



Caudalímetro

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

Manual de funcionamiento e instalación

Manual original





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Lea detenidamente el manual de instrucciones antes de utilizar el aparato. Tenga en cuenta especialmente las indicaciones de advertencia y seguridad. En caso contrario podrían producirse daños personales o materiales. Bühler Technologies GmbH no tendrá responsabilidad alguna en caso de que el usuario realice modificaciones por cuenta propia o en caso de uso inadecuado del dispositivo.

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Información del documento

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1 Introducción

1.1 Uso adecuado

El caudalímetro puede utilizarse para indicar el volumen de caudal de gases de muestreo o de medios líquidos. Puede comprobar de qué tipo dispone consultando la placa indicadora. En esta encontrará el número de artículo junto al número de pedido y la designación del tipo. Si hay especificaciones concretas para un tipo de caudalímetro, estas aparecerán descritas aparte en el manual de uso. Tenga en cuenta los valores característicos del caudalímetro para la conexión y los modelos correctos para cargar repuestos.

Los caudalímetros de la serie SM-6/SM-6-V también pueden equiparse con un interruptor de valor límite biestable. En la serie SM-6-V puede ajustarse el volumen del caudal con la válvula de aguja.

En los caudalímetros de seguridad de la serie S-SM el cono de medición real está protegido por un segundo cilindro de cristal de pared gruesa. Si el cono de medición estallara, el cilindro de cristal exterior se haría cargo de la función de protección para que el medio no pudiera escapar. Además, este cilindro de cristal exterior cuenta con protección contra daños mecánicos gracias a un tubo de acero inoxidable. Los distintos tipos de S-SM pueden encontrarse en la hoja de datos.

INDICACIÓN



En caso de uso en zonas con riesgo de explosión

Los caudalímetros de los tipos SM-6, SM6-V y S-SM 3-1 cumplen los requisitos de seguridad esenciales de la normativa 2014/34/UE y, por lo tanto, son adecuados para su uso en entornos explosivos de la zona 1 (**Modelo S-SM 3-1: Grupo de explosión IIC; modelo SM-6, SM-6-V: Grupo de explosión IIB**); Imprescindible considerar las indicaciones de peligro). A través del caudalímetro es posible conducir gases no inflamables y gases inflamables del **grupo de explosión IIB** (modelos SM-6 y SM-6-V) **o IIC** (modelo S-SM 3-1) que en un funcionamiento normal pueden resultar explosivos (**zona 1**). La placa indicadora del caudalímetro no lleva identificación de protección contra incendios, ya que el equipo no incorpora ninguna fuente de ignición ni se encuentra en el campo de aplicación de la normativa 2014/34/UE.

1.2 Suministro

- 1 x caudalímetro
- 1 x documentación del producto
- 1 x soporte (solo en tipos SM-6 / SM-6-V)

1.3 Instrucciones de pedidos

El número de artículo codifica la configuración de su dispositivo. Para ello utilice los siguientes códigos de productos:

4056	XX	X	99	X	Rango de medición*
	00				Aire 6 - 60 l/h
	01				Aire 10 - 100 l/h
	02				Aire 25 - 250 l/h
	03				Aire 50 - 500 l/h
	04				Aire 80 - 800 l/h
	05				Agua 0,5 - 5 l/h
	06				Agua 1,2 - 12 l/h
	07				Agua 2,5 - 25 l/h
	08				Agua 4 - 40 l/h
	09				Agua 6 - 60 l/h
	10				Rango de medición especial
		0			sin válvula de aguja
		1			Válvula de PVDF / Viton
		2			Válvula de PCTFE / perfluoroelastómero
				S	Interruptor de valores límite con soporte
				-	sin interruptor de valores límite

* Tubo de medición estándar; aire 20° C 1,2 bar abs; agua 20° C

Instrucciones para pedido de interruptor de valores límite: Dispondrá de un interruptor de valores límite instalado de fábrica si el número de artículo presenta una «S» en última posición. Sin esta «S» el caudalímetro no dispondrá de interruptor de valores límite. Para controlar el interruptor de valores límite existen diversos amplificadores de conmutación de aislamiento (ver hoja de datos n.º 400003).

2 Avisos de seguridad

2.1 Indicaciones importantes

Solamente se puede ejecutar este aparato si:

- se utiliza el producto bajo las condiciones descritas en el manual de uso e instalación y se lleva a cabo su ejecución de acuerdo con las placas de indicaciones y para el fin previsto. Bühler Technologies GmbH no se hace responsable de las modificaciones que haga el usuario por cuenta propia,
- se tienen en cuenta los datos e identificaciones en las placas indicadoras.
- se mantienen los valores límite expuestos en la hoja de datos y en el manual,
- se conectan de forma correcta los dispositivos de control / medidas de seguridad,
- se llevan a cabo las tareas de servicio y reparación que no están descritas en este manual por parte de Bühler Technologies GmbH,
- se utilizan refacciones originales.

Este manual de instrucciones es parte del equipo. El fabricante se reserva el derecho a modificar sin previo aviso los datos de funcionamiento, las especificaciones o el diseño. Conserve el manual para su futuro uso.

Palabras clave para advertencias

PELIGRO	Palabra clave para identificar un peligro de riesgo elevado que, de no evitarse, puede tener como consecuencia la muerte o lesiones corporales graves de no evitarse.
ADVERTENCIA	Palabra clave para identificar un peligro de riesgo medio que, de no evitarse, puede tener como consecuencia la muerte o lesiones corporales graves.
ATENCIÓN	Palabra clave para identificar un peligro de riesgo pequeño que, de no evitarse, puede tener como consecuencia daños materiales o lesiones corporales leves.
INDICACIÓN	Palabra clave para información importante sobre el producto sobre la que se debe prestar atención en cierta medida.

Señales de advertencia

En este manual se utilizan las siguientes señales de advertencia:

	Señal general de advertencia		Utilizar mascarilla
	Peligro por inhalación de gases tóxicos		Utilizar protección para la cara
	Peligro por materiales corrosivos		Utilizar guantes
	Advertencia de peligro de explosión		

2.2 Avisos de peligro generales

Las tareas de mantenimiento solo pueden ser realizadas por especialistas con experiencia en seguridad laboral y prevención de riesgos.

Deben tenerse en cuenta las normativas de seguridad relevantes del lugar de montaje, así como las regulaciones generales de las instalaciones técnicas. Prevenga las averías, evitando de esta forma daños personales y materiales.

El usuario de la instalación debe garantizar que:

- Estén disponibles y se respeten las indicaciones de seguridad y los manuales de uso.
- Se respeten las disposiciones nacionales de prevención de accidentes.
- Se cumpla con los datos aportados y las condiciones de uso.
- Se utilicen los dispositivos de seguridad y se lleven a cabo las tareas de mantenimiento exigidas.
- Se tengan en cuenta las regulaciones vigentes respecto a la eliminación de residuos.
- se cumplan las normativas nacionales de instalación.

Mantenimiento, reparación

Para las tareas de mantenimiento y reparación debe tenerse en cuenta lo siguiente:

- Las reparaciones en el equipo solo pueden llevarse a cabo por personal autorizado por Bühler.
- Solamente se deben llevar a cabo las tareas de mantenimiento descritas en este manual de uso e instalación.
- Utilizar solamente repuestos originales.
- No instalar piezas de repuesto dañadas o defectuosas. En caso necesario, realiza una revisión visual antes de la instalación para detectar posibles daños evidentes de las piezas de repuesto.

Al realizar tareas de mantenimiento de cualquier tipo deben respetarse las instrucciones de seguridad y de trabajo del país de aplicación.

PELIGRO



Gases tóxicos y corrosivos

Los gases de muestreo pueden ser perjudiciales para la salud.

- Antes de comenzar las tareas de mantenimiento se debe desconectar el suministro de gas y limpiar las tuberías de gas con aire.
- En caso necesario asegúrese de que el gas se elimine de forma segura.
- Utilice medios de protección contra gases tóxicos o corrosivos durante el mantenimiento. Utilice el equipo de protección correspondiente



PELIGRO



Instalación en zonas con peligro de explosión

Los gases y polvo inflamables pueden incendiarse o explotar. Evite los siguientes riesgos:

Acumulación de electricidad estática (formación de chispas)

Limpie las partes de plástico de la carcasa y los adhesivos con un paño húmedo.

¡Las carcasas metálicas deben estar conectadas con potencial de tierra (PE) conductor!

¡Temperatura máxima de la superficie!

La temperatura máxima de la superficie T_{surf} del equipo dependen de la temperatura del medio T_{med} . Se aplica $T_{surf} \leq T_{med}$.

¡Temperatura de ignición!

Mantenga las temperaturas de ignición de los gases explosivos, así como las temperaturas de superficie máximas permitidas T_{surf} , de acuerdo a las normas correspondientes.

Peligro de rotura/posible salida de gases explosivos o tóxicos.

Proteja el equipo contra golpes externos o móntelo con la protección previa.

¡Salida de gas!

Peligro de muerte y de explosión por posible salida de gas en caso de funcionamiento no adecuado y en tareas de mantenimiento.

3 Transporte y almacenamiento

Los productos solamente se pueden transportar en su embalaje original o en un equivalente adecuado.

Si no se utiliza, se habrá de proteger el equipo contra humedad o calor. Se debe conservar en un espacio atechado, seco y libre de polvo con una temperatura de entre -10° C a 40° C.

4 Construcción y conexión

Las roscas de conexión para entradas y salidas de gas del caudalímetro son:

Caudalímetro	Roscas
SM-6 / SM-6-V	G1/4
S-SM 3-1	NPT 1/4"

Puede encontrar la imagen de montaje en el apartado [Dimensiones](#) [> Página 19]. ¡Los acoples deben ir enroscados de forma estanca con cinta de teflón o material aislante/anillo de retención!

4.1 Conexiones eléctricas (seguridad intrínseca)

ADVERTENCIA



Voltaje eléctrico peligroso

La conexión solamente se puede llevar a cabo por especialistas formados.

CUIDADO



Tensión de red incorrecta

Una tensión de red incorrecta puede destrozar el dispositivo. Comprobar en la conexión que la tensión de red sea la correcta de acuerdo con la placa indicadora.

CUIDADO



Peligro de explosión por valores de conexión eléctrica no permitidos

Los valores de conexión eléctrica no permitidos pueden provocar la ignición de una mezcla explosiva de gases.

El dispositivo únicamente puede emplearse en entornos de gas explosivos si cuenta con un suministro eléctrico de seguridad intrínseca. El suministro eléctrico debe ser apto para la zona en cuestión. Es necesario respetar los valores límite indicados en este manual de instrucciones y nunca deben superarse, incluso en el caso de versiones con dos fuentes de alimentación de seguridad intrínseca separadas.

Es necesario garantizar que no se superen los valores límite incluso en caso de fallo, por ej. en caso de conexión en serie o paralela accidental.

Tenga en cuenta las indicaciones de seguridad aplicables, por ej. IEC/EN 60079-11 y IEC/EN 60079-14, al instalar y operar con equipos de seguridad intrínseca.

4.1.1 Montaje del interruptor de valores límite con soporte (solo en modelo SM-6/SM-6-V)

PELIGRO



Peligro de explosión

En caso de uso en zonas con peligro de explosión

Únicamente utilice el interruptor de valores límite con la autorización correspondiente.

El interruptor de valores límite se envía preinstalado.

- Antes del primer uso, afloje los tornillos avellanados de plástico de la placa de fijación y posicione el interruptor de valores límite a la altura deseada.
- Después deberá volver a fijar los tornillos avellanados de plástico.
- Conecte el cable a la fuente de suministro de energía eléctrica.

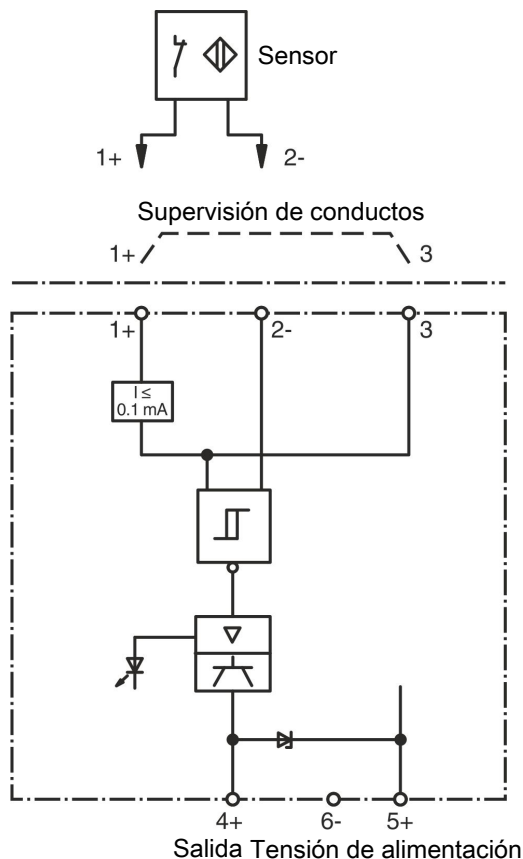
Uso del interruptor de valores límite en entornos Ex:

Tenga en cuenta los parámetros de conexión del limitador de nivel opcional de los modelos RC10-14-N3 o RC15-14-N3 indicados en el permiso PTB99ATEX2128X del apartado [Documentación adjunta](#) [> Página 22]. El modelo exacto puede consultarse en la denominación de modelo del correspondiente limitador de nivel instalado.

4.1.2 Montaje y conexión del amplificador de conmutación de aislamiento (solo en modelo SM-6/SM-6-V)

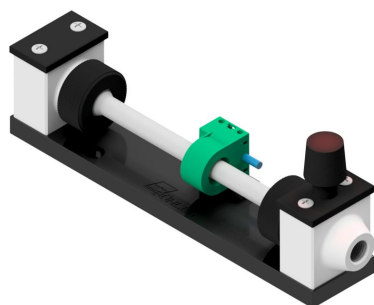
Modelo MACX: Tenga en cuenta los parámetros de conexión indicados en los permisos (IECEX IBE100002X y IBEx U10ATEX1005X) y las instrucciones de montaje del manual de uso adjunto en el apartado [Documentación adjunta](#) [> Página 22].

Modelo KCD2-E2L: Si utiliza un contacto mecánico como generador de impulsos, deberá conectar in situ una resistencia de 10 kOhm en paralelo a este contacto para supervisar la rotura del conductos.

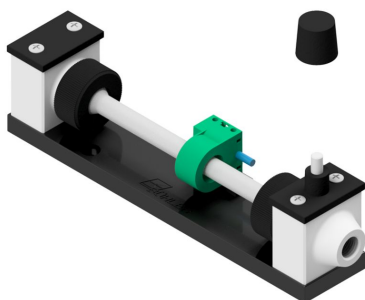


Ilus. 1: Plano de conexión de amplificador de conmutación de aislamiento KCD2-E2L

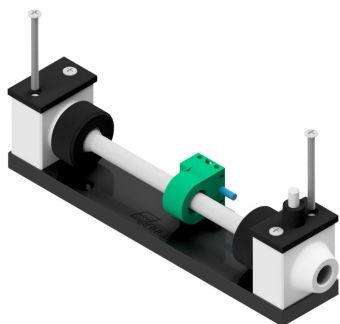
4.2 Montaje de la tapa (n.º art. 40158998)



- Comience el proceso de montaje quitando con cuidado la tapa de la válvula de aguja.



- Desmonte el tornillo de la válvula de aguja y al hacerlo tenga cuidado de sujetar el botón giratorio para evitar que la válvula realice accidentalmente algún giro involuntario.



- Realice el desmontaje del tornillo avellanado.



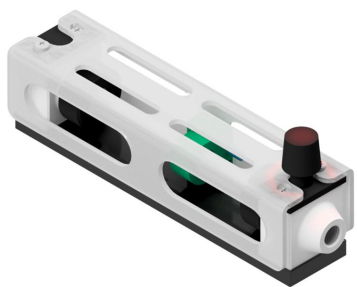
- Coloque la tapa en el lugar correspondiente.



