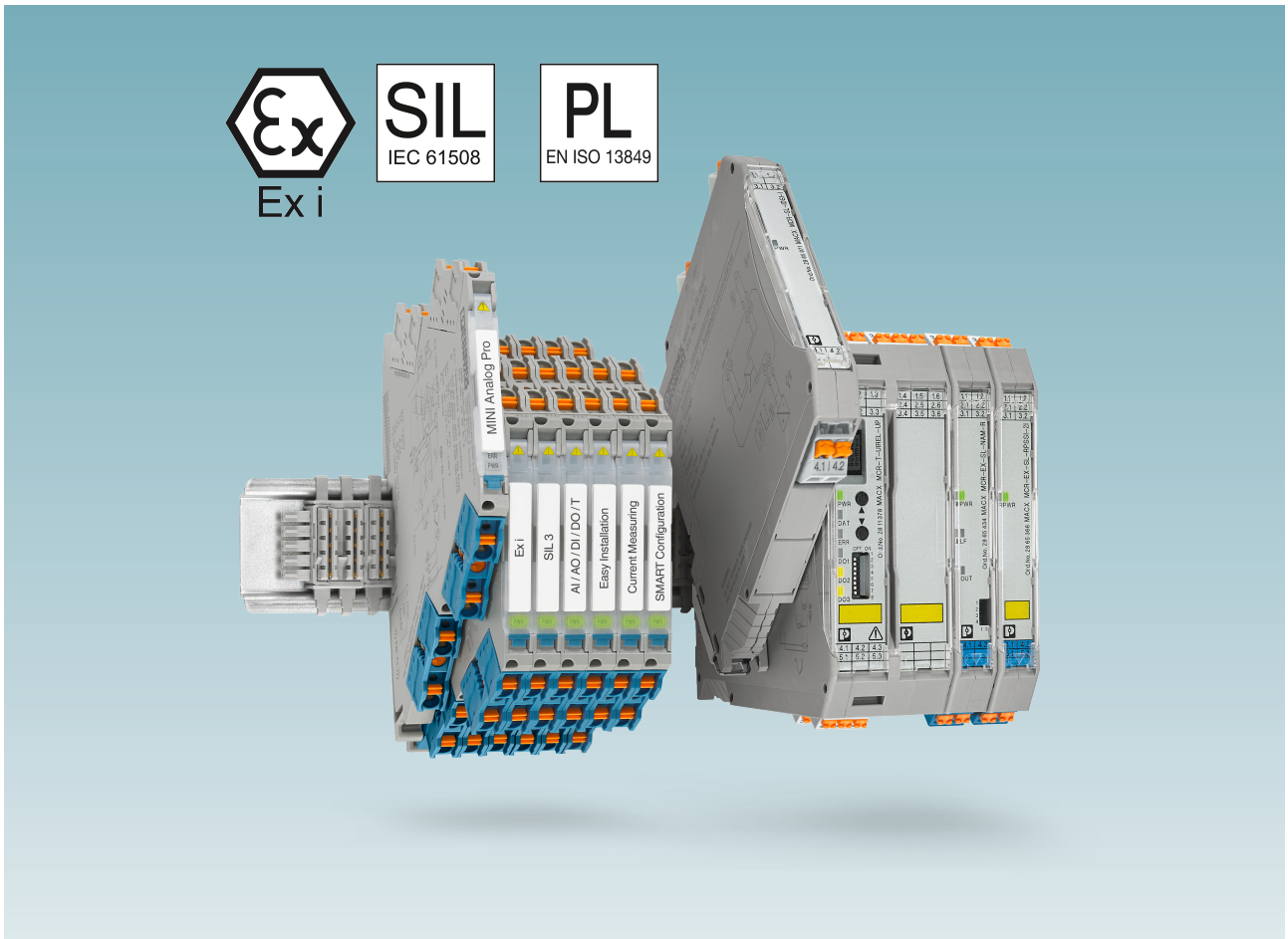
CE

## 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

PHOENIX CONTACT

# 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 |

105810_en_02

**Phoenix Contact GmbH & Co. KG • Flachsmarktstraße 8 • 32825 Blomberg • Germany**
**phoenixcontact.com**

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# 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:

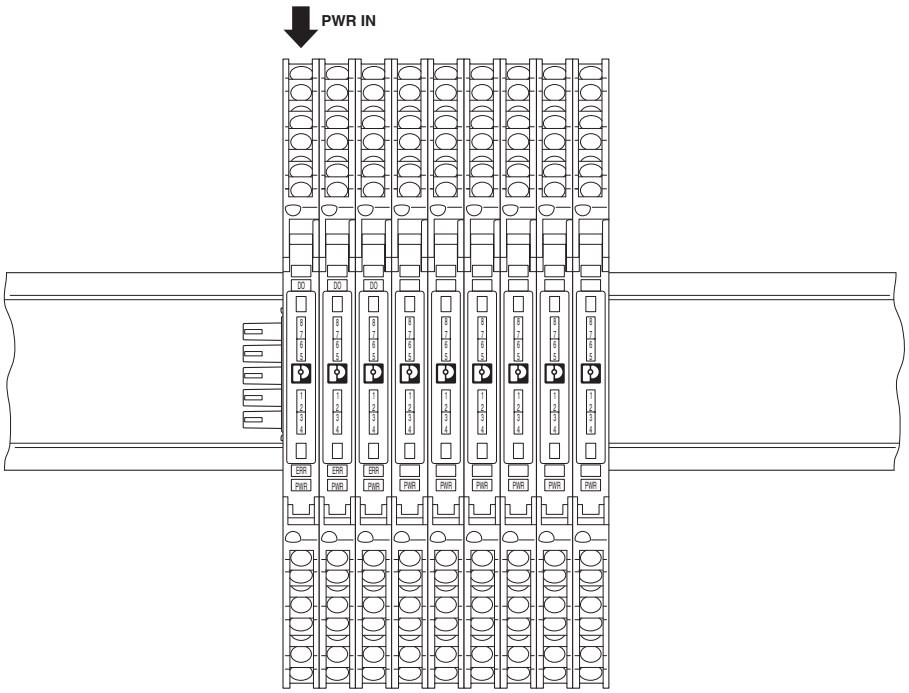
– Direct DC feed-in at any Analog module in the group
– Supply via a power terminal of the same shape
– Supply via any MINI Analog, MINI Analog Pro or MACX Analog power terminal
– Supply via a system power supply with a wide range input of 85 V AC ... 264 V AC

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.

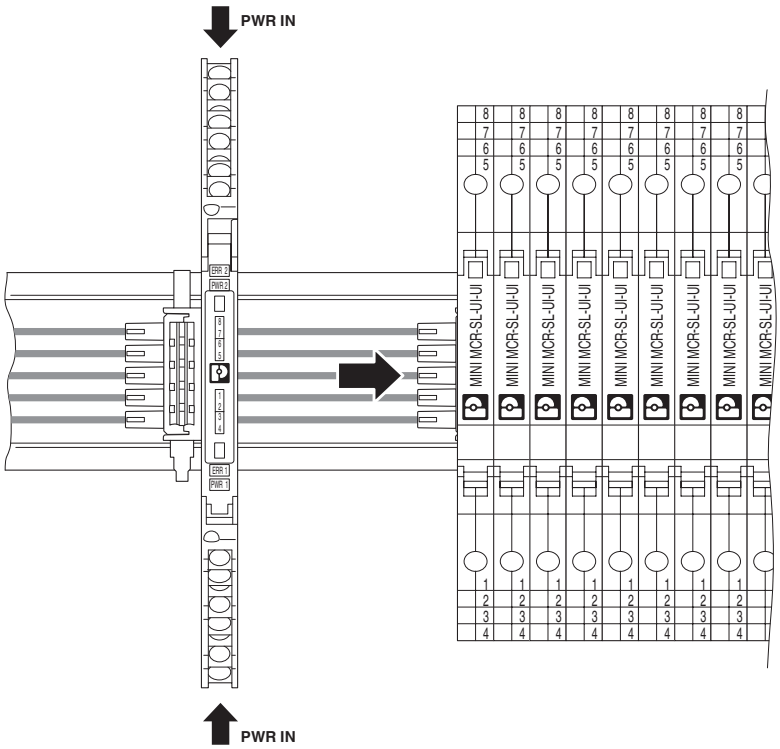
Figure 2-1 Direct supply via any module, e.g., MINI Analog Pro



## 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.

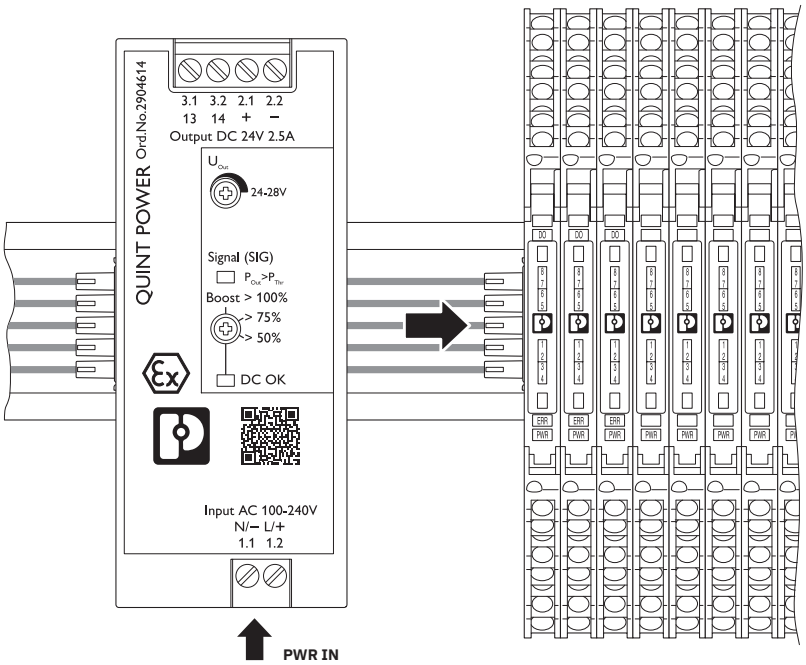
Figure 2-2 Supply via any MINI Analog, MINI Analog Pro or MACX Analog power terminal



## 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

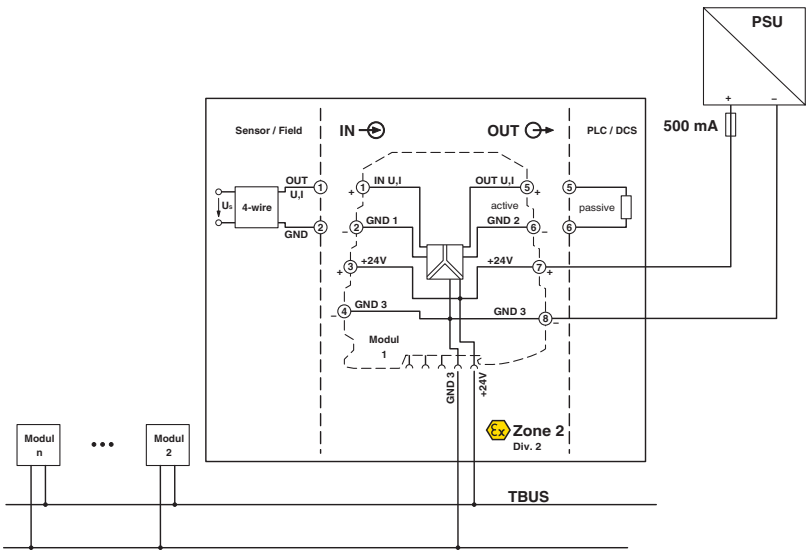
In the case of direct supply, all modules connected to the TBUS DIN rail connector are supplied via the supply at a signal conditioner. Please note that the maximum total current consumption of $I_{max}$ = 400 mA must not be exceeded and the maximum number of modules is therefore restricted to a few 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:

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

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

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.

