Gas Analysis

Flow Meter

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

Installation and Operation Instructions

Original instructions

BE400001
10/2024

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Read this instruction carefully prior to installation and/or use. Pay attention particularly to all advises and safety instructions to prevent injuries. Bühler Technologies can not be held responsible for misusing the product or unreliable function due to unauthorised modifications.

Document information
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Version.....10/2024

Contents

1 Introduction

1.1 Intended use

The flow meter can be used to display flow volumes of sample gasses or liquid mediums. Please refer to the nameplate to identify your model. In addition to the job number it also contains the item number and model designation. Any special features applicable to a flow meter model are described separately in the operating manual. When connecting, please note the specific values of the flow meter, and the correct version when ordering spare parts.

SM-6/SM-6-V series flow meters can also be equipped with a bistable limit switch. On the SM-6-V the flow volume can be adjusted with the needle valve.

On S-SM series safety flow meters the actual metering glass is protected by a second, thick-walled glass cylinder. If the metering glass bursts, the outer glass cylinder resumes protecting so medium cannot leak. A stainless steel tube further protects this outer glass cylinder from mechanical damage. Please refer to the data sheet for the various S-SM models.

NOTICE

When used in explosive areas

Model SM-6, SM6-V and S-SM 3-1 flow meters meet the fundamental safety requirements of Directive 2014/34/EU and are therefore suitable for use in Zone 1 Ex areas (**model S-SM 3-1: explosion group IIC; model SM-6, SM-6-V: explosion group IIB);** hazard notes must be observed). The flow meter can be used to transport non-flammable gases and flammable gases **explosion group IIB** (model SM-6 and SM-6-V) **or IIC** (model S-SM 3-1) which may occasionally be explosive during normal operation (**Zone 1**). The type plate on the flow meters has no Ex classification, as the mediums have no own ignition sources and therefore do not fall under Directive 2014/34/EU.

1.2 Contents

- 1 x Flow meter
- 1 x Product documentation
- 1 x Bracket (Model SM-6 / SM-6-V only)

1.3 Ordering instructions

The item number is a code for the configuration of your unit. Please use the following model key:

4056	X X	X	99	X	Measuring range*
	0 0				Air 6 - 60 Nl/h
	0 1				Air 10 - 100 Nl/h
	0 2				Air 25 - 250 Nl/h
	0 3				Air 50 - 500 Nl/h
	0 4				Air 80 - 800 Nl/h
	0 5				Water 0.5 - 5 L/h
	0 6				Water 1.2 - 12 L/h
	0 7				Water 2.5 - 25 L/h
	0 8				Water 4 - 40 L/h
	0 9				Water 6 - 60 L/h
	1 0				Special range
		0			without needle valve
		1			Valve PVDF / Viton
		2			Valve PCTFE / perfluorelastomer
				S	Limit switch with mounting bracket
				-	without limit switch

* Standard measuring tubes; air 20 °C 1.2 bar abs; water 20 °C

Ordering information for limit switch: A limit switch is factory installed if the last character of the item number is "S". Without the "S" marking the flow meter has no limit switch. We offer various switch amplifiers for controlling the limit switch (see data sheet no. 400003).

2 Safety instructions

2.1 Important advice

Operation of the device is only permitted if:

- the product is used under the conditions described in the installation- and operation instruction, the intended application according to the type plate and the intended use. In case of unauthorized modifications done by the user Bühler Technologies GmbH can not be held responsible for any damage,
- when complying with the specifications and markings on the nameplates.
- the performance limits given in the datasheets and in the installation- and operation instruction are obeyed,
- monitoring devices and safety devices are installed properly,
- service and repair is carried out by Bühler Technologies GmbH,
- only original spare parts are used.

This manual is part of the equipment. The manufacturer keeps the right to modify specifications without advanced notice. Keep this manual for later use.

Signal words for warnings

DANGER	Signal word for an imminent danger with high risk, resulting in severe injuries or death if not avoided.
WARNING	Signal word for a hazardous situation with medium risk, possibly resulting in severe injuries or death if not avoided.
CAUTION	Signal word for a hazardous situation with low risk, resulting in damaged to the device or the property or minor or medium injuries if not avoided.
NOTICE	Signal word for important information to the product.

Warning signs

These instructions include the following warnings:

	General warning sign		Wear respiratory equipment
	Warning not to inhale toxic gases		Wear a safety mask
	Warning of corrosive substances		Wear gloves
	Warning of explosion hazard		

2.2 General hazard warnings

The equipment must be installed by a professional familiar with the safety requirements and risks.

Be sure to observe the safety regulations and generally applicable rules of technology relevant for the installation site. Prevent malfunctions and avoid personal injuries and property damage.

The operator of the system must ensure:

- Safety notices and operating instructions are available and observed,
- The respective national accident prevention regulations are observed,
- The permissible data and operational conditions are maintained,
- Safety guards are used and mandatory maintenance is performed,
- Legal regulations are observed during disposal,
- compliance with national installation regulations.

Maintenance, Repair

Please note during maintenance and repairs:

- Repairs to the unit must be performed by Bühler authorised personnel.
- Only perform conversion-, maintenance or installation work described in these operating and installation instructions.
- Always use genuine spare parts.
- Do not install damaged or defective spare part. If necessary, visually inspect prior to installation to determine any obvious damage to the spare parts.

Always observe the applicable safety and operating regulations in the respective country of use when performing any type of maintenance.

DANGER

Toxic, acidic gasses

Sample gas can be harmful.

a) Switch off the gas supply before performing maintenance and, if necessary, flush the gas lines with air.

b) If necessary, ensure a safe gas discharge.

c) Protect yourself from toxic / acidic gasses when performing maintenance. Wear appropriate protective equipment.

DANGER

Application in explosive atmosphere

Combustible gases and dust may inflame or explode. Avoid the following hazardous situations:

Electrostatic charge (spark formation)!

Clean plastic parts and labels with damp cloth only.

Connect metallic housings to ground!

Maximum surface temperature!

The maximum surface temperature T_{surf} of the equipment corresponds to the medium-temperature T_{med}; $T_{surf} \leq T_{med}$.

Ignition temperature!

Regard the ignition temperature of the explosive gas-atmosphere as well as maximum allowable surface temperatures (regard directive 94/9/ EC and harmonized standards).

Risk of breakage / emission of explosive or toxic gas possible.

Protect the equipment against being hit.

Gas leakage!

Life and explosion risk may result from gas leakage due to improper use or during maintenance.

3 Transport and storage

The product should only be transported inside the original packaging or a suitable alternative.

When not in use, the equipment must be protected from moisture and heat. They must be stored in a covered, dry and dust-free room at a temperature between -10 °C and 40 °C.

4 Installation and connection

The flow meters are equipped with the following threads:

Flow meter	Thread
SM-6 / SM-6-V	G 1/4
S-SM 3-1	NPT 1/4”

Please refer to chapter Dimensions [> page 20] for the assembly drawing. The fittings must be screwed in tight, sealed with Teflon tape or sealant/flat gasket!

4.1 Electrical connections (intrinsically safe)

WARNING

Hazardous electrical voltage

The device must be installed by trained staff only.

CAUTION

Wrong mains voltage

Wrong mains voltage may damage the device.
Regard the correct mains voltage as given on the type plate.

CAUTION

Explosion hazard due to prohibited electrical connection data

Prohibited electrical connection data can cause an explosive gas mixture to ignite.
In areas with explosive gas atmospheres, this device may only be operated with an intrinsically-safe power supply. The power supply must be suitable for the respective zone.
The limits specified in these operating instructions must be observed and must not be exceeded, even with two separate intrinsically-safe power supplies.
Ensure the limits will not be exceeded, even in the event of a fault, e.g. accidental series or parallel connection.
Please observe the relevant safety requirements, e.g. IEC/EN 60079-11 and IEC/EN 60079-14, when installing and operating intrinsically-safe equipment.

4.1.1 Installing the limit switch with bracket (only model SM-6/SM-6-V)

DANGER

Explosion hazard

Application in explosive atmosphere
Only use certificated flow sensors.

The limit switch is pre-installed.

- Prior to first use, loosen the plastic countersunk screws from the mounting plate and position the limit switch at the desired height.
- The plastic countersunk screws must be fastened again.
- Connect the cable to the power supply.

Using the limit switch in Ex areas:

Please note the wiring parameters of the optionally installed limit indicators model RC10-14-N3 or RC15-14-N3 specified in the certificate PTB99ATEX2128X in chapter Attached documents [> page 23]. The exact model can be found on the model designation of the respective limit indicator.

4.1.2 Installing and connecting the switch amplifier (only model SM-6/SM-6-V)

Model MACX: Observe the specified wiring parameters in the approvals (IECExIBE100002X and IBExU10ATEX1005X) and the installation instructions in the attached user manual in the chapter Attached documents [> page 23].

Model KCD2-E2L: If you use a mechanical contact as a pulse generator, you must connect a 10 kOhm resistor in parallel to this contact on site for line break monitoring.

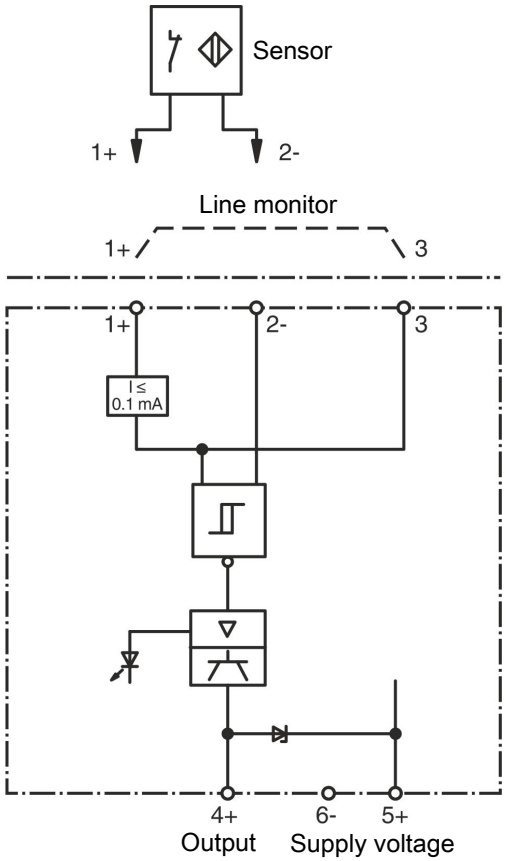
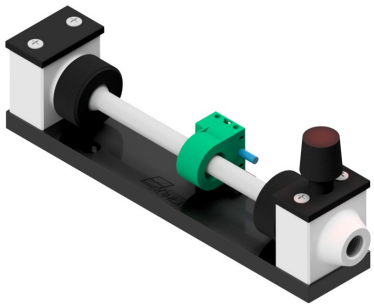
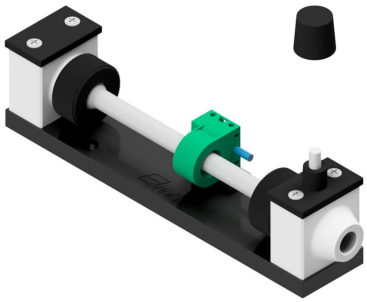


Fig. 1: KCD2-E2L switch amplifier connection plan

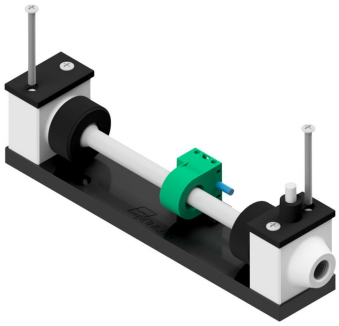
4.2 Installing the cover (item no. 40158998)



– Start the installation process by carefully removing the cover cap of the needle valve.



– Remove the screw from the needle valve while taking care to hold on to the knob to prevent any undesired contortion of the valve.



– Remove the countersunk screws.

– Place the cover in the designated position.

– Use the raised countersunk screws included to fix the cover securely in place.

– Attach the needle valve and tighten it in place. It is important again here to keep the knob stable while tightening the needle valve to prevent unintentional contortion of the needle valve.

– To complete the installation process, reattach the cover cap of the needle valve.

We recommend taking special care while performing the above-mentioned steps to ensure proper installation.

5 Operation and control

NOTICE

The device must not be operated beyond its specifications.

Information on operating the flow meter with the cover:

- The cover is only available as a retrofit kit. Factory installation is not planned. Please take responsibility for following the attached instructions when carrying out the installation.
- The cover must not be used in explosive areas. Ensure that the usage environment complies with the local safety regulations.
- The maximum medium temperature for the cover is 120 °C. Ensure that the media used do not exceed this maximum temperature to guarantee proper function of the cover.

5.1 Read the flow value

The flow value can be read at the top of the float.

Please note: The values can only be correct, if the medium and pressure specified on the type plate match the sample.

5.2 Adjusting the needle valve

NOTICE! Please note: The needle valve is NOT a shut-off valve. Do not force the valve.

The valve is closed turning clockwise.

6 Maintenance

During maintenance, remember:

- The equipment must be maintained by a professional familiar with the safety requirements and risks.
- Only perform maintenance work described in these operating and installation instructions.
- Observe the respective safety regulations and operating specifications when performing any type of maintenance.
- Always use genuine spare parts.

DANGER

Explosion hazard

Gas leakage

If explosive, toxic or corrosive gas (liquid) will lead through the flow meter, check the leak tightness at regular intervals.

DANGER

Toxic, corrosive gasses

Sample gas can be harmful.

a) Switch off the process (depressurise) before starting maintenance. To do so, close the shut-off valve (if applicable).

b) Flush the flow meter with air before opening.

c) Protect yourself from toxic / corrosive gasses when performing maintenance. Wear appropriate protective equipment.

CAUTION

Gas leakage

Don't use damaged parts again.
Only use original spare parts.

6.1 Replacing the flow sensor with brackets (type SM-6 / SM-6-V only)

DANGER **Explosion hazard**

Application in explosive atmosphere
Only use certificated flow sensors.

Remove the plastic countersunk screws (1) from the limit switch mounting plate (see Fig. 1). This will also loosen the clamping plate at the back of the flow meter.

Loosen both swivel nuts on the measuring tube. Slide the measuring tube into the upper end piece, applying light pressure. You can now swing out the measuring tube (see Fig. 2). Remove the gasket (2), die swivel nut (3) and limit switch (4) at the bottom end of the measuring tube. The measuring tube may be cleaned if necessary.

Measuring tubes with limit switch are assembled in the reverse order. Please be sure the chamfer on the gasket faces the respective end piece.

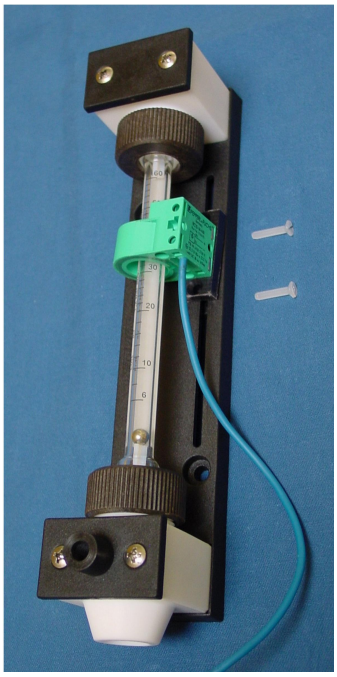


Fig. 1

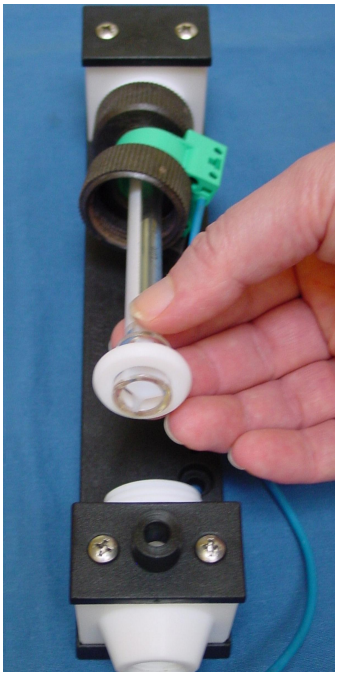


Fig. 2

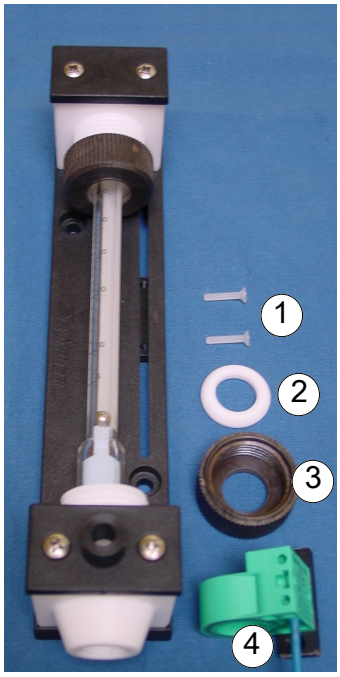


Fig. 3

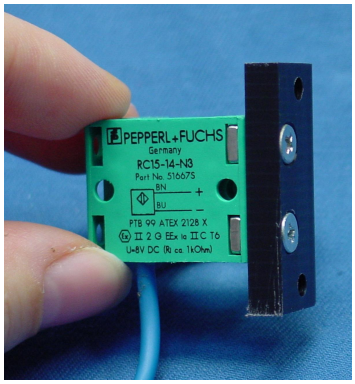


Fig. 4

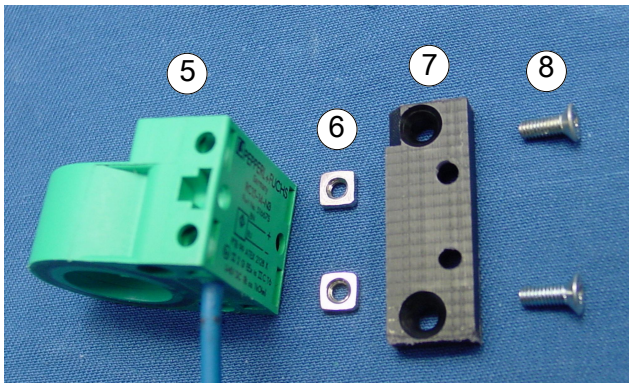


Fig. 5

1	Plastic countersunk screws	3	Swivel nut
2	Gasket	4	Limit switch with mounting plate
5	Limit switch	7	Machined mounting plate
6	M3 square nuts	8	Cross-head screws

Loosen both cross-head screws (8) on the mounting plate for the limit switch (see Fig. 4). Remove the mounting plate (7). Be careful not to lose the two square nuts (6) in the slots on the limit switch! Replace the limit switch (5) and fasten the mounting plate. The machined chamfer on the mounting plate (7) must face the top left.