- Utilice los tornillos de cabeza cilíndrica suministrados para fijar bien la tapa.



- Coloque la válvula de aguja y apriétela. De nuevo es importante mantener estable el botón giratorio al apretarlo para evitar que la válvula realice accidentalmente algún giro involuntario.



- Termine el proceso de montaje colocando de nuevo con cuidado la tapa de la válvula de aguja.

Se recomienda llevar a cabo los pasos mencionados con cuidado para garantizar un montaje profesional.

5 Uso y funcionamiento

INDICACIÓN



¡No se puede utilizar el dispositivo fuera de sus especificaciones!

Indicaciones sobre el funcionamiento del caudalímetro con tapa:

- La cubierta está disponible exclusivamente como set de reequipamiento. No está prevista una instalación de fábrica. Realice el montaje usted mismo siguiendo las instrucciones adjuntas.
- La tapa no debe utilizarse en entornos con riesgo de explosión (zonas EX). Asegúrese de que el entorno de aplicación cumpla con las normas de seguridad locales.
- La tapa establece un límite máximo de 120 °C para la temperatura máxima del medio. Verifique que el medio utilizado no exceda este límite de temperatura para garantizar que la cubierta funcione correctamente.

5.1 Lectura del caudalímetro

El valor de caudal se lee en el canto superior del flotador.

Tenga en cuenta que los valores solo pueden ser correctos si la presión del tubo de medición se corresponde con el valor fijado.

5.2 Ajuste de la válvula de aguja

INDICACIÓN! Tenga en cuenta que la válvula de aguja **NO** es una válvula de cierre. No intente apretar de más la válvula ejerciendo mucha fuerza.

La válvula se cierra al girarla en el sentido de las agujas del reloj.

6 Mantenimiento

Para las labores de mantenimiento debe tenerse en cuenta lo siguiente:

- Las labores de mantenimiento solo pueden ser realizadas por personal especializado con experiencia en seguridad laboral y prevención de riesgos.
- Solo deben llevarse a cabo las labores de mantenimiento descritas en este manual de uso e instalación.
- Al realizar cualquier labor de mantenimiento deben cumplirse siempre las instrucciones de seguridad y de funcionamiento.
- Utilice únicamente piezas de recambio originales.

PELIGRO



Peligro de explosión

Salida de gas en el caudalímetro

Si el caudalímetro conduce gases explosivos, tóxicos o corrosivos, debe revisarse regularmente que el sistema no tenga fugas.

PELIGRO



Gases tóxicos y corrosivos

Los gases de muestreo pueden ser perjudiciales para la salud.

- Apague el proceso antes de comenzar con las tareas de mantenimiento (realizar sin presión). Para ello, desconecte la válvula de cierre (si la hubiera).
- Limpie el caudalímetro antes de abrirlo con aire.
- Utilice medios de protección contra gases tóxicos o corrosivos durante el mantenimiento. Utilice el equipo de protección correspondiente



CUIDADO



Salida de gas

No reutilizar las partes o las juntas estropeadas.
Utilice únicamente piezas de recambio originales.

6.1 Cambiar el interruptor de valores límite con soporte (solo en tipos SM-6 / SM-6-V)

PELIGRO



Peligro de explosión

En caso de uso en zonas con peligro de explosión

Únicamente utilice el interruptor de valores límite con la autorización correspondiente.

Retire los tornillos avellanados de plástico (1) de la placa de fijación del interruptor de valores límite (ver imagen 1). A la vez se suelta la placa de fijación de la parte trasera del medidor de caudal.

Suelte las dos tuercas de unión del tubo de medición. Deslizar el tubo de medición en el cabezal superior presionando suavemente. Ahora ya puede extraerse el tubo de medición (ver imagen 2). Retire de la parte baja del tubo de medición el anillo de retención (2), la tuerca de unión (3) y el interruptor de valores límite (4). Si es necesario puede limpiar el tubo de medición.

El montaje del tubo de medición equipado con un interruptor de valores límite se lleva a cabo en el orden inverso. Es necesario asegurarse de que el bisel del anillo de retención apunte hacia la pieza frontal correspondiente.

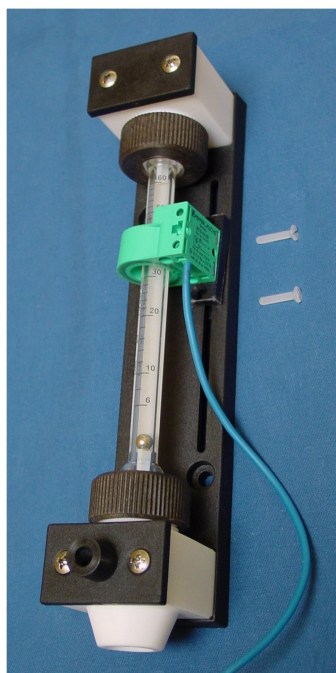


Imagen 1



Imagen 2

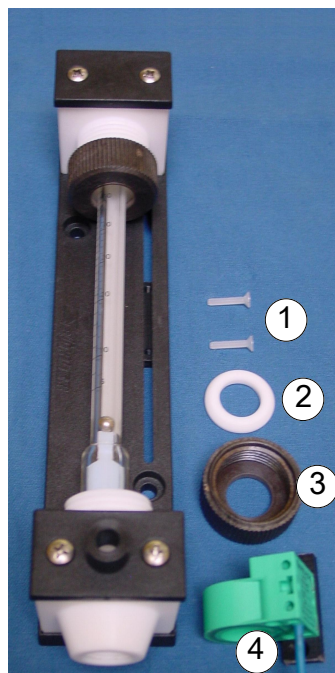


Imagen 3

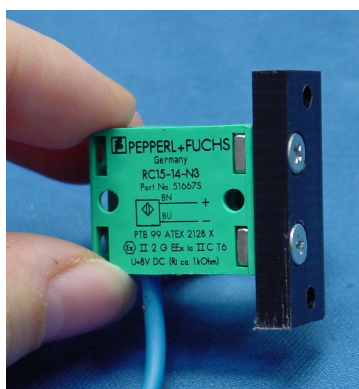


Imagen 4

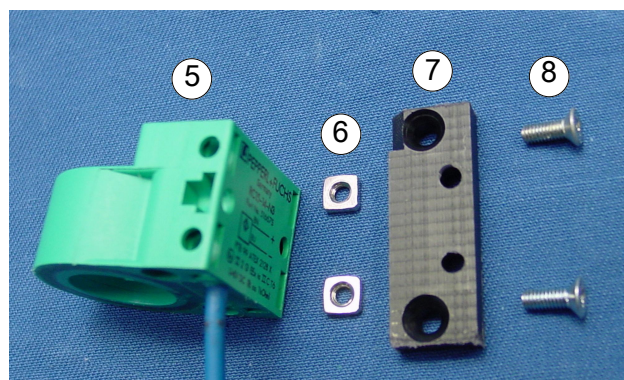


Imagen 5

1	Tornillos avellanados de plástico	3	Tuerca de unión
2	Anillo de retención	4	Interruptor de valores límite con placa de fijación
5	Interruptor de valores límite	7	Placa de fijación fresada
6	Tuerca cuadrada M3	8	Tornillos de estrella

Suelte los tornillos de estrella (8) de la placa de fijación del interruptor de valores límite (ver imagen 4). Retire la placa de fijación (7). ¡Asegúrese de que ninguna de las dos tuercas cuadradas (6) se pierda en las ranuras del interruptor de valores límite! Cambie el interruptor de valores límite (5) y fije la placa de fijación. El bisel fresado de la placa de fijación (7) debe apuntar hacia la izquierda.

El interruptor de valores de nivel ya puede volver a colocarse de nuevo en el tubo de medición. Para ello tenga en cuenta la dirección de caudal, lo que significa que la escala de valores debe ser legible, la placa de fijación del interruptor de valores límite debe quedar con los orificios de los tornillos sobre el orificio longitudinal y el cable se saca hacia fuera.

A continuación coloque la tuerca de unión y el anillo de retención (con el cono de retención hacia el soporte) en el tubo de medición. Vuelva a colocar el tubo de medición y fije la tuerca de unión manualmente.

Con los dos tornillos avellanados de plástico es posible atornillar y ajustar la placa de fijación a través de la ranura longitudinal en la placa base del medidor de caudal con la placa de fijación de la parte trasera de la placa base.

6.2 Cambiar el cristal de medición (solo en modelos SM-6 / SM-6V)

Si cuenta con una tapa, será necesario quitarla antes de volver a colocar el cristal.

6.2.1 Sin interruptor de valores límite

Suelte las dos tuercas de unión del tubo de medición. Deslice el cristal de medición en la pieza frontal superior presionando suavemente. Ahora puede colocar los anillos de retención dispuestos bajo las tuercas de unión en la parte renovada del cristal de medición. Ahora ya puede extraerse el tubo de medición.

También pueden retirarse las tuercas de unión y los anillos de retención del tubo de medición y en caso necesario colocarse en el nuevo tubo de medición. El montaje del cristal de medición se lleva a cabo en el orden inverso. Es necesario asegurarse de que el bisel del anillo de retención apunte hacia la pieza frontal correspondiente.

6.2.2 Con interruptor de valores límite

Suelte el tornillo avellanado de plástico (1) superior de la placa de fijación del interruptor de valores límite (ver imagen 1) y retire el tornillo avellanado de plástico (1) inferior hasta que el interruptor de valores límite pueda moverse sin problemas. En este caso no es necesario quitar completamente la placa de fijación.

Suelte las dos tuercas de unión (3) del tubo de medición. Deslice el cristal de medición en la pieza frontal superior presionando suavemente. Gire hacia un lado el interruptor de valores límite (ver imagen 6), si el cristal de medición puede sacarse del interruptor de valores límite del mismo modo que la tuerca de unión. Si es necesario, desplace también el interruptor de valores límite. Retire de la parte baja del cristal de medición el anillo de retención (2) y la tuerca de unión (3). El interruptor de valores límite permanece en la placa de fijación (ver imagen 7).

El montaje del tubo de medición se lleva a cabo en el orden inverso. Es necesario asegurarse de que el bisel del anillo de retención apunte hacia la pieza frontal correspondiente.



Imagen 6



Imagen 7

6.3 Cambiar el cristal de medición, caudalímetro de seguridad S-SM

INDICACIÓN! ¡Este cambio debe realizarse con extremo cuidado! Llévelo a cabo únicamente si está seguro de dominarlo por completo. Nuestra recomendación es que envíe el S-SM al fabricante.

Desenrosque uno de los extremos del tubo de protección de acero. Mantenga el caudalímetro de tal modo que al retirar el extremo el cristal de protección y el tubo de medición no puedan deslizarse y caer. Ahora ya puede extraerse el tubo de medición.

Al montar el nuevo tubo de medición debe asegurarse de que el tubo de medición y el tubo de protección queden en el lugar exacto de los alojamientos de las juntas tóricas del extremo.

7 Servicio y reparación

Si se produce un fallo de funcionamiento, busque en este capítulo información sobre posibles causas y cómo solucionarlos.

Solo puede realizar reparaciones en el equipo personal autorizado por Bühler.

Ante cualquier pregunta, consulte a nuestro servicio técnico:

Tel.: +49-(0)2102-498955 o a su persona de contacto habitual

Consulte más información sobre nuestros servicios personalizados de instalación y mantenimiento en <https://www.buehler-technologies.com/service>.

Si tras resolver eventuales problemas y conectar el equipo a la tensión de red, este siguiera sin funcionar correctamente, entonces, el equipo deberá ser revisado por parte del fabricante. Envíe, para ello, el equipo embalado adecuadamente a la siguiente dirección:

Bühler Technologies GmbH

- Reparatur/Service -

Harkortstraße 29

40880 Ratingen

Alemania

Adjunte al paquete la declaración de descontaminación RMA cumplimentada y firmada. De lo contrario, no se podrá tramitar su encargo de reparación.

El formulario se encuentra anexo a este manual y puede solicitarse también por correo electrónico:

service@buehler-technologies.com.

7.1 Búsqueda y eliminación de fallos

Problema / Avería	Posible causa	Solución
El flotador no sube	– Válvula de aguja cerrada	– Abrir válvula de aguja
	– Suciedad por polvo	– limpiar

Tab. 1: Búsqueda y eliminación de fallos

7.2 Piezas de repuesto

A la hora de pedir repuestos debe indicar el tipo de dispositivo y el número de serie.

Encontrará los componentes para el reequipamiento y la extensión en nuestro catálogo.

Los siguientes repuestos están disponibles:

Artículo n.º:	Denominación
40158997	Anillo de retención para diámetro de cristal Ø 10 mm
4055050	Anillo de retención para diámetro de cristal Ø 15 mm

7.2.1 Material de desgaste y accesorios - SM-6, SM-6-V

Artículo n.º:	Denominación
40158998	Tapa SM-6, SM-6-V

INDICACIÓN



Indicaciones importantes al utilizar una tapa

- Tapa disponible exclusivamente como set de reequipamiento.
- No apta para entornos con riesgo de explosión.
- Temperatura máxima del medio limitada a 120 °C.

7.2.2 Material de desgaste y accesorios - S-SM

Artículo n.º:	Denominación	
4022999	Caudalímetro S-SM 3-1	Piezas de extremos de acero 1.4571
4023999	Caudalímetro S-SM 3-1	Piezas de extremos de titanio

7.2.3 Material de desgaste y accesorios - Amplificador de conmutación de aislamiento

N.º de artículo	Denominación
9100070059	Amplificador de conmutación de aislamiento MACX
9100070007	Amplificador de conmutación de aislamiento, KCD2-E2L, 24 V CC
4949021	Interruptor de valores límite con soporte Ø10
4949019	Interruptor de valores límite con soporte Ø15

8 Eliminación

A la hora de desechar los productos, deben tenerse en cuenta y respetarse las disposiciones legales nacionales aplicables. El desecho no debe suponer ningún riesgo para la salud ni para el medio ambiente.

El símbolo del contenedor con ruedas tachado para productos de Bühler Technologies GmbH indica que deben respetarse las instrucciones especiales de eliminación dentro de la Unión Europea (UE) para productos eléctricos y electrónicos.



El símbolo del contenedor de basura tachado indica que los productos eléctricos y electrónicos así marcados deben eliminarse por separado de la basura doméstica. Deberán eliminarse adecuadamente como residuos de equipos eléctricos y electrónicos.

Bühler Technologies GmbH puede desechar sus dispositivos marcados de esta forma. Para hacerlo así, envíe el dispositivo a la siguiente dirección.



Estamos legalmente obligados a proteger a nuestros empleados frente a los posibles peligros de los equipos contaminados. Por lo tanto, le pedimos que comprenda que únicamente podemos desechar su dispositivo usado si no contiene materiales operativos agresivos, cáusticos u otros que sean dañinos para la salud o el medio ambiente. **Para cada residuo de aparato eléctrico y electrónico se debe presentar el formulario «Formulario RMA y declaración de descontaminación» que tenemos disponible en nuestra web. El formulario completado debe adjuntarse al embalaje de manera que sea visible desde el exterior.**

Utilice la siguiente dirección para devolver equipos eléctricos y electrónicos usados:

Bühler Technologies GmbH
WEEE
Harkortstr. 29
40880 Ratingen
Alemania

Tenga en cuenta también las reglas de protección de datos y su responsabilidad de garantizar que no haya datos personales en los dispositivos usados que devuelva. Por lo tanto, debe asegurarse de eliminar sus datos personales de su antiguo dispositivo antes de devolverlo.