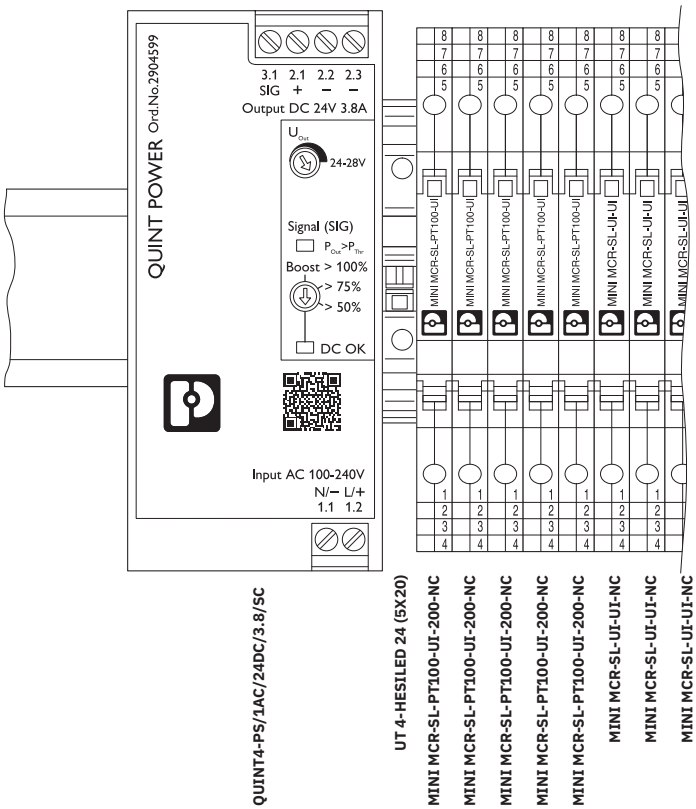
Then determine the maximum total current consumption of all eight modules.

$I = n_1 * I_{module1} + n_2 * I_{module2} + n_3 * I_{module3} + ...$

$I = 5 * 19\ mA + 3 * 21\ mA = 158\ mA < 400\ mA$

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.

Figure 3-2 Example for direct supply via a module




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.

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

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

**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

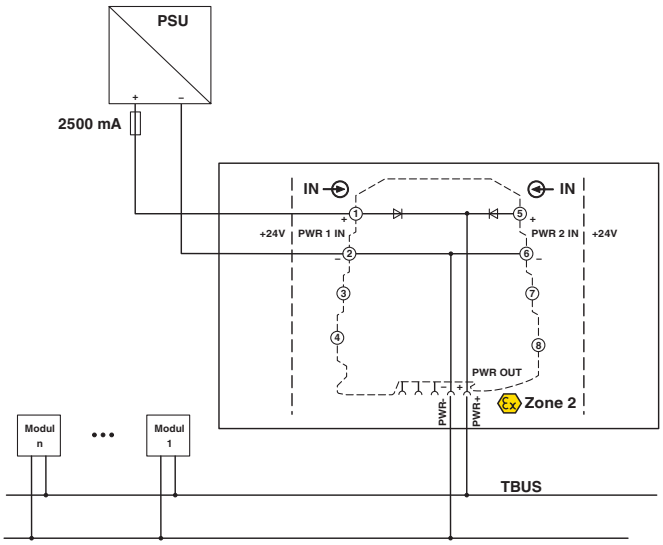
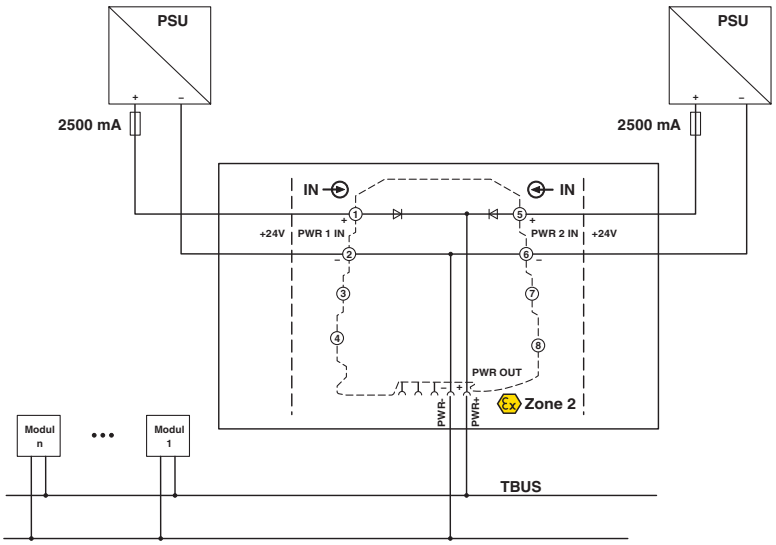


Figure 3-4 Supply by means of redundant power supply




**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.

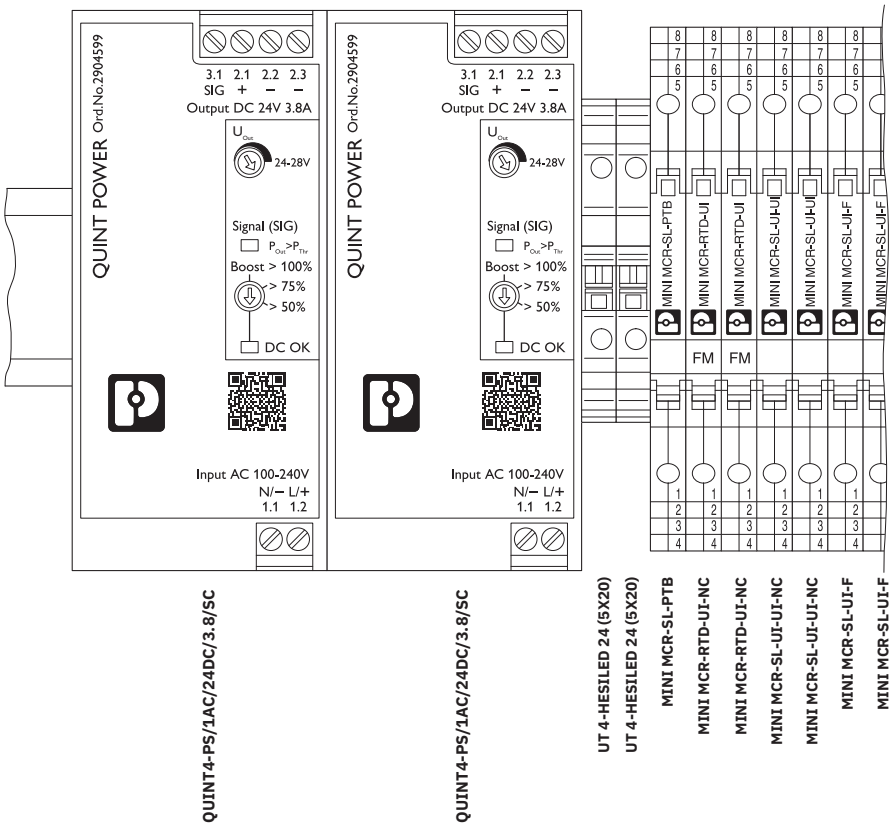
Then determine the maximum total current consumption of all 82 modules.

$I = n_1 * I_{module1} + n_2 * I_{module2} + n_3 * I_{module3} + ...$

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

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

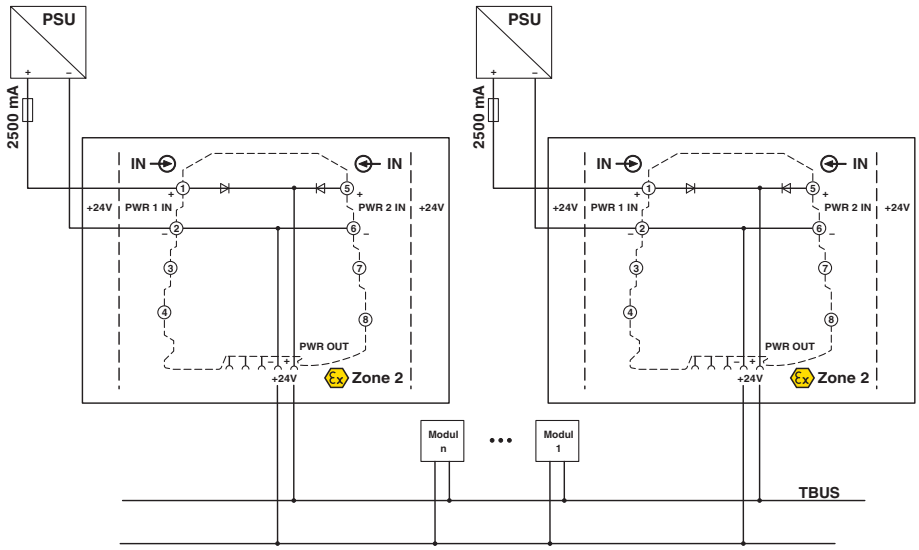



The disadvantage here is that in the event that the power terminal fails, the supply of all signal conditioners is interrupted. However, this can be indicated in this example by means of an N/C contact by using a MINI MCR-SL-FM-RC-NC(-SP) fault signaling module and the MINI MCR-SL-PTB-FM(-SP) power terminal,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