You can now slide the limit switch onto the measuring tube again. When doing so, please note the direction of flow, i.e. the markings must be visible, the mounting plate for the limit switch must be positioned with the screw holes over the slot and the cable is fed out the bottom.

Finally, slide the swivel nut and the gasket (with the sealing cone toward the bracket) onto the measuring tube. Reinstall the measuring tube and tighten the swivel nut by hand.

Now insert the plastic countersunk screws through the slot in the base plate of the flow meter to fasten and adjust the mounting plate to the clamping plate inside the back of the base plate.

6.2 Replacing the metering tube (only for Type SM-6/SM-6V)

If a cover is present, it must be uninstalled before replacing the metering tube.

6.2.1 Without flow sensor

Loosen the two swivel nuts for the measuring tube. Slide the metering tube into the upper end piece, applying light pressure. You can now move the gaskets under the swivel nuts onto the tapered end of the metering tube. You can now swing out the measuring tube.

You can now remove the swivel nuts and gaskets from the measuring tube and, if necessary, move them onto the new measuring tube. The metering tube is assembled in the reverse order. Please be sure the chamfer on the gasket faces the respective end piece.

6.2.2 With flow sensor

Loosen the top plastic countersunk screw (1) from the mounting plate for the limit switch (see Fig. I) and loosen the bottom plastic countersunk screw (1) so the limit switch can be moved. Removing it completely from the mounting plate is not required.

Loosen the two swivel nuts (3) for the measuring tube. Slide the metering tube into the upper end piece, applying light pressure. Turn the limit switch to the side (see Fig. 6) when pulling the metering tube out of the limit switch as well as the swivel nut. If necessary, move the limit switch in the process. Remove the gasket (2) and the swivel nut (3) at the bottom of the metering tube. Leave the limit switch on the mounting plate (see Fig. 7).

Assemble the measuring tube in the reverse order. Please be sure the chamfer on the gasket faces the respective end piece.

Fig. 6

Fig. 7

6.3 Replacing the metering tube - Safety flow meters S-SM

NOTICE! This procedure has to be carried out very carefully. You should only do it yourself, if you are sure, you are able to cope with it. We recommend sending the flow meter back to the manufacturer.

Screw one of the end pieces out of the flow meter while holding the flow meter in a direction preventing the metering tube from slipping out. The metering tube can now be taken out.

When mounting the new metering tube the metering and the protection glass has to fit correctly into the O-rings and end pieces.

7 Service and repair

This chapter contains information on troubleshooting and correction should an error occur during operation.

Repairs to the unit must be performed by Bühler authorised personnel.

Please contact our Service Department with any questions:

Tel.: +49-(0)2102-498955 or your agent

For further information about our services and customised maintenance visit http://www.buehler-technologies.com/service.

If the equipment is not functioning properly after correcting any malfunctions and switching on the power, it must be inspected by the manufacturer. Please send the equipment inside suitable packaging to:

Bühler Technologies GmbH

- Reparatur/Service -

Harkortstraße 29

40880 Ratingen

Germany

Please also attach the completed and signed RMA decontamination statement to the packaging. We will otherwise be unable to process your repair order.

You will find the form in the appendix of these instructions, or simply request it by e-mail:

service@buehler-technologies.com.

7.1 Troubleshooting

Problem / Failure	Possible cause	Solution
Float doesn't rise	– Needle valve closed	– Open needle valve
	– Pollution by liquid or particles	– Clean metering tube

Tab. 1: Troubleshooting

7.2 Spare parts

Please also specify the model and serial number when ordering parts.

Upgrade and expansion parts can be found in our catalog.

Available spare parts:

Item no.	Description
40158997	Gasket for Ø 10 mm tube diameter
4055050	Gasket for Ø 15 mm tube diameter

7.2.1 Spare parts and accessories – SM-6, SM-6-V

Item no.	Description
40158998	Cover SM-6, SM-6-V

NOTICE

Important information on use of a cover

- Cover only available as retrofit kit.
- Not suitable for explosive areas.
- Maximum medium temperature limited to 120 °C.

7.2.2 Spare parts and accessories - S-SM

Item no.	Description	
4022999	Flow Meter S-SM 3-1	End sections stainless steel 1.4571
4023999	Flow Meter S-SM 3-1	End sections titanium

7.2.3 Spare parts and accessories - switch amplifier

Item no.	Description
9100070059	MACX switch amplifier
9100070007	Switch amplifier, KCD2-E2L, 24 V DC
4949021	Limit switch with mounting bracket Ø10
4949019	Limit switch with mounting bracket Ø15

8 Disposal

The applicable national laws must be observed when disposing of the products. Disposal must not result in a danger to health and environment.

The crossed out wheelie bin symbol on Bühler Technologies GmbH electrical and electronic products indicates special disposal notices within the European Union (EU).

The crossed out wheelie bin symbol indicates the electric and electronic products bearing the symbol must be disposed of separate from household waste. They must be properly disposed of as waste electrical and electronic equipment.

Bühler Technologies GmbH will gladly dispose of your device bearing this mark. Please send your device to the address below for this purpose.

We are obligated by law to protect our employees from hazards posed by contaminated devices. Therefore please understand that we can only dispose of your waste equipment if the device is free from any aggressive, corrosive or other operating fluids dangerous to health or environment. **Please complete the "RMA Form and Decontamination Statement", available on our website, for every waste electrical and electronic equipment. The form must be applied to the packaging so it is visible from the outside.**

Please return waste electrical and electronic equipment to the following address:

Bühler Technologies GmbH
WEEE
Harkortstr. 29
40880 Ratingen
Germany

Please also observe data protection regulations and remember you are personally responsible for the returned waste equipment not bearing any personal data. Therefore please be sure to delete your personal data before returning your waste equipment.

9 Appendices

9.1 Technical Data

Flow meter	SM-6	SM-6-V
Gas ambient temperature:	-20 °C to +80 °C *	-20 °C to +80 °C *
Liquid ambient temperature:	+5 °C to +80 °C *	+5 °C to +80 °C *
Medium temperature:	≤ 150 °C, for special ranges max. 80 °C	≤ 130 °C, for special ranges max. 80 °C
Max. operating pressure:	4 bar	4 bar
Mechanical load:	Tested based on DNV-GL CG0339 ** vibration class A (0.7 g) 2 Hz-13.2 Hz amplitude ± 1.0 mm 13.2 Hz -100 Hz 0.7 g acceleration	Tested based on DNV-GL CG0339 ** vibration class A (0.7 g) 2 Hz-13.2 Hz amplitude ± 1.0 mm 13.2 Hz -100 Hz 0.7 g acceleration
Material		
Heads:	PTFE	PTFE
Seal:	PTFE	PTFE
Adjusting spindle:	-	PVDF/Viton or PCTFE/perfluorelastomer
Measuring tube:	Borosilicate glass	Borosilicate glass
Float:	Hastelloy C 4	Hastelloy C 4
Swivel nut:	PPS fibreglass reinforced	PPS fibreglass reinforced
Base plate:	PA	PA

* Please note the ambient temperature for the configuration with limit switch!
** not when using a flow meter with a cover.

Limit switch	Ø10*	Ø15
Ingress protection class:	IP 67	IP 67
Ambient temperature:	-20 °C to +80 °C	-20 °C to +70 °C
Housing material:	PBT	PBT
Operation:	bi-stable	bi-stable
Cord length:	2 m	2 m
Approval:	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

* Use in special range under some circumstances. For more information available upon request.

Safety Flow Meter S-SM 3-1	
Ambient temperature:	-20 °C to 80 °C *
Operating pressure:	10 bar (at max. 20 °C) **
Operating temperature:	100 °C (at max. 2 bar) **
Measuring range:	see table
Weight:	0.9 kg
Float:	glass, Hastelloy, stainless steel or PTFE
End sections:	PTFE, stainless steel or titanium
Mounting:	via included pipe clamps

* specify in order, select mounting.

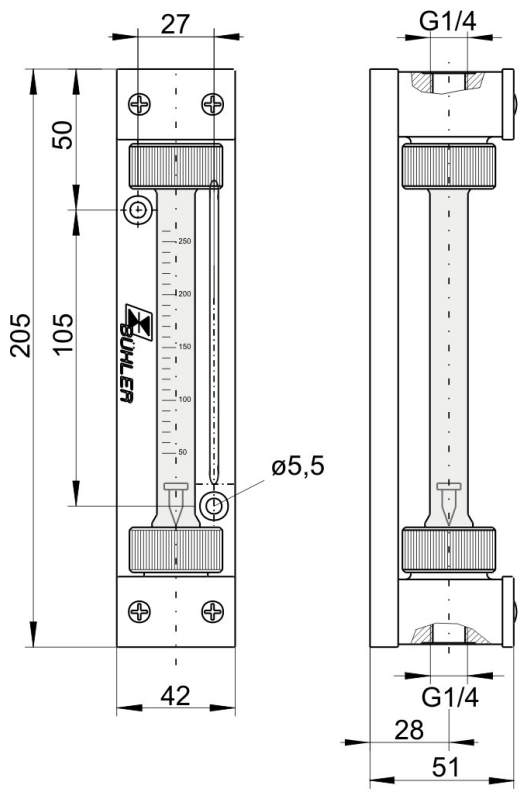
** Max. operating pressure [bar] = 10 - $\frac{\text{Max. operating temperature [°C]} - 20}{10}$

Switch amplifier	MACX MCR-EX-SL-2NAM-R-UP	KCD2-E2L
Supply voltage:	24 ... 230 V AC/DC 50/60 Hz	10–30 V DC
Inherently safe per:	IEC/EN 60079-11	no
Line monitor:	yes	yes
Approvals: *(per operating manual)*	**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	---
Output (not inherently safe):	Changeover contact	NO contact PNP transistor
Switching current output:	250 V AC (2 A, 60 Hz) 120 V DC (0.2 A) 30 V DC (2 A)	200 mA DC
Ambient temperature:	-40 °C ...+60 °C	-25 °C ...+70 °C
IP rating:	IP20	IP20
Dimensions:	17.5x112.5x114.5 mm (WxHxD)	20x63x44 mm (WxHxD)

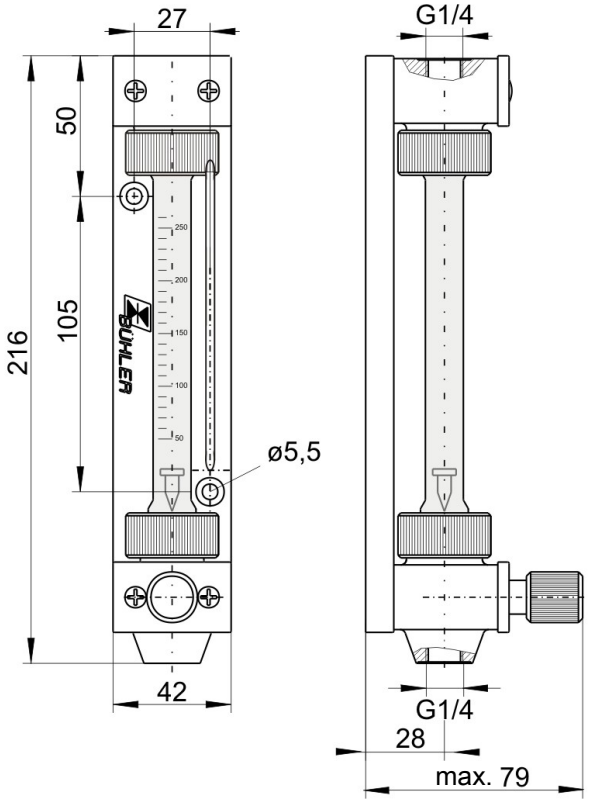
9.2 Dimensions

Flow meter SM6/SM6-V:

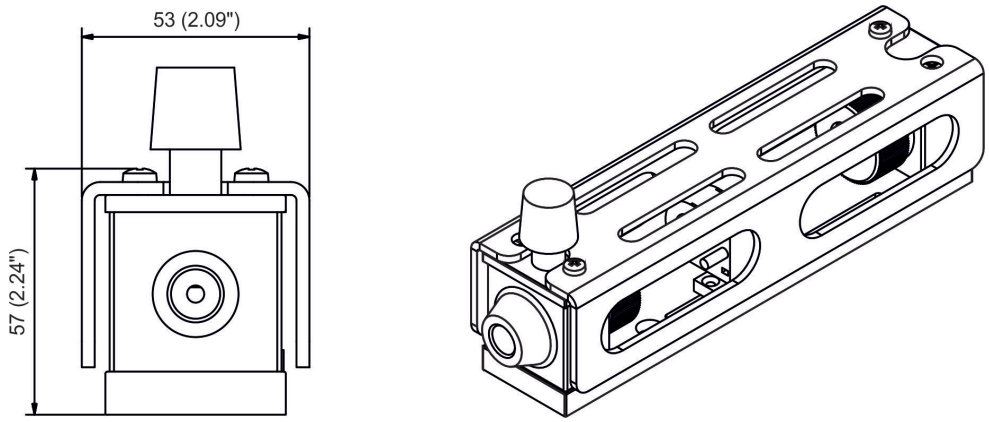
SM-6



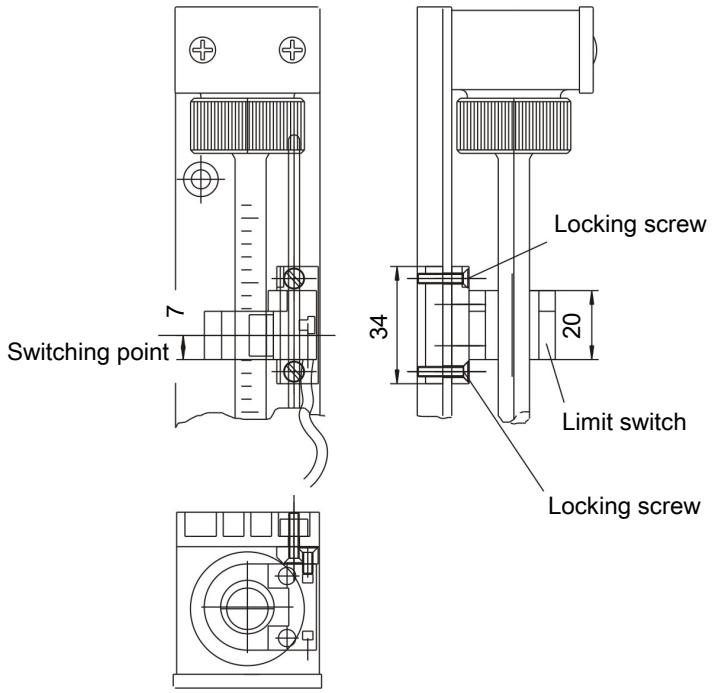
SM-6-V



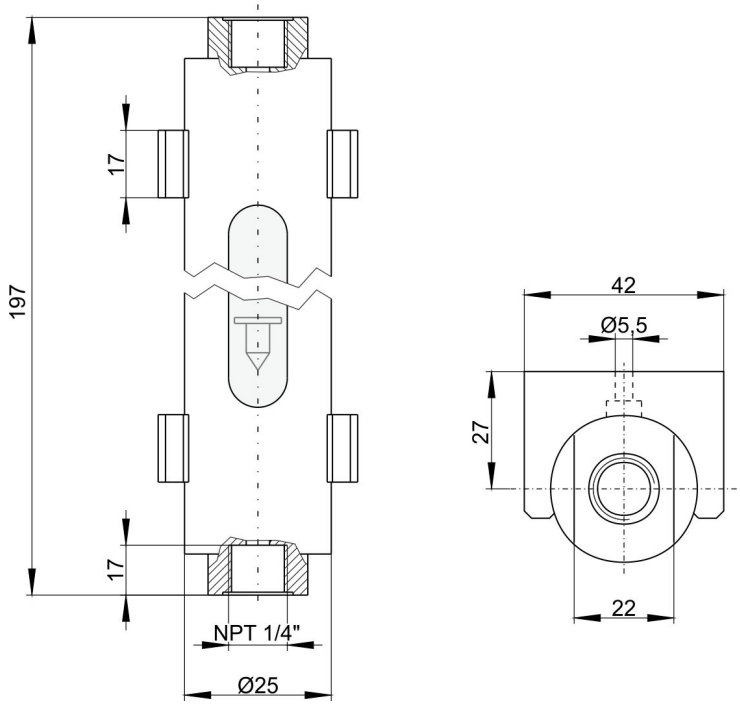
Flow meter with cover:



Limit switch:



S-SM safety flow meter:



9.3 Measuring ranges

	SM-6 flow meter	
Medium:	Air	Water
Pressure:	+ 1.2 bar abs.	
Temperature:	+ 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

	Flow Meter S-SM 3-1	
Medium:	Air	Water
Pressure:	+ 1.2 bar abs.	
Temperature:	+ 20 °C	+ 20 °C
	1.6 – 16 Nl/h	0.25 - 2.5 l/h
	4 – 40 Nl/h	0.5 - 5 l/h
	6 - 60 Nl/h	1.2 - 12 l/h
	10 – 100 Nl/h	2.5 - 25 l/h
	25 – 250 Nl/h	
	50 – 500 Nl/h	
	80 – 800 Nl/h	

10 Attached documents

- EU manufacturer declaration HX400001
- UK manufacturer declaration HX400001UK
- EU Declaration of conformity KCD2-E2L
- MACX user manual
- EU Declaration of conformity MACX
- UK Declaration of Conformity MACX
- EU Type Examination Certificate MACX (IBExU10ATEX1005 X)
- IECEx Certificate of Conformity MACX (IECExIBE100002X)
- EU Declaration of Conformity RC10/RC15
- UK Declaration of Conformity RC10/RC15
- Type Examination Certificate RC10/RC15 (PTB99ATEX2128X)
- UK Type Examination Certificate RC10/RC15 (CML 21UKEX21274X)
- RMA – Decontamination Statement

Herstellererklärung
Manufacturer Declaration

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

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

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

Die Produkte besitzen keine eigenen Zündquellen, wenn die Sicherheitsbestimmungen der zugehörigen Technischen Dokumentation, wie Betriebsanleitungen und Datenblätter, eingehalten und die einschlägigen Sicherheitsvorschriften des Explosionsschutzes gemäß ATEX-Richtlinie umgesetzt werden. Die Produkte dürfen nur von qualifizierten Fachpersonal installiert, betrieben, gewartet oder gereinigt werden.
The products do not have their own ignition sources if the safety regulations in the relevant technical documentation, such as instruction manuals and datasheets, and the relevant safety regulations of explosion protection per the ATEX directive are followed. The products may only be installed, operated, maintained or cleaned by qualified specialist personnel.

Die Produkte sind für den Einsatz in explosionsgefährdeten Bereichen der Zone 1, Explosionsgruppe IIC (Typ S-SM-3-1) bzw. Explosionsgruppe IIB (Typen SM-6, SM-6-V), geeignet.
Alle Typen können zur Anzeige der Durchflussmenge von Gasen oder flüssigen Medien verwendet werden. Durch die Strömungsmesser können nichtbrennbare Gase und brennbare Gase, die im Normalbetrieb gelegentlich explosiv sein können, geleitet werden (Zone 1, Explosionsgruppe IIC (Typ S-SM 3-1) oder Explosionsgruppe IIB (Typ SM-6, SM-6-V)).
The products are suitable for use in potentially explosive atmospheres of zone 1, explosion group IIC (type S-SM-3-1) or explosion group IIB (types SM-6, SM-6-V).
All types can be used to display the flow rate of gases or liquid media. Non-flammable gases and flammable gases, which can occasionally be explosive in normal operation, can be channelled through the flow meters (zone 1, explosion group IIC (type S-SM 3-1) or explosion group IIB (type SM-6, SM-6-V)).

Die im Produkt optional verbauten Grenzwertgeber sind eigensichere Komponenten mit separatem ATEX-Zertifikat (PTB 99 ATEX 2128X) und ATEX-Kennzeichnung.
Bezüglich der elektrischen Versorgung der Grenzwertgeber müssen die Grenzwerte der Beschaltungswerttabellen des zugehörigen ATEX-Zertifikats eingehalten werden. Die Eigensicherheit des Stromkreises kann andernfalls gefährdet sein. Lesen Sie dazu die exakte Typbezeichnung am jeweils verbauten Grenzwertgeber ab und entnehmen die zugehörigen Grenzwerte aus der Grenzwerttabelle des ATEX-Zertifikats.
Der im Datenblatt Nr. 400003 aufgeführte, für den Explosionsschutz zertifizierte Trennschaltverstärker hält den erforderlichen Grenzwertbereich der optionalen Grenzwertgeber ein.
The limit switches optionally installed in the product are intrinsically safe components with a separate ATEX certificate (PTB 99 ATEX 2128X) and ATEX labelling.
The limit values of the wiring value tables of the associated ATEX certificate must be observed with regard to the electrical supply of the limit switches. Otherwise, the intrinsic safety of the circuit may be jeopardised.
Read the exact type designation on the limit switch installed and take the corresponding limit values from the limit value table of the ATEX certificate.
The isolation switching amplifier listed in data sheet No. 400003, which is certified for explosion protection, complies with the required limit value range of the optional limit value transmitters.

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

EN ISO 80079-36:2016 **EN ISO 80079-37:2016**

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

TRGS 727

Die alleinige Verantwortung für die Ausstellung dieser Herstellererklärung trägt der Hersteller.
This declaration of manufacture is issued under the sole responsibility of the manufacturer.
Dokumentationsverantwortlicher für diese Herstellererklärung ist Herr Stefan Eschweiler mit Anschrift am Firmensitz.
The person authorised to compile the technical file is Mr. Stefan Eschweiler located at the company's address.

Ratingen, den 06.09.2024

Stefan Eschweiler
Geschäftsführer – *Managing Director*

Frank Pospiech
Geschäftsführer – *Managing Director*

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

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EU-Declaration of conformity

en/de

EU-Konformitätserklärung

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

www.pepperl-fuchs.com

PEPPERL+FUCHS

Declaration of conformity / *Konformitätserklärung*

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

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

Products / *Produkte*

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

Directives and Standards / *Richtlinien und Normen*

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

Affixed CE Marking / *Angebrachte CE-Kennzeichnung*

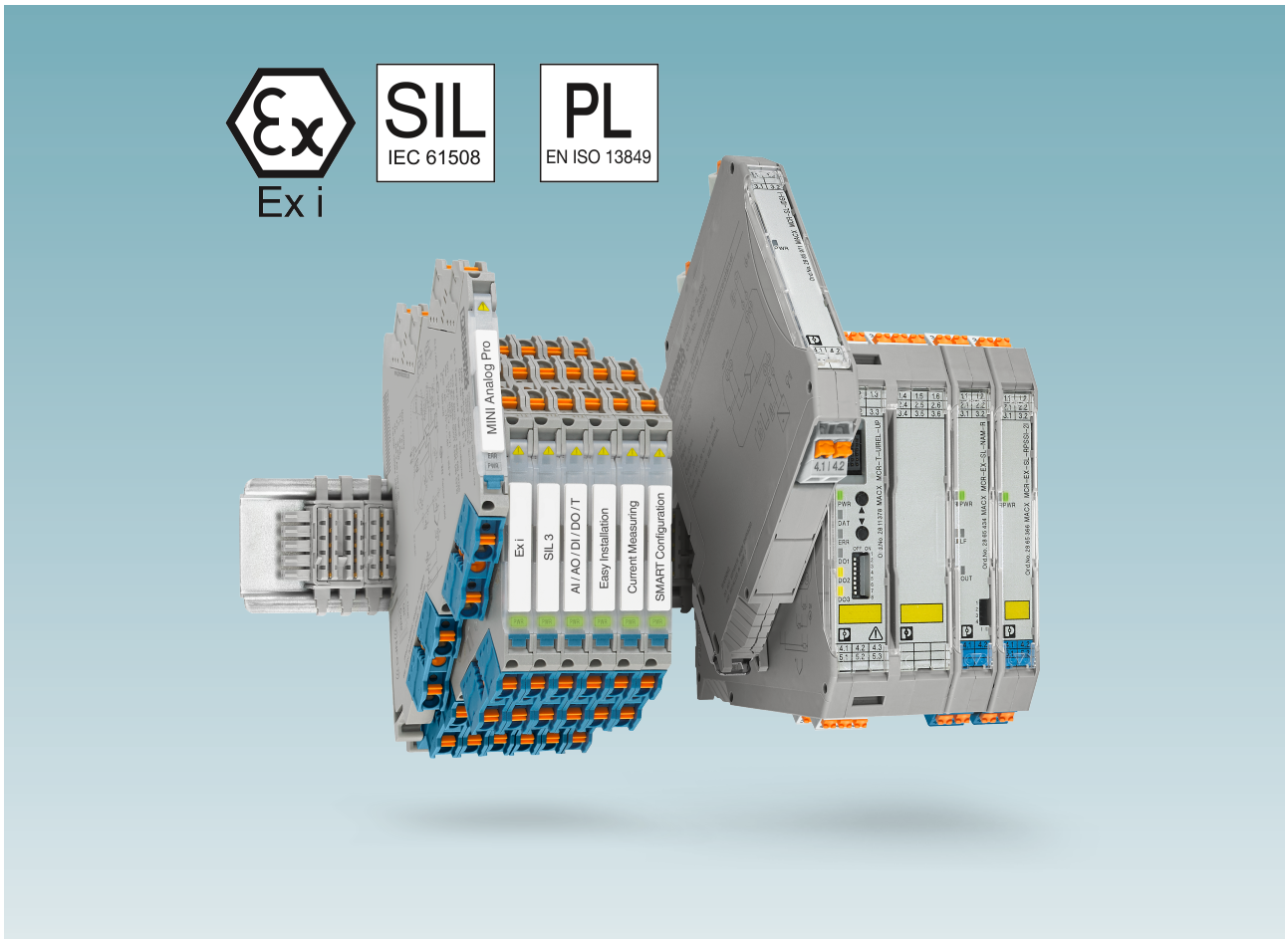
CE

Signatures / *Unterschriften*

Mannheim, 2021-10-29

i.V. Sebastian Stöber
Director Business Unit SYSTEMS

i.V. Wolfram Warnecke
Approval Engineer



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

User manual

PHOENIX CONTACT

User manual

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

UM EN Power Manual, Revision 02 2024-07-29

This manual is valid for:

Designation
MINI Analog MINI MCR-... product family
MINI Analog Pro MINI MCR-2-... product family
MINI Analog Pro MINI MCR-EX... product family
MACX Analog MACX MCR-... product family
MACX Analog Ex MACX MCR-EX... product family

Accessories	Item No.
ME 6,2 TBUS-2 1,5/5-ST-3,81 GN	2869728
ME 6,2 TBUS-2 1,5/5-ST-3,81 GY	2695439
ME 17,5 TBUS 1,5/5-ST-3,81 KMGY	2713645
ME 17,5 TBUS	1090049
ME-TBUS-A-MC-1,5-2	1351974
ME-TBUS-A-IMC-1,5-2	1351982
MCR-DP	1430594
QUINT4-SYS-PS/1AC/24DC/2,5/SC	2904614
QUINT4-PS/1AC/24DC/3,8/SC	2904599
TC-MACX-MCR-PTB	2904673

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phoenixcontact.com

Table of contents

1 For your safety

Read this manual carefully and keep it for future reference.

1.1 Identification of warning notes

This symbol indicates hazards that could lead to personal injury.

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

DANGER

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

WARNING

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

CAUTION

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

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

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

1.2 Qualification of users

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

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

1.3 Safety notes

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

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

1.3.1 Installation notes

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

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

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

1.3.3 Safety-related applications (SIL)

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

1.3.4 System power supplies

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

2 General notes on the supply of Phoenix Contact signal conditioners

Observe the corresponding packing slip for the relevant products.

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

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

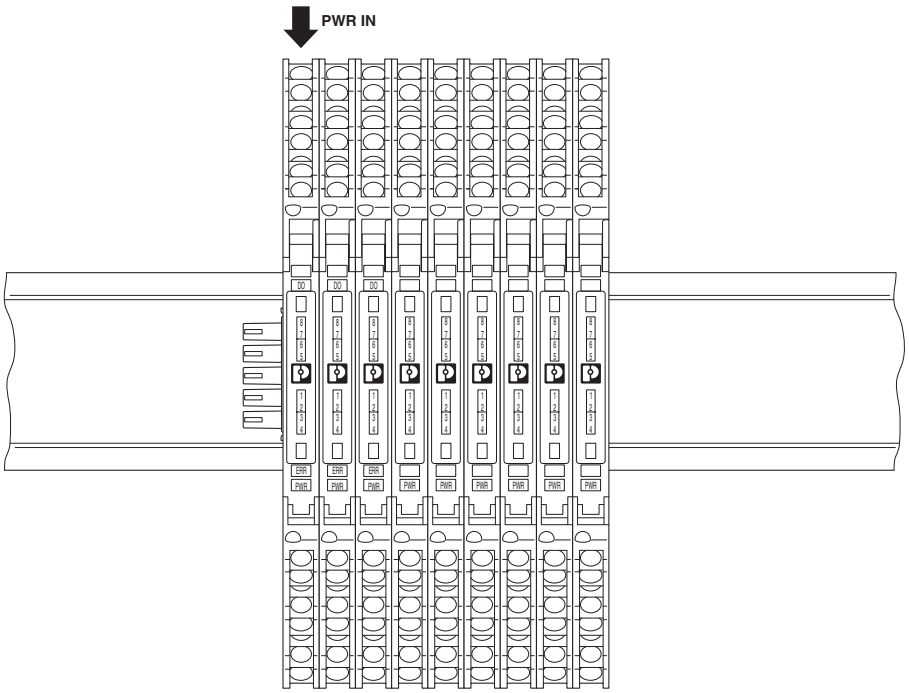
– Direct DC feed-in at any Analog module in the group
– Supply via a power terminal of the same shape
– Supply via any MINI Analog, MINI Analog Pro or MACX Analog power terminal
– Supply via a system power supply with a wide range input of 85 V AC ... 264 V AC

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

2.1 Direct DC supply at any analog module in the group

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

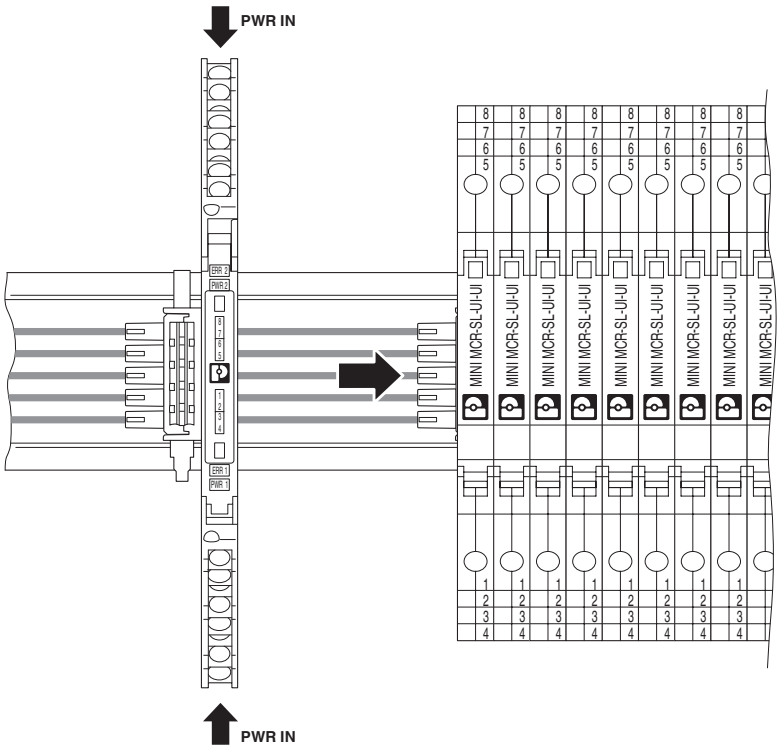
Figure 2-1 Direct supply via any module, e.g., MINI Analog Pro



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

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

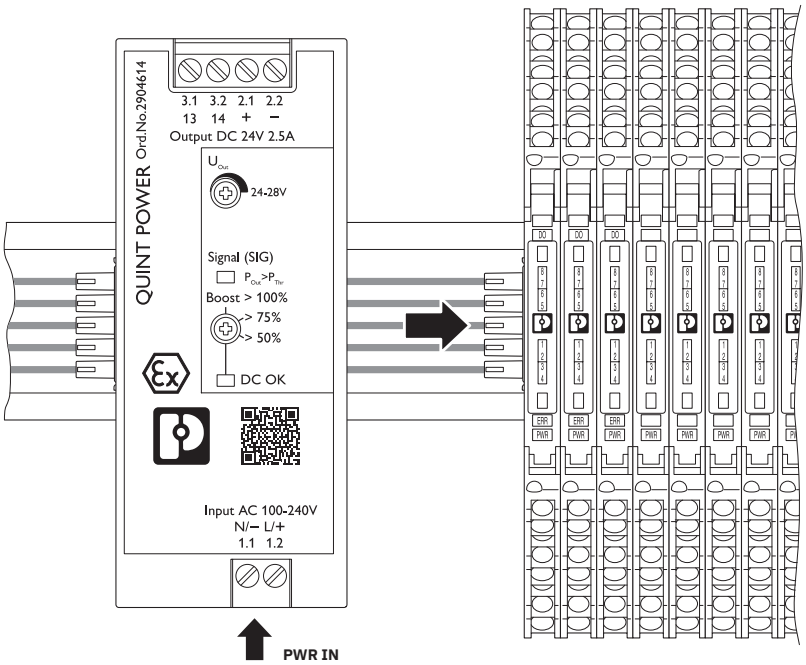
Figure 2-2 Supply via any MINI Analog, MINI Analog Pro or MACX Analog power terminal



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

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

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



3 MINI Analog supply options

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

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

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

NOTE: Risk of property damage
Never connect the supply voltage directly to the DIN rail connector.