9 Anexo

9.1 Características técnicas

Caudalímetro	SM-6	SM-6-V
Gas a temperatura ambiente:	de -20 °C a +80 °C *	de -20 °C a +80 °C *
Líquidos a temperatura ambiente:	de +5 °C a +80 °C *	de +5 °C a +80 °C *
Temperatura del medio:	≤ 150 °C, con rangos de medición especiales de máx. 80 °C	≤ 130 °C, con rangos de medición especiales de máx. 80 °C
Presión de funcionamiento máx.:	4 bar	4 bar
Carga mecánica:	Probado conforme a DNV-GL CG0339 ** clase de vibración A (0,7 g) 2 Hz-13,2 Hz amplitud ± 1,0 mm 13,2 Hz -100 Hz 0,7 g de aceleración	Probado conforme a DNV-GL CG0339 ** Clase de vibración A (0,7 g) 2 Hz-13,2 Hz amplitud ± 1,0 mm 13,2 Hz -100 Hz 0,7 g de aceleración
Material		
Cabezales:	PTFE	PTFE
Junta:	PTFE	PTFE
Husillo de ajuste:	-	PVDF/Viton o PCTFE/perfluoroelastómero
Tubo de medición:	Vidrio de borosilicato	Vidrio de borosilicato
Flotador:	Hastelloy C 4	Hastelloy C 4
Tuerca de unión:	PPS con refuerzo de fibra de vidrio	PPS con refuerzo de fibra de vidrio
Placa base:	PA	PA

* ¡Tener en cuenta la temperatura ambiente al realizar la configuración con un interruptor de valores límite!

** No utilizar con un caudalímetro con tapa.

Interruptor de valores límite	Ø10*	Ø15
Nivel de protección:	IP 67	IP 67
Temperatura ambiente:	de -20 °C hasta +80 °C	de -20 °C hasta +70 °C
Material de carcasa:	PBT	PBT
Funcionamiento:	biestable	biestable
Longitud de cable:	2 m	2 m
Permiso:	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

* Podría utilizarse en rangos de medición especiales. Más información por solicitud.

Caudalímetro de seguridad S-SM 3-1

Temperatura ambiental:	de -20° C a 80° C *
Presión de funcionamiento:	10 bar (con máx. 20° C) **
Temperatura de funcionamiento:	100° C (con máx. 2 bar) **
Rango de medición:	ver tabla
Peso:	0,9 kg
Flotador:	Vidrio, Hastelloy, acero o PTFE
Piezas de extremos:	PTFE, acero o titanio
Fijación:	mediante las abrazaderas suministradas

* Indicar en el pedido elección del sistema de fijación.

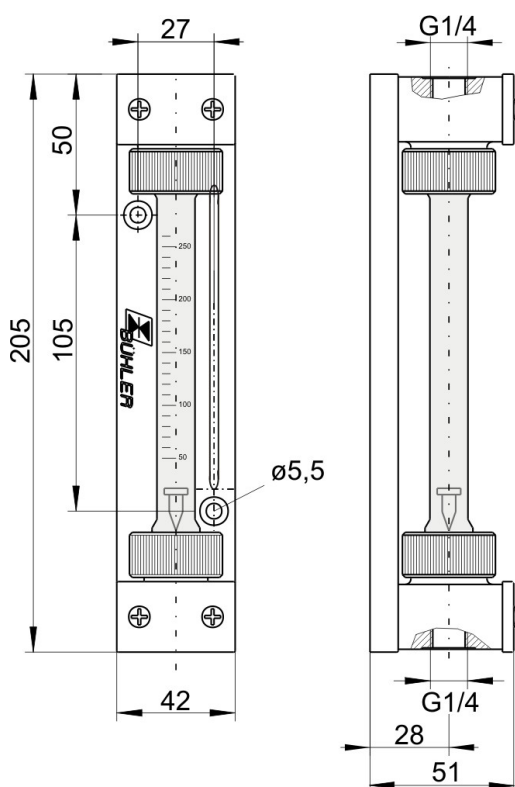
** Presión de funcionamiento máx. [bar] = $10 - \frac{\text{Temperatura de funcionamiento máx. [°C]} - 20}{10}$

Amplificador de conmutación de aislamiento	MACX MCR-EX-SL-2NAM-R-UP	KCD2-E2L
Tensión de alimentación:	24 ... 230 V CA/CC 50/60 Hz	10 - 30 V CC
Seguridad intrínseca según:	IEC/EN 60079-11	no
Supervisión de conductos:	sí	sí
Permisos: (según manual de instrucciones)	ATEX: Ex II(1) G [Ex ia Ga] IIC Ex II 3(1) G Ex ec [ia Ga] nC IIC T4 Gc IECEx: [Ex ia Ga] IIC Ex ec [ia Ga] nC IIC T4 Gc	---
Salida (sin seguridad intrínseca):	Conmutador	Contacto de trabajo Transistor PNP
Salida de corriente de conmutación:	250 V CA (2 A, 60 Hz) 120 V CC (0,2 A) 30 V CC (2 A)	200 mA CC
Temperatura ambiente:	-40° C ... +60° C	-25° C ... +70° C
Tipo de protección:	IP20	IP20
Medidas:	17,5x112,5x114,5 mm (AnxAIxP)	20x63x44 mm (AnxAIxP)

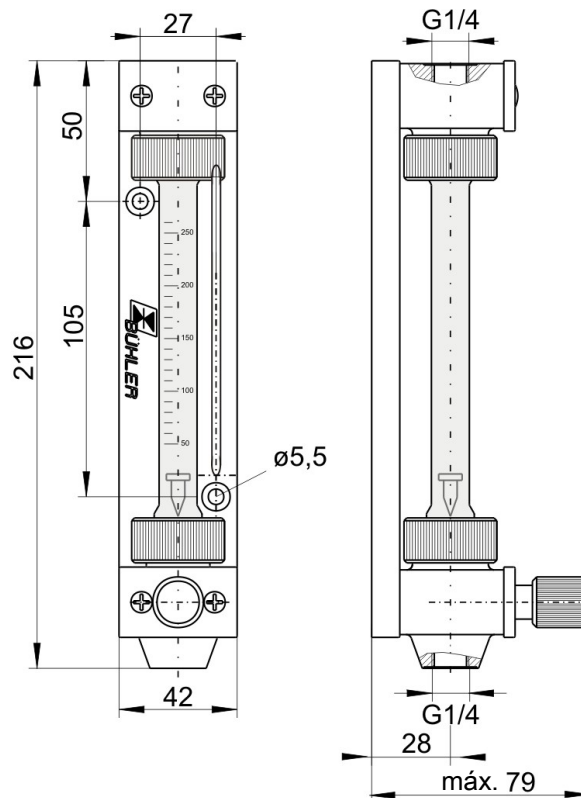
9.2 Dimensiones

Caudalímetro SM6/SM6-V:

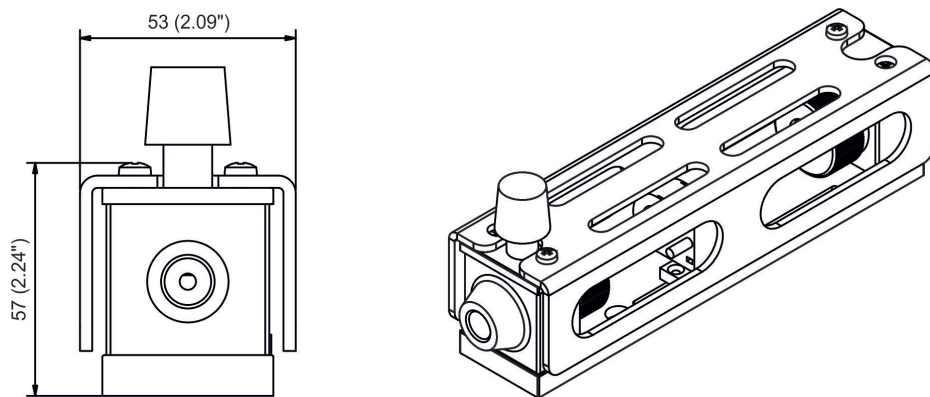
SM-6



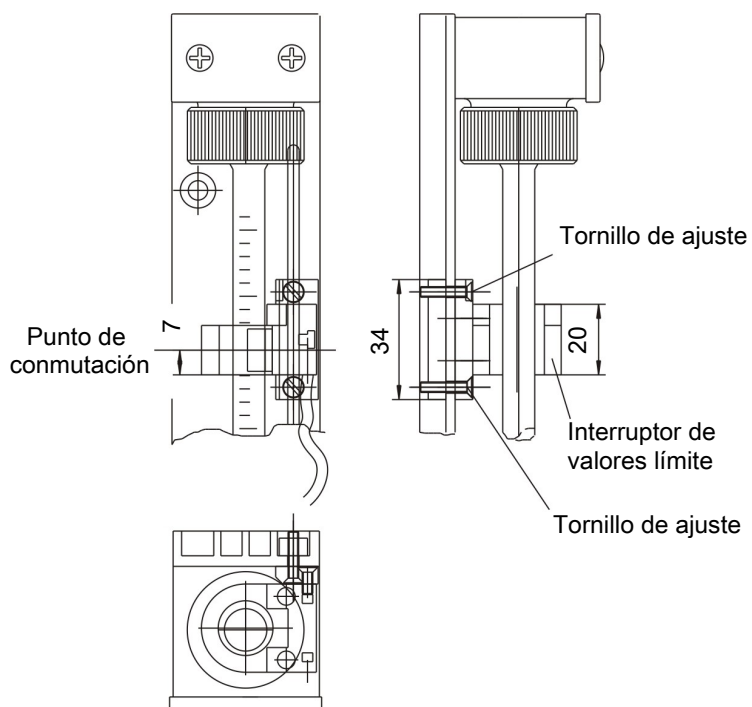
SM-6-V



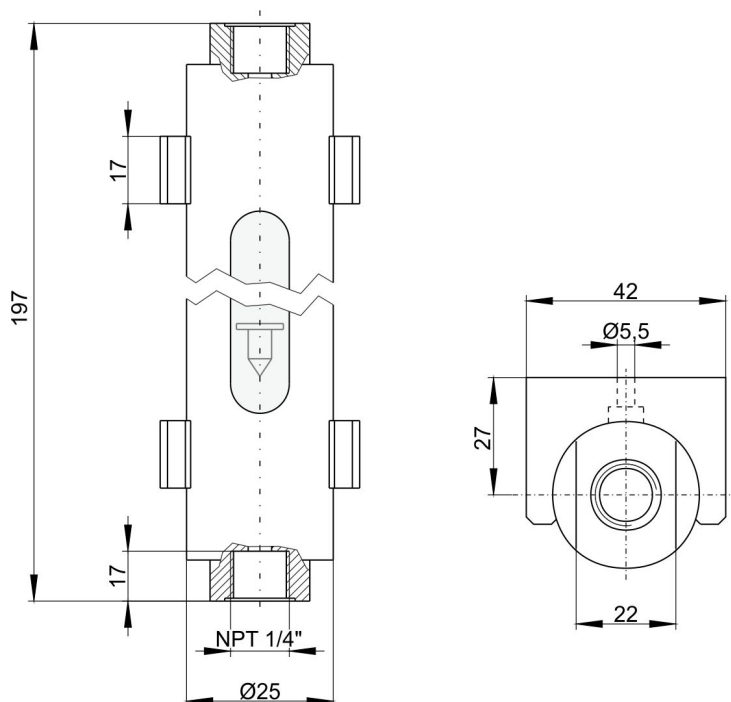
Caudalímetro con tapa:



Interruptor de valores límite:



Caudalímetro de seguridad S-SM:



9.3 Rangos de medición

Caudalímetro SM-6

Medio:	Aire	Agua
Presión:	+ 1,2 bar abs.	
Temperatura:	+ 20 °C	+ 20 °C
	6 ... 60 NL/h	0,5 ... 5 L/h
	10 ... 100 NL/h	1,2 ... 12 L/h
	25 ... 250 NL/h	2,5 ... 25 L/h
	50 ... 500 NL/h	4 ... 40 L/h
	80 ... 800 NL/h	6 ... 60 L/h

Caudalímetro S-SM 3-1

Medio:	Aire	Agua
Presión:	+ 1,2 bar abs.	
Temperatura:	+ 20° C	+ 20° C
	1,6 – 16 NI/h	0,25 - 2,5 l/h
	4 – 40 NI/h	0,5 - 5 l/h
	6 - 60 NI/h	1,2 - 12 l/h
	10 – 100 NI/h	2,5 - 25 l/h
	25 – 250 NI/h	
	50 – 500 NI/h	
	80 – 800 NI/h	

10 Documentación adjunta

- Declaración del fabricante UE HX400001
- Declaración del fabricante del Reino Unido HX400001UK
- Declaración de conformidad UE KCD2-E2L
- Manual de uso MACX
- Declaraciones de conformidad UE MACX
- Declaraciones de conformidad del Reino Unido MACX
- Certificado de examen de tipo UE MACX (IBExU10ATEX1005 X)
- Certificado de conformidad IECEX MACX (IECEXIBE100002X)
- Declaraciones de conformidad UE RC10/RC15
- Declaraciones de conformidad del Reino Unido RC10/RC15
- Certificado de examen RC10/RC15 (PTB99ATEX2128X)
- Certificado de examen de tipo del Reino Unido RC10/RC15 (CML 21UKEX21274X)
- Declaración de descontaminación RMA

Herstellereklärung 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 Herstellereklärung 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 Herstellereklärung trägt der Hersteller.
This declaration of manufacture is issued under the sole responsibility of the manufacturer.

Dokumentationsverantwortlicher für diese Herstellereklärung ist Herr Stefan Eschweiler mit Anschrift am Firmensitz.
The person authorised to compile the technical file is Mr. Stefan Eschweiler located at the company's address.

Ratingen, den 06.09.2024

Stefan Eschweiler
Geschäftsführer – Managing Director

Frank Pospiech
Geschäftsführer – Managing Director

HX 41 0001

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

Manufacturer Declaration



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

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

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

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

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

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

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

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

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

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

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

EN ISO 80079-36:2016

EN ISO 80079-37:2016

In addition, the following standards have been used:

TRGS 727

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

Ratingen in Germany, 06.09.2024


Stefan Eschweiler
Managing Director


Frank Pospiech
Managing Director

HX 41 0001UK

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

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■ Declaration of conformity / Konformitätserklärung

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

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

■ Products / Produkte

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

■ Directives and Standards / Richtlinien und Normen

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

■ Affixed CE Marking / Angebrachte CE-Kennzeichnung

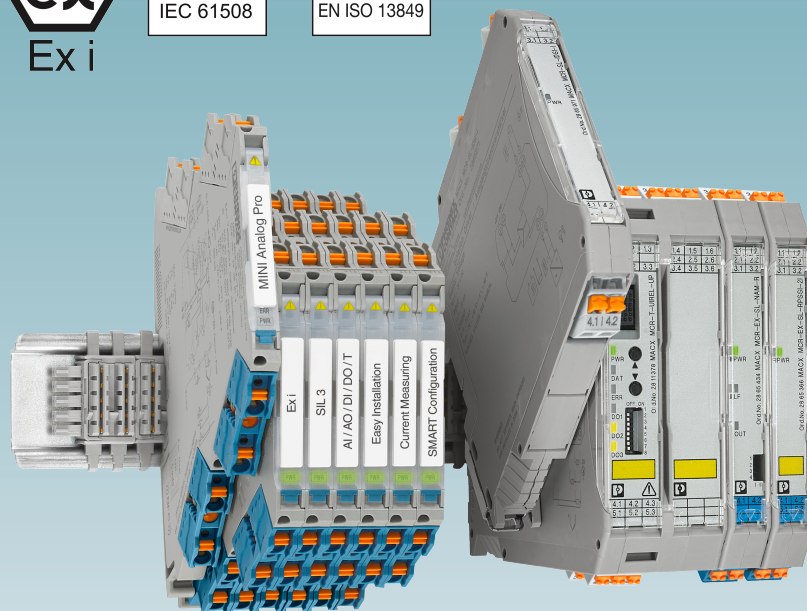


■ Signatures / Unterschriften

Mannheim, 2021-10-29

i.V. Sebastian Stöber
Director Business Unit SYSTEMS

i.V. Wolfram Warnecke
Approval Engineer



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

User manual

User manual

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

UM EN Power Manual, Revision 02

2024-07-29

This manual is valid for:

Designation

MINI Analog MINI MCR-... product family

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

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

MACX Analog MACX MCR-... product family

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

Accessories

Item No.