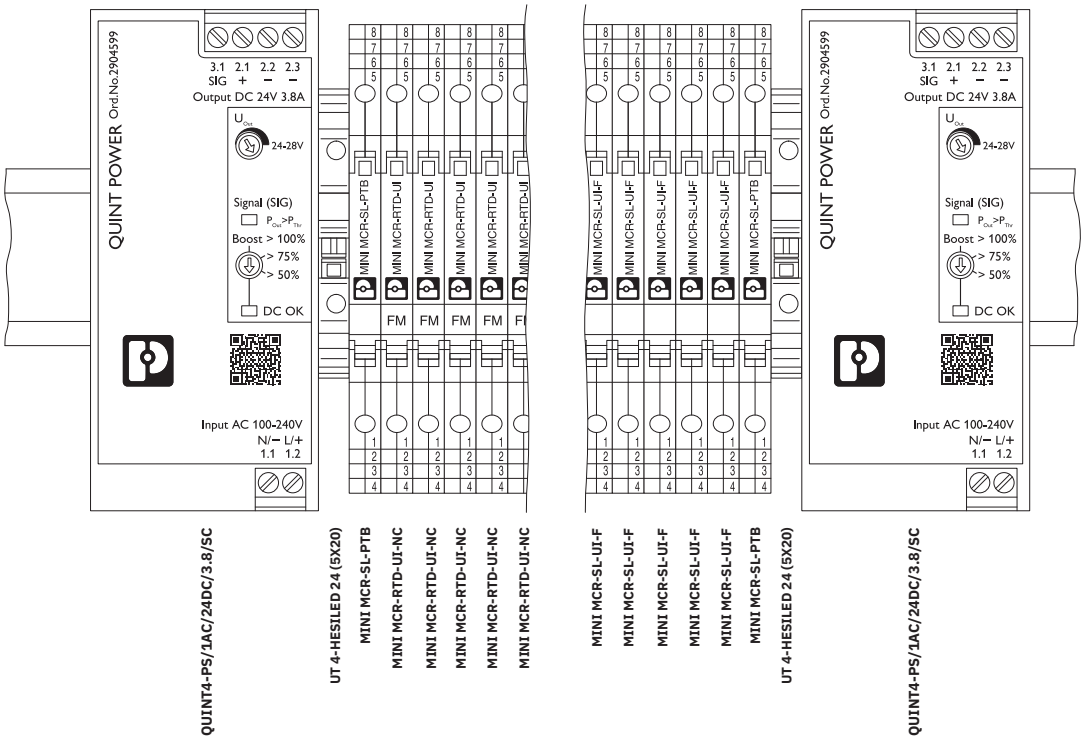
Then determine the maximum total current consumption of all 82 modules.

$I = n_1 * I_{module1} + n_2 * I_{module2} + n_3 * I_{module3} + ...$

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

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.

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

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

**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.

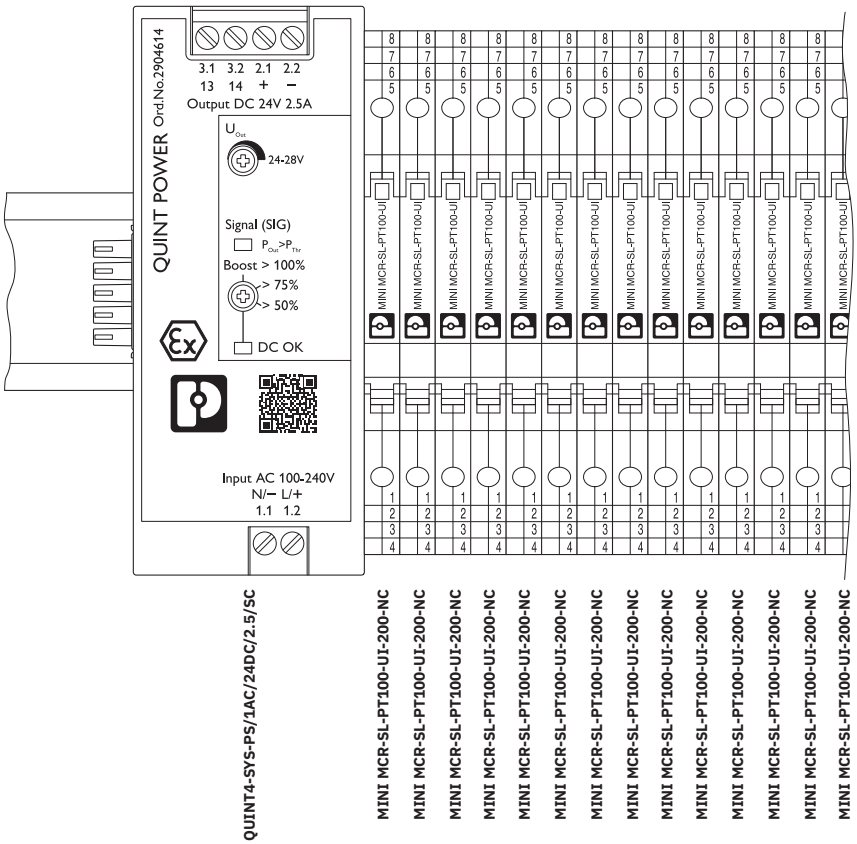
Then determine the maximum total current consumption of all 65 modules.

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

$$I = 65 * 21\ mA = 1365\ mA < 1500\ mA$$

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.

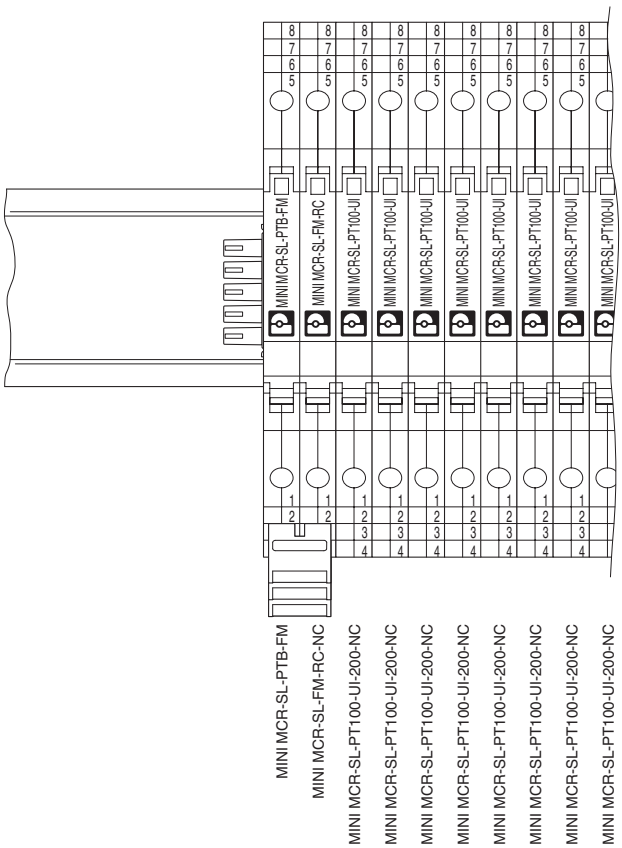
Figure 3-8 Supply via a system power supply



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

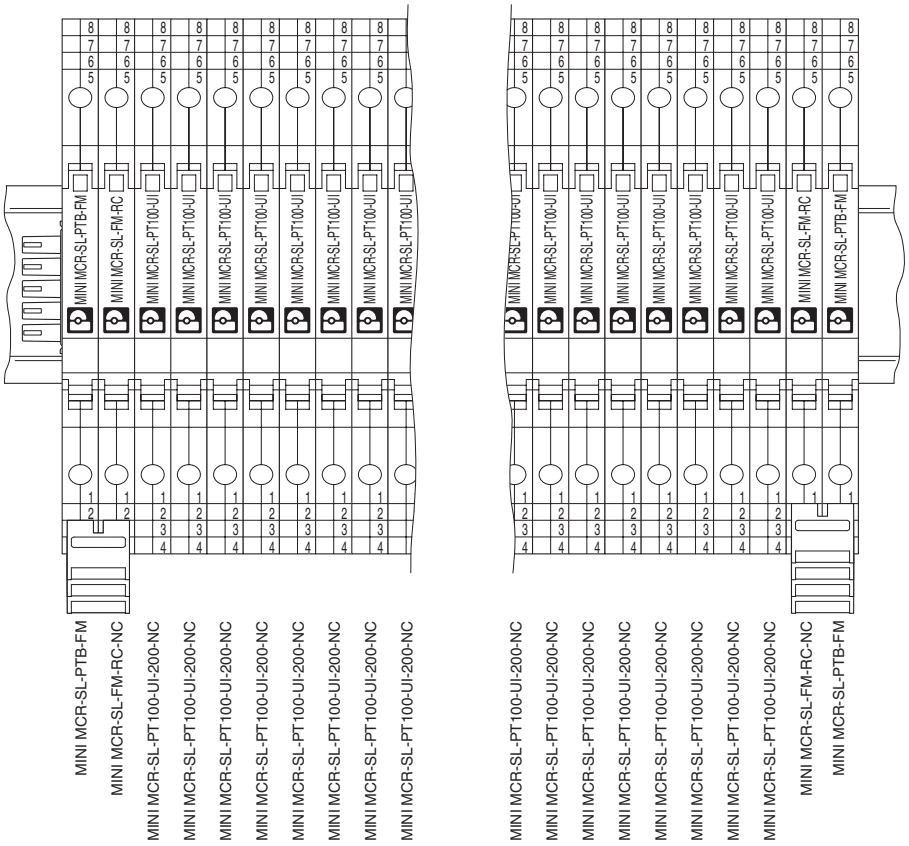
As described in Section 3.2 on page 14, the MINI Analog modules can be supplied with power via a MINI MCR-SL-PTB power terminal. If the MINI MCR-SL-PTB-FM... modules (item no. 2864134) and the MINI MCR-SL-FM-RC... error message modules (item no. 2902961) are used, it is possible to establish redundant 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.

Figure 3-10 Additional mechanical redundancy



# 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

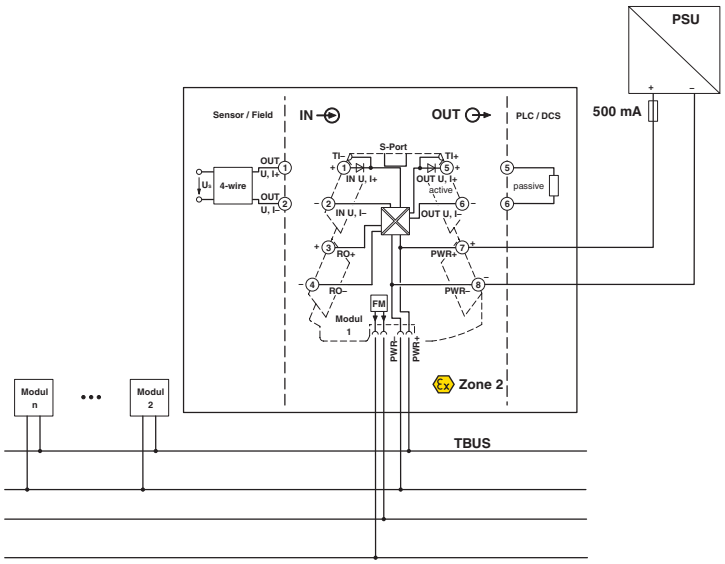
In the case of direct supply, all modules connected to the TBUS DIN rail connector are supplied via the supply at a signal conditioner. Please note that the maximum total current consumption of $I_{max}$ = 400 mA must not be exceeded and the maximum number of modules is therefore restricted to a few 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:

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

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

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.