3.1 Direct supply via a MINI Analog signal conditioner

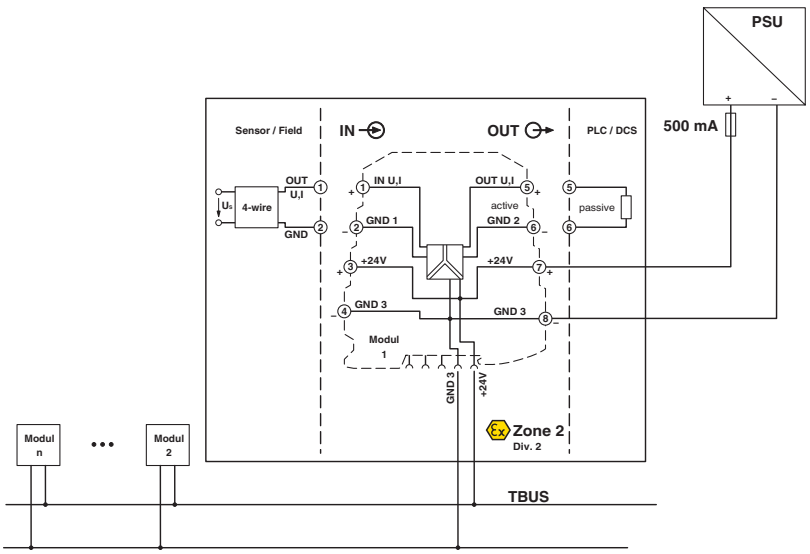
In the case of direct supply, all modules connected to the TBUS DIN rail connector are supplied via the supply at a signal conditioner. Please note that the maximum total current consumption of I_{max} = 400 mA must not be exceeded and the maximum number of modules is therefore restricted to a few devices.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

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

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

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

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



Example for direct supply via a module

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

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

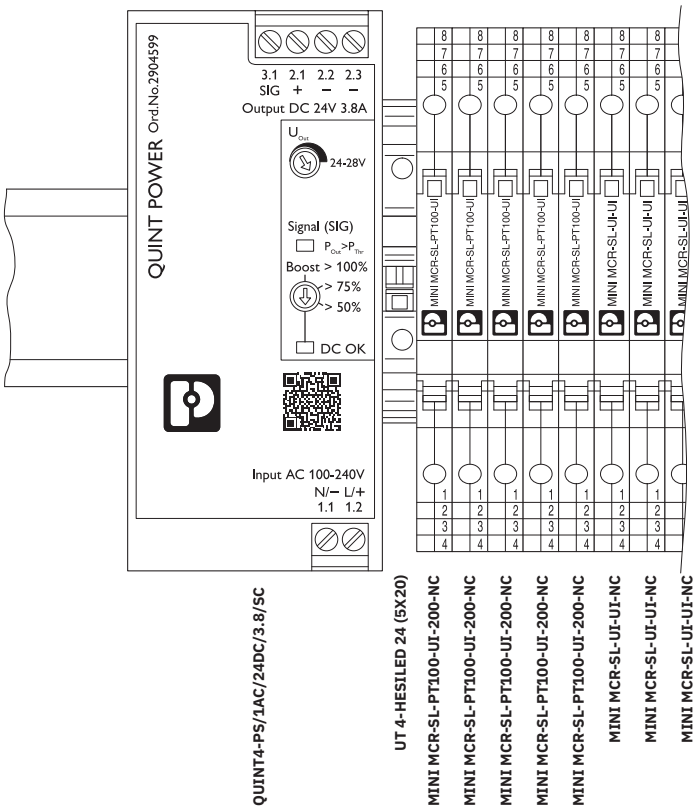
Then determine the maximum total current consumption of all eight modules.

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

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

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

Figure 3-2 Example for direct supply via a module



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

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

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

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

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

Recommended fuse for power terminal:
Fuse according to IEC 60127-2/V
Nominal current: 2.5 A
Characteristic: slow-blow
(e.g., Wickmann 5 x 20 mm/No. 195 - glass fuse)

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

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

Figure 3-3 Supply by means of one power supply

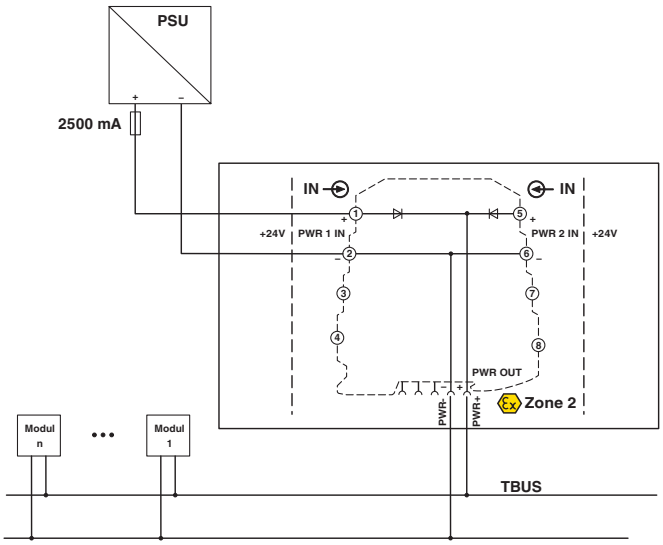
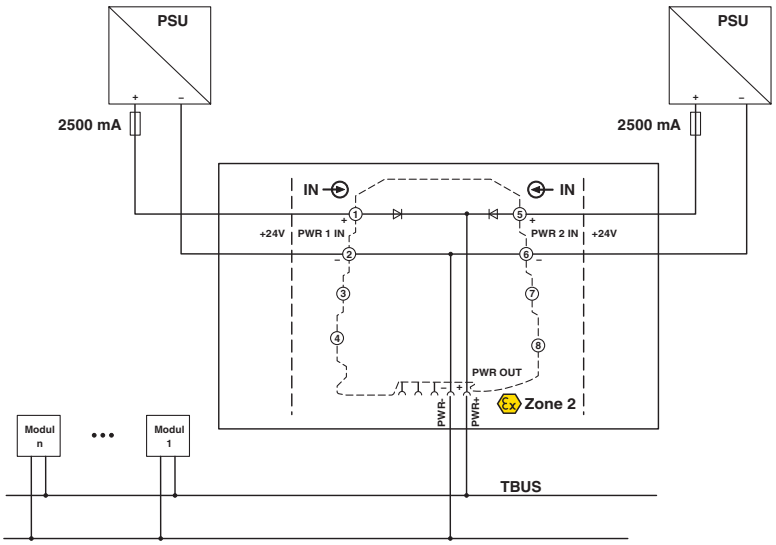


Figure 3-4 Supply by means of redundant power supply



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

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

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

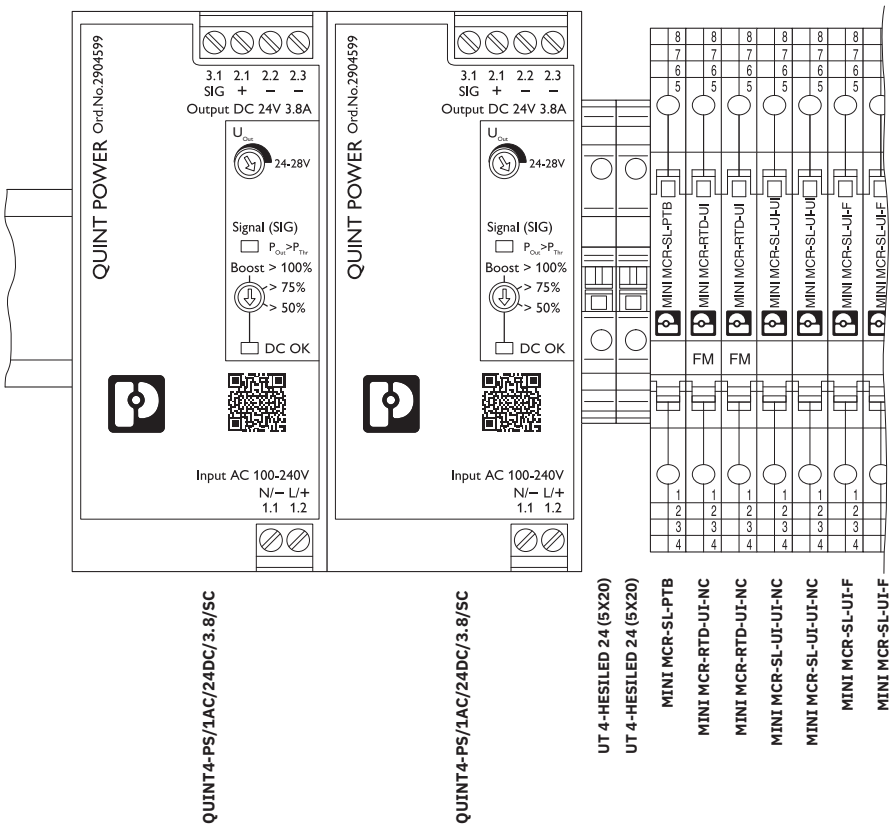
Then determine the maximum total current consumption of all 82 modules.

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

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

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

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

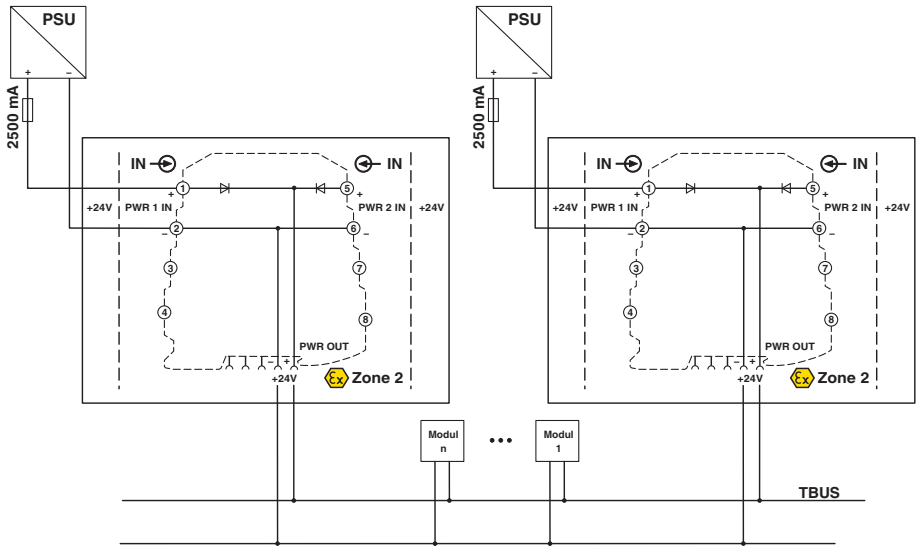


The disadvantage here is that in the event that the power terminal fails, the supply of all signal conditioners is interrupted. However, this can be indicated in this example by means of an N/C contact by using a MINI MCR-SL-FM-RC-NC(-SP) fault signaling module and the MINI MCR-SL-PTB-FM(-SP) power terminal,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

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

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

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



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

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

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

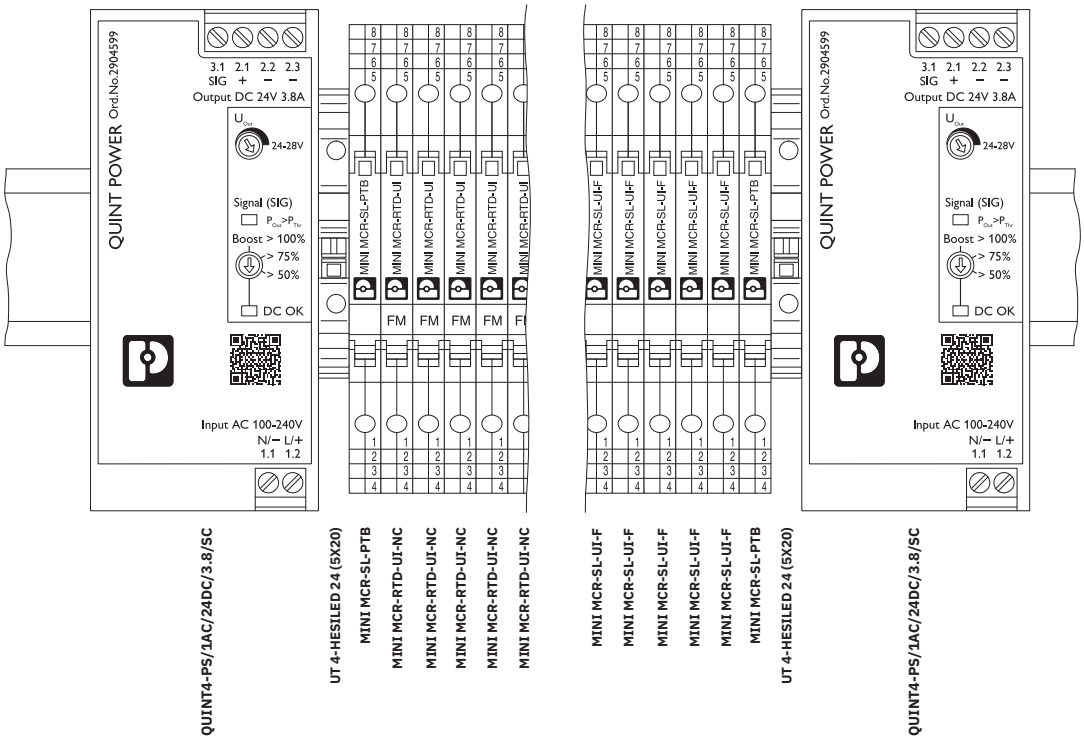
Then determine the maximum total current consumption of all 82 modules.

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

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

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

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



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

3.3 Supply via a system power supply

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

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

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

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

Example for supply via a system power supply

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

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

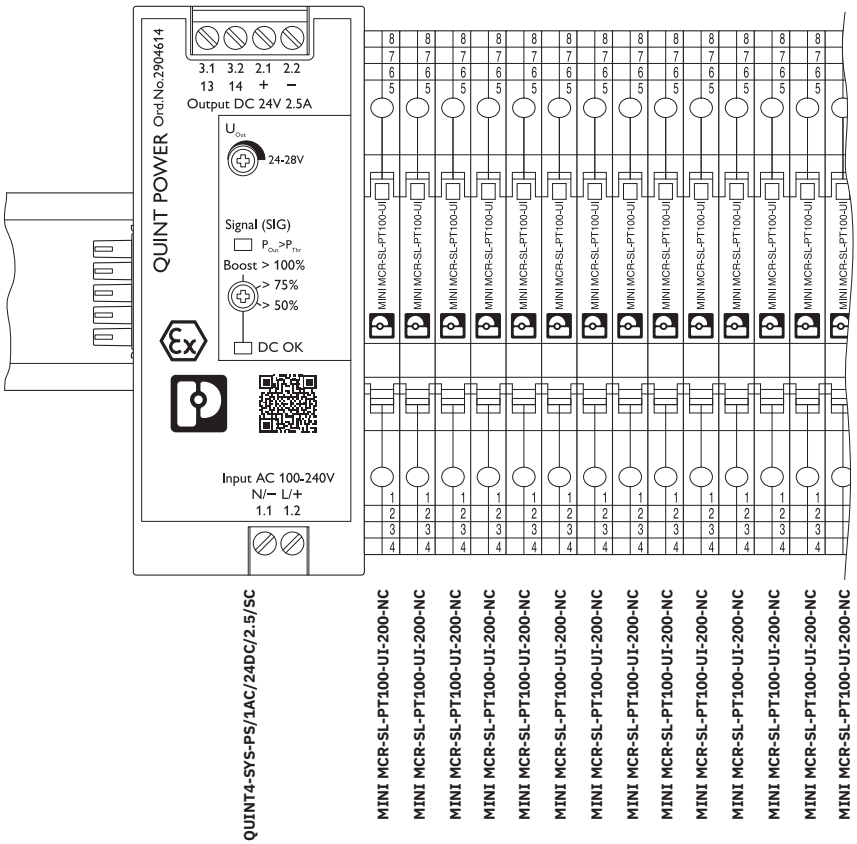
Then determine the maximum total current consumption of all 65 modules.