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

2869728

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

2695439

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

2713645

ME 17,5 TBUS

1090049

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

1351974

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

1351982

MCR-DP

1430594

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

2904614

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

2904599

TC-MACX-MCR-PTB

2904673

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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.

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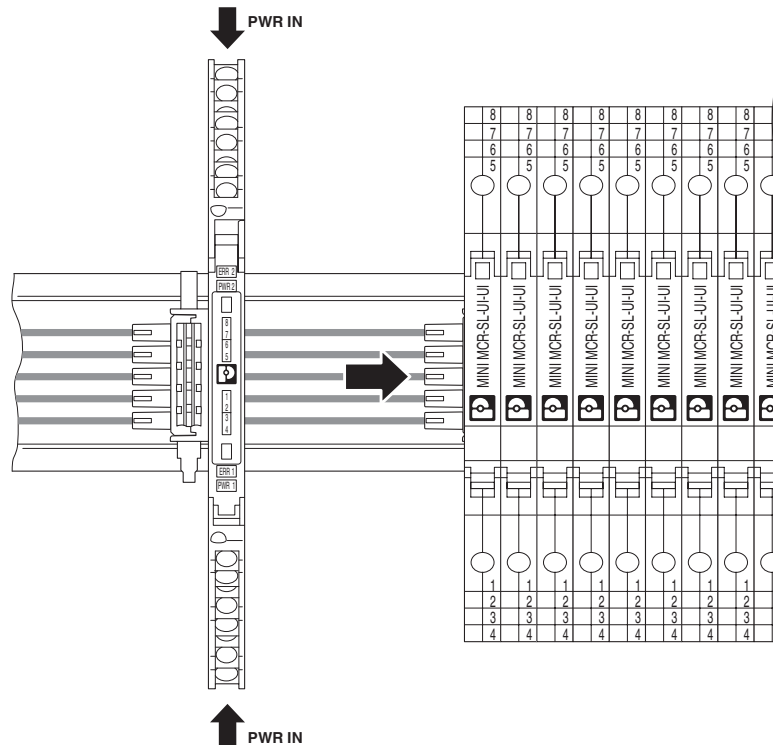
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2.2 Supply via any MINI Analog, MINI Analog Pro or MACX Analog power terminal

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

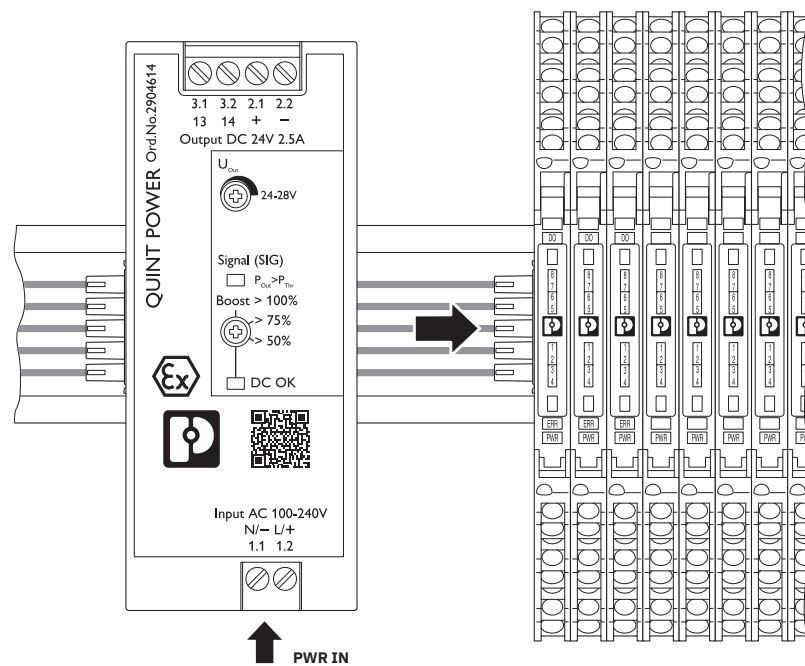
Figure 2-2 Supply via any MINI Analog, MINI Analog Pro or MACX Analog power terminal



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

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

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



3 MINI Analog supply options

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

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

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



NOTE: Risk of property damage

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

3.1 Direct supply via a MINI Analog signal conditioner

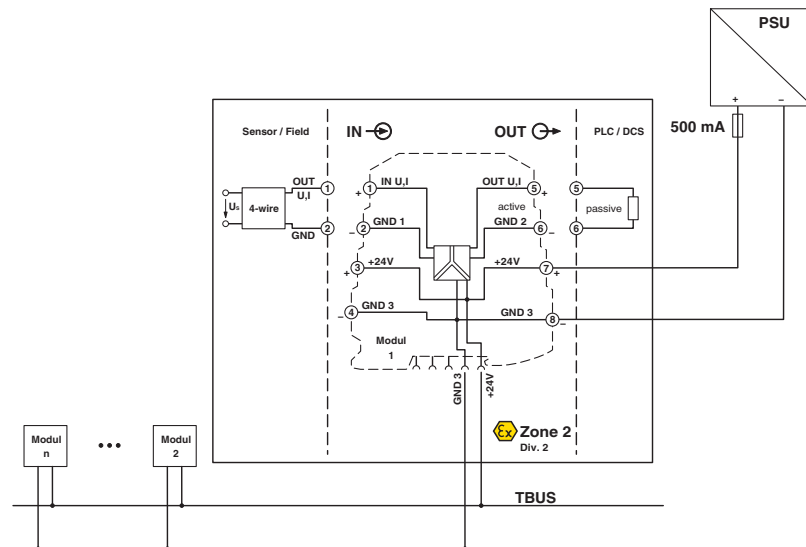
In the case of direct supply, all modules connected to the TBUS DIN rail connector are supplied via the supply at a signal conditioner. Please note that the maximum total current consumption of $I_{\max} = 400 \text{ mA}$ must not be exceeded and the maximum number of modules is therefore restricted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

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

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

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

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



Example for direct supply via a module

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

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

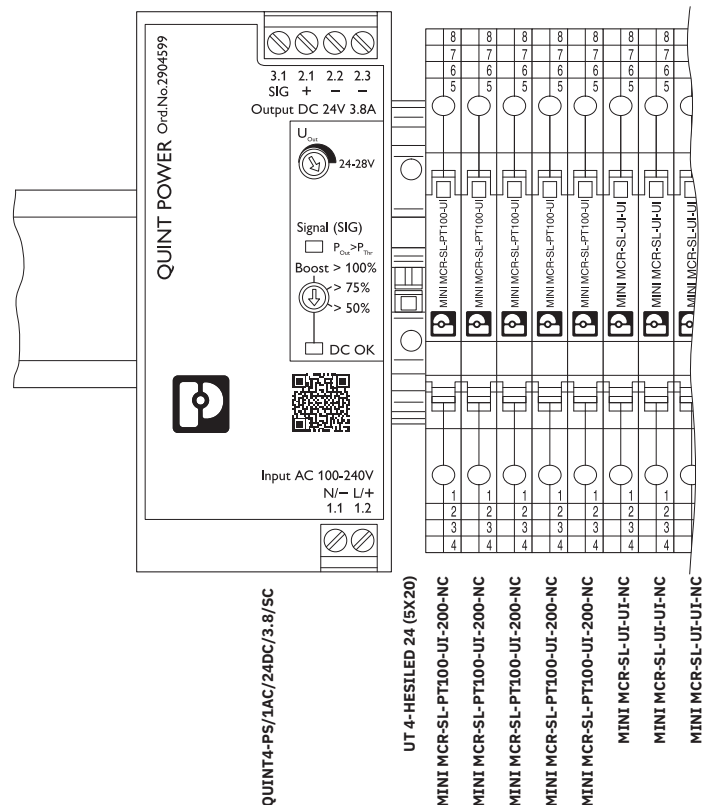
Then determine the maximum total current consumption of all eight modules.

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

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

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.

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

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



Recommended fuse for power terminal:

Fuse according to IEC 60127-2/V

Nominal current: 2.5 A

Characteristic: slow-blow

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

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

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

Figure 3-3 Supply by means of one power supply

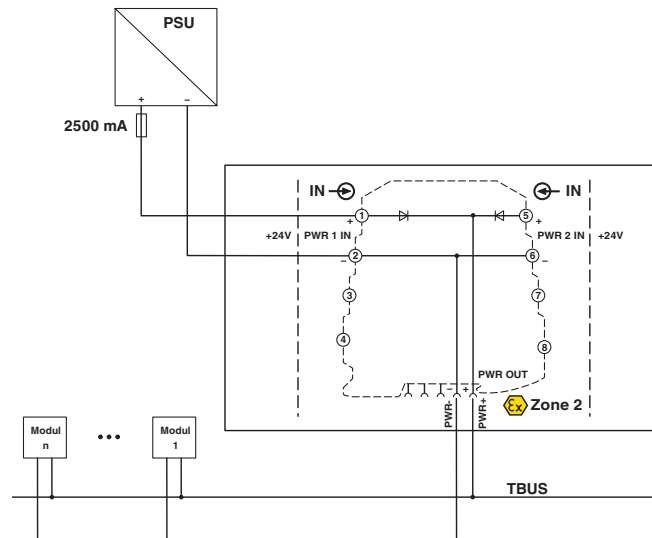
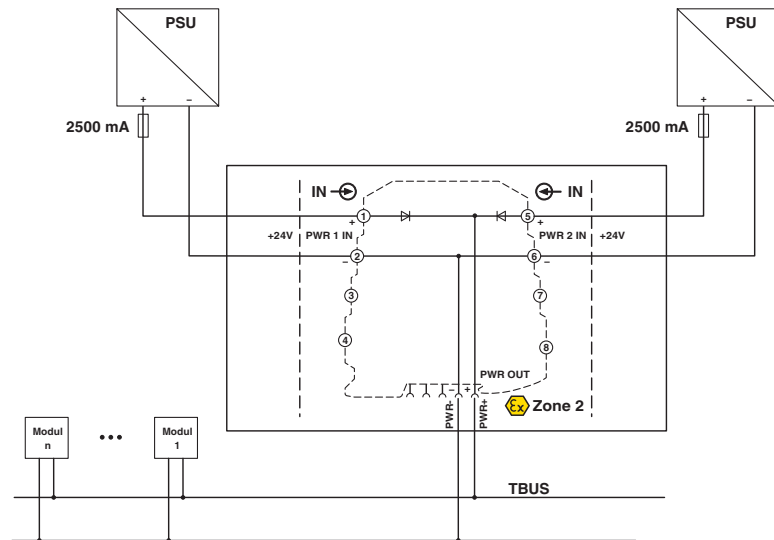


Figure 3-4 Supply by means of redundant power supply



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

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

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

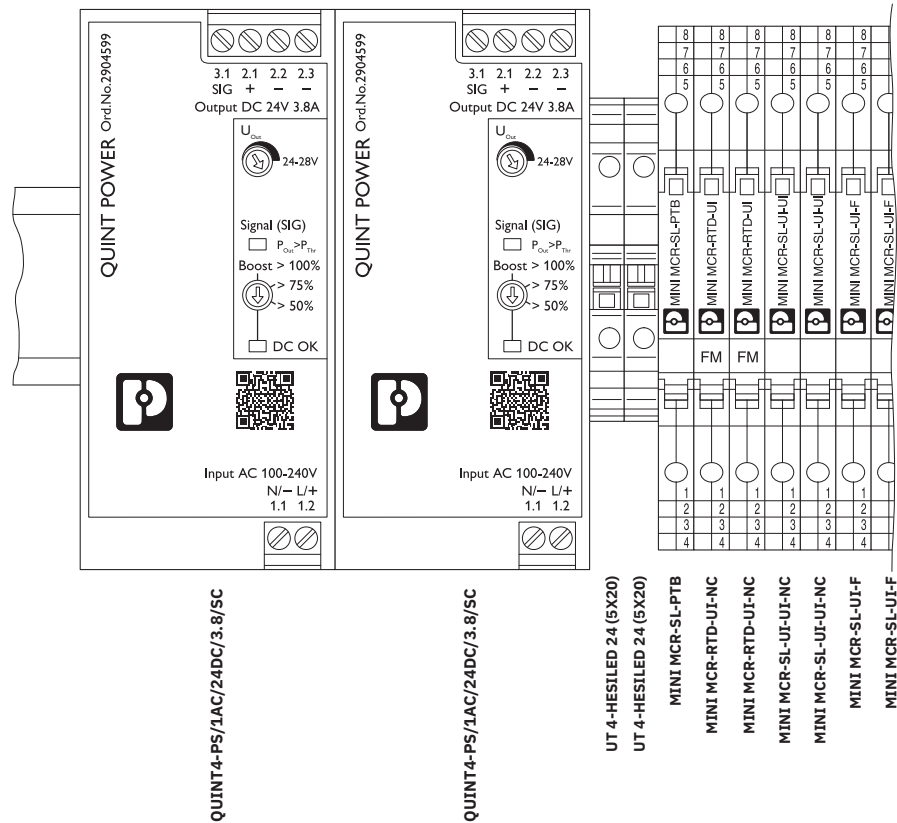
Then determine the maximum total current consumption of all 82 modules.