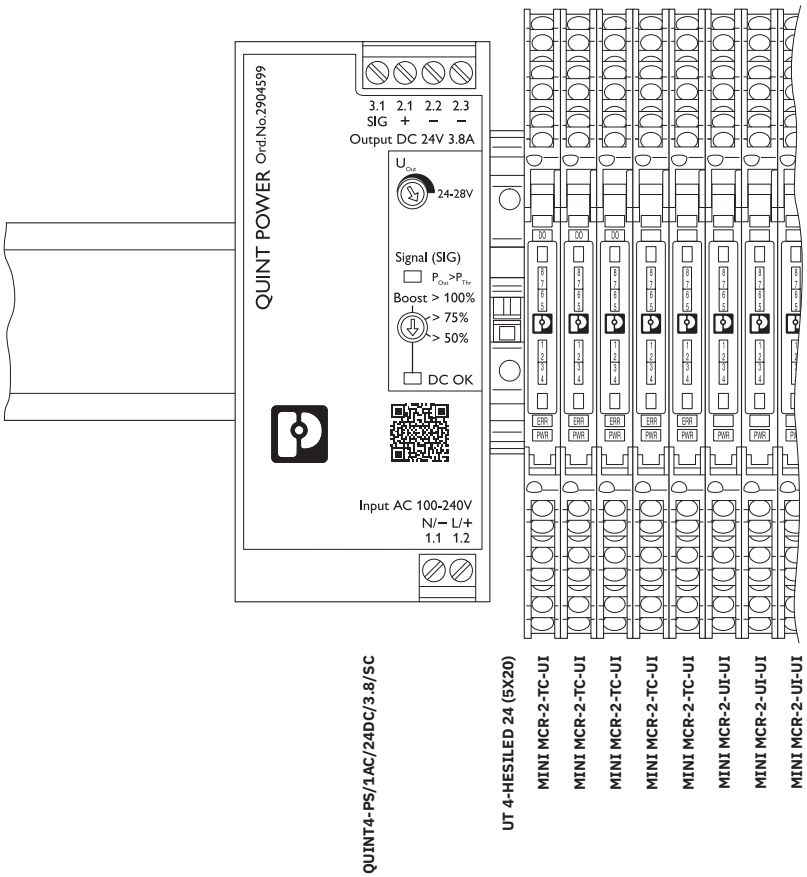
Then determine the maximum total current consumption of all eight modules.

$I = n_1 * I_{module1} + n_2 * I_{module2} + n_3 * I_{module3} + ...$

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

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.

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

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

**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

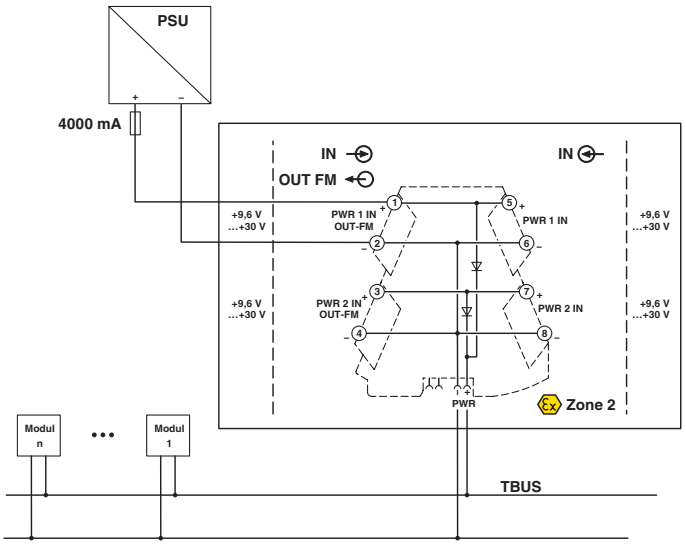
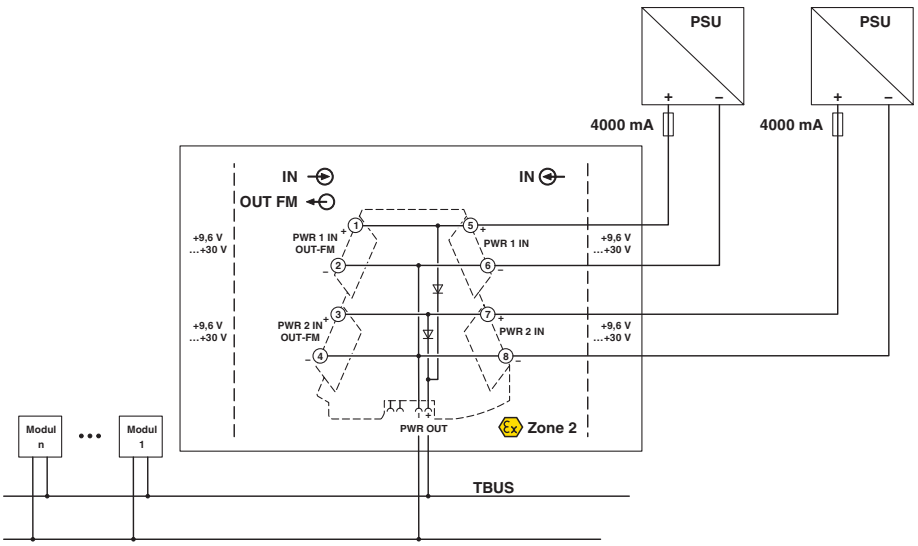



Figure 4-4 Supply by means of redundant power supplies



**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.

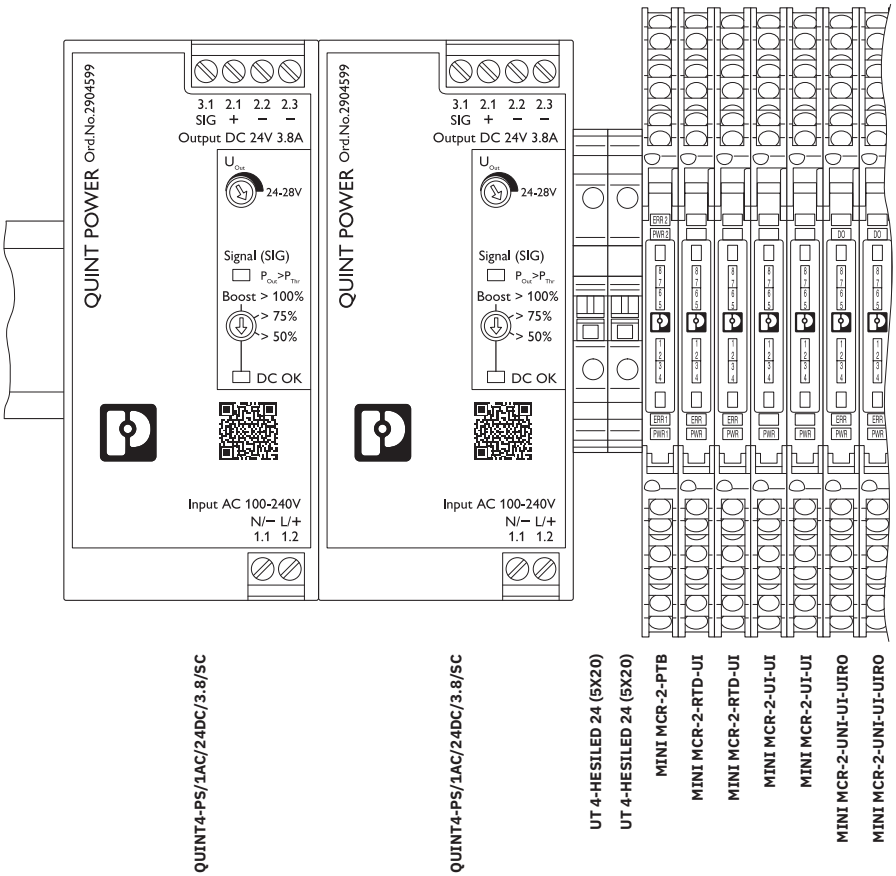
Then determine the maximum total current consumption of all 82 modules.

$I = n_1 * I_{module1} + n_2 * I_{module2} + n_3 * I_{module3} + ...$

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

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

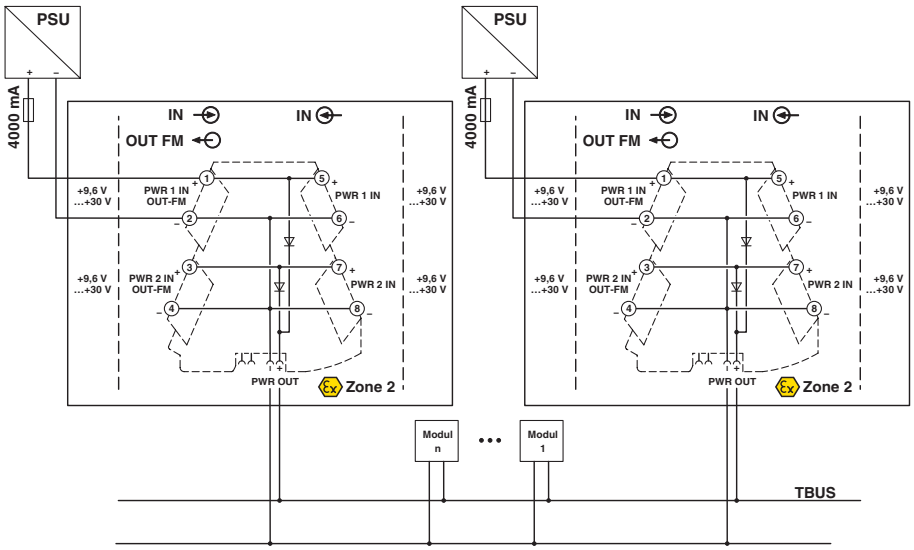



The disadvantage here is that in the event that the power terminal fails, the supply of all signal conditioners is interrupted. However, this can be indicated in this example by means of an N/C contact by using a MINI MCR-2-FM-RC fault signaling module and the MINI MCR-2-PTB power terminal.

### 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




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.