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

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

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

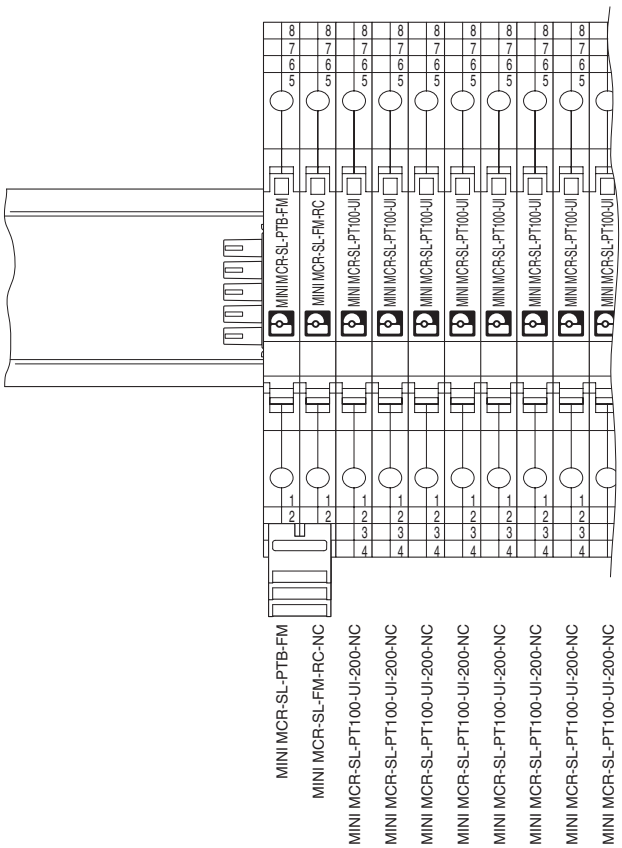
Figure 3-8 Supply via a system power supply



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

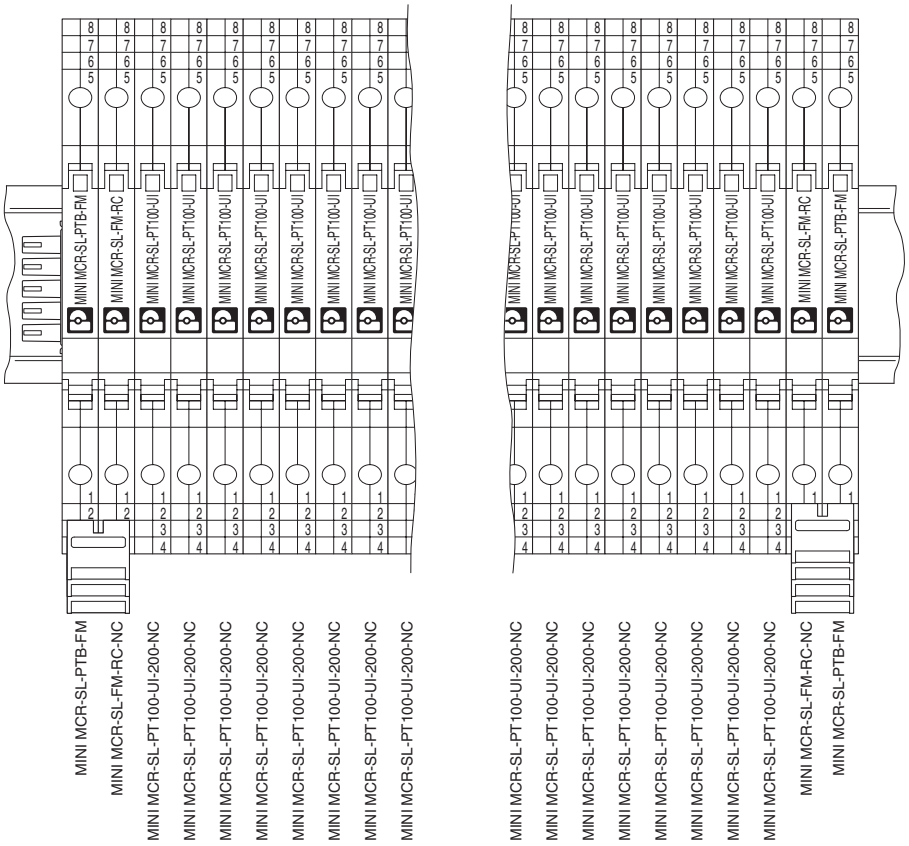
As described in Section 3.2 on page 14, the MINI Analog modules can be supplied with power via a MINI MCR-SL-PTB power terminal. If the MINI MCR-SL-PTB-FM... modules (item no. 2864134) and the MINI MCR-SL-FM-RC... error message modules (item no. 2902961) are used, it is possible to establish redundant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

Figure 3-9 Redundancy monitoring of the supply voltage



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

Figure 3-10 Additional mechanical redundancy



4 Supply options for MINI Analog Pro

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

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

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

NOTE: Risk of property damage
Never connect the supply voltage directly to the DIN rail connector.

4.1 Direct supply via a MINI Analog Pro signal conditioner

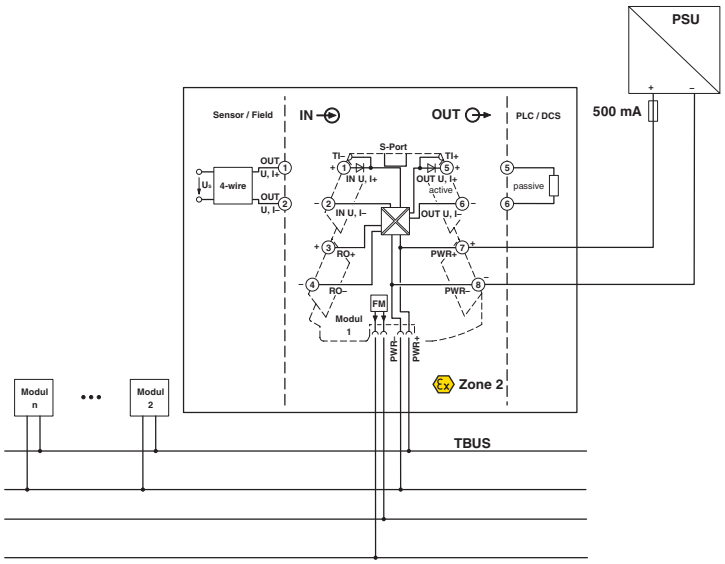
In the case of direct supply, all modules connected to the TBUS DIN rail connector are supplied via the supply at a signal conditioner. Please note that the maximum total current consumption of I_{max} = 400 mA must not be exceeded and the maximum number of modules is therefore restricted to a few devices.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

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

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

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

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



Example for direct supply via a module

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

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

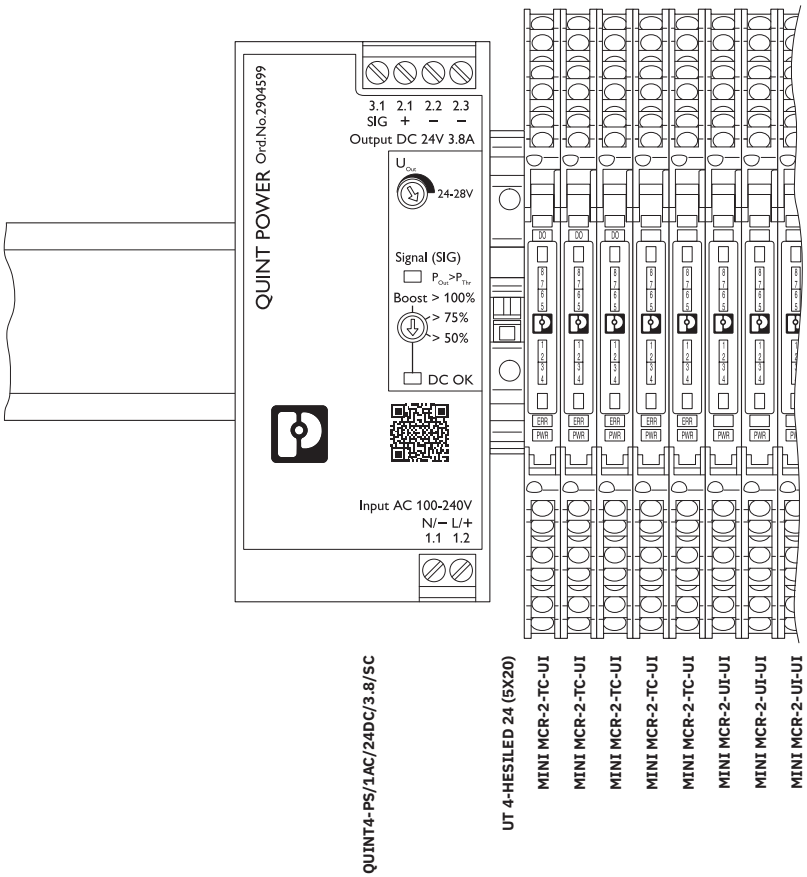
Then determine the maximum total current consumption of all eight modules.

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

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

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

Figure 4-2 Example for direct supply via a module



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

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

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

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

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

Recommended fuse for power terminal:
Fuse according to IEC 60127-2/V
Nominal current: 2.5 A
Characteristic: slow-blow
(e.g., Wickmann 5 x 20 mm/No. 195 - glass fuse)

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

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

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

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

For intrinsically safe and functionally safe MINI Analog Pro versions, you must observe Section 4.2.1.

Figure 4-3 Supply by means of one power supply

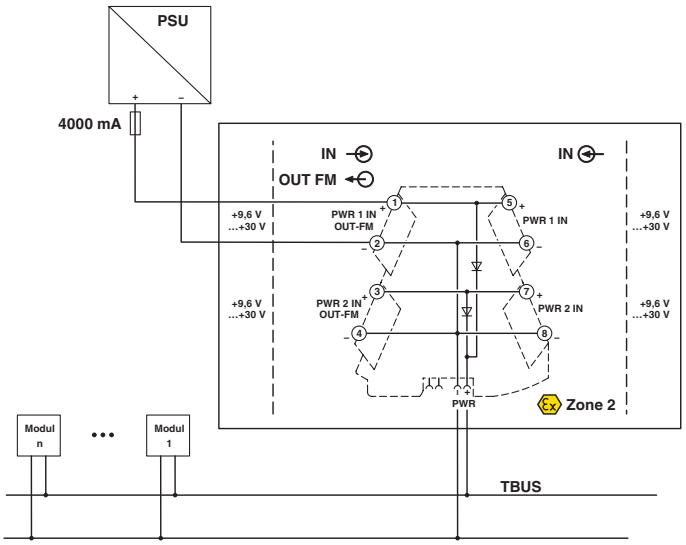
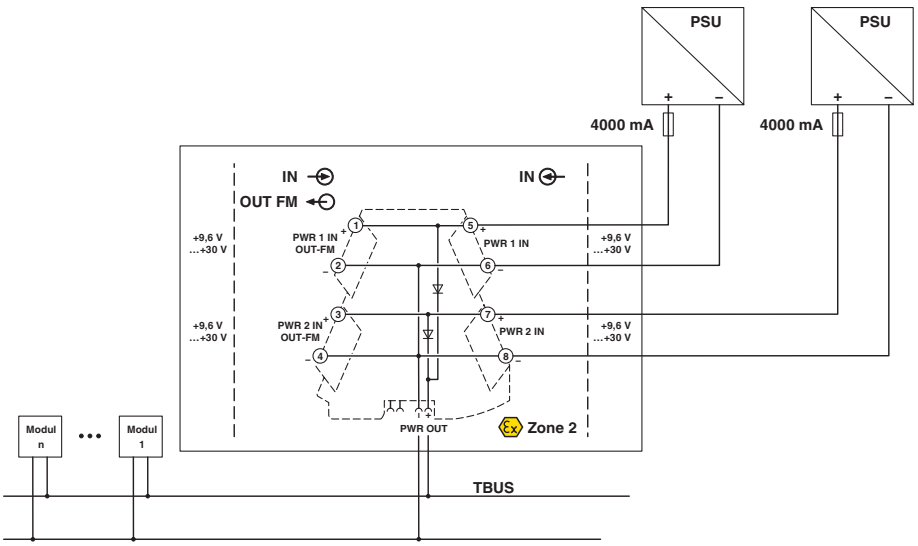


Figure 4-4 Supply by means of redundant power supplies



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

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

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

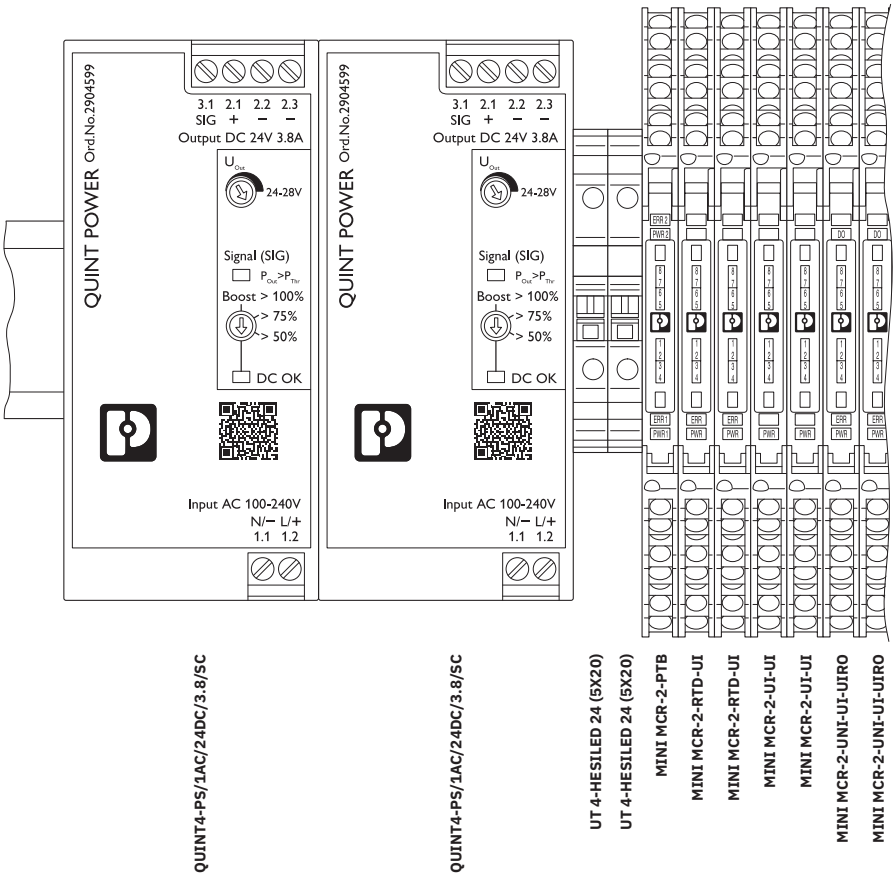
Then determine the maximum total current consumption of all 82 modules.

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

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

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

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

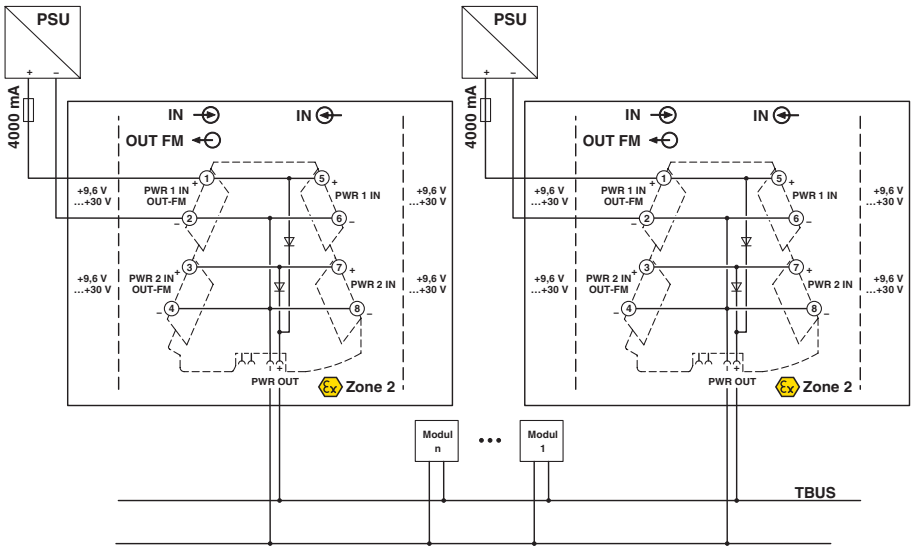


The disadvantage here is that in the event that the power terminal fails, the supply of all signal conditioners is interrupted. However, this can be indicated in this example by means of an N/C contact by using a MINI MCR-2-FM-RC fault signaling module and the MINI MCR-2-PTB power terminal.