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

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

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

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

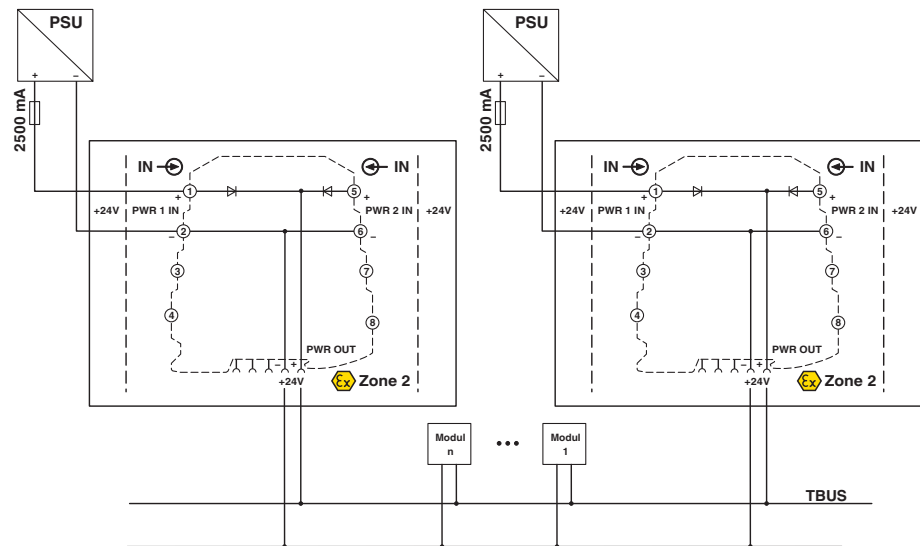


The disadvantage here is that in the event that the power terminal fails, the supply of all signal conditioners is interrupted. However, this can be indicated in this example by means of an N/C contact by using a MINI MCR-SL-FM-RC-NC(-SP) fault signaling module and the MINI MCR-SL-PTB(-SP) power terminal,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

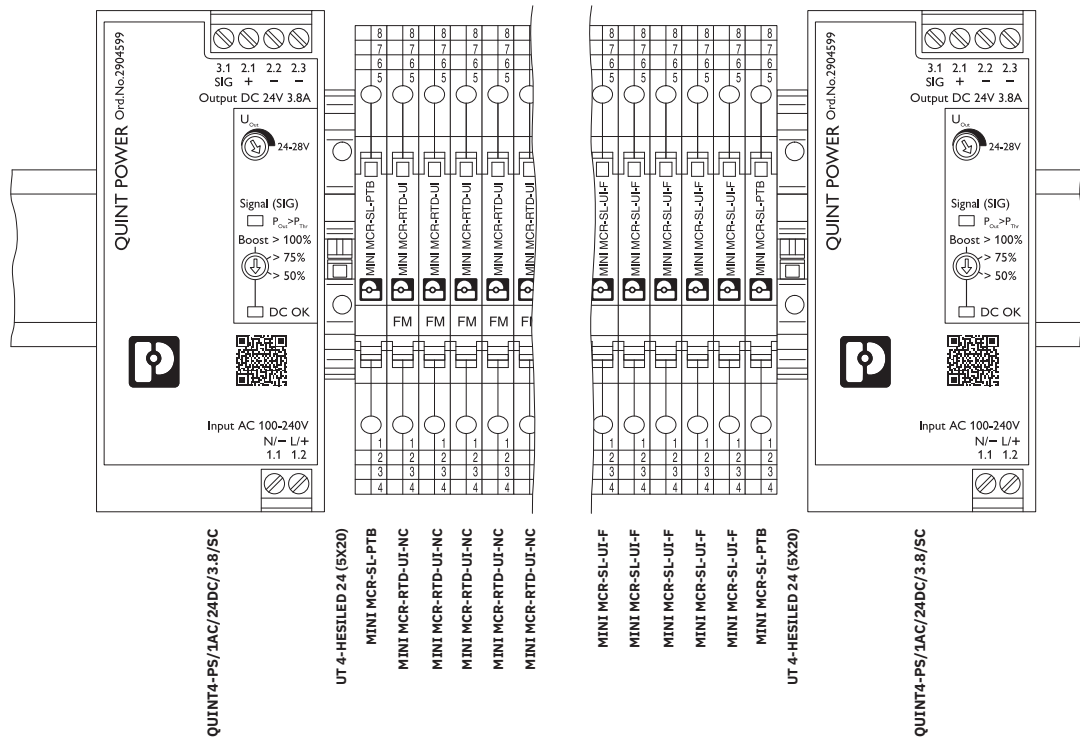
Then determine the maximum total current consumption of all 82 modules.

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

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

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

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



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

3.3 Supply via a system power supply

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

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

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

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

Example for supply via a system power supply

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

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

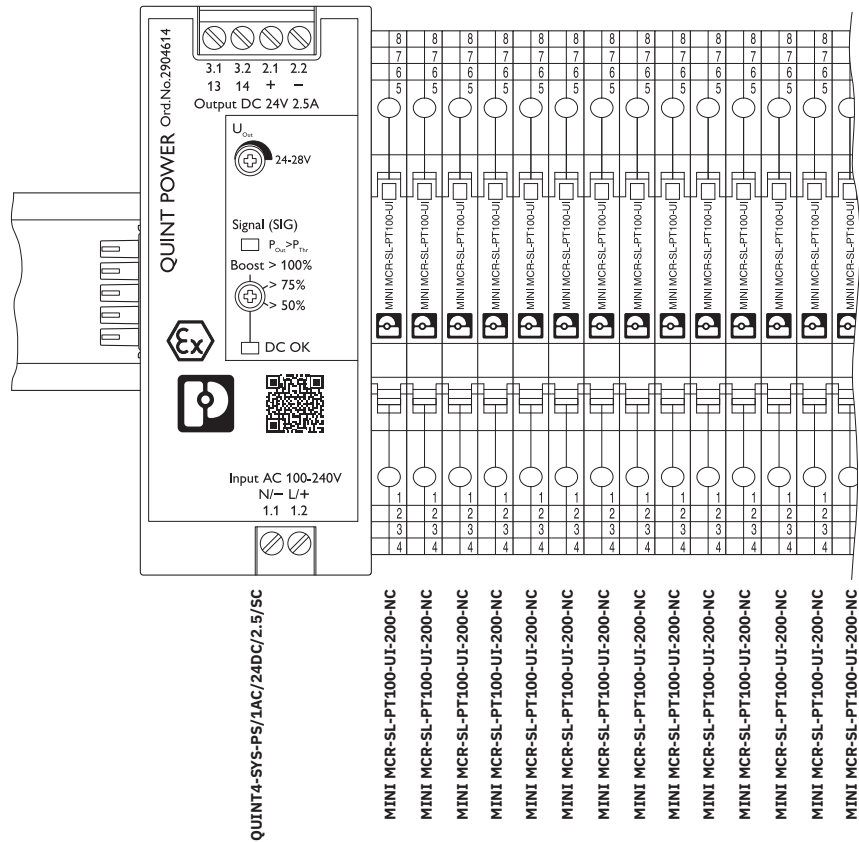
Then determine the maximum total current consumption of all 65 modules.

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

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

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

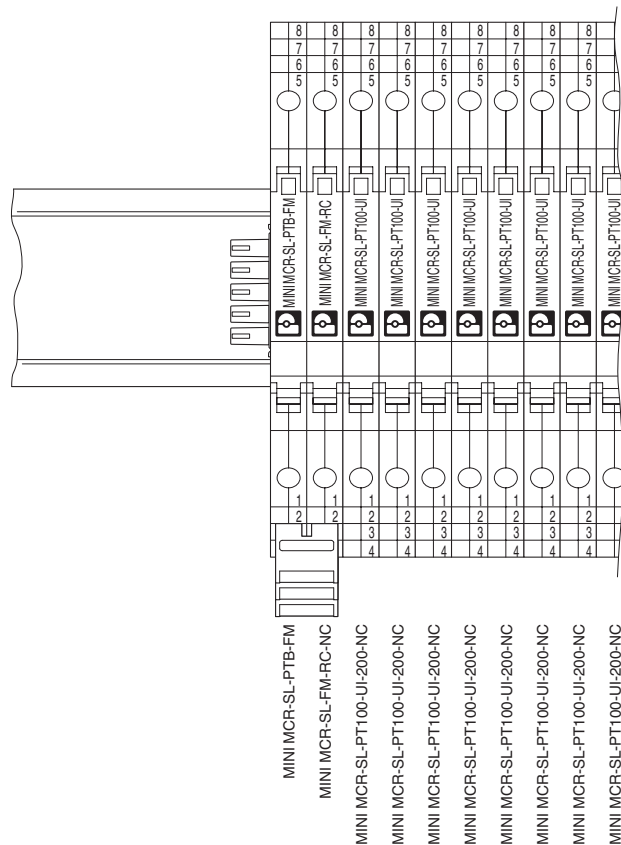
Figure 3-8 Supply via a system power supply



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

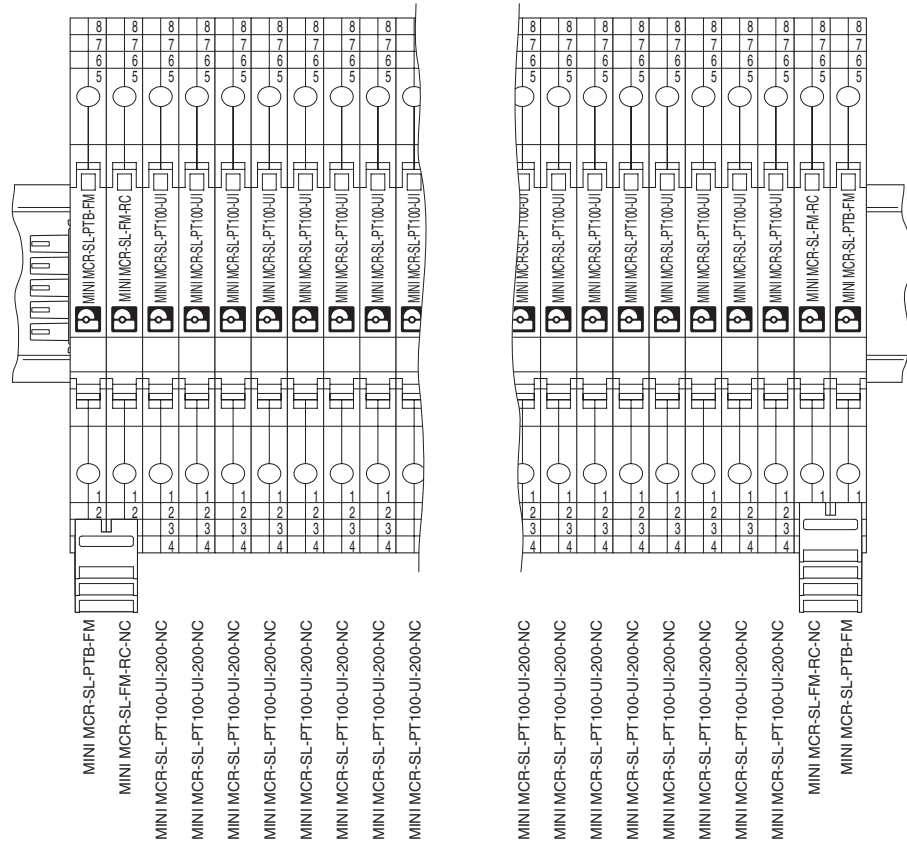
As described in Section 3.2 on page 14, the MINI Analog modules can be supplied with power via a MINI MCR-SL-PTB power terminal. If the MINI MCR-SL-PTB-FM... modules (item no. 2864134) and the MINI MCR-SL-FM-RC... error message modules (item no. 2902961) are used, it is possible to establish redundant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

Figure 3-9 Redundancy monitoring of the supply voltage



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

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

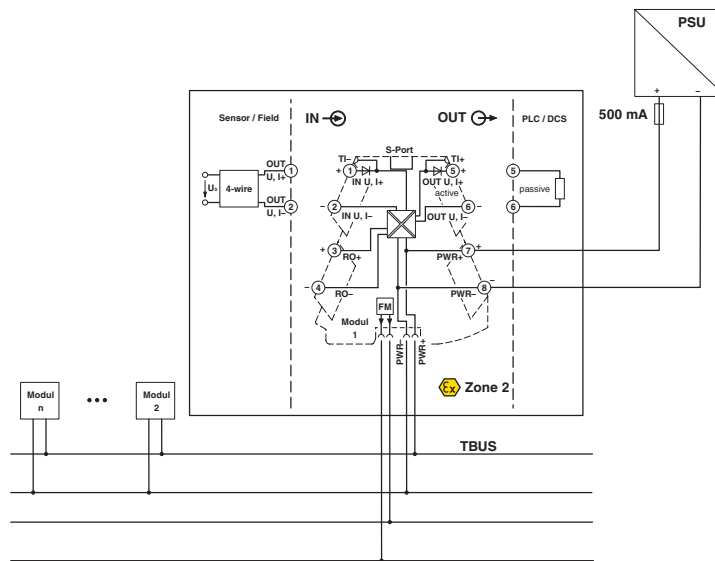
In the case of direct supply, all modules connected to the TBUS DIN rail connector are supplied via the supply at a signal conditioner. Please note that the maximum total current consumption of $I_{\max} = 400 \text{ mA}$ must not be exceeded and the maximum number of modules is therefore restricted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

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

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

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

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



Example for direct supply via a module

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

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

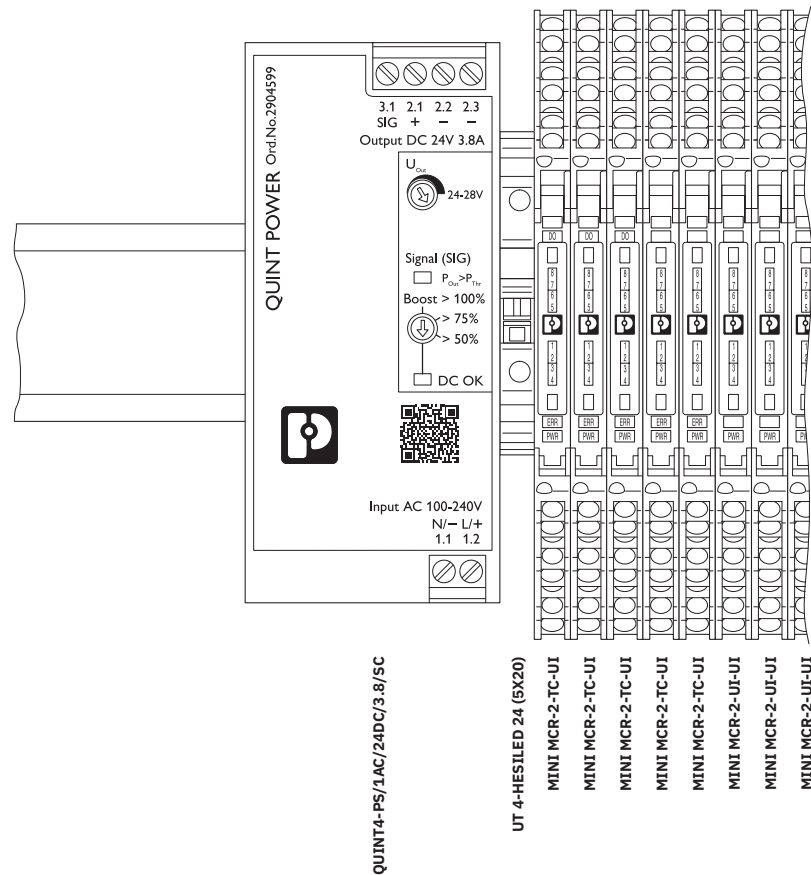
Then determine the maximum total current consumption of all eight modules.