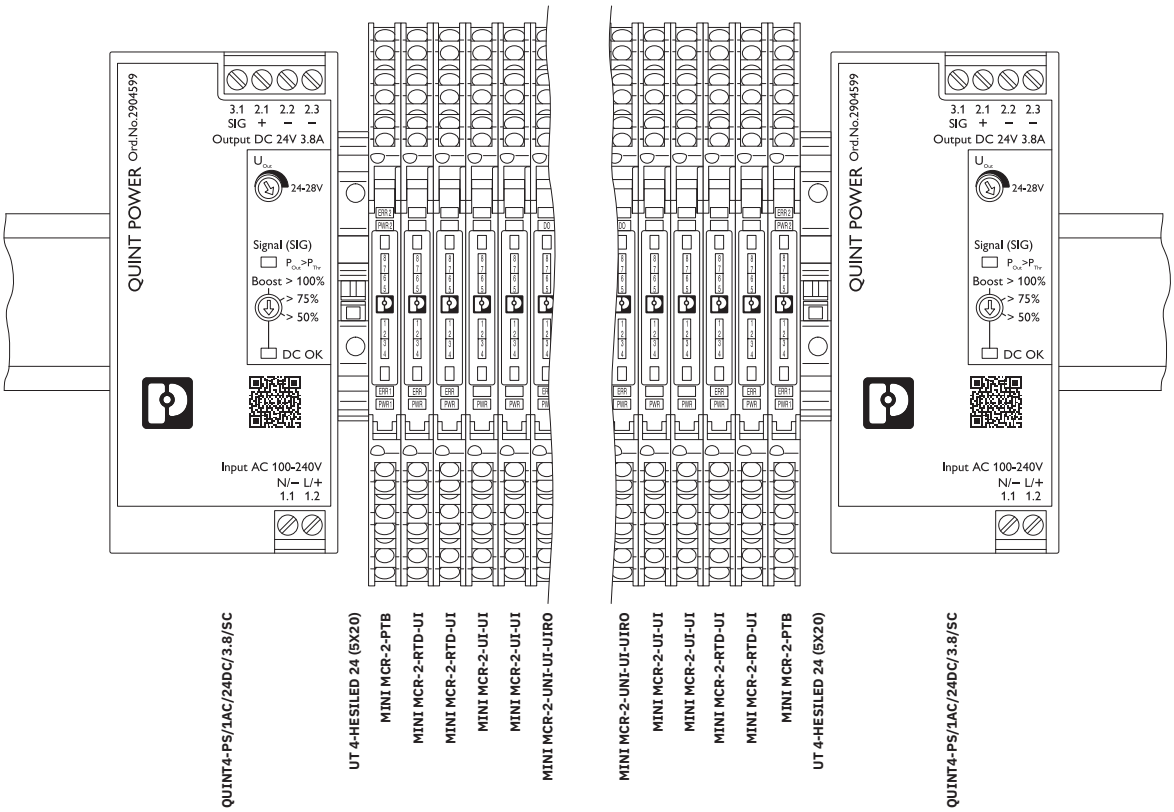
Then determine the maximum total current consumption of all 51 modules.

$I = n_1 * I_{module1} + n_2 * I_{module2} + n_3 * I_{module3} + ...$

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

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.

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

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

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

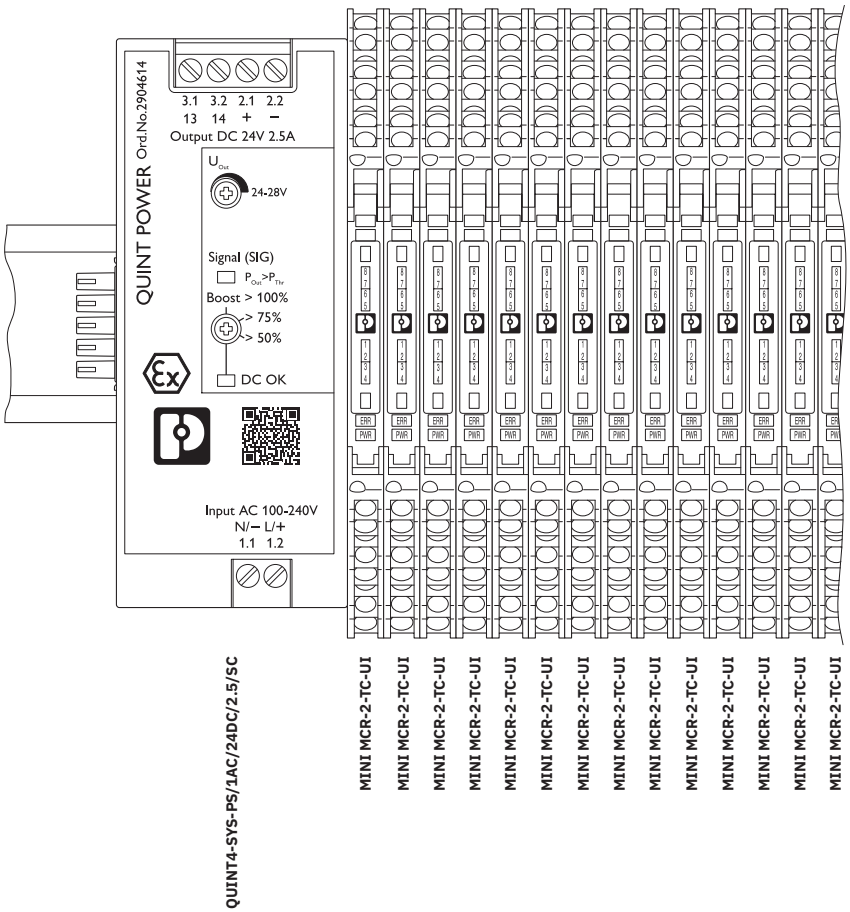
First determine the current consumption of the modules from the packing slips. For this temperature measuring transducer it is 32.5 mA per module.

Then determine the maximum total current consumption of the 40 modules.
$I = n_1 * I_{module1} + n_2 * I_{module2} + n_3 * I_{module3} + \ldots$

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

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**

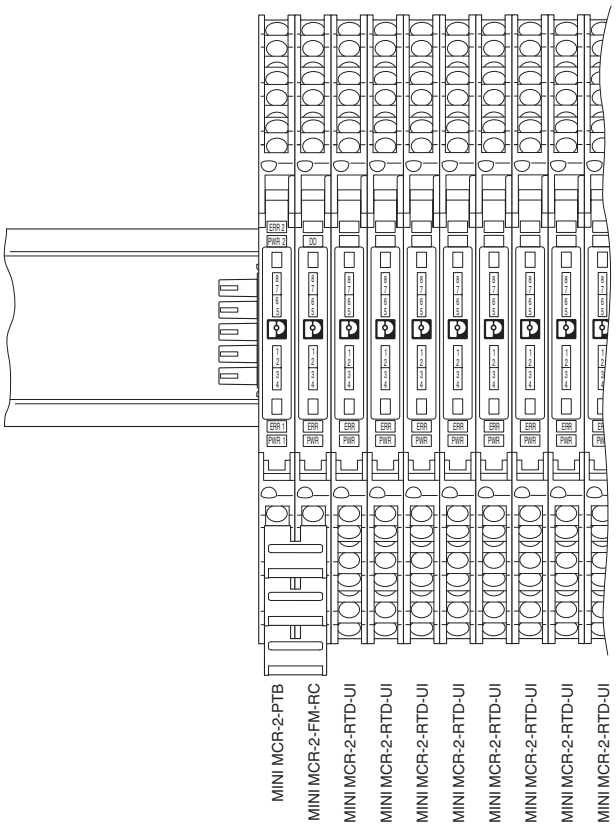
You must observe a 50 mm clearance between the intrinsically safe versions of the MINI Analog Pro product family and the system power supply.

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

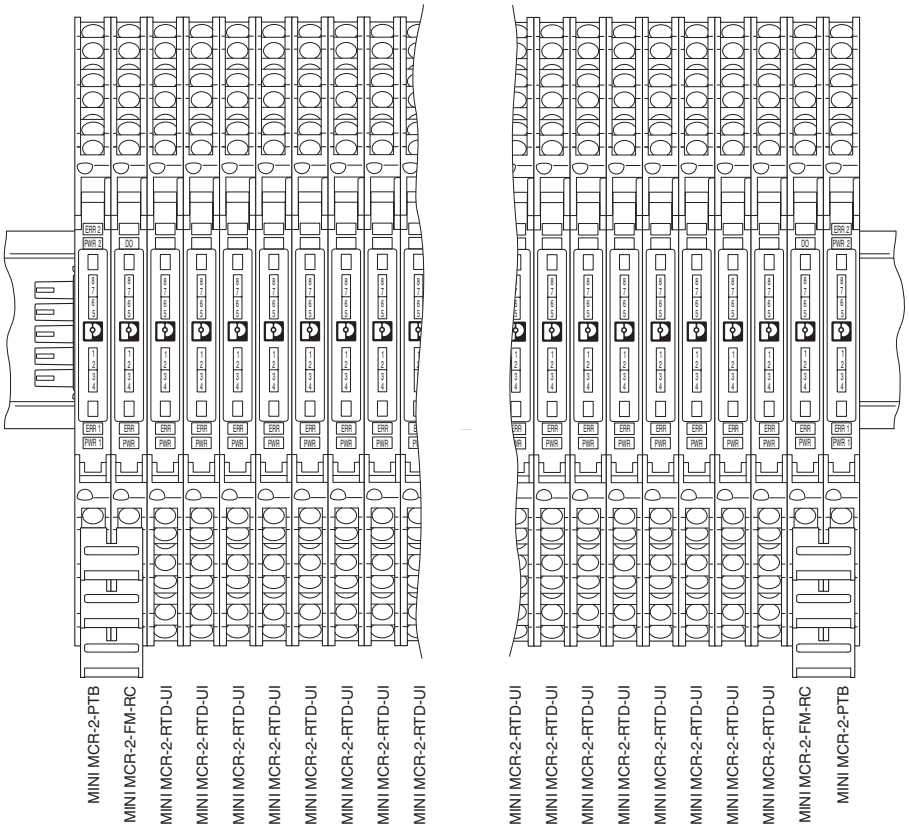
As described in Section 4.2 on page 28, the MINI Analog Pro modules can be supplied with power via a MINI MCR-2-PTB... power terminal (item no. 2902066). By using the MINI MCR-2-FM-RC-... fault signaling modules (item no. 2904504), it is then possible to establish redundancy monitoring of the supply 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.