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

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

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



For intrinsically safe and functionally safe MINI Analog Pro versions, you must observe Section 4.2.1.

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

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

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

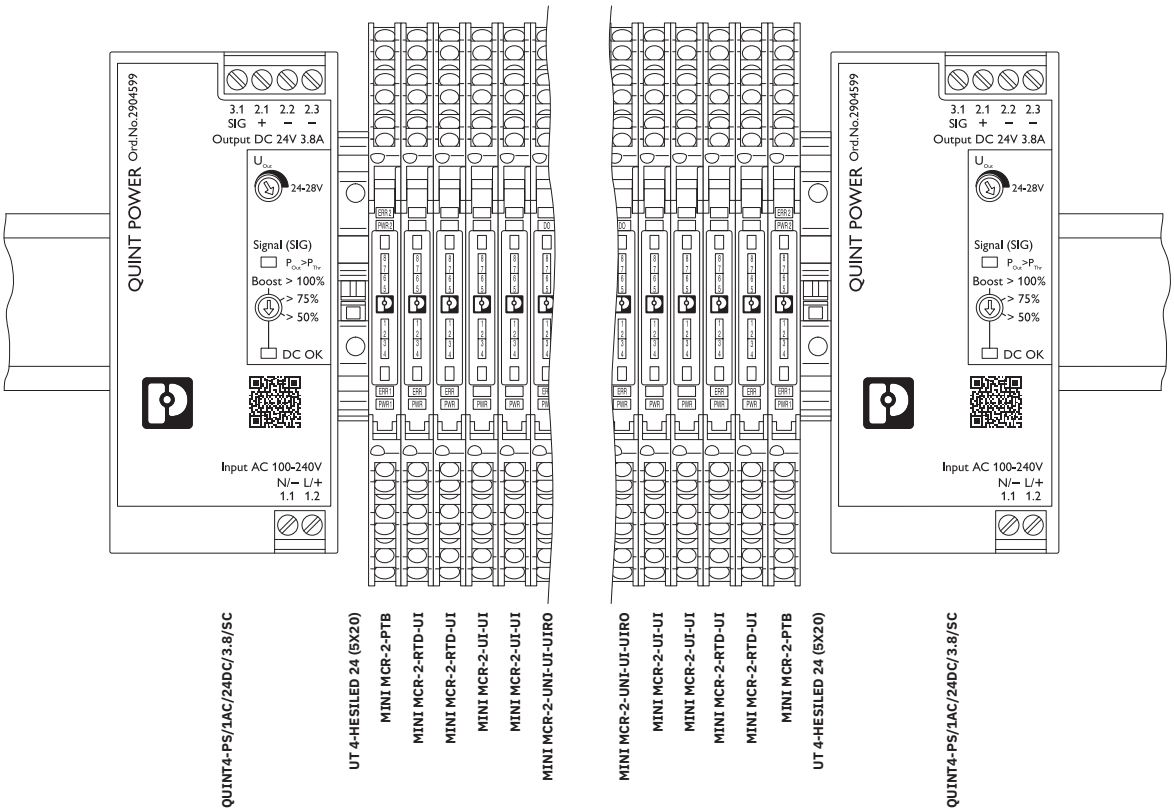
Then determine the maximum total current consumption of all 51 modules.

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

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

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

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



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

4.3 Supply via system power supply

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

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

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

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

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

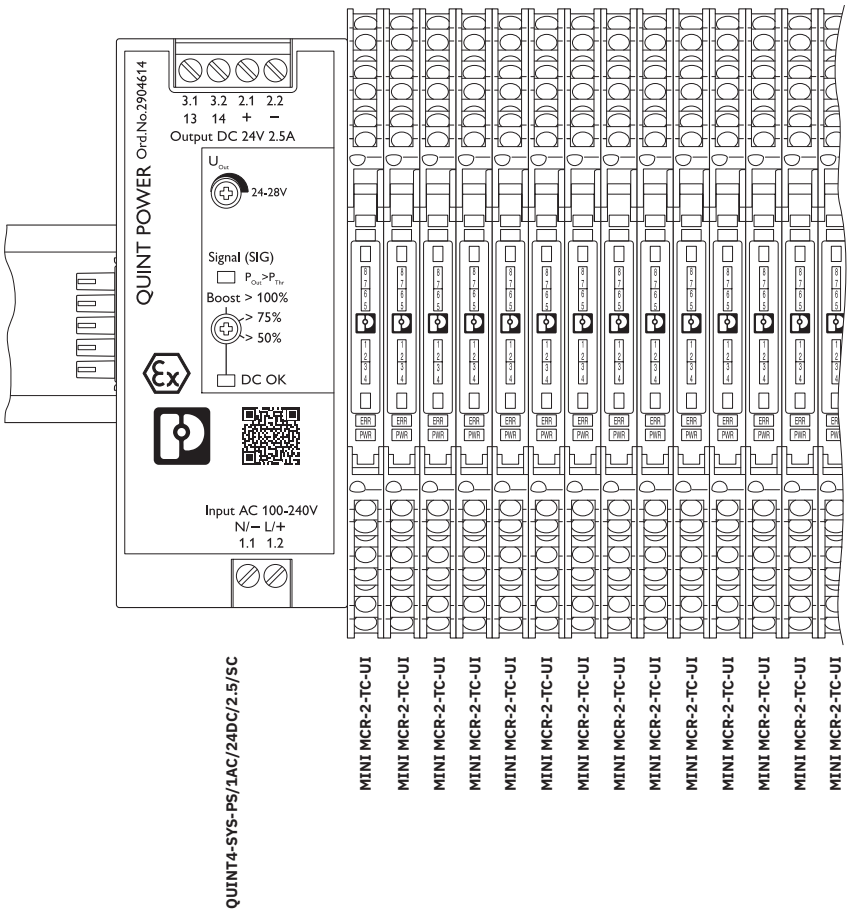
First determine the current consumption of the modules from the packing slips. For this temperature measuring transducer it is 32.5 mA per module.

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

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

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

Figure 4-8 Supply via system power supply.



DANGER: Explosion hazard

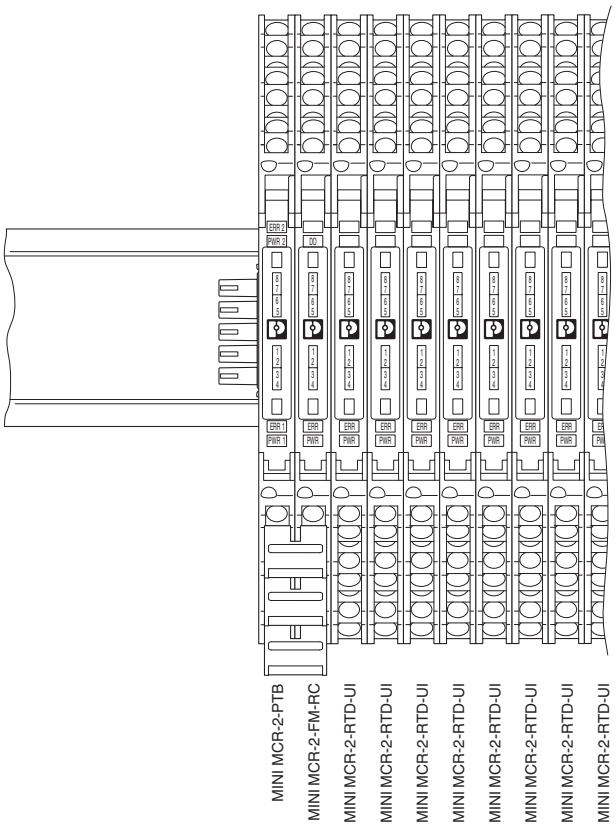
You must observe a 50 mm clearance between the intrinsically safe versions of the MINI Analog Pro product family and the system power supply.

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

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

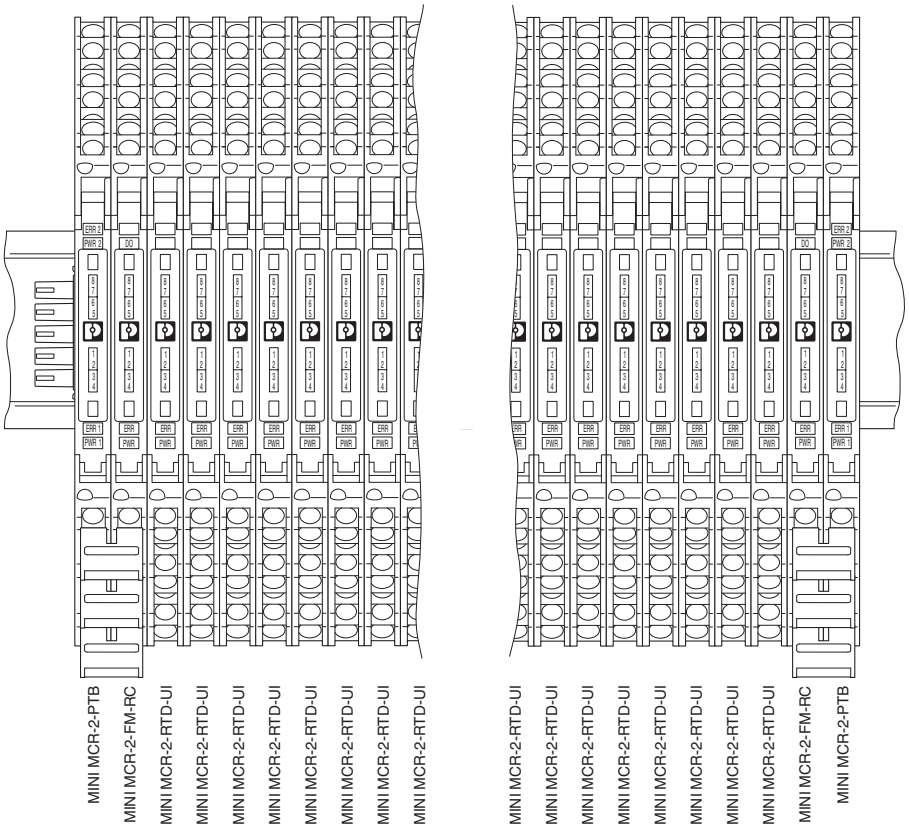
As described in Section 4.2 on page 28, the MINI Analog Pro modules can be supplied with power via a MINI MCR-2-PTB... power terminal (item no. 2902066). By using the MINI MCR-2-FM-RC-... fault signaling modules (item no. 2904504), it is then possible to establish redundancy monitoring of the supply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

Figure 4-9 Redundancy monitoring of the supply voltage



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

Figure 4-10 Additional mechanical redundancy



DANGER: Explosion hazard

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

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

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

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

Example for direct supply via a module

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

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

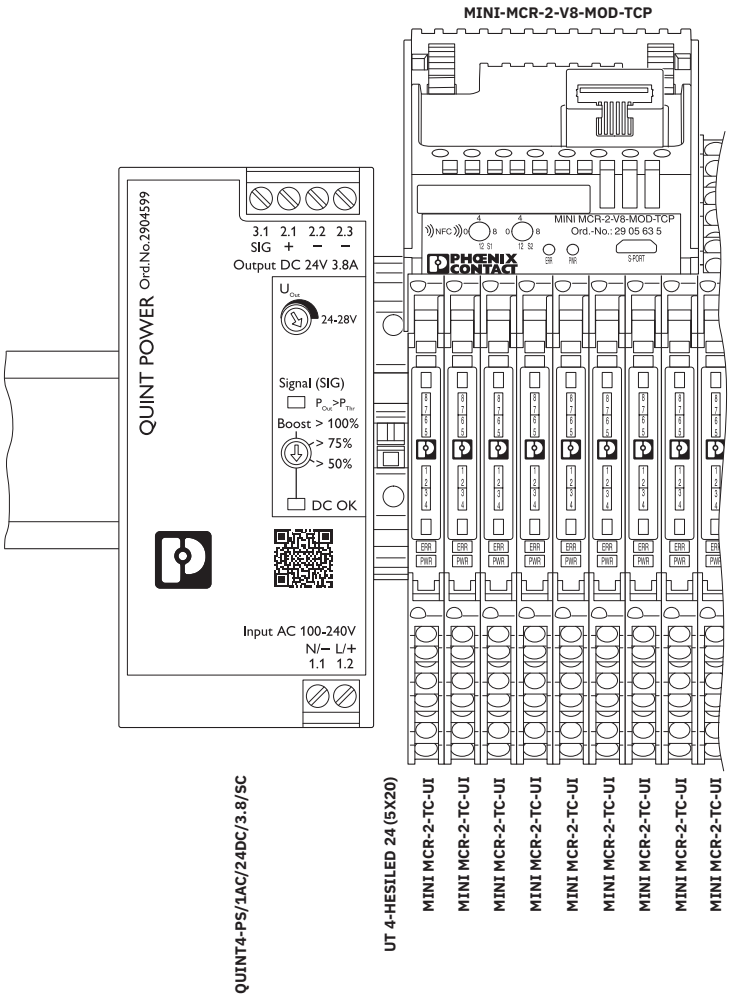
Then determine the maximum total current consumption of all nine modules.

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

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

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

Figure 4-11 Example for direct supply via a module



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

DANGER: Explosion hazard

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

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

5 Supply options for MACX Analog

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

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

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

NOTE: Risk of property damage
Never connect the supply voltage directly to the DIN rail connector.

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

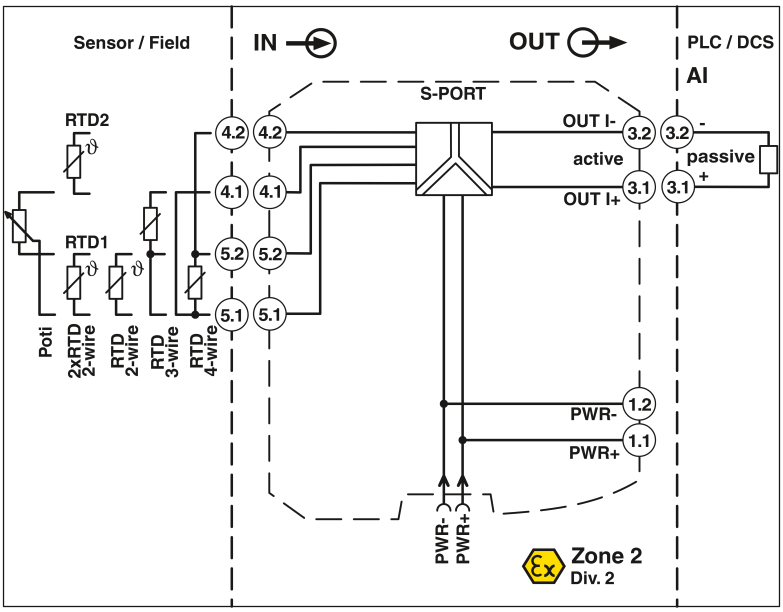
In the case of direct supply, all modules connected to the TBUS DIN rail connector are supplied via the supply at a signal conditioner. Please note that the maximum total current consumption of I_{max} = 400 mA must not be exceeded and the maximum number of modules is therefore restricted to a few devices.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

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

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

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

Figure 5-1 Direct supply via a module



Example for direct supply via a module

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

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

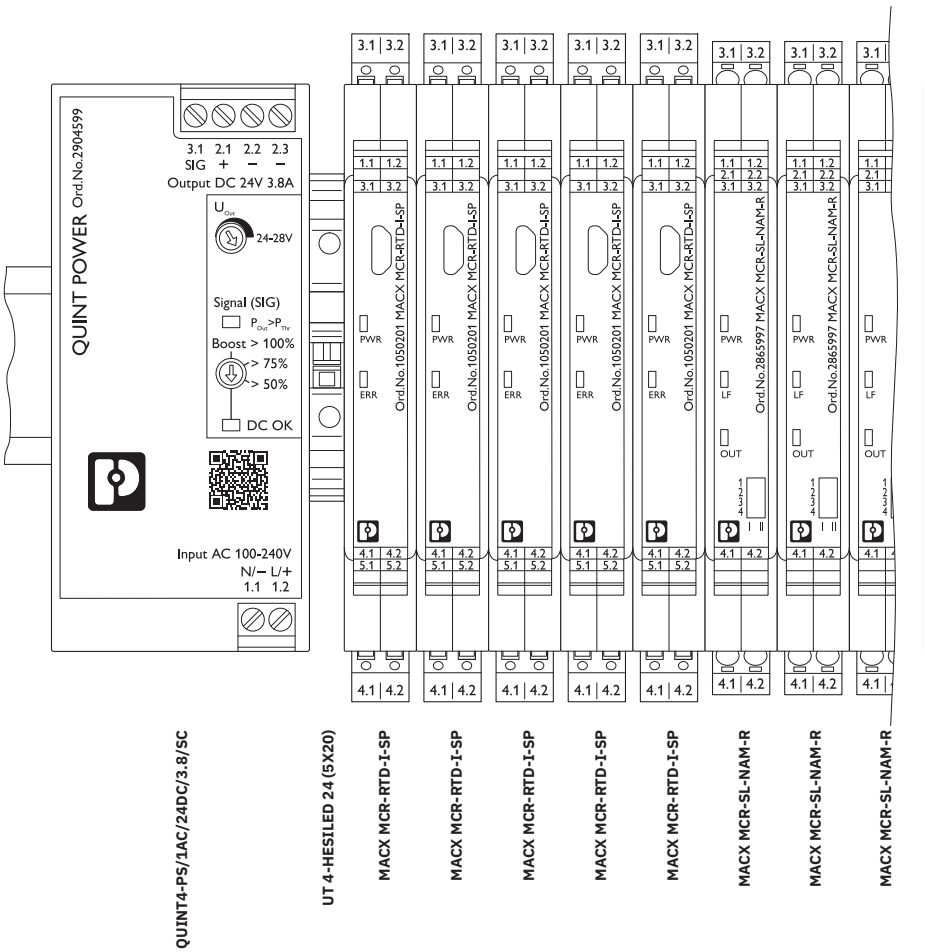
Then determine the maximum total current consumption of all eight modules.