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

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

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

Figure 4-2 Example for direct supply via a module



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

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

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

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

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



Recommended fuse for power terminal:

Fuse according to IEC 60127-2/V

Nominal current: 2.5 A

Characteristic: slow-blow

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

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

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

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

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



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

Figure 4-3 Supply by means of one power supply

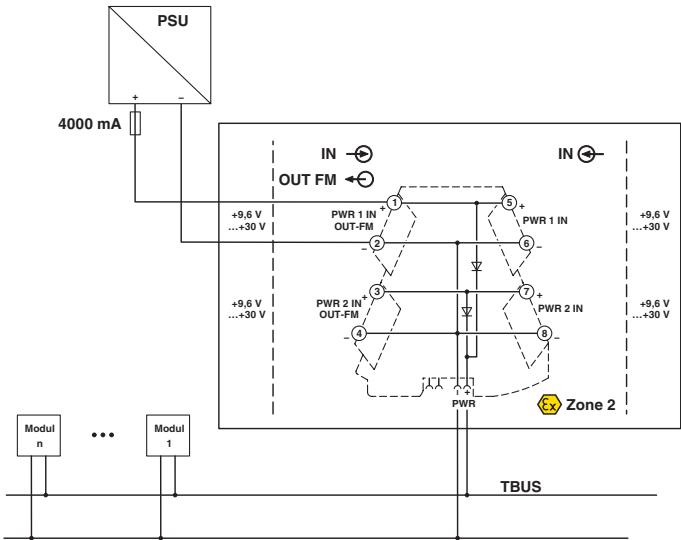
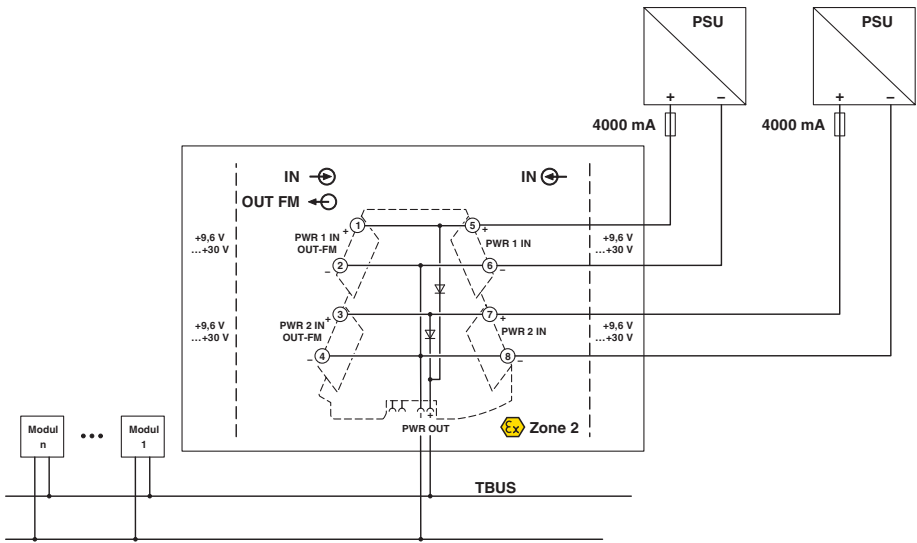


Figure 4-4 Supply by means of redundant power supplies



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

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

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

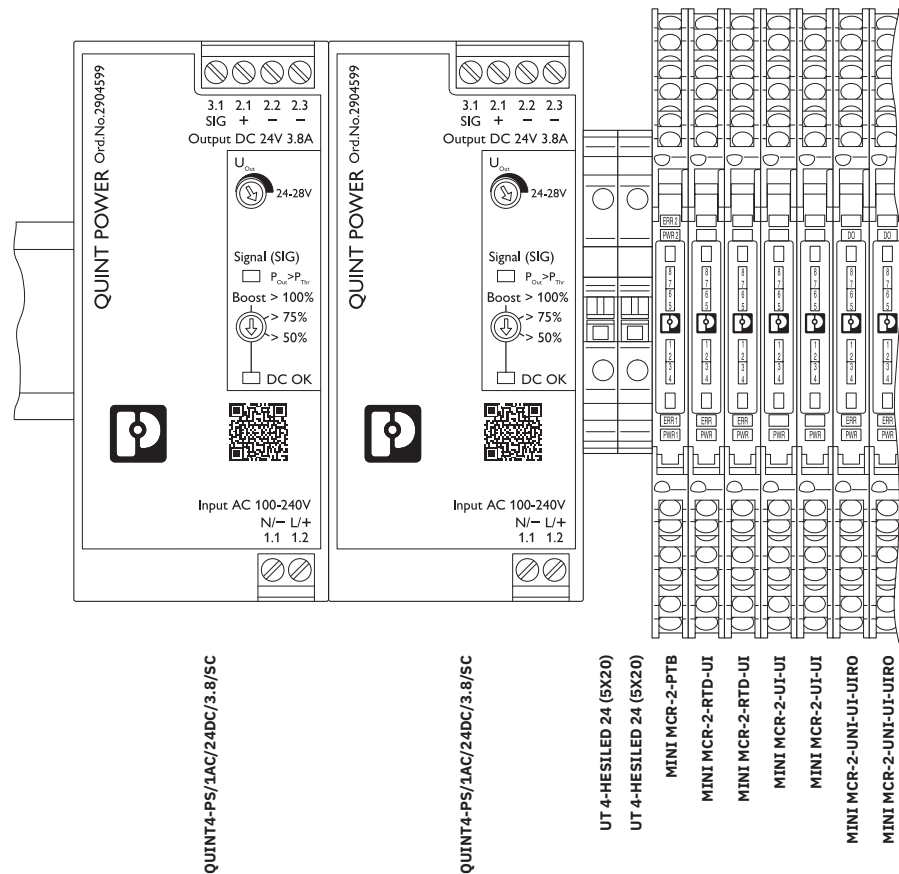
Then determine the maximum total current consumption of all 82 modules.

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

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

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

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

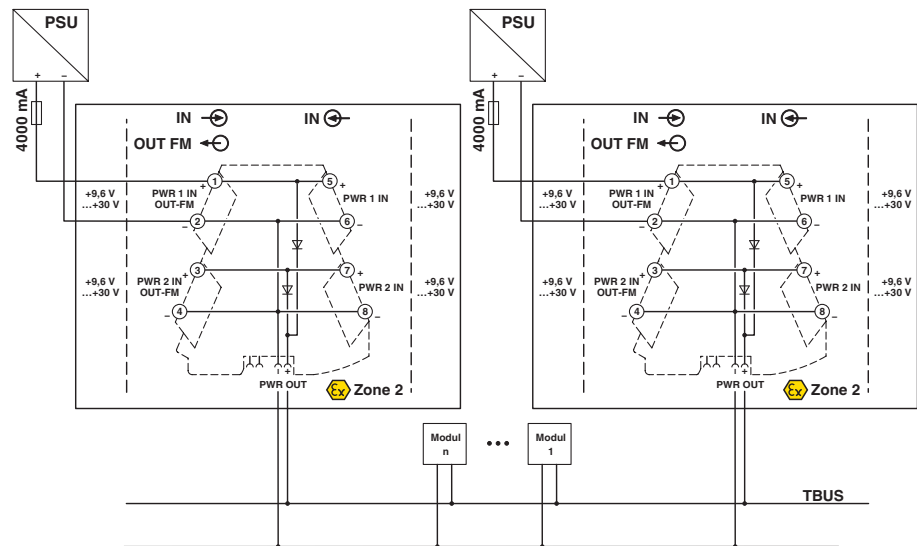


The disadvantage here is that in the event that the power terminal fails, the supply of all signal conditioners is interrupted. However, this can be indicated in this example by means of an N/C contact by using a MINI MCR-2-FM-RC fault signaling module and the MINI MCR-2-PTB power terminal.

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

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

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



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

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

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

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

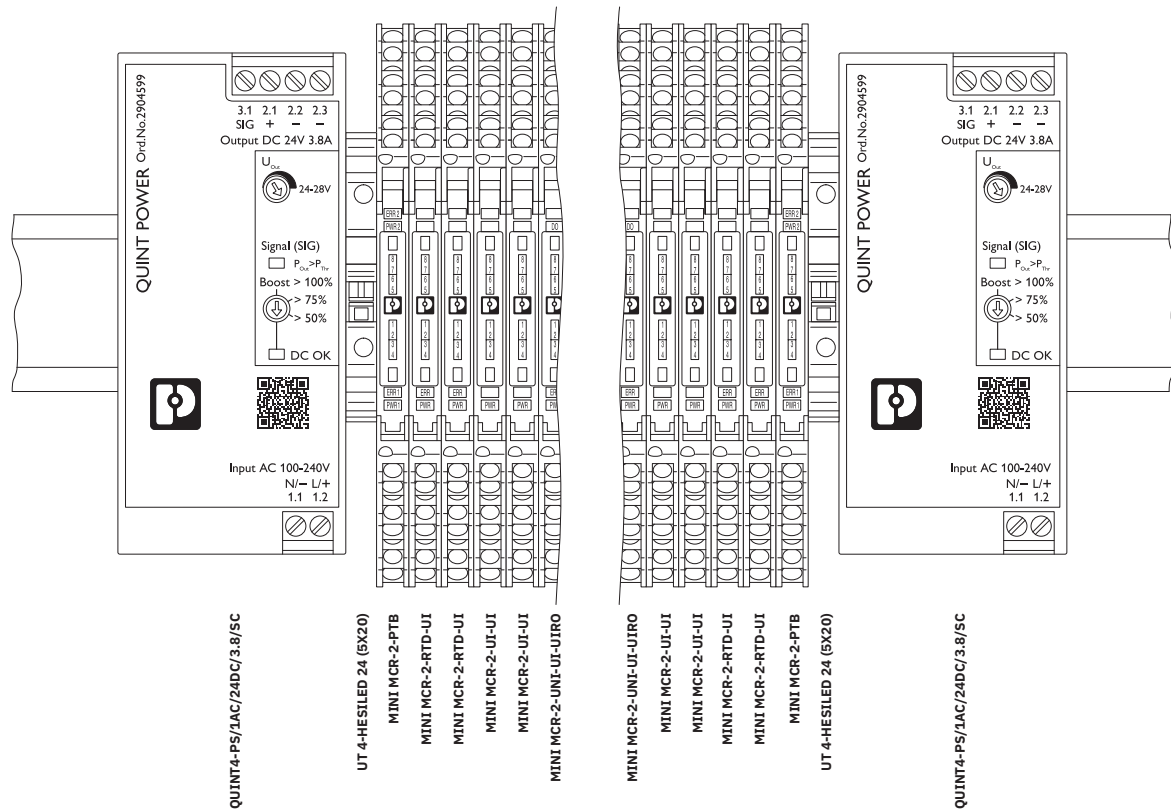
Then determine the maximum total current consumption of all 51 modules.

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

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

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

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



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

4.3 Supply via system power supply

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

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

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

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

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

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

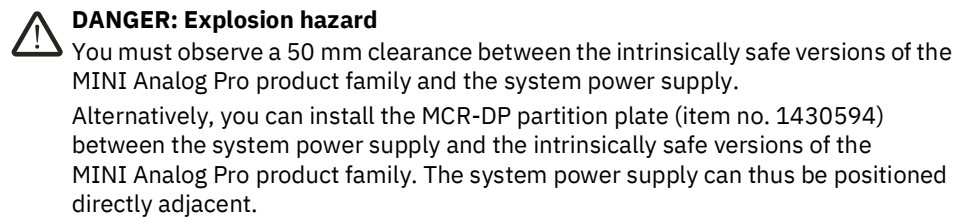
Then determine the maximum total current consumption of the 40 modules.

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

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

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

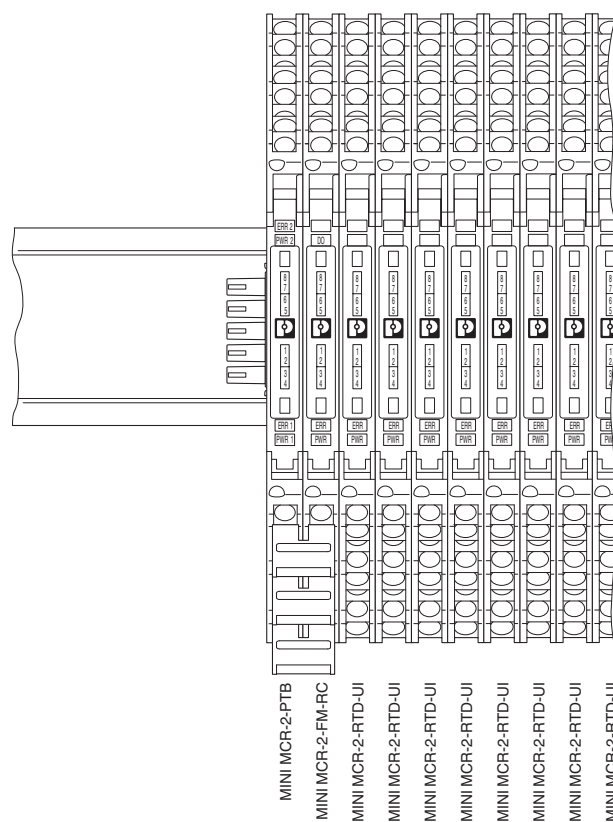
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4.4 Monitoring the supply voltage using MINI MCR-2-FM-RC-... fault signaling modules

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.

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

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

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

Example for direct supply via a module

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

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

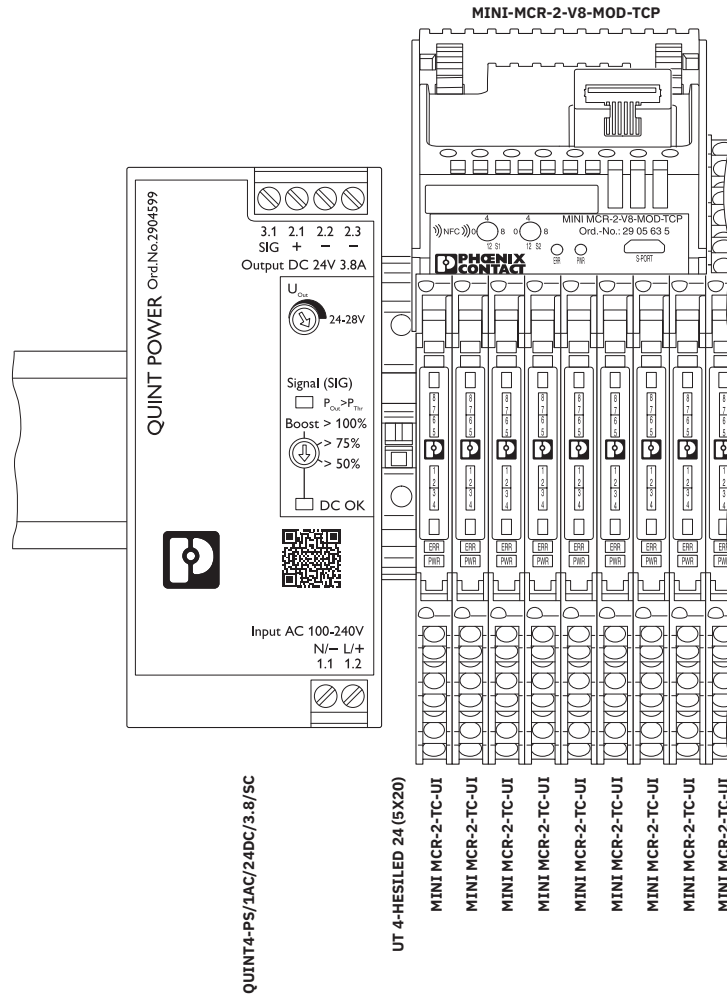
Then determine the maximum total current consumption of all nine modules.