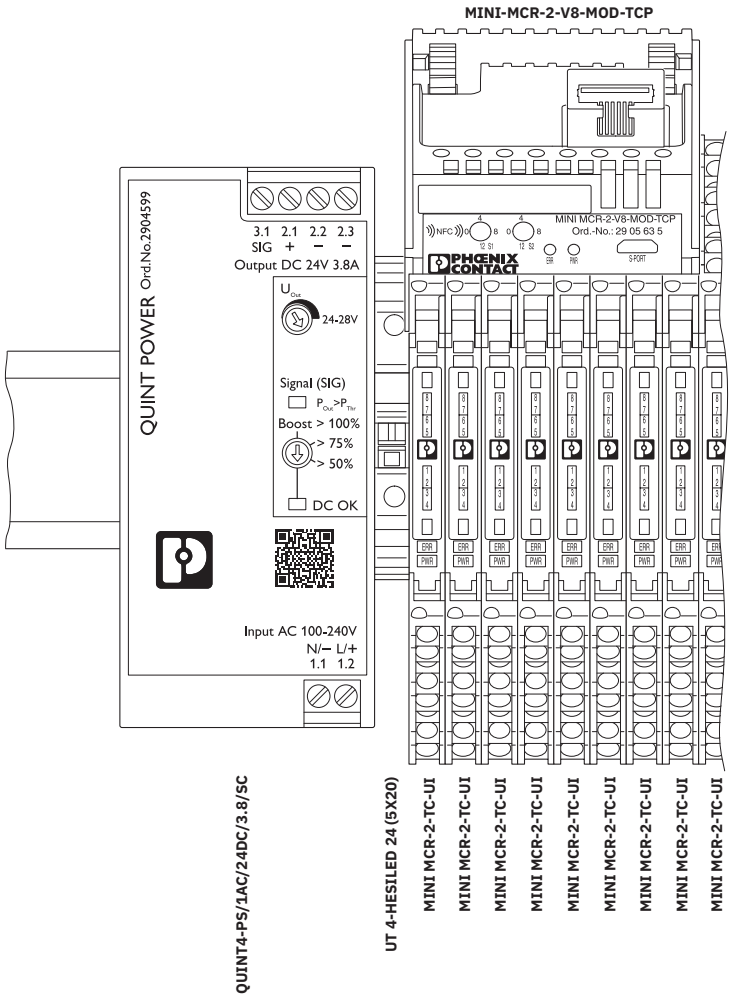
Then determine the maximum total current consumption of all nine modules.

$I = n_1 * I_{module1} + n_2 * I_{module2} + n_3 * I_{module3} + ...$

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

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.

Figure 4-11 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.

**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.

# 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

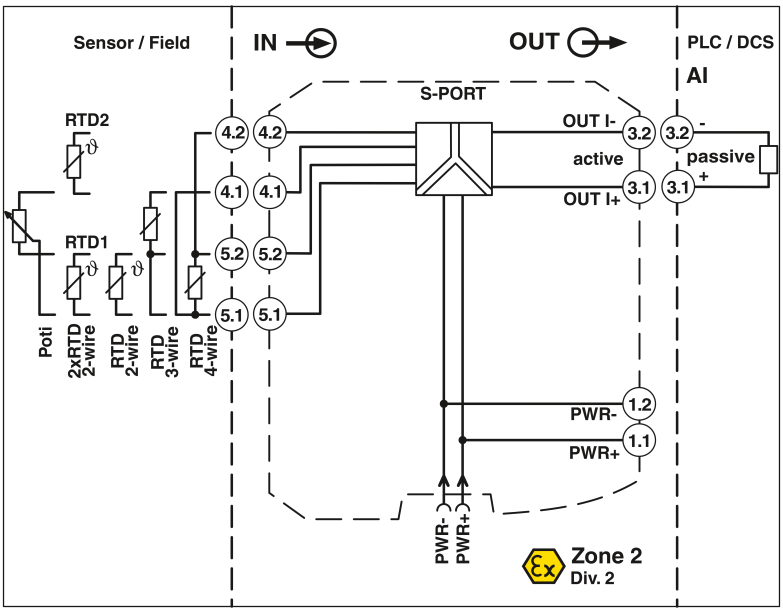
In the case of direct supply, all modules connected to the TBUS DIN rail connector are supplied via the supply at a signal conditioner. Please note that the maximum total current consumption of $I_{max}$ = 400 mA must not be exceeded and the maximum number of modules is therefore restricted to a few 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:

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

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

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.

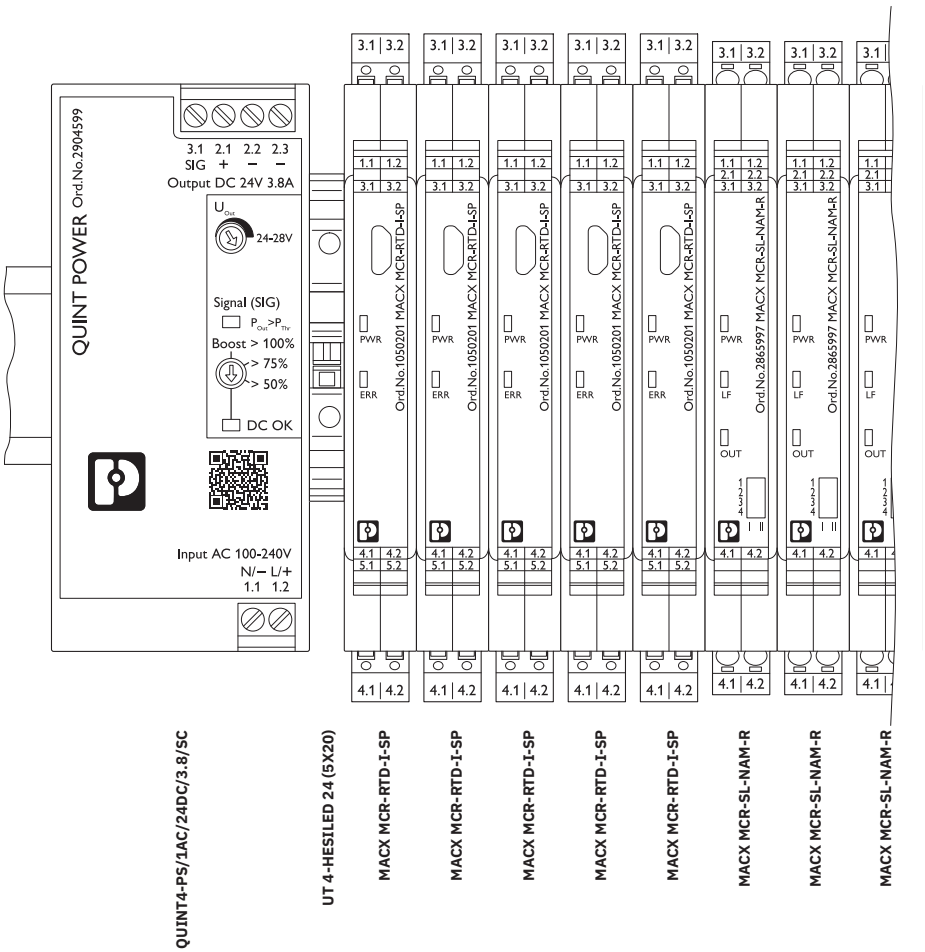
Then determine the maximum total current consumption of all eight modules.

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

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

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.

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

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

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

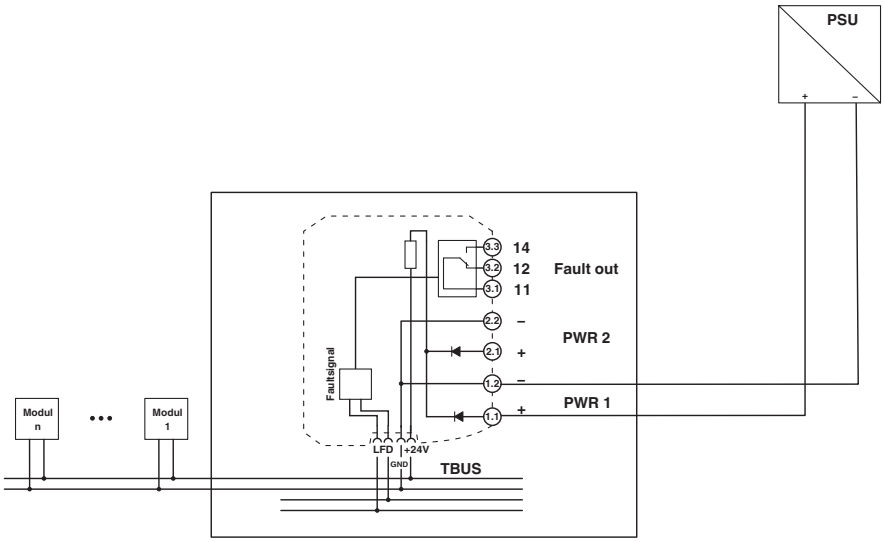
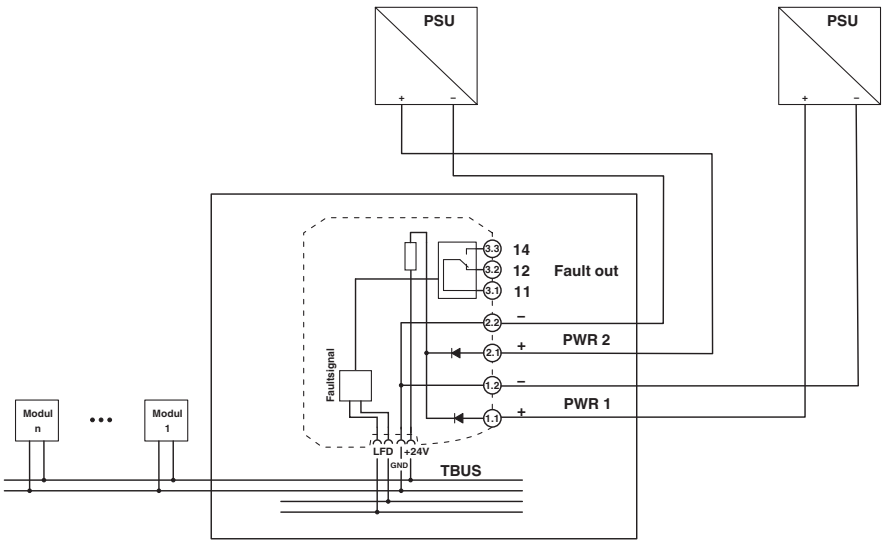



Figure 5-4 Supply by means of redundant power supplies



**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.

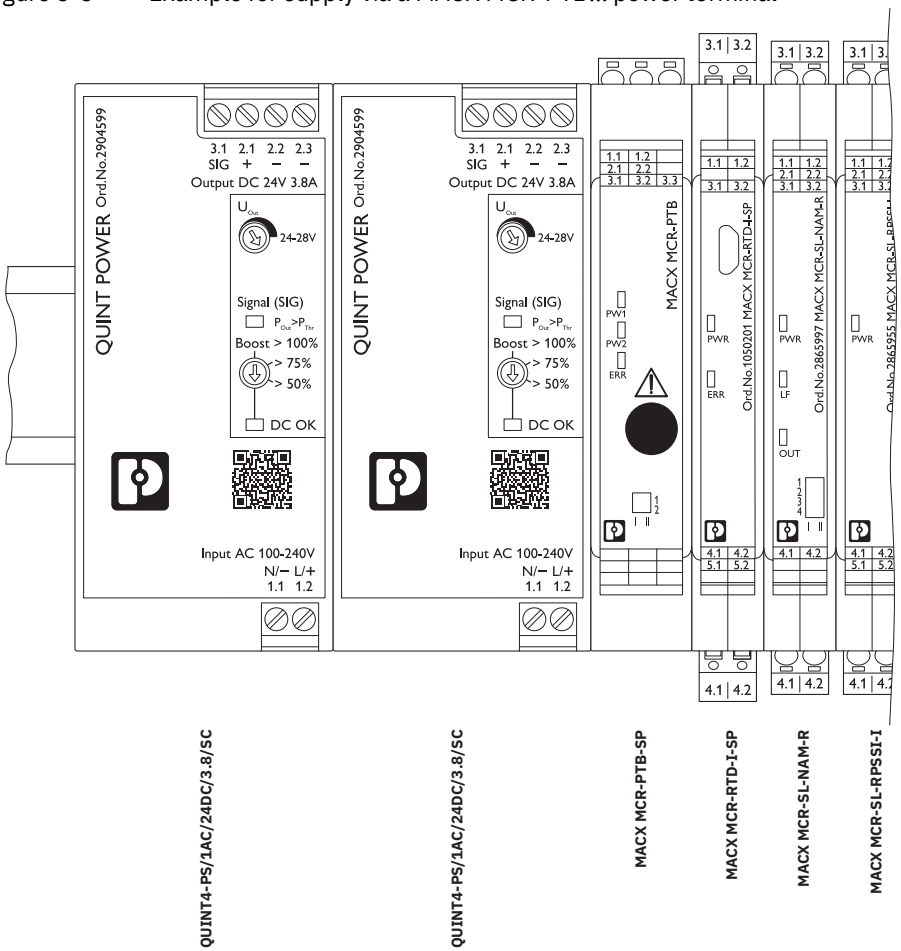
Then determine the maximum total current consumption of all 92 modules.