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

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

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

Figure 5-2 Example for direct supply via a module



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

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

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

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

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

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

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

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

Figure 5-3 Supply by means of one power supply

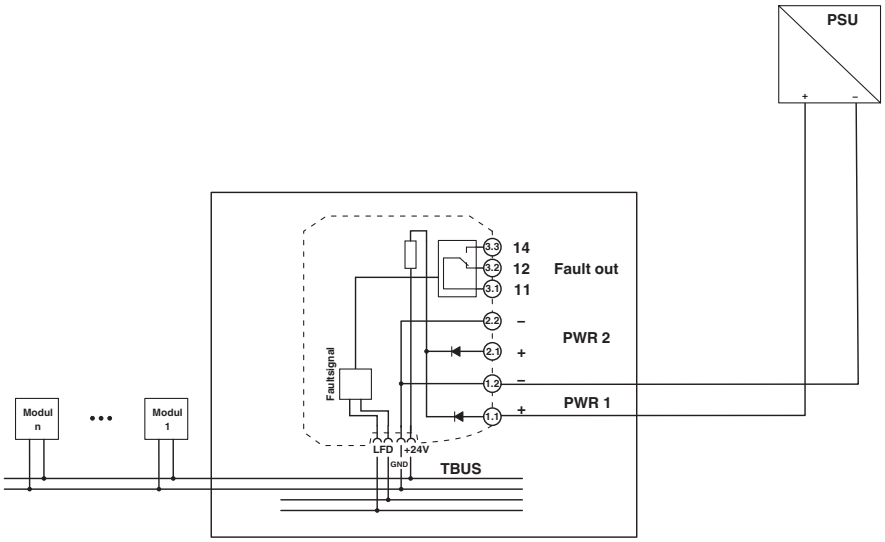
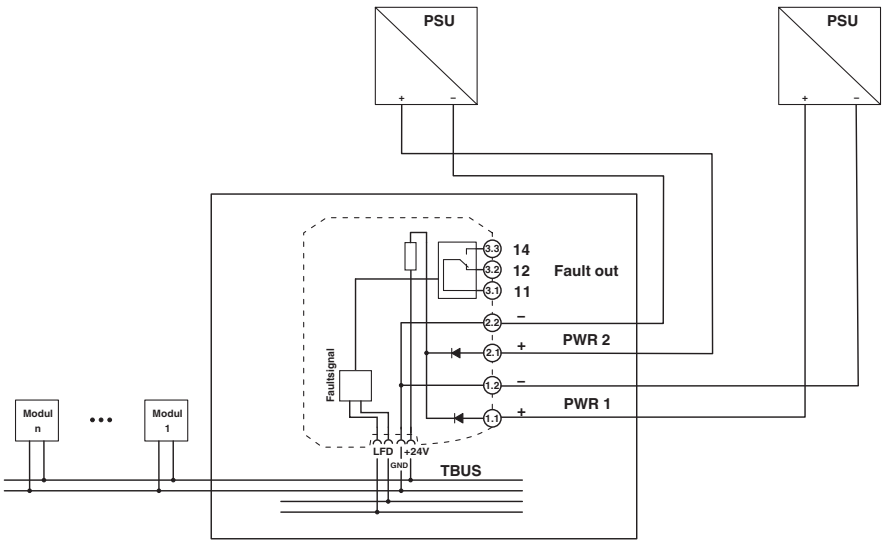


Figure 5-4 Supply by means of redundant power supplies



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

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

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

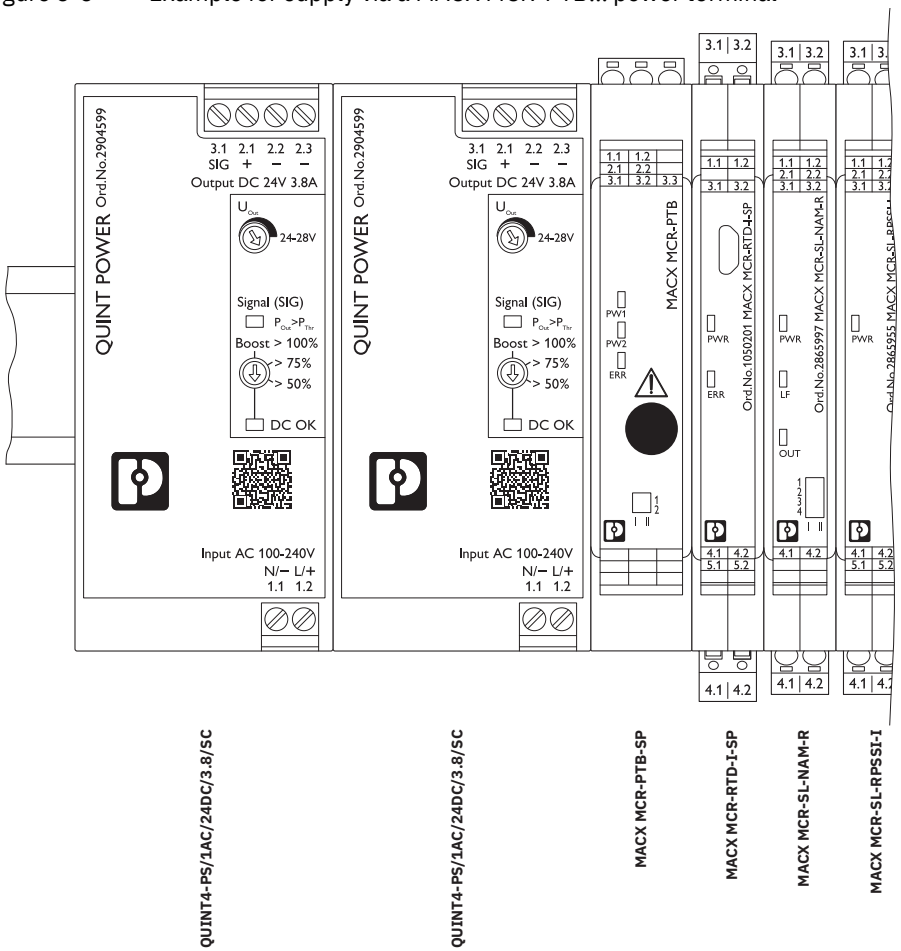
Then determine the maximum total current consumption of all 92 modules.

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

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

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

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



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

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

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

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

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

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

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

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

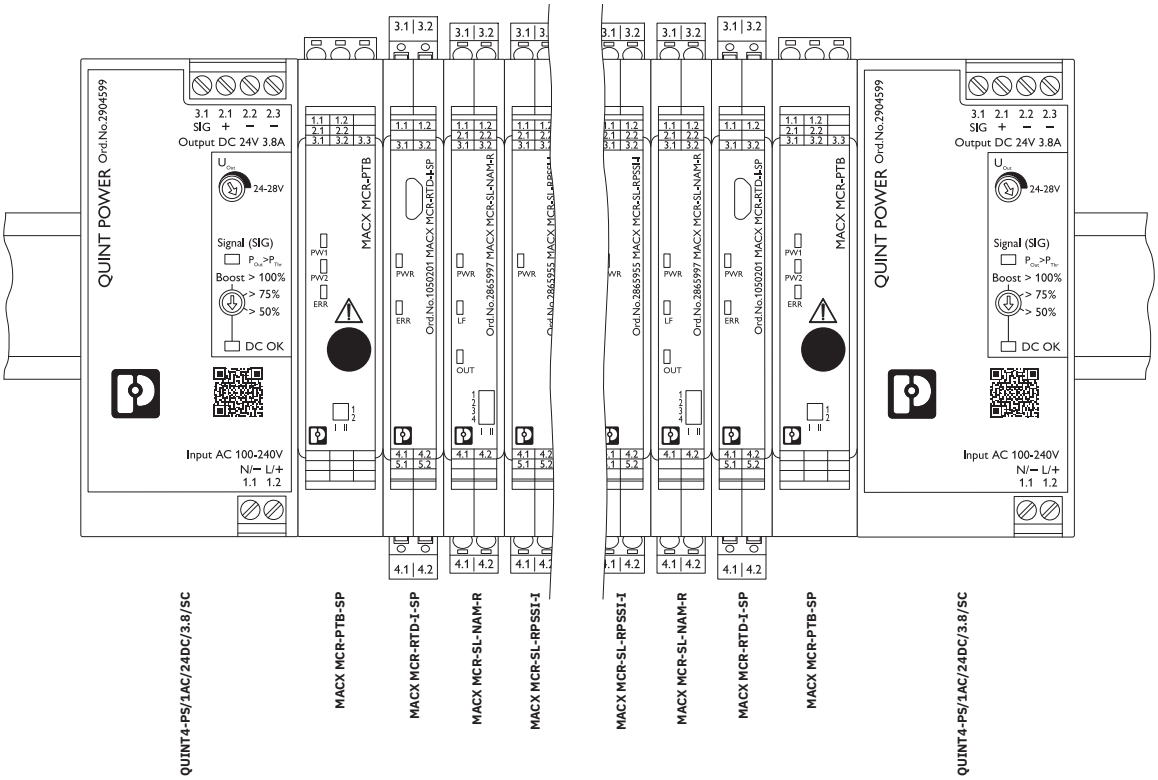
$$I = n_1 * I_{module1} + n_2 * I_{module2} + n_3 * I_{module3} + \ldots$$

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

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

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

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

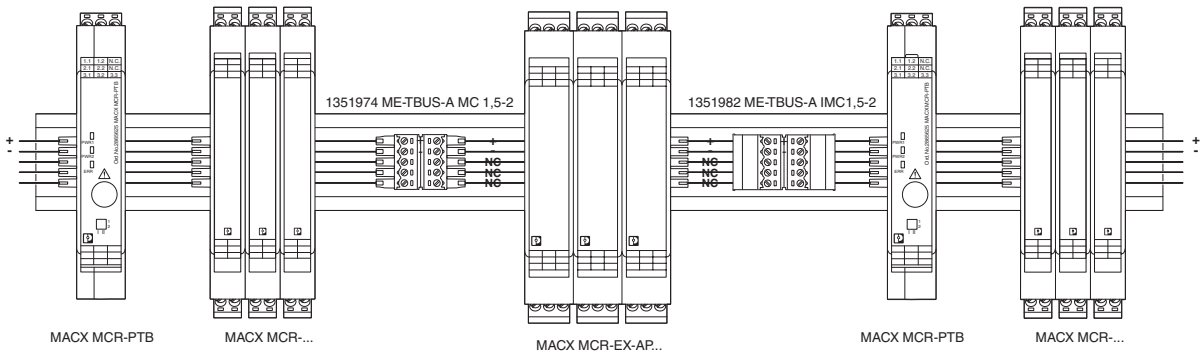


5.3 Supply via MACX MCR(-EX)-AP power module with DIN rail connector

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

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

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



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

5.4 Supply via system power supply

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

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

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

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

Example for supply via a system power supply

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

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

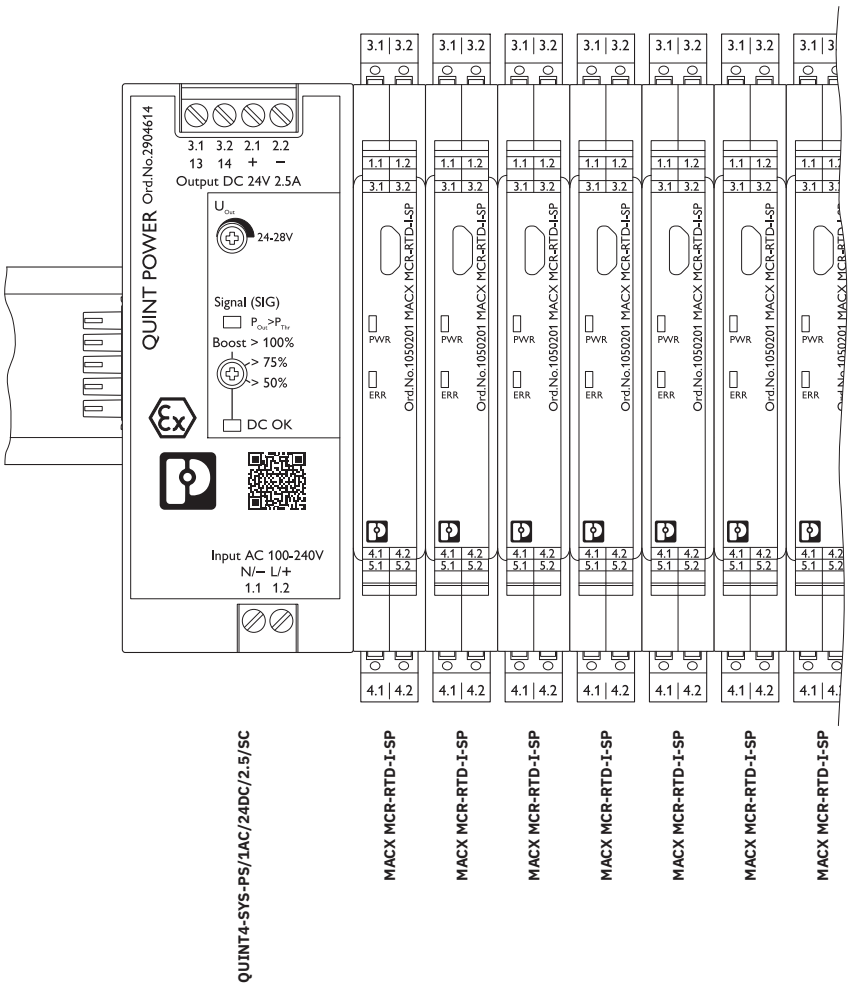
Then determine the maximum total current consumption of the 35 modules.

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

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

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

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



A Appendix for document lists

A 1 List of figures

Section 2

Section 3

Section 4

Section 5

Please observe the following notes

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105810_en_02

EU-Konformitätserklärung

EU Declaration of Conformity

Nr. / No. 083113343_07_DoC_EU

Hersteller / Manufacturer:	**Phoenix Contact GmbH & Co. KG**
Anschrift / Address:	Flachsmarktstraße 8, 32825 Blomberg, Germany
Produktbezeichnung / Product designation:	**MACX MCR-EX-SL-2NAM-R-UP**
Artikel-Nr. / Order No.:	2865984

Die alleinige Verantwortung für die Ausstellung dieser Konformitätserklärung trägt der Hersteller. Die in dieser Erklärung bezeichneten Produkte stimmen mit den einschlägigen Anforderungen der folgenden Harmonisierungsrechtsvorschriften überein:
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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:
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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:
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IECEx IBE 10.0002X: IEC 60079-0:2017, IEC 60079-7:2017, IEC 60079-15:2017

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Artikel-Nr. / Order No.	Produktbezeichnung / Product designation
2924249	**MACX MCR-EX-SL-2NAM-R-UP-SP**

Blomberg, 2023-08-29

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i. V. Carsten Thörner

Carsten Thörner
Business Unit Interface Components
Vice President

Zeichnungsberechtigter / Authorized signatory

UK Declaration of Conformity

UK-Konformitätserklärung

No. / Nr. 097106924_00_DoC_UK

Manufacturer / Hersteller:	**PHOENIX CONTACT GmbH & Co. KG**
Address / Anschrift:	Flachsmarktstraße 8, 32825 Blomberg, Germany
Product designation / Produktbezeichnung:	**MACX MCR-EX-SL-2NAM-R-UP**
Order No. / Artikel-Nr.:	2865984

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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

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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**

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No. / Nr.: 2503
Reference / Referenz: CML 22UKEX3528X

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Order No. / Artikel-Nr.	Product designation / Produktbezeichnung
2924249	**MACX MCR-EX-SL-2NAM-R-UP-SP**

Blomberg, 2023-01-05

i. A. P. Schnelle

Pascal Schnelle
Business Unit Interface Components
Manager MCR/Ex Development

Contact person / Ansprechpartner

i. V. Carsten Thörner

Carsten Thörner
Business Unit Interface Components
Vice President

Authorized signatory / Zeichnungsberechtigter

[1] EU-TYPE EXAMINATION CERTIFICATE - Translation

[2] Equipment or protective systems
intended for use in potentially explosive atmospheres, Directive 2014/34/EU

[3] EU-type examination certificate number **IBExU10ATEX1005 X** | Issue 2

[4] Product: **NAMUR Switch Isolating Amplifier**
Type: MACX ****-EX-SL-xNAM-yR-UP(-SP)***

[5] Manufacturer: PHOENIX CONTACT GmbH & Co. KG

[6] Address: Flachsmarktstraße 8
32825 Blomberg
GERMANY

[7] This product and any acceptable variation thereto is specified in the schedule to this certificate and the documents therein referred to.