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

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

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

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

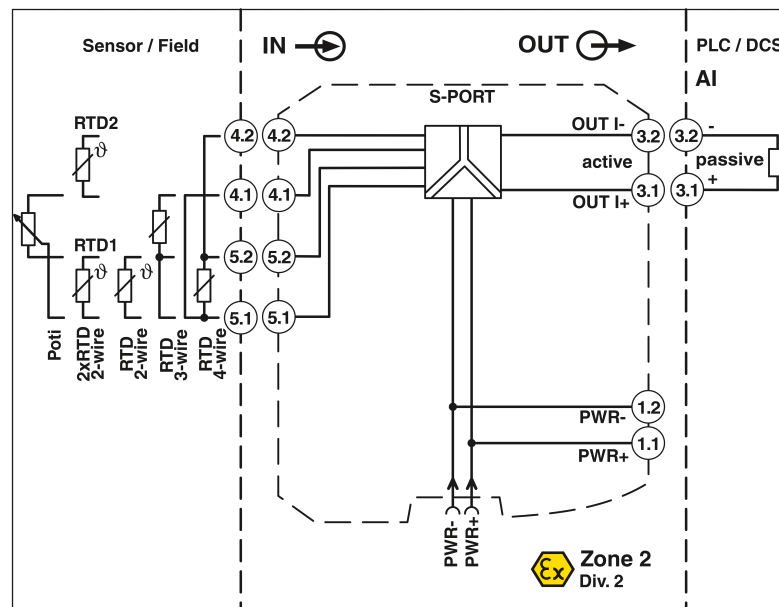
In the case of direct supply, all modules connected to the TBUS DIN rail connector are supplied via the supply at a signal conditioner. Please note that the maximum total current consumption of $I_{\max} = 400 \text{ mA}$ must not be exceeded and the maximum number of modules is therefore restricted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

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

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

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

Figure 5-1 Direct supply via a module



Example for direct supply via a module

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

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

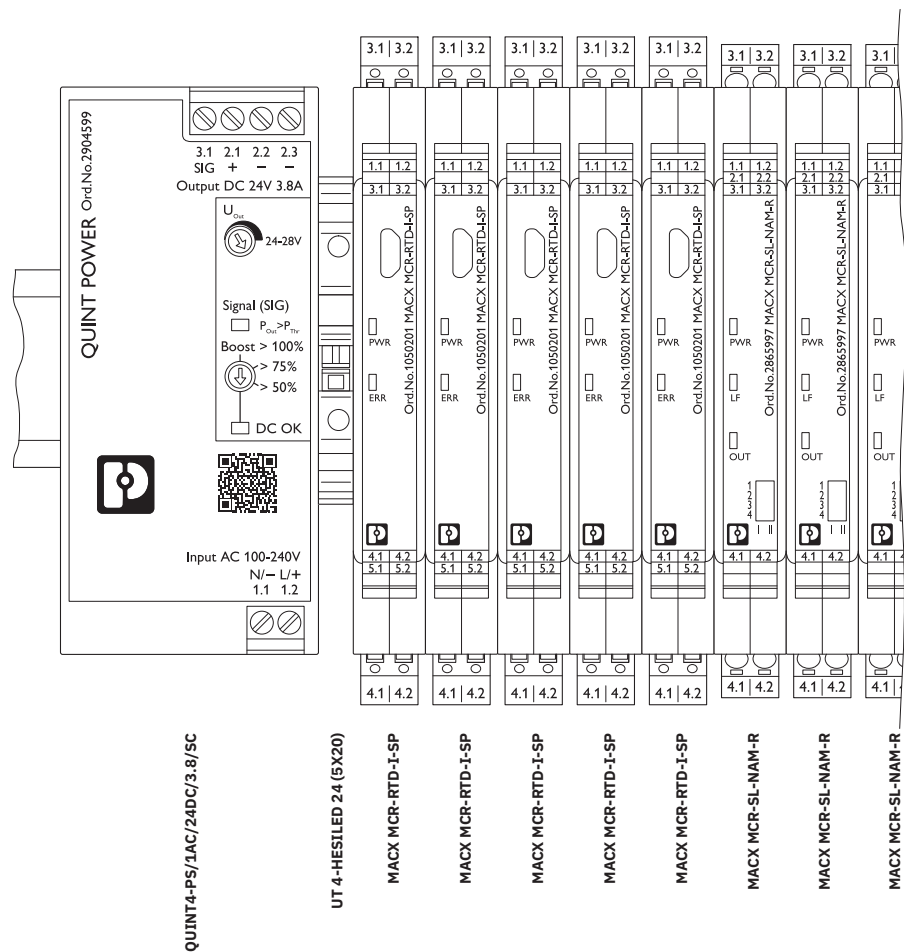
Then determine the maximum total current consumption of all eight modules.

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

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

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

Figure 5-2 Example for direct supply via a module



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

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

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

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

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



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

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

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

Figure 5-3 Supply by means of one power supply

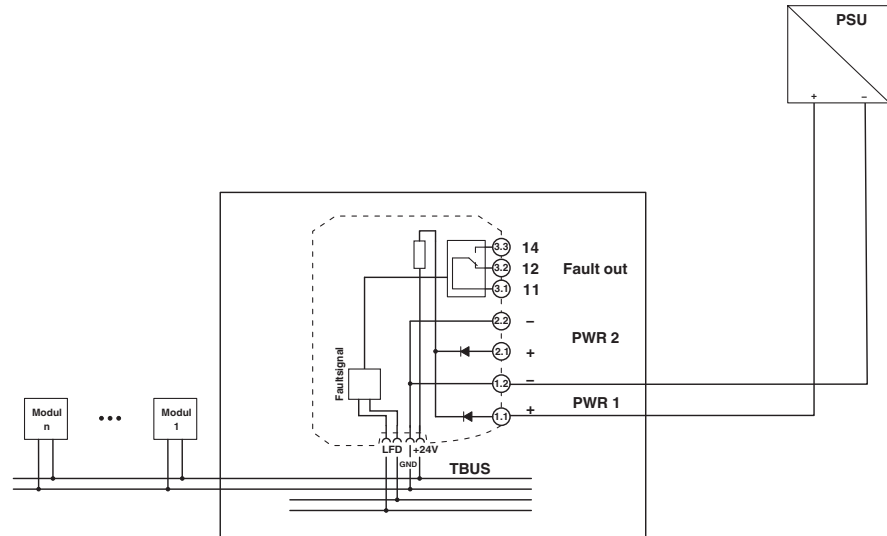
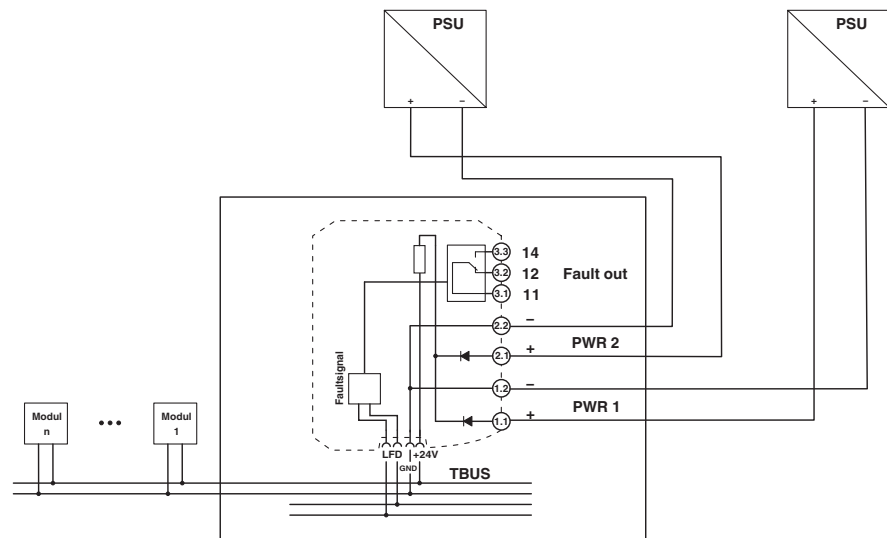


Figure 5-4 Supply by means of redundant power supplies



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

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

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

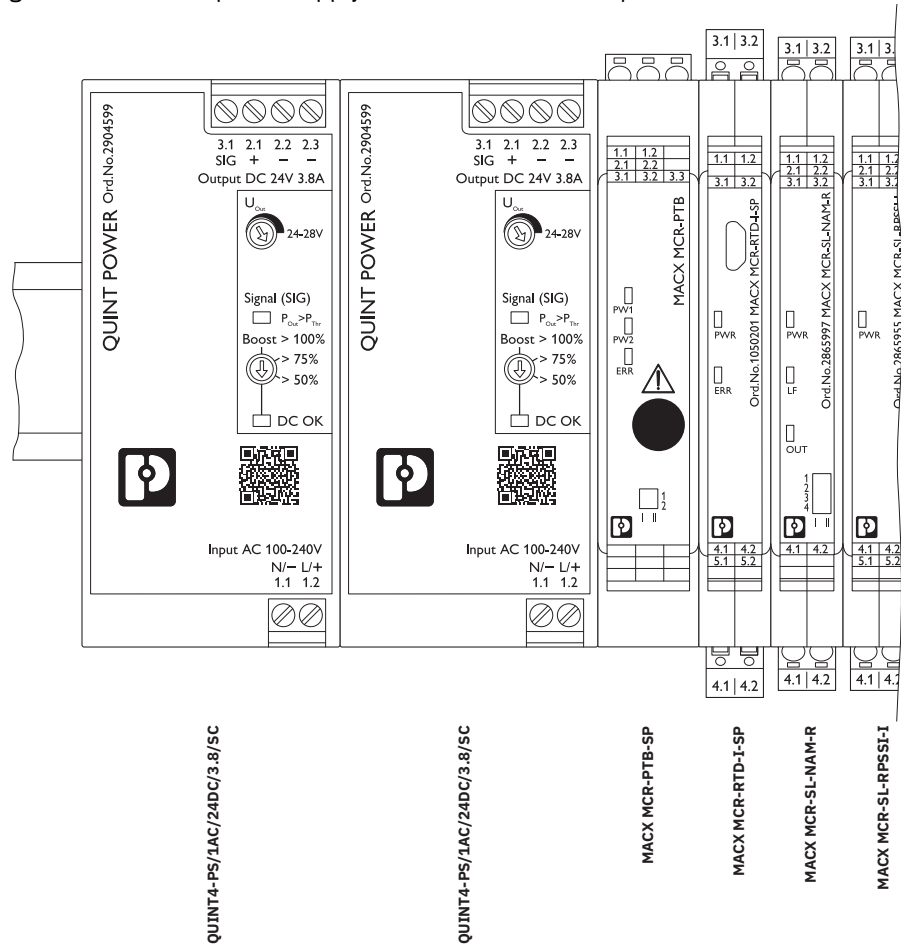
Then determine the maximum total current consumption of all 92 modules.

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

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

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

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



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

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

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



NOTE: Functional limitation

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

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

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

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

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

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

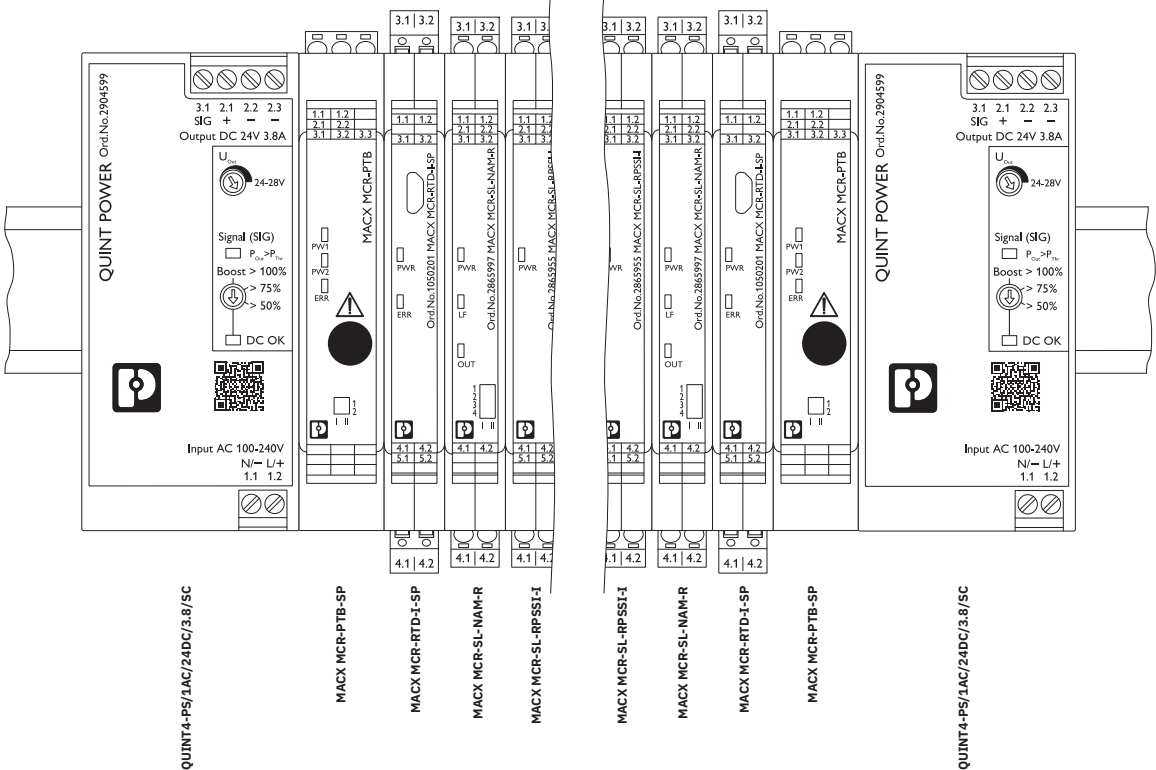
$$I = 32 * 40 \text{ mA} + 40 * 21 \text{ mA} + 20 * 76 \text{ mA} = 3640 \text{ mA} < 3750 \text{ mA}$$

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



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

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

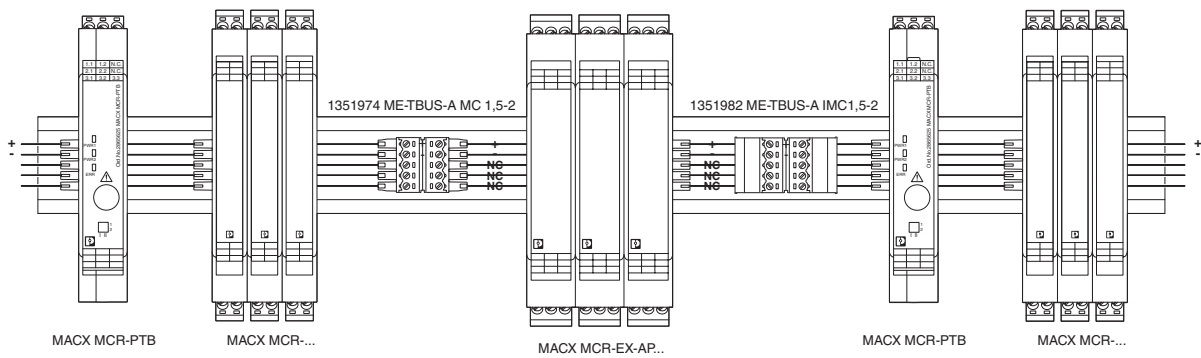


5.3 Supply via MACX MCR(-EX)-AP power module with DIN rail connector

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

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

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



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

5.4 Supply via system power supply

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

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

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

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

Example for supply via a system power supply

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

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

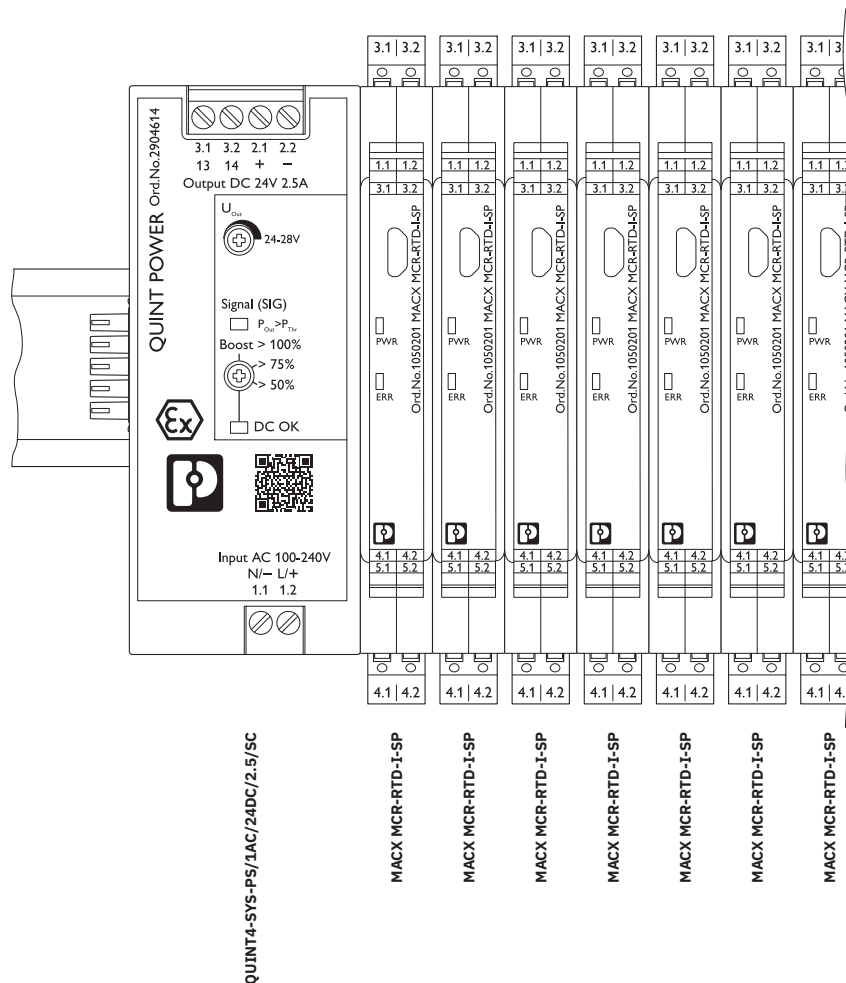
Then determine the maximum total current consumption of the 35 modules.