$I = n_1 * I_{module1} + n_2 * I_{module2} + n_3 * I_{module3} + ...$

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

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.

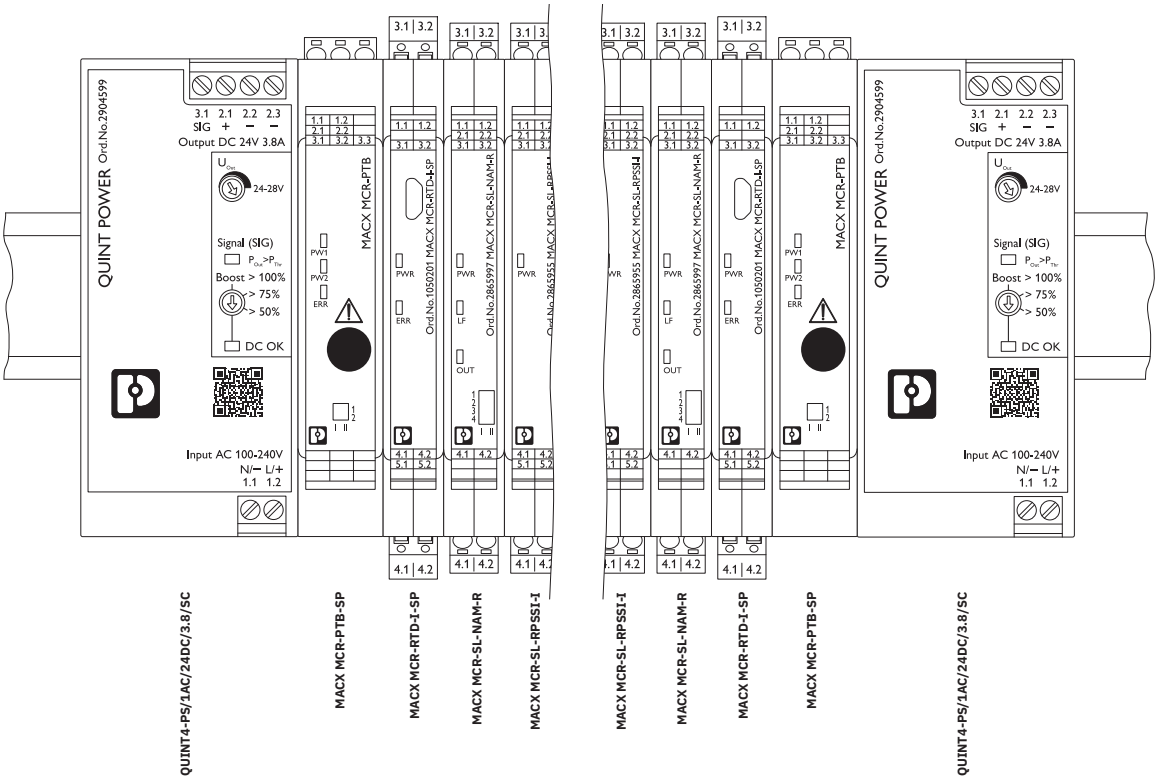
$$I = n_1 * I_{module1} + n_2 * I_{module2} + n_3 * I_{module3} + \ldots$$

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

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

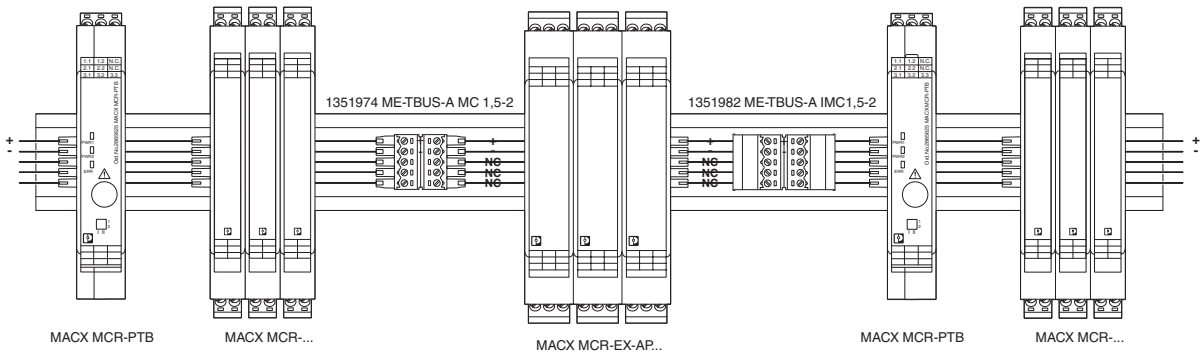


## 5.3 Supply via MACX MCR(-EX)-AP power module with DIN rail connector

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 each (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




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:

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

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

### 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.

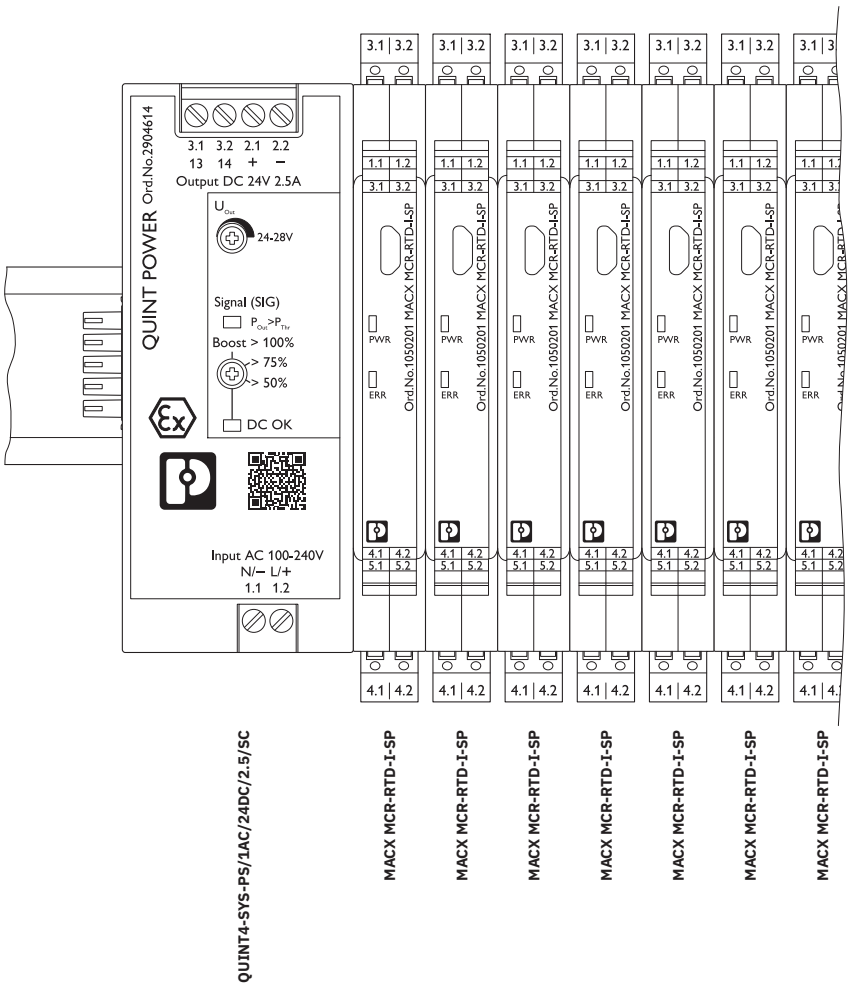
Then determine the maximum total current consumption of the 35 modules.

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

$I = 35 * 40\ mA = 1400\ mA < 1500\ mA$

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



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# Please observe the following notes

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105810_en_02

# EU-Konformitätserklärung

EU Declaration of Conformity

Nr. / No. 083113343_07_DoC_EU

| | |
|---|---|
| Hersteller / Manufacturer: | **Phoenix Contact GmbH & Co. KG** |
| Anschrift / Address: | Flachsmarktstraße 8, 32825 Blomberg, Germany |
| Produktbezeichnung / Product designation: | **MACX MCR-EX-SL-2NAM-R-UP** |
| Artikel-Nr. / Order No.: | 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**<br>(OJ L 174, 1 July 2011) | **Beschränkung der Verwendung bestimmter gefährlicher Stoffe**<br>Restriction of the use of certain hazardous substances (RoHS) |
| **2014/30/EU**<br>(OJ L 96, 29 March 2014) | **EMV-Richtlinie (Elektromagnetische Verträglichkeit)**<br>Electromagnetic Compatibility Directive (EMC) |
| **2014/34/EU**<br>(OJ L 96, 29 March 2014) | **Geräte in explosionsgefährdeten Bereichen**<br>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

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i.V. 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**<br>Verordnung zur Beschränkung der Verwendung bestimmter gefährlicher Stoffe in Elektro- und Elektronikgeräten 2012 |
| **S.I. 2016/1091** | **Electromagnetic Compatibility Regulations 2016**<br>Verordnung über elektromagnetische Verträglichkeit 2016 |
| **S.I. 2016/1107** | **Equipment and Protective Systems Intended for use in Potentially Explosive Atmospheres Regulations 2016**<br>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

i. A. P. Schnelle

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Contact person / Ansprechpartner

i. V. Carsten Thörner

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:

**Ex I (M1) [Ex ia Ma] I**
**Ex II (1) G [Ex ia Ga] IIC**
**Ex II (1) D [Ex ia Da] IIIC**
**Ex II 3(1) G Ex ec [ia Ga] nC IIC T4 Gc**

$-40\ °C \leq T_{amb} \leq +60\ °C / +70\ °C$

IBExU Institut für Sicherheitstechnik GmbH
Fuchsmühlenweg 7
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By order

Dipl.-Ing.(FH) A. Henker

Zertifizierungsstelle Explosionsschutz IBExU Institut für Sicherheitstechnik GmbH 0637 Freiberg - Seal
(notified body number 0637)

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<br>-40 °C up to +70 °C<br>(with ≥ 6 mm distance to other devices) |
| Degree of protection | ≥ IP20 (acc. to EN 60529) |

**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);<br>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) /<br>120 V DC (0.2 A) /<br>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 µF 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 µF | 1 µF | 1 µF | 1 µF |
| $L_o$ | 100 mH | 50 mH | 5 mH | 1 mH | 10 µH | 100 mH | 5 mH | 1 mH | 10 µH |

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)<br>Issue 2 (2016-04-14)<br>Issue 1 (2012-07-27)<br>Issue 0 (2010-04-06) |
| Date of Issue: | 2021-12-21 | | |

Applicant: **PHOENIX CONTACT GmbH & Co. KG**
Flachsmarktstraße 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)

Date: 2021-12-21

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Certificate issued by:

**IBExU Institut für Sicherheitstechnik GmbH**
**Fuchsmühlenweg 7**
**09599 Freiberg**
**Germany**

# IECEx Certificate of Conformity



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/ExTR10.0002/01 DE/IBE/ExTR10.0002/02
DE/IBE/ExTR10.0002/03 DE/IBE/ExTR10.0002/04

Quality Assessment Report:

NL/DEK/QAR11.0009/08

# IECEx Certificate of Conformity



**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



**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<br>-40 °C up to + 70 °C<br>(with ≥ 6 mm distance to other devices) |
| Degree of protection of the enclosure | ≥ 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) /<br>120 V DC (0.2 A) /<br>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 Ci of the external circuit (excluding the cable) is < 1 % of the Co value.

| | Ex ia IIC | Ex ia IIB/IIIC | Ex ia IIA, Ex ia I |
|---|---|---|---|
| $C_O$ | 3.6 µF | 26 µF | 210 µF |
| $L_O$ | 300 mH | 1000 mH | 1000 mH |

The values of $L_O$ and $C_O$, 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 Li of the external circuit (excluding the cable) is ≥ 1 % of the Lo value and
- the total Ci of the external circuit (excluding the cable) is ≥ 1 % of the Co 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 µF | 1 µF | 1 µF | 1 µF |
| $L_O$ | 100 mH | 50 mH | 5 mH | 1 mH | 10 µH | 100 mH | 5 mH | 1 mH | 10 µH |

FB107009_1_170526 | Vorlage: 00VD002v170_170117 | öffentlich

# IECEx Certificate of Conformity - Annex



The reduced capacitance of the external circuit (including cable) shall not be greater than 1 µF 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<br>-40 °C up to + 70 °C<br>(with ≥ 6 mm distance to other devices) |
| Degree of protection of the enclosure | ≥ 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 ± 10 % |
| | nominal output current | I | 8 mA ± 10 % |
| 3. | **Relay output (2.1 ... 2.3 / 3.1 ... 3.3)** | | |
| | maximum switching voltage | $U_S$ | 250 V AC (2 A) /<br>120 V DC (0.2 A) /<br>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).

FB107009_1_170526 | Vorlage: 00VD002v170_170117 | öffentlich

# EU-Declaration of conformity

**en**/de

*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

Copyright Pepperl+Fuchs
**www.pepperl-fuchs.com**

PEPPERL+FUCHS

## 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<br>EN IEC 60079-0:2018-07 |
| EMC 2014/30/EU (L96/79-106) | EN 60947-5-6:2000-01<br>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*

CE 0102

## Signatures / *Unterschriften*

Mannheim, 2022-09-22

ppa. Wolfgang Helm
Director
Business Unit Sensors

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<br>Bundesallee 100<br>38116 Braunschweig<br>Germany |

# UK-Declaration of conformity

**en**

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

Copyright Pepperl+Fuchs
**www.pepperl-fuchs.com**

PEPPERL+FUCHS

## 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<br>EN IEC 60947-5-2:2020-03 |
| UK SI 2016 No. 1107 (EX) | EN 60079-11:2012-01<br>EN IEC 60079-0:2018-07 |

## Affixed UKCA Marking

UK CA 2503

## 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<br>Newport Business Park - New Port Road<br>CH65 4LZ Ellesmere Port<br>United Kingdom |

# Physikalisch-Technische Bundesanstalt

**Braunschweig und Berlin**

(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. Johannsmeyer
Regierungsdirektor

PHYSIKALISCH-TECHNISCHE BUNDESANSTALT 24



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.

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(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 V | $U_i$ = 16 V | $U_i$ = 16 V |
| $I_i$ = 25 mA | $I_i$ = 25 mA | $I_i$ = 52 mA |
| $P_i$ = 34 mW | $P_i$ = 64 mW | $P_i$ = 169 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 intiators are shown in the table:



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.

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| types | $L_i$ | $C_i$ | type 1 | | | type 2 | | | type 3 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | maximum permissible ambient temperature in °C for application in temperature class | | | | | | | | |
| | [µH] | [nF] | 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.



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.

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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. Johannsmeyer
Regierungsdirektor

PHYSIKALISCH-TECHNISCHE BUNDESANSTALT 24



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.

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Physikalisch-Technische Bundesanstalt
Braunschweig und Berlin
Nationales Metrologieinstitut

# 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: Ⓔx **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:

Ⓔx **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

ZSEx10101e b

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:

Ex II 2 G

Ex ia IIC T6…T1 Gb

L. A. Brisk
Certification Officer

## 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

## 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 -60C 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
# Формуляр RMA и заявление об обеззараживании

RMA-Nr./ Номер возврата

**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./ Номер возврата неисправного оборудования Выполучите от Вашего контактного лица в отделе сбыта или в отделе обслуживания. При возврате старого устройства на утилизацию введите в поле номера RMA "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./ К настоящему бланку возврата прилагается заявление об обеззараживании. Согласно установленным законом нормативам Вы должны заполнить настоящее заявление об обеззараживании, подписать и выслать нам его/ вместе с возвращаемым оборудованием. Пожалуйста, полностью заполните данное заявление также и по соображениям охраны здоровья наших сотрудников.**

**Firma/ Фирма**

Firma/ Фирма

Straße/ Улица

PLZ, Ort/ Индекс, город

Land/ Страна

**Ansprechpartner/ Контактное лицо**

Name/ Имя

Abt./ Отдел

Tel./ Тел.

E-Mail

Gerät/ Прибор

Anzahl/ Количество

Auftragsnr./ Номер заказа

Serien-Nr./ Серийный номер

Artikel-Nr./ Арт. номер

**Grund der Rücksendung/ Причина возврата**

- ☐ Kalibrierung/ Калибровка
- ☐ Modifikation/ Модификация
- ☐ Reklamation/ Рекламация
- ☐ Reparatur/ Ремонт
- ☐ Elektroaltgerät/ Старое электрооборудование (WEEE)
- ☐ andere/ другое

bitte spezifizieren/ просим указать детально

**Ist das Gerät möglicherweise kontaminiert?/ Может ли прибор быть экологически опасным?**

☐ Nein, da das Gerät nicht mit gesundheitsgefährdenden Stoffen betrieben wurde./ Нет, поскольку прибор был очищен и обеззаражен надлежащим образом.

☐ Nein, da das Gerät ordnungsgemäß gereinigt und dekontaminiert wurde./ Нет, поскольку прибор не использовался с вредными для здоровья веществами.

☐ Ja, kontaminiert mit:/ Да, он может представлять следующую опасность:

| ☐ explosiv/ взрывоопасность | ☐ entzündlich/ легковоспламеняемость | ☐ brandfördernd/ пожароопасность | ☐ komprimierte Gase/ сжатые газы | ☐ ätzend/ едкость | ☐ giftig, Lebensgefahr/ ядовитость, опасность для жизни | ☐ gesundheitsgefährdend/ опасность для здоровья | ☐ gesundheitsschädlich/ вред для здоровья | ☐ umweltgefährdend/ вред для окружающей среды |
|---|---|---|---|---|---|---|---|---|

**Bitte Sicherheitsdatenblatt beilegen!/ просим приложить паспорт безопасности!**

Das Gerät wurde gespült mit:/ Прибор был промыт при помощи:

*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.*

*Данное заявление было правильно и полностью заполнено и подписано ответственным лицом. Транспортировка (загрязненных) приборов и компонентов осуществляется согласно установленным законом предписаниям.*

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.

Если товар поступит к нам в неочищенном, т.е. в загрязненном виде, компания Bühler оставляет за собой право, передать прибор на очистку стороннему подрядчику и выставить Вам за это соответствующий счет.

Firmenstempel/ Печать фирмы

Datum/ Дата

rechtsverbindliche Unterschrift/ Юридически обязующая подпись



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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.

### Предотвращение модификации и повреждения отправляемого компонента

Анализ неисправных компонентов является неотъемлемой частью обеспечения качества компании Bühler Technologies GmbH. Для обеспечения точного анализа продукт должен по возможности исследоваться в неизмененнном состоянии. Не допускаются изменения или другие повреждения, которые могут скрыть причину и помешать анализу.

### Обращение с электростатически чувствительными компонентами

Электронные компоненты могут представлять собой электростатично чувствительные компоненты. Необходимо следить за тем, чтобы работа с такими компонентами осуществлялась согласно ESD. По возможности такие компоненты должны заменяться на рабочем месте, оборудованном в соответствии с ESD. Еслеи это невозможно, при замене необходимо принять меры согласно ESD. Транспортировка должна осуществляться только в контейнерах в соотв. с ESD. Упаковка компонентов должна осуществляться только в соотв. с ESD. По возможности используйте упаковку запасных частей или сами выберите упаковку, отвечающую нормам ESD.

### Установка запасных частей

При монтаже запасных частей соблюдайте указания выше. Следите на надлежащим монтажом деталей и компонентов. Перед вводом в эксплуатацию приведите кабельные соединения в изначальное состояние. В случае сомнения обращайтесь за дальнейшей информацией к производителю.

### Возврат старого электрооборудования на утилизацию

Если вы хотите отправить электрооборудование компании Bühler Technologies GmbH для профессиональной утилизации, введите в поле номера RMA "WEEE". Полностью заполненное Заявление об обеззараживании для транспортировки необходимо приложить к старому оборудованию так, чтобы его было видно снаружи. Подробную информацию об утилизации старого электрооборудования можно найти на сайте нашей компании.



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