[8] IBExU Institut für Sicherheitstechnik GmbH, notified body number 0637 in accordance with Article 17 of Directive 2014/34/EU of the European Parliament and of the Council, dated 26 February 2014, certifies that this product has been found to comply with the essential health and safety requirements relating to the design and construction of products intended for use in potentially explosive atmospheres given in Annex II to the Directive.

The examination and test results are recorded in the confidential test report IB-21-3-0210/2.

[9] Compliance with the essential health and safety requirements has been assured by compliance with:
EN IEC 60079-0:2018, EN IEC 60079-7:2015/A1:2018, EN 60079-11:2012 and
EN IEC 60079-15:2019
except in respect of those requirements listed at item [18] of the schedule.

[10] If the sign "X" is placed after the certificate number, it indicates that the product is subject to the specific conditions of use specified in the schedule to this certificate.

[11] This EU-type examination certificate relates only to the design and construction of the specified product. Further requirements of the Directive apply to the manufacturing process and supply of this product. These are not covered by this certificate.

[12] The marking of the product shall include the following:

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Ⓔx II (1) G [Ex ia Ga] IIC
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By order

Dipl.-Ing.(FH) A. Henker

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

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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)
Degree of protection	≥ IP20 (acc. to EN 60529)

Electrical data

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

Safety instructions:

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

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

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

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

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

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

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

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

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

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

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

Variations compared to issue 1 of this certificate:

Variation 1
The ambient temperature range has been extended to +70 °C.

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

Summary of the test results
The NAMUR Switch Isolating Amplifiers type MACX ***-EX-SL-xNAM-yR-UP(-SP)*** mentioned under [4] further fulfil the requirements of explosion protection on an associated apparatus for Group I and II and Category M1 and 1G or 1D in type of protection intrinsic safety.
Additionally the NAMUR Switch Isolating Amplifiers fulfil the requirements of explosion protection of an electrical equipment for Equipment Group II and Category 3G in type of protection increased safety in combination with type of protection "n", sealed device "nc" and intrinsic safety.

[17] **Specific conditions of use**

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

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

None

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

IBExU Institut für Sicherheitstechnik GmbH
Fuchsmühlenweg 7
09599 Freiberg, GERMANY

By order

Dipl.-Ing.(FH) A. Henker

Freiberg, 2021-12-21

IECEx Certificate of Conformity

INTERNATIONAL ELECTROTECHNICAL COMMISSION
IEC Certification System for Explosive Atmospheres

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

Certificate No.:	**IECEx IBE 10.0002X**	Page 1 of 4	Certificate history:
Status:	**Current**	Issue No: 4	Issue 3 (2020-10-07) Issue 2 (2016-04-14) Issue 1 (2012-07-27) Issue 0 (2010-04-06)
Date of Issue:	2021-12-21		

Applicant: **PHOENIX CONTACT GmbH & Co. KG**
Flachsmarktstraße 8
32825 Blomberg
Germany

Equipment: **NAMUR Switch Isolating Amplifier (Ex i and Non Ex i) type MACX *** (-EX)-SL-xNAM-yR-UP(-SP)...**

Optional accessory:

Type of Protection: **Intrinsic safety or increased safety in combination with intrinsic safety and type of protection "n"**

Marking: **type MACX ***-EX-SL-xNAM-yR-UP(-SP)....**

[Ex ia Ma] I
[Ex ia Ga] IIC
[Ex ia Da] IIIC

Ex ec [ia Ga] nC IIC T4 Gc
-40 °C ≤ T_{amb} ≤ +60 °C / +70 °C

type MACX *-SL-xNAM-yR-UP(-SP)....**

Ex ec nC IIC T4 Gc
-40 °C ≤ T_{amb} ≤ +60 °C / +70 °C

Approved for issue on behalf of the IECEx Certification Body: **Alexander Henker**

Position: **Deputy Head of department Certification Body**

Signature: (for printed version)

Date: 2021-12-21

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

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

Additional manufacturing locations:

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

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

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

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

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

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

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

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

Test Reports:

DE/IBE/ExTR10.0002/00 DE/IBE/ExTR10.0002/01 DE/IBE/ExTR10.0002/02
DE/IBE/ExTR10.0002/03 DE/IBE/ExTR10.0002/04

Quality Assessment Report:

NL/DEK/QAR11.0009/08

IECEx Certificate of Conformity

EQUIPMENT:
Equipment and systems covered by this Certificate are as follows:

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

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

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

The technical data are mentioned in the Annex.

SPECIFIC CONDITIONS OF USE: YES as shown below:
Special conditions for safe use in zone 2:

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

IECEx Certificate of Conformity

DETAILS OF CERTIFICATE CHANGES (for issues 1 and above)
The ambient temperature range is extended to +70 °C.

Annex:

Annex_IBE10.0002_04.pdf

IECEx Certificate of Conformity - Annex

Certificate No: IECEx IBE 10.0002X Issue No: 4

Date of Issue: 2021-12-21

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	≥ 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 Ci of the external circuit (excluding the cable) is < 1 % of the Co value.

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

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

- the total Li of the external circuit (excluding the cable) is ≥ 1 % of the Lo value and
- the total Ci of the external circuit (excluding the cable) is ≥ 1 % of the Co value.

	Ex ia IIC					Ex ia I, Ex ia IIB/IIA, Ex ia			
C_O	510 nF	580 nF	600 nF	600 nF	600 nF	1 µF	1 µF	1 µF	1 µF
L_O	100 mH	50 mH	5 mH	1 mH	10 µH	100 mH	5 mH	1 mH	10 µH

IECEx Certificate of Conformity - Annex

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

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

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

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

en/de

EU-Konformitätserklärung

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

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

PEPPERL+FUCHS

Declaration of conformity / *Konformitätserklärung*

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

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

Products / *Produkte*

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

Directives and Standards / *Richtlinien und Normen*

EU-Directive *EU-Richtlinie*	**Standards** *Normen*
ATEX 2014/34/EU (L96/309-356)	EN 60079-11:2012-01 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*

CE 0102

Signatures / *Unterschriften*

Mannheim, 2022-09-22

ppa. Wolfgang Helm
Director
Business Unit Sensors

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

ANNEX ATEX

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

Marking and Certificates / *Kennzeichnung und Zertifikate*

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

Key for Issuer ID / *Schlüssel zur Aussteller ID*

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

UK-Declaration of conformity

en

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Phone +49 621 776-0
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No: DOC-6565A
Date: 2022-09-22

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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

UK CA 2503

Signatures

Mannheim, 2022-09-22

ppa. Wolfgang Helm
Director
Business Unit Sensors

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

ANNEX UK SI 2016 No. 1107 (EX)

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

Marking and Certificates

Marking	Certificate	ID
Ex II 2 G	CML 21UKEX21274X	2503

Key for ID

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

Physikalisch-Technische Bundesanstalt

Braunschweig und Berlin

(1) # EC-TYPE-EXAMINATION CERTIFICATE

(Translation)

(2) Equipment and Protective Systems Intended for Use in Potentially Explosive Atmospheres - **Directive 94/9/EC**

(3) EC-type-examination Certificate Number:

PTB 99 ATEX 2128 X

(4) Equipment: Ring initiator types RJ..., RC... and TG...

(5) Manufacturer: Pepperl + Fuchs GmbH

(6) Address: D-68307 Mannheim

(7) This equipment and any acceptable variation thereto are specified in the schedule to this certificate and the documents therein referred to.

(8) The Physikalisch-Technische Bundesanstalt, notified body No. 0102 in accordance with Article 9 of the Council Directive 94/9/EC of 23 March 1994, certifies that this equipment has been found to comply with the Essential Health and Safety Requirements relating to the design and construction of equipment and protective systems intended for use in potentially explosive atmospheres, given in Annex II to the Directive.

The examination and test results are recorded in the confidential report PTB Ex 99-29058.

(9) Compliance with the Essential Health and Safety Requirements has been assured by compliance with:

EN 50014:1997 **EN 50020:1994**

(10) If the sign "X" is placed after the certificate number, it indicates that the equipment is subject to special conditions for safe use specified in the schedule to this certificate.

(11) This EC-type-examination Certificate relates only to the design and construction of the specified equipment in accordance with Directive 94/9/EC. Further requirements of this Directive apply to the manufacture and supply of this equipment.

(12) The marking of the equipment shall include the following:

Ex II 2 G EEx ia IIC T6

Zertifizierungsstelle Explosionsschutz
By order:

Braunschweig, August 10, 1999

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

PHYSIKALISCH-TECHNISCHE BUNDESANSTALT 24

(13) # SCHEDULE

(14) ## EC-TYPE-EXAMINATION CERTIFICATE PTB 99 ATEX 2128 X

(15) Description of equipment

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

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

Electrical data

Evaluation and
supply circuit..... type of protection Intrinsic Safety EEx ia IIC/IIB
..... resp. EEx ib IIC/IIB
only for connection to certified intrinsically safe circuits
Maximum values:

type 1	type 2	type 3
U_i = 16 V	U_i = 16 V	U_i = 16 V
I_i = 25 mA	I_i = 25 mA	I_i = 52 mA
P_i = 34 mW	P_i = 64 mW	P_i = 169 mW

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

SCHEDULE TO EC-TYPE-EXAMINATION CERTIFICATE PTB 99 ATEX 2128 X

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

(16) Test report PTB Ex 99-29058

(17) Special conditions for safe use

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

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

(18) Essential health and safety requirements

Met by the standards mentioned above

Zertifizierungsstelle Explosionsschutz
By order:

Braunschweig, August 10, 1999

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

PHYSIKALISCH-TECHNISCHE BUNDESANSTALT 24

Physikalisch-Technische Bundesanstalt
Braunschweig und Berlin
Nationales Metrologieinstitut

1. SUPPLEMENT

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

to EC-TYPE-EXAMINATION CERTIFICATE PTB 99 ATEX 2128 X

(Translation)

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

Marking: Ⓔx **II 2 G EEx ia IIC T6**

Manufacturer: Pepperl+Fuchs GmbH

Address: Lilienthalstraße 200, 68307 Mannheim, Germany

Description of supplements and modifications

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

In the future the marking will read:

Ⓔx **II 2 G Ex ia IIC T6...T1 Gb**

Applied standards

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

Test report: PTB Ex 15-24246

ZSEx10101e b

Konformitätsbewertungsstelle, Sektor Explosionsschutz
On behalf of PTB:

Braunschweig, April 28, 2015

Dr.-Ing. U. Johannsmeyer
Direktor und Professor

Sheet 1/1

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

L. A. Brisk
Certification Officer

11 Description

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

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

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

Electrical data

Evaluation and supply circuit.. only for connection to certified intrinsically safe circuits
Ex ia IIC/IIB or Ex ib IIC/IIB for EPL Gb

Maximum values:

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

Table 1

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

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

Table 2

12 Certificate history and evaluation reports

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

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

13 Conditions of Manufacture

None.

14 Specific Conditions of Use

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

i. The relationship between type of the connected circuit, maximum permissible ambient temperature for adherence to the temperature class as well as the effective internal reactance for the individual types of ring initiators is specified in tables 1 and 2 of this certificate or in the operating instructions manual.

ii. The ring initiators shall be protected against mechanical damage due to impact if they are applied within an ambient temperature range of -60C to -20 °C. An ambient temperature below -60 °C is not permitted.

iii. The connection facilities of the ring initiators shall be installed as such that a minimum degree of protection of IP20 according to IEC 60529 is met.

iv. For the application of the following ring initiators in hazardous areas of group II appropriate measures shall be taken to protect the free surface of the encapsulation against mechanical damage if the encapsulation surface is freely accessible after installation.
   a. Types
   b. RC10-...-N0...
   c. RC10- ...-N3...
   d. RJ15-N...
   e. RJ15-... -N ...
   f. RC15- ...-N0...
   g. RC15- ...-N3...

Certificate Annex

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

The following documents describe the equipment defined in this certificate:

Issue 0

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

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

RMA-Formular und Erklärung über Dekontaminierung
RMA-Form and explanation for decontamination

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./ You may obtain the RMA number from your sales or service representative. When returning an old appliance for disposal, please enter "WEEE" in the RMA number box.

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./ This return form includes a decontamination statement. The law requires you to submit this completed and signed decontamination statement to us. Please complete the entire form, also in the interest of our employee health.

Firma/ Company

Firma/ Company	
Straße/ Street	
PLZ, Ort/ Zip, City	
Land/ Country	

Ansprechpartner/ Person in charge

Name/ Name	
Abt./ Dept.	
Tel./ Phone	
E-Mail	

Gerät/ Device	
Anzahl/ Quantity	
Auftragsnr./ Order No.	

Serien-Nr./ Serial No.	
Artikel-Nr./ Item No.	

Grund der Rücksendung/ Reason for return

- ☐ Kalibrierung/ Calibration
- ☐ Modifikation/ Modification
- ☐ Reklamation/ Claim
- ☐ Reparatur/ Repair
- ☐ Elektroaltgerät/ Waste Electrical & Electronic Equipment (WEEE)
- ☐ andere/ other

bitte spezifizieren/ please specify

Ist das Gerät möglicherweise kontaminiert?/ Could the equipment be contaminated?

☐ Nein, da das Gerät nicht mit gesundheitsgefährdenden Stoffen betrieben wurde./ No, because the device was not operated with hazardous substances.

☐ Nein, da das Gerät ordnungsgemäß gereinigt und dekontaminiert wurde./ No, because the device has been properly cleaned and decontaminated.

☐ Ja, kontaminiert mit:/ Yes, contaminated with:

☐ explosiv/ explosive	☐ entzündlich/ flammable	☐ brandfördernd/ oxidizing	☐ komprimierte Gase/ compressed gases	☐ ätzend/ caustic	☐ giftig, Lebensgefahr/ poisonous, risk of death	☐ gesundheitsgefährdend/ harmful to health	☐ gesundheitsschädlich/ health hazard	☐ umweltgefährdend/ environmental hazard

Bitte Sicherheitsdatenblatt beilegen!/ Please enclose safety data sheet!

Das Gerät wurde gespült mit:/ The equipment was purged with:

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.

This declaration has been filled out correctly and completely, and signed by an authorized person. The dispatch of the (decontaminated) devices and components takes place according to the legal regulations.

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.

Should the goods not arrive clean, but contaminated, Bühler reserves the right, to comission an external service provider to clean the goods and invoice it to your account.

Firmenstempel/ Company Sign

Datum/ Date

rechtsverbindliche Unterschrift/ Legally binding signature

Bühler Technologies GmbH, Harkortstr. 29, D-40880 Ratingen
Tel. +49 (0) 21 02 / 49 89-0, Fax: +49 (0) 21 02 / 49 89-20
E-Mail: service@buehler-technologies.com
Internet: www.buehler-technologies.com

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.

Avoiding alterations and damage to the components to be returned

Analysing defective assemblies is an essential part of quality assurance at Bühler Technologies GmbH. To ensure conclusive analysis the goods must be inspected unaltered, if possible. Modifications or other damages which may hide the cause or render it impossible to analyse are prohibited.

Handling electrostatically conductive components

Electronic assemblies may be sensitive to static electricity. Be sure to handle these assemblies in an ESD-safe manner. Where possible, the assembles should be replaced in an ESD-safe location. If unable to do so, take ESD-safe precautions when replacing these. Must be transported in ESD-safe containers. The packaging of the assemblies must be ESD-safe. If possible, use the packaging of the spare part or use ESD-safe packaging.

Fitting of spare parts

Observe the above specifications when installing the spare part. Ensure the part and all components are properly installed. Return the cables to the original state before putting into service. When in doubt, contact the manufacturer for additional information.

Returning old electrical appliances for disposal

If you wish to return an electrical product from Bühler Technologies GmbH for proper disposal, please enter "WEEE" in the RMA number box. Please attach the fully completed decontamination declaration form for transport to the old appliance so that it is visible from the outside. You can find more information on the disposal of old electrical appliances on our company’s website.

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