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

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

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

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



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Please observe the following notes

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GERMANY

Should you have any suggestions or recommendations for improvement of the contents and layout of our manuals, please send your comments to:

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phoenixcontact.com

EU-Konformitätserklärung

EU Declaration of Conformity

Nr. / No. 083113343_07_DoC_EU



Hersteller / Manufacturer:

Anschrift / Address:

Produktbezeichnung / Product designation:

Artikel-Nr. / Order No.:

Phoenix Contact GmbH & Co. KG

Flachsmarktstraße 8, 32825 Blomberg, Germany

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

2865984

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

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

2011/65/EU

(OJ L 174, 1 July 2011)

Beschränkung der Verwendung bestimmter gefährlicher Stoffe

Restriction of the use of certain hazardous substances (RoHS)

2014/30/EU

(OJ L 96, 29 March 2014)

EMV-Richtlinie (Elektromagnetische Verträglichkeit)

Electromagnetic Compatibility Directive (EMC)

2014/34/EU

(OJ L 96, 29 March 2014)

Geräte in explosionsgefährdeten Bereichen

Equipment for explosive atmospheres (ATEX)

Für die Beurteilung der Übereinstimmung wurden folgende einschlägige Normen herangezogen:

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

EN 60079-11:2012

EN IEC 60079-0:2018

EN IEC 60079-7:2015 + A1:2018

EN IEC 61000-6-4:2019

EN 61326-1:2013

EN IEC 60079-15:2019

EN IEC 61000-6-2:2019

EN IEC 63000:2018

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

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

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

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

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

Zertifikate einer benannten Stelle:

Certificates of a notified body:

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

Nr. / No.: 0637

Referenz / Reference: IBExU10ATEX1005X

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

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

Artikel-Nr. / Order No.

Produktbezeichnung / Product designation

2924249

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

Blomberg, 2023-08-29

Lars-Peter Wimmer

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

Ansprechpartner / Contact person

Carsten Thörner

Carsten Thörner
Business Unit Interface Components
Vice President

Zeichnungsberechtigter / Authorized signatory

UK Declaration of Conformity

UK-Konformitätserklärung

No. / Nr. 097106924_00_DoC_UK



Manufacturer / Hersteller:

PHOENIX CONTACT GmbH & Co. KG

Address / Anschrift:

Flachsmarktstraße 8, 32825 Blomberg, Germany

Product designation / Produktbezeichnung:

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

Order No. / Artikel-Nr.:

2865984

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

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

S.I. 2012/3032

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

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

S.I. 2016/1091

Electromagnetic Compatibility Regulations 2016

Verordnung über elektromagnetische Verträglichkeit 2016

S.I. 2016/1107

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

Verordnung für Geräte und Schutzsysteme zur Verwendung in explosionsgefährdeten Bereichen 2016

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

Für die Beurteilung der Übereinstimmung wurden folgende einschlägige Normen herangezogen:

EN 60079-11:2012

EN 61326-1:2013

EN IEC 60079-0:2018

EN IEC 60079-15:2019

EN IEC 60079-7:2015 + A1:2018

EN IEC 61000-6-2:2019

EN IEC 61000-6-4:2019

EN IEC 63000:2018

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

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

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

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

Certificates of an approved body:

Zertifikate einer zugelassenen Stelle:

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

No. / Nr.: 2503

Reference / Referenz: CML 22UKEX3528X

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

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

Order No. / Artikel-Nr.

Product designation / Produktbezeichnung

2924249

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

Blomberg, 2023-01-05

P. Schnelle

Pascal Schnelle
Business Unit Interface Components
Manager MCR/Ex Development

Contact person / Ansprechpartner

C. 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:

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

IBExU Institut für Sicherheitstechnik GmbH
Fuchsmühlenweg 7
09599 Freiberg, GERMANY

By order

Dipl.-Ing.(FH) A. Henker



(notified body number 0637)

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

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

Freiberg, 2021-12-21

[13]

Schedule

[14]

Certificate number IBExU10ATEX1005 X | Issue 2

[15]

Description of product

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

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

Technical data:

Environmental conditions

Ambient temperature range

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

Degree of protection

Electrical data

1. Power Supply (1.1 and 1.2) and TBUS

rated voltage range

U_n 24 ... 230 V DC or AC

supply current

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

power consumption

P_n < 1.1 W

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

U_m 253 V AC / 125 V DC

galvanically separated up to a peak voltage

U_p 375 V

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

maximum output voltage

U_o 9.56 V

maximum output current

I_o 10.3 mA

maximum output power

P_o 25 mW

characteristic

linear (928 Ω)

effective internal capacity

C_i negligible

effective internal inductivity

L_i negligible

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

maximum Switching voltage

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

maximum switching power

P_s 500 VA

Safety instructions:

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

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

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

IBExU Institut für Sicherheitstechnik GmbH

An-Institut der TU Bergakademie Freiberg

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

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

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

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

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

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

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

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

Variations compared to issue 1 of this certificate:

Variation 1

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

[16] Test report

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

Summary of the test results

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

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

[17] Specific conditions of use

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

[18] Essential health and safety requirements

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

None

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

IBExU Institut für Sicherheitstechnik GmbH
Fuchsmühlenweg 7
09599 Freiberg, GERMANY

By order



Dipl.-Ing.(FH) A. Henker

Freiberg, 2021-12-21



IECEX Certificate of Conformity

INTERNATIONAL ELECTROTECHNICAL COMMISSION IEC Certification System for Explosive Atmospheres

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

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

Approved for issue on behalf of the IECEx
Certification Body:

Alexander Henker

Position:

Deputy Head of department Certification Body

Signature:
(for printed version)

Date:

2021-12-21

1. This certificate and schedule may only be reproduced in full.
2. This certificate is not transferable and remains the property of the issuing body.
3. The Status and authenticity of this certificate may be verified by visiting www.iecex.com or use of this QR Code.



Certificate issued by:

IBExU Institut für Sicherheitstechnik GmbH
Fuchsmühlenweg 7
09599 Freiberg
Germany



IECEx Certificate of Conformity

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

Page 2 of 4

Date of issue: 2021-12-21

Issue No: 4

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

Additional
manufacturing
locations:

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

STANDARDS :

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

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

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

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

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

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

TEST & ASSESSMENT REPORTS:

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

Test Reports:

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

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

DE/IBE/ExTR10.0002/02

Quality Assessment Report:

NL/DEK/QAR11.0009/08



IECEx Certificate of Conformity

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

Page 3 of 4

Date of issue: 2021-12-21

Issue No: 4

EQUIPMENT:

Equipment and systems covered by this Certificate are as follows:

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

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

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

The technical data are mentioned in the Annex.

SPECIFIC CONDITIONS OF USE: YES as shown below:

Special conditions for safe use in zone 2:

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



IECEx Certificate of Conformity

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

Page 4 of 4

Date of issue: 2021-12-21

Issue No: 4

DETAILS OF CERTIFICATE CHANGES (for issues 1 and above)

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

Annex:

[Annex_IBE10.0002_04.pdf](#)



IECEX Certificate of Conformity - Annex



Certificate No: IECEx IBE 10.0002X

Issue No: 4

Date of Issue: 2021-12-21

Page 1 of 2

Technical data:

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

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

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

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

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

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

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

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

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

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



IECEX Certificate of Conformity - Annex



Certificate No: IECEx IBE 10.0002X

Issue No: 4

Date of Issue: 2021-12-21

Page 2 of 2

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

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

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

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

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

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

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

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

EU-Konformitätserklärung

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

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

Copyright Pepperl+Fuchs
www.pepperl-fuchs.com



Declaration of conformity / Konformitätserklärung

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

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

Products / Produkte

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

Directives and Standards / Richtlinien und Normen

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

Affixed CE Marking / Angebrachte CE-Kennzeichnung



Signatures / Unterschriften

Mannheim, 2022-09-22

ppa. J. Helm

ppa. Wolfgang Helm
Director
Business Unit Sensors

i.V. U. Ehrenfried

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

ANNEX ATEX

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

Marking and Certificates / Kennzeichnung und Zertifikate

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

Key for Issuer ID / Schlüssel zur Aussteller ID

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

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

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

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www.pepperl-fuchs.com

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

■ Affixed UKCA Marking



■ Signatures

Mannheim, 2022-09-22


ppa. Wolfgang Helm
Director
Business Unit Sensors


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

■ ANNEX UK SI 2016 No. 1107 (EX)

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

■ Marking and Certificates

Marking	Certificate	ID
 II 2 G	CML 21UKEX21274X	2503

■ Key for ID

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



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

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



PTB 99 ATEX 2128 X

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

 **II 2 G EEx ia IIC T6**

Zertifizierungsstelle Explosionsschutz
By order:

Braunschweig, August 10, 1999

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



sheet 1/4

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

(13)

SCHEDULE

(14)

EC-TYPE-EXAMINATION CERTIFICATE PTB 99 ATEX 2128 X

(15) Description of equipment

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

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

Electrical data

Evaluation and

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

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

only for connection to certified intrinsically safe circuits

Maximum values:

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

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

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

(16) Test report PTB Ex 99-29058

(17) Special conditions for safe use

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

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

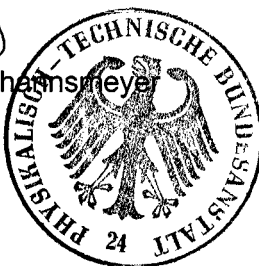
(18) Essential health and safety requirements

Met by the standards mentioned above

Zertifizierungsstelle Explosionsschutz
By order:

Braunschweig, August 10, 1999


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



1. SUPPLEMENT

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

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

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

Marking:  II 2 G EEx ia IIC T6

Manufacturer: Pepperl+Fuchs GmbH

Address: Lilienthalstraße 200, 68307 Mannheim, Germany

Description of supplements and modifications

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

In the future the marking will read:

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

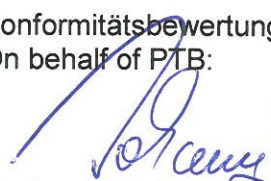
Applied standards

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

Test report: PTB Ex 15-24246

Konformitätsbewertungsstelle, Sektor Explosionsschutz
On behalf of PTB:

Braunschweig, April 28, 2015


Dr.-Ing. U. Johannsmeyer
Direktor und Professor



Sheet 1/1

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

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

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

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

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



II 2 G

Ex ia IIC T6...T1 Gb





CML 21UKEX21274X
Issue 0

11 Description

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

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

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

Electrical data

Evaluation and
supply circuit..

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

Maximum values:

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

Table 1

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

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

Table 2



CML 21UKEX21274X
Issue 0

12 Certificate history and evaluation reports

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

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

13 Conditions of Manufacture

None.

14 Specific Conditions of Use

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

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

Certificate Annex

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



The following documents describe the equipment defined in this certificate:

Issue 0

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

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

RMA-Formular und Erklärung über Dekontaminierung

Formulario RMA y declaración de descontaminación



RMA-Nr./ RMA-No.

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./ Recibirá el número RMA de su contacto de ventas o de atención al cliente. Al enviar un aparato usado para su eliminación introduzca "WEEE" en el apartado del n.º RMA.

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./ Junto con el formulario de devolución debe enviarse también una declaración de descontaminación. Las disposiciones legales indican que usted debe enviarnos esta declaración de descontaminación rellena y firmada. Por la salud de nuestros trabajadores, le rogamos que rellene este documento completamente.

Firma/ Empresa

Firma/ Empresa

Straße/ Calle

PLZ, Ort/ C.P., municipio

Land/ País

Gerät/ Dispositivo

Anzahl/ Cantidad

Auftragsnr./ Número de encargo

Ansprechpartner/ Persona de contacto

Name/ Nombre

Abt./ Dpto.

Tel./ Tel.

E-Mail

Serien-Nr./ N.º de serie

Artikel-Nr./ N.º de artículo

Grund der Rücksendung/ Motivo de devolución

- ☐ Kalibrierung/ Calibrado ☐ Modifikation/ Modificación
☐ Reklamation/ Reclamación ☐ Reparatur/ Reparación
☐ Elektroaltgerät/ Equipo eléctrico usado (WEEE)
☐ andere/ otros

bitte spezifizieren / especifique, por favor

War das Gerät im Einsatz?/ ¿Estaba en uso el dispositivo?

- ☐ Nein, da das Gerät nicht mit gesundheitsgefährdeten Stoffen betrieben wurde./ No, puesto que el dispositivo no utiliza sustancias peligrosas.
☐ Nein, da das Gerät ordnungsgemäß gereinigt und dekontaminiert wurde./ No, puesto que el dispositivo se ha limpiado y descontaminado correctamente.
☐ Ja, kontaminiert mit:/ Sí, con los siguientes medios:



☐
explosiv/
explosivo



☐
entzündlich/
inflamable



☐
brandfördernd/
comburente



☐
komprimierte
Gase/ gases
comprimidos



☐
ätzend/
corrosivo



☐
giftig,
Lebensgefahr/
venenoso, pe-
ligro de muerte



☐
gesundheitsge-
fährdend/
perjudicial para
la salud



☐
gesund-
heitsschädlich/
nocivo



☐
umweltge-
fährdend/
dañino para el
medio ambiente

Bitte Sicherheitsdatenblatt beilegen!/ Adjunte la hoja de datos de seguridad!

Das Gerät wurde gespült mit:/ El dispositivo ha sido lavado con:

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.

La presente declaración se ha cumplimentado correcta e íntegramente y ha sido firmada por una persona autorizada a tal efecto. El envío de los dispositivos y componentes (descontaminados) se realiza conforme a las disposiciones legales.

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.

En caso de que la mercancía no esté limpia, es decir, nos llegue contaminada, la compañía Bühler se reserva el derecho a contratar a un proveedor externo para que la limpie y a cargarle los gastos a su cuenta.

Firmenstempel/ Sello de la empresa

Datum/ Fecha

rechtsverbindliche Unterschrift/ Firma autorizada



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.

Evitar modificaciones y daños en el conjunto que se va a enviar

El análisis de módulos defectuosos es una parte importante del control de calidad de Bühler Technologies GmbH. Para garantizar un análisis concluyente la mercancía debe inspeccionarse alterándola lo mínimo posible. No pueden darse cambios ni otros daños que puedan ocultar las causas o impedir el análisis.

Manipulación de conjuntos sensibles a la electricidad estática

En el caso de módulos electrónicos puede tratarse de módulos electrostáticos sensibles. Debe tenerse en cuenta que hay que tratar estos módulos conforme a ESD. En caso de que sea posible los módulos deben cambiarse en un lugar de trabajo conforme con ESD. Si no es posible, deben adoptarse medidas conformes con ESD en caso de intercambio. El transporte puede llevarse a cabo en recipientes conformes con ESD. El embalaje de los módulos debe estar conforme con ESD. Utilice si es posible el embalaje de la pieza de repuesto o seleccione usted mismo un embalaje conforme con ESD.

Instalación de piezas de repuesto

Al instalar la pieza de repuesto tenga en cuenta las mismas indicaciones que se han descrito anteriormente. Asegúrese de que realiza el montaje de la pieza y de todos los componentes. Antes de la puesta en funcionamiento, ponga el cableado de nuevo en su estado original. En caso de dudas pida más información al fabricante.

Envío de dispositivos eléctricos usados para su eliminación

Si desea enviar un producto eléctrico de Bühler Technologies GmbH para su adecuada eliminación por parte de nuestros profesionales, introduzca "WEEE" en el apartado del n.º RMA. Para el transporte, adjunte la declaración de descontaminación del dispositivo usado completamente cumplimentada de forma que sea visible desde fuera. Puede encontrar más información sobre la eliminación de dispositivos electrónicos usados en la página web de nuestra empresa